



INTERNATIONAL

Prepared For:

United States Department of Energy

Congestion Analysis of the Eastern Interconnection: Simulation Results

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Task 1

**TABLE 1 - EXISTING STUDIES - DOE Task 1
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS**

Congestion Area Path Number & Name or Map Reference Number	Reference Study / Template (See Template for additional details)	Study Time Frame	Analytical Method (Observed / Modeled)	Criteria and Metrics Used	Status / Findings
New Brunswick to Maine -- Le Preau to Orrington	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>Northeast Reliability Interconnect Project—adds a new 345 kV tie line between New England and New Brunswick to improve the transfer capability between the two regions by 300 MW and improve system performance in northern Maine. The projected in-service date for this project is December 2007. Specific methodology for validating project not stated.</i>
	Northeast Coordinated System Plan: 2005	2005	Observed - historical congestion	N/A	<i>Siting approval was to be completed in October 2005.</i>
	ISO-NE Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1935 hours constrained at Orrington
Southwest Connecticut	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>Southwest Connecticut Reliability—improves the transfer of power and system performance in Southwest Connecticut via 345 kV. * Phase 1 is currently under construction and will increase the import capability by 275 MW with a projected in-service date of December 2006. * Phase 2 is currently in the final design and analysis stage and will increase the import capability by 825 MW with a projected in-service date of December 2009. Specific methodology for validating project not stated.</i>
	Northeast Coordinated System Plan: 2005	2005	Observed - historical congestion	N/A	<i>Siting approval completed.</i>
	ISO-NE Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2947 hours constrained at Norwalk-Stamford in Connecticut

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	ISO-NE Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1154 hours constrained at Norwalk-Stamford in Connecticut
Maine to New Hampshire -- North South Interface (Scobie)	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>The ISO is conducting analyses to identify upgrades that will increase the transfer capabilities of the northern New England interfaces and reduce operational complexity by reducing the interdependencies of specific generators on the transfer capability</i> <i>* Closing the Y-138 line.</i> <i>* Adding a 500–600 MVAR static compensator to provide dynamic voltage control at the Deerfield 345 kV Substation.</i> <i>* Eliminating critical Buxton 345 kV contingencies resulting from the failure of key circuit breakers to operate.</i> <i>* Looping Section 391 into the Deerfield 345 kV Substation.</i> <i>* Upgrading 115 kV facilities near the southern Maine–New Hampshire border.</i> <i>* Adding capacitor banks in western Maine and at Maxcy's.</i> <i>Specific methodology for validating project not stated.</i>
	ISO-NE Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	* 1660 hours constrained on northern New England Scobie in New Hampshire * 1167 hours constrained on North-South Interface
	ISO-NE Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	* 716 hours constrained on northern New England Scobie in New Hampshire * 252 hours constrained on North-South Interface
Into Boston	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>NSTAR 345 kV Reliability Project—increases the transfer limits into the Greater Boston area. NSTAR has commenced construction. The projected in-service date is June 2006 for the first two cable circuits and summer 2008 for the third cable. The first two cables will increase the import capability by 900 MW and the third cable by another 200 MW.</i> <i>Specific methodology for validating project not stated.</i>
	Northeast Coordinated System Plan: 2005	2005	Observed - historical congestion	N/A	<i>Siting approval completed.</i>

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	ISO-NE Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1466 hours constrained on lines into Boston
	ISO-NE Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	202 hours constrained on lines into Boston
Southern New England	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>Solutions for reliability issues still under study.</i>
	Northeast Coordinated System Plan: 2005	2005	Observed - historical congestion	N/A	<i>Siting approval complete in January 2008.</i>
	ISO-NE Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	926 hours constrained on lines from the east to west and vice versa servicing Southern New England.
	ISO-NE Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	228 hours constrained on lines from the east to west and vice versa servicing Southern New England.
Northwest Vermont	ISO-NE Regional System Plan 2005	2005 thru 2014	Observed - historical congestion Modeled - Power flow, voltage stability, thermal limits, Loss of Load Expectation (LOLE)	NERC and regional reliability standards	<i>Northwest Vermont Reliability Project—improves the Vermont Electric Power Company's (VELCO) 345 kV and 115 kV transmission system for the major load center in northwestern Vermont. VELCO has commenced construction, is preparing the final design, and is analyzing project modifications. The projected in-service dates for individual stages of the project range from May 2006 through October 2007. Specific methodology for validating project not stated.</i>
	Northeast Coordinated System Plan: 2005	2005	Observed - historical congestion	N/A	<i>Siting approval completed.</i>
	ISO-NE Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1584 hours constrained on Highgate

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Flows from Western to Eastern NY -- (Central East and Total East Interface)	NYISO 2004 Transmission Performance Report	2001 thru 2004	Observed - Analysis of hourly recorded data	Simultaneous interface constraints	Noted as area of constraint.
	NYISO Operating Study Winter 2005-2006	Winter 2005-2006	Modeled - power flow and thermal transfer limits	NERC and regional reliability standards	Noted that Central East and Total East limits have decreased.
	NYISO 2004 State of the Market Report	2004	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	New York Independent System Operator Electric System Planning Process Initial Planning Report	2003	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	5808 hours constrained on Central East Interface
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1389 hours constrained on Central East 735 hours constrained on Pleasant Valley-Leeds
Westchester to NYC (Sprainbrook - Dunwoodie South Interface: Sprainbrook-Dunwoodie South, W. 49th St. 345 kV, Rainey to Dunwoodie 345 kV, Rainey to Vernon 345 kV)	NYISO 2004 Transmission Performance Report	2001 thru 2004	Observed - Analysis of hourly recorded data	Simultaneous interface constraints	Noted as an area of constraint. <i>Installation of the 345 kV fault-current limiting series reactors at the Sprain Brook 345 kV station.</i>
	NYISO 2004 State of the Market Report	2004	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	New York Independent System Operator Electric System Planning Process Initial Planning Report	2003	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	4476 hours constrained Sprainbrook-Dunwoodie South

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	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	* 4427 hours constrained on Rainey-Vernon * 2877 W49th to Sprain Brook * 2142 Rainey-Dunwoodie
Flows from Northern NY (Moses South Interface: Massena to Marcy, Moses to Adirondack)	NYISO Operating Study Winter 2005-2006	Winter 2005-2006	Modeled - power flow and thermal transfer limits	NERC and regional reliability standards	Noted that the Moses South interface limit has decreased.
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	61 hours constrained on Marcy 765/345 kV
	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1753 hours constrained on Marcy 765/345 kV
Flows into Western NY (Dysinger East Interface: AES Somerset to Rochester, Niagara to Rochester, Stolle to Meyer)	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	5337 hours constrained on Dysinger East Interface
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	820 hours constrained on Dysinger East Interface
Flows into Central NY (West Central Interface: Pannell Road to Clay, Stolle to Meyer)	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	3910 hours constrained on West-Central Interface
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	47 hours constrained on West-Central Interface
Westchester to Long Island (Coned-LIPA Interface: Dunwoodie to Shore Road, Sprain Brook to East Garden City)	NYISO 2004 State of the Market Report	2004	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.

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	New York Independent System Operator Electric System Planning Process Initial Planning Report	2003	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	9412 hours constrained on Dunwoodie-Shore Road
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	11,428 hours constrained on Dunwoodie-Shore Road 757 hours constrained Dunwoodie 345/138 kV
Flows into NY Metro Region (UPNY-Coned Interface: Ladentown to Buchanan South, Pleasant Valley to Wood St., Pleasant Valley to E. Fishkill, Pleasant Valley to Millwood, Roseton to E. Fishkill, Ramapo to Buchanan North)	NYISO 2004 State of the Market Report	2004	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	New York Independent System Operator Electric System Planning Process Initial Planning Report	2003	Observed - Analysis of hourly recorded data	Analysis of real-time congestion	Noted as area of constraint.
	NYISO Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2014 hours constrained on UPNY-Coned
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	421 hours constrained on UPNY-Coned
West Virginia to Virginia and Maryland - Bedington-Black Oak and APS South (Doubs-Mt. Storm 500 KV line and Meadowbrook Mt. Storm 500)	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	No quantitative analysis provided. <i>Bedington-Black Oak in feasibility study</i> <i>Mt. Storm upgrade in engineering/ procurement stage.</i>
	The Trans-Allegheny Interstate Line Project: A 500 kV Transmission Line Through the AP Zone	2010	Modeled - power flow	Increase in west-to-east transfer capability	Proposal would increase transfer capability by 3800 MW over base case levels.

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	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	3268 hours constrained on Bedington-Black Oak 60 hours constrained on APS South
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	6831 hours constrained on Bedington-Black Oak 436 hours constrained on APS South
	Other Project Development Status Notes				<i>* AEP's proposed Project Mountaineer 765 kV line would alleviate congestion on Bedington-Black Oak and APS South. Allegheny's 500 kV proposed line would do the same.</i>
Central PA to Eastern PA (PJM Western Interface: Keystone & Conemaugh - Juniata, Conemaugh - Hunterstown, Doubs-Brighton, Conastone-Peachbottom)	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	<i>PECO to upgrade Peach Bottom 500kV XFMr by 4Q 2007.</i>
	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	331 hours constrained on Keystone 140 hours constrained on Hunterstown 31 hours constrained on Conemaugh
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1027 hours constrained on Keystone 53 hours constrained on Hunterstown
Eastern PA to New Jersey -- (PJM Eastern Interface: Wescosville & Juniata-Alburtis, TMI-Hosensack, Peach Bottom - Limerick, Peach Bottom-Keeney)	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	<i>PECO to upgrade Peach Bottom 500kV XFMr by 4Q 2007. Replace wave trap at Alburtis 500kV substation by 6/1/2008.</i>
	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	420 hours constrained
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2686 hours constrained
Branchburg Transformer	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	<i>Replace all de-rated Branchburg 500/230 kV transformers by 1/1/2007. Proposed at Branchburg substation to replace wave trap on Branchburg - Readington 230kV circuit.</i>
	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	1772 hours constrained on Branchburg Transformer

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	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	894 hours constrained on Branchburg
PJM to New York City - Hudson to Farragut, Linden to Goethals	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	<i>PSEG to replace Hudson 230kV circuit breakers #1-2, relocate the X-2250 circuit from Hudson 1-6 bus to Hudson 7-12 bus, replace Hudson 230 KV breaker BS2-3, Replace Linden 230 KV breaker#1-5, #1-3, #2-3, BS5-6, and BS2-6 in 2006</i>
	NYISO Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	144 hours constrained on Hudson-Farragut 100 hours constrained on Linden-Goethals
Ohio to West Virginia and Pennsylvania-- Wylie Ridge-Kammer	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	4382 hours constrained on Kammer and Wylie Ridge
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2065 hours constrained on Kammer and Wylie Ridge
	PJM Regional Transmission Expansion Plan 2005	2005 thru 2010	Modeled - power flow	NERC and regional reliability standards	<i>Installed SPS at Wylie Ridge as of 3/31/2005. Proposal to install third Wylie Ridge 500/345kV transformer.</i>
	PJM TLR	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours above TLR level 3a	3537 hours on Wylie Ridge 1381 hours on Kammer
	MISO Real Time Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	1095 hours constrained on Kammer 370 hours constrained on Wylie Ridge
	MISO Day Ahead Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	262 hours constrained on Wylie Ridge and Kammer
Illinois to Indiana-- Crete-St. Johns Tap, Dune Acres-Michigan City, State Line-Wolf Lake	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Both 138 kV circuits from Dune Acres to Michigan City are planned for reconductor to 186 MVA capacity in 2005</i>
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2008 hours constrained on Crete-St. John's 160 hours constrained on Dune Acres-Michigan 94 hours constrained on State Line-Wolf Lake

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	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	332 hours constrained on Crete-St. John's, Dune Acres-Michigan, and State Line-Wolf Lake
Central PA to Central NY -- Homer City-Watercure, Homer City 345/230kV	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	39 hours constrained on Homer City-Watercure 199 hours constrained on Homer City 345/230kV
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	2599 hours constrained on Homer City-Watercure 1090 hours constrained on Homer City 345/230kV
NW Pennsylvania to W. New York -- Erie West to Erie South, Erie E. to Erie SE 230 kV	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	270 hours constrained on Erie Xfmrs/lines.
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	628 hours constrained on Erie Xfmrs/lines.
West Virginia to Southern Virginia -- Kanawha-Matt Funk	PJM Real Time Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	101 hours constrained on Kanawha-Matt Funk
	PJM Day Ahead Constraints	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours constrained	19 hours constrained on Kanawha-Matt Funk
North Carolina to Southern Virginia	VEM Winter 05/06	Winter 05/06	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
	VEM Summer 2005	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
	VASTE 2005 Summer Reliability Study of Projected Operating Conditions	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.

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Michigan to Ontario -- Belle River - St. Clair 345 kV	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	The Michigan–Ontario interface was a significant limitation to transfers, particularly transfers involving Ontario. ITC is developing some conceptual plan, e.g., HVDC, to address this issue.
	Michigan Exploratory Study, Preliminary Study Report (Draft) October 2005	2011	Modeled - Power flow	Loss of Load Expectation (LOLE)	Evaluates two options for alleviating transfers across Michigan to Ontario. Further analysis still required.
Manitoba to Minnesota	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>New transmission lines and conversion options are being studied by MISO</i>
	CapX 2020 Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs	2009-2020	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Study provides possible transmission solutions to serve load centers in Minnesota with planned generation in Dakotas, Iowa, Southern Minnesota, and Wisconsin.
Minnesota to Wisconsin -- Eau Claire Arpin, Minnesota- Wisconsin Stability Interface	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Arrowhead-Weston 345 kV line is a pending improvement for 2008</i>
	CapX 2020 Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs	2009-2020	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Study provides possible transmission solutions to serve load centers in Minnesota with planned generation in Dakotas, Iowa, Southern Minnesota, and Wisconsin.
	MISO Real Time Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	882 hours constrained on Eau Claire-Arpin
	MISO Day Ahead Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	650 hours constrained on Eau Claire-Arpin
	MISO TLRs	2004 thru 2005	Observed - Analysis of hourly recorded data	Number of hours above TLR level 3a	1731 TLR hours on Eau Claire-Arpin

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Upper Peninsula Michigan to Wisconsin -- Flow South	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>1) Rebuilding double circuit Plains–Amberg 138 kV line, construct, rebuild and convert the 69 kV & 138 kV line from West Marinett to Amberg as a 138 kV line with portions double circuited with a 69 kV line. Complete in 2005. 2) Uprate Morgan–White Clay 138 kV. Complete in 2005. 3) Rebuild Morgan–Stiles 138 kV. Complete in 2005. 4) Uprate North Appleton–White Clay 138 kV. Complete in 2005. 5) Considering adding a series reactor to the Highway V–Preble 138 kV line. Complete in 2005. 6) Construct a 345 kV line from a new Werner West SS to Morgan. Complete in 2009.</i>
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	3,749 hours above 3a on Flow South
Illinois and Iowa to Wisconsin -- Paddock Transformer	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Ranked 21st in TLRs <i>Constructed Wempleton–Paddock 345 kV circuit #2 as of 2005</i>
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	243 hours above 3a on Paddock
	MISO Real Time Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	42 hours constrained on Paddock
	MISO Day Ahead Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	449 hours constrained on Paddock
W. Nebraska to W. Kansas -- Gentleman- Red Willow	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	765 hours above 3a on Gentlemen-Red Willow
	MISO Real Time Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	210 hours constrained on Gentlemen-Red Willow
LGE System -- Blue Lick 345 k/161/ Xfmr, Frankfort to East- Tyrone 138 kV	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Proposed Mill Creek–Hardin County 345 kV line, a part of Trimble County Outlet #2 project for completion in 2009.</i>
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	362 hours above 3a for Frankfort to East Tyrone 223 hours above 3a for Blue lick

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	MISO Day Ahead Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	1099 hours constrained on Frankfort to East Tyrone 154 hours constrained on Blue Lick
	MISO Real Time Constraints	04/05 thru 12/05	Observed - Analysis of hourly recorded data	Number of hours constrained	1023 hours constrained on Frankfort to East Tyrone 1810 hours constrained on Blue Lick
Wisconsin -- Stiles- Amberg and Crivitz 138 kV, Kewaunee 345/138 Xfmr, Highway-Preble 138 kV	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>1) Rebuilding double circuit Plains–Amberg 138 kV line, construct, rebuild and convert the 69 kV & 138 kV line from West Marinett to Amberg as a 138 kV line with portions double circuited with a 69 kV line in 2005. 2) Rebuild the Stiles–Amberg double circuit 138 kV line in 2006. 3) Installed a series reactor on the Highway V - Preble 138 kV line in 2005.</i>
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	711 hours above 3a for Highway-Preble
	MISO Real Time Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	310 hours constrained on Highway-Preble
	MISO Day Ahead Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	669 hours constrained on Stiles 606 hours constrained on Highway-Preble 152 hours constrained on Amberg
Indiana-Ohio Border -- Miami Fort 345/138 kV	Midwest ISO Transmission Expansion Plan 2005	2005 thru 2009	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Upgrade Miami Fort–345 / 138 ckt 2</i>
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	445 hours above 3a on Miami Fort
	MISO Day Ahead Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	118 hours constrained on Miami Fort
	MISO Real Time Constraints	2005	Observed - Analysis of hourly recorded data	Number of hours constrained	163 hours constrained on Miami Fort

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Illinois to Kentucky	2005 MAIN Summer Transmission Assessment Study	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
W. Oklahoma to W. Texas -- Elk City 230/138 kV Transformer	SPP RTO Expansion Plan	2005 thru 2010	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Replace free standing metering CT at Elk City</i>
Central Oklahoma -- Redbud-Arcadia 345 kV	SPP RTO Expansion Plan	2005 thru 2010	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	<i>Installed two 25 Mvar 345 kV reactors at Arcadia in march 2005.</i>
	SPP Analysis	First 3Qs of 2005	Observed - historical data	MW Curtailed; Firm Requests Refused (%)	9145; 8.2%
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	109 hours above 3a on Redbud-Arcadia 345 kV
Southeast Oklahoma -- Valliant-Lydia 345 kV and Pittsburg-Seminole 345 kV	SPP Analysis	First 3Qs of 2005	Observed - historical data	MW Curtailed; Firm Requests Refused (%)	1488; 9.4%
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	109 hours above 3a on Valiant-Lydia
Arkansas to Oklahoma -- Ft. Smith 500/345 kV Transformer	SPP Analysis	First 3Qs of 2005	Observed - historical data	Firm Requests Refused (%)	2.40%
	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	39 hours above 3a on Ft. Smith 500/345 kV
NE Kansas -- Iatan to Stranger Creek 345 kV	SPP Analysis	First 3Qs of 2005	Observed - historical data	MW Curtailed	32,526
SE Missouri to NE Arkansas	Entergy 2004 FERC Form 715	2004	Observed - historical data		Noted as an area of constraint.
Central Arkansas to S. Arkansas	Entergy 2004 FERC Form 715	2004	Observed - historical data		Noted as an area of constraint.

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Into New Orleans	Entergy 2004 FERC Form 715	2004	Observed - historical data		Noted as an area of constraint.
SE Louisiana to W Louisiana	Entergy 2004 FERC Form 715	2004	Observed - historical data		Noted as an area of constraint.
NW Alabama to NE Mississippi-- McAdams 500/230 kV AutoXfmr	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	1369 hours above 3a on McAdams 500/230 kV
Tennessee to Kentucky -- Volunteer to Sullivan	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	823 hours above 3a for Volunteer
Flows into Western Tennessee -- Cumberland-Davidson, Johnsonville-Davidson	TLRs	2004 thru 2005	Observed - historical TLRs	Number of hours above Level 3a	2010 combined hours above 3a on Cumberland-Davidson and Cumberland-Johnsonville
Tennessee to Georgia	VASTE 2005 Summer Reliability Study of Projected Operating Conditions	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
E. Georgia to E. Florida -- Southern FRCC Interface	Southern/ Florida Interface Study	2004 thru 2005	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
Eastern South Carolina	VASTE 2005 Summer Reliability Study of Projected Operating Conditions	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.
Atlanta	VASTE 2005 Summer Reliability Study of Projected Operating Conditions	Summer 05	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Noted as an area of constraint.

Congestion Area Path Number & Name or Map Reference Number	Reference Study / Template (See Template for additional details)	Study Time Frame	Analytical Method (Observed / Modeled)	Criteria and Metrics Used	Status / Findings
Kansas/ Panhandle	Kansas/Panhandle Sub Regional Transmission Study	2010-2011	Modeled - Power flow	Regional reliability criteria	Reviews transmission options for delivering low-cost wind and coal power northward from Iowa and Southern Minnesota
	Addendum to the Kansas/Panhandle Sub Regional Transmission Study	2010-2011	Modeled - Power flow	Regional reliability criteria	Reviews transmission options for delivering low-cost wind and coal power northward from Iowa and Southern Minnesota
Dakotas	Iowa -Southern Minnesota Exploratory Study Presentation to NWCC	2009	Modeled - Power flow	Regional reliability criteria	Examined possible routes for delivering low-cost coal and wind in the Dakotas east toward Minneapolis
	Buffalo Ridge Incremental Generation Outlet Transmission Study	2007	Modeled - Power flow, voltage stability, thermal analyses	Regional reliability criteria	Suggested transmission upgrades include installing a Nobles Co-Fenton 115 kV line, a 345/115 kV transformer at Nobles Co, a Lake Yankton-Marshall SW 115 kV line, and shunt capacitors at Panther, Lk Tankton, and Winnebago Jct.
	CapX 2020 Technical Update: Identifying Minnesota's Electric Transmission Infrastructure Needs	2009-2020	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Study provides possible transmission solutions to serve load centers in Minnesota with planned generation in Dakotas, Iowa, Southern Minnesota, and Wisconsin.
	Big Stone II Certificate of Need Application for Transmission Lines in Western Minnesota	2005	Observed	N/A	Examined possible routes for delivering low-cost coal from Big Stone II in South Dakota east toward Minnesota
	2005 Minnesota Biennial Transmission Projects Report	2003-2015	Observed	N/A	Examined possible routes for delivering low-cost wind and coal in the Dakotas east toward Minnesota

Congestion Area Path Number & Name or Map Reference Number	Reference Study / Template (See Template for additional details)	Study Time Frame	Analytical Method (Observed / Modeled)	Criteria and Metrics Used	Status / Findings
	Dakotas Wind Transmission Study Tasks 3 and 4 Final Report: System Impact Study and Transfer Capability Study	2013	Modeled - Power flow, voltage stability, thermal analyses	NERC and regional reliability standards	Examined possible routes for delivering low-cost wind in the Dakotas east toward Minnesota
<i>Red Italics indicates proposed or planned improvement</i>					



Task 1: Mapping of Historical Constraints



INTERNATIONAL

March 15, 2006

Regional Congestion

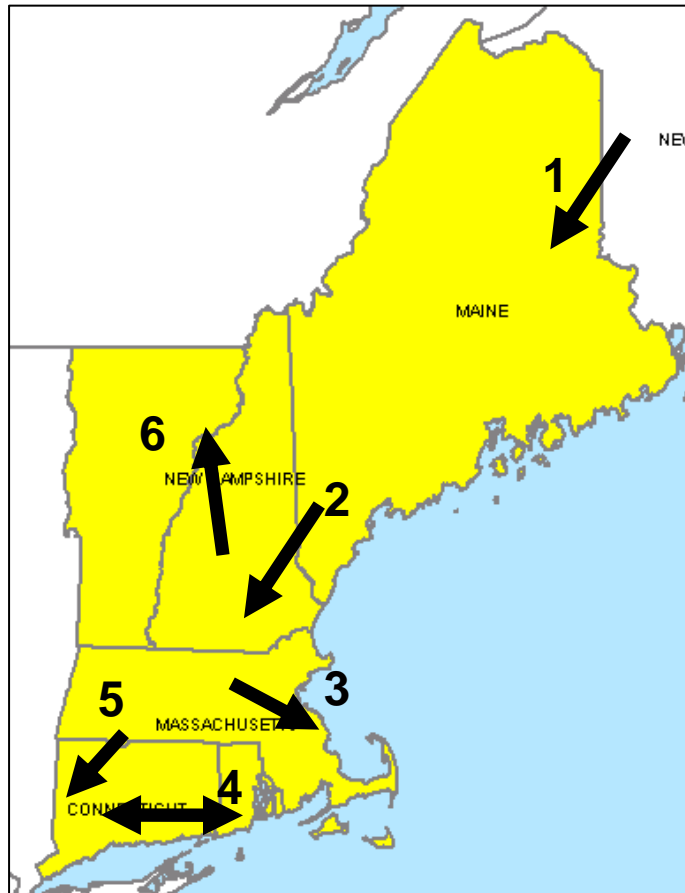
Regional Congestion

- **The following slides identify major points of congestion in the Eastern Interconnection based on market data, TLR data and RTO reports**
- **These are not congestion study results**

ISONE

- 1. New Brunswick to Maine**
- 2. North-South Interface (or Maine-New Hampshire Interface)**
- 3. Boston Import**
- 4. Southern New England East-West Flows**
- 5. Southwest Connecticut**
- 6. Flows into Northwestern Vermont**

ISONE



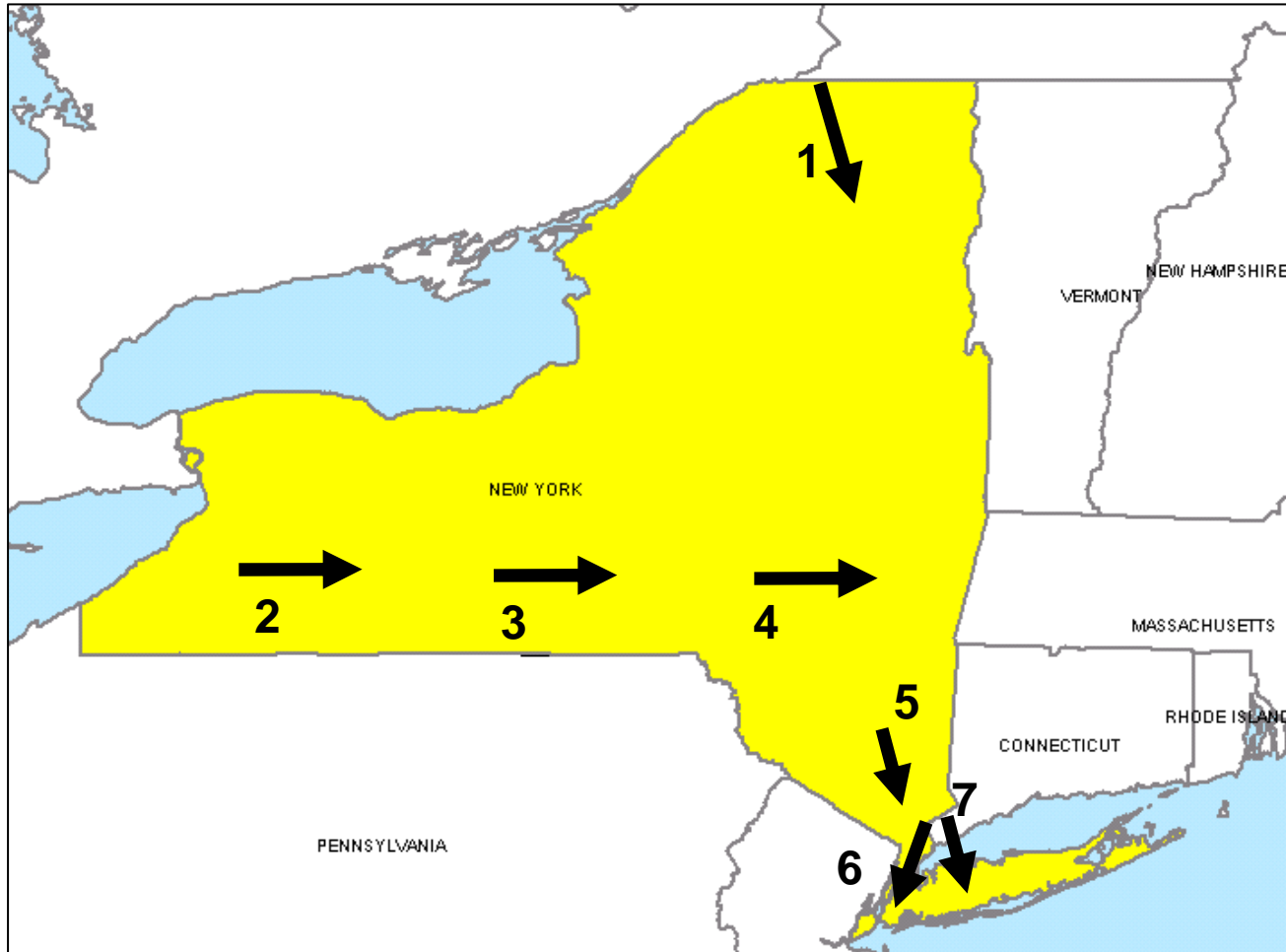
Note:

- Constraint arrows point from resource to direction of load
- Numbers serve as reference to the constraint description; they do not imply any ranking

NYISO

1. **Moses South Interface** (Massena to Marcy, Moses to Adirondack)
2. **Dysinger East Interface** (AES Somerset to Rochester, Niagara to Rochester, Stolle to Meyer)
3. **West Central Interface** (Pannell Road to Clay, Stolle to Meyer)
4. **Central East and Total East Interface** (Edic to New Scotland, Porter to Rotterdam, Marcy to New Scotland)
5. **UPNY-Coned Interface** (Ladentown to Buchanan South, Pleasant Valley to Wood St., Pleasant Valley to E. Fishkill, Pleasant Valley to Millwood, Roseton to E. Fishkill, Ramapo to Buchanan North)
6. **Westchester to NYC** (Sprainbrook – W. 49th St. 345 kV, Rainey to Dunwoodie 345 kV, Rainey to Vernon 345 kV)
7. **Westchester to LI** (Dunwoodie to Shore Road, Sprain Brook to East Garden City)

NYISO



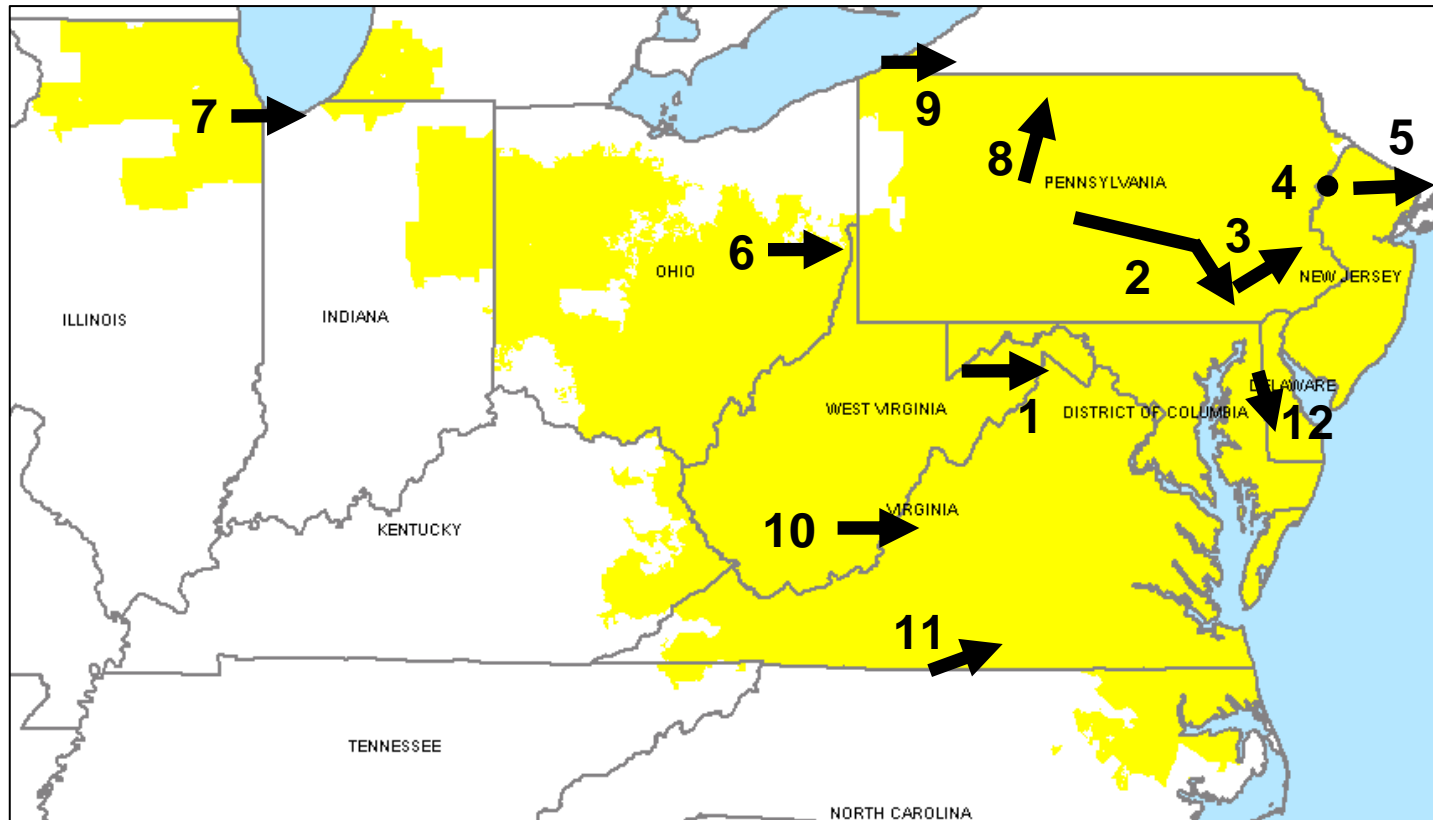
Note:

- Arrows point towards direction of constrained load
- Numbers serve as reference to the constraint description; they do not imply any ranking

PJM

1. **Constraints from APS to PEPCO and Dominion (formerly now as the VEM constraints), primarily Bedington-Black Oak and APS South**
2. **The Western Interface and Central Interfaces of “classic PJM”** (Keystone-Juniata, Conemaugh-Juniata, Conemaugh-Huntertown, Doubs-Brighton, and Conastone-Peach Bottom lines).
3. **The Eastern Interface of “classic PJM”** (Wescosville-Alburtis, Juniata-Alburtis, TMI-Hosensack, Peach Bottom-Limerick, and Peach Bottom-Keeney 5014 lines).
4. **The Branchburg transformer**
5. **Constraints from PJM to NYC**
6. **AEP and First Energy to APS (the Wylie Ridge and Kammer transformers)**
7. **The lines connecting ComEd to AEP along Lake Michigan** (Crete-St. Johns Tap, Dunes Acres - Michigan City, State Line – Wolf Lake)
 - These lines also limit MISO flows
 - When AEP joined PJM on October 1, 2004 the NIPS system experienced a significant rise in congestion that was mitigated by including some NIPS constraints in the PJM dispatch
8. **Homer City 345/230 KV Transformer #2**
9. **Erie East – Erie SE 230 kV**
10. **Kanawha – Mt. Funk**
11. **North Carolina to Southern Virginia**
12. **Constraints into Delmarva Peninsula**

PJM



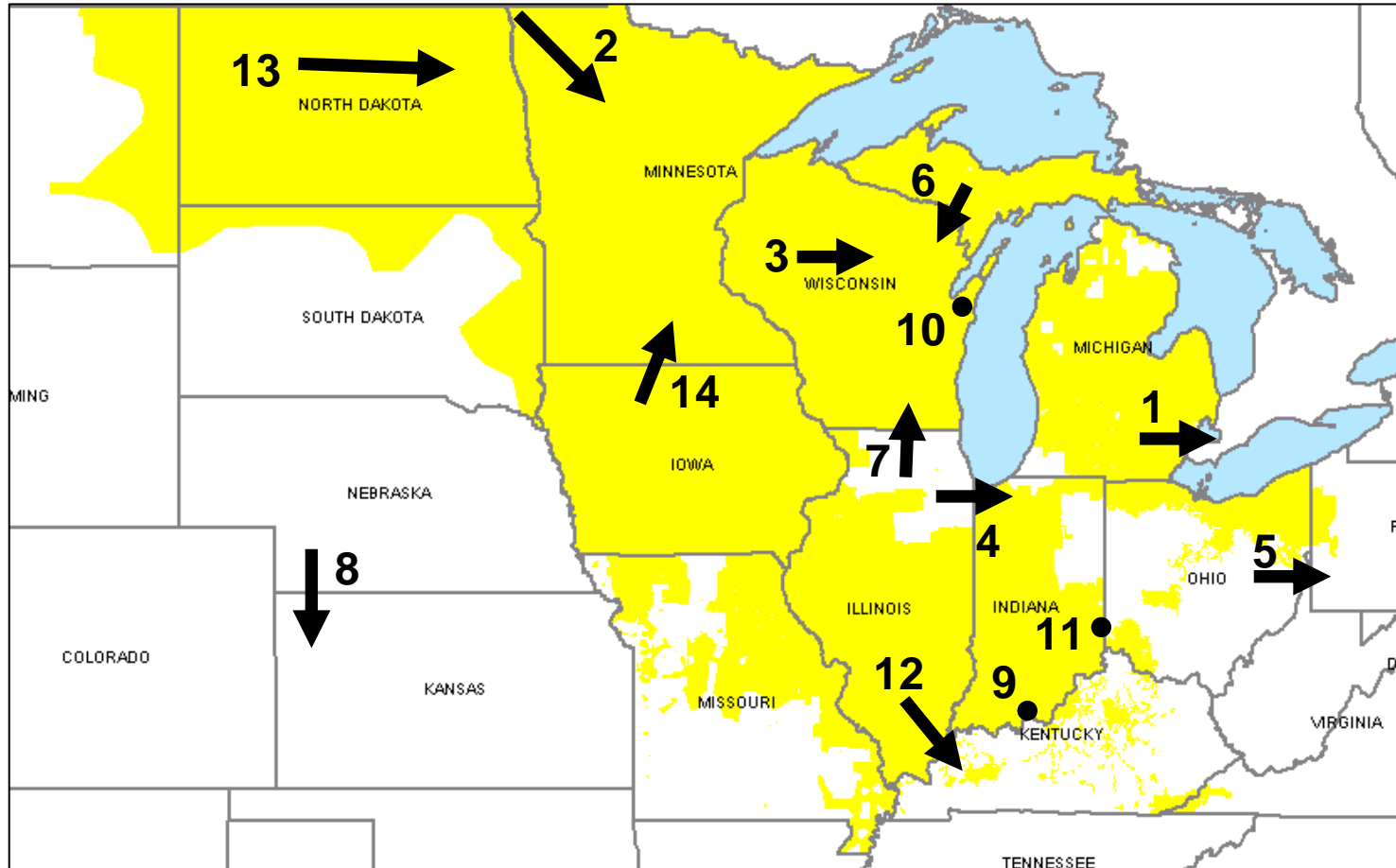
Note:

- Arrows point towards direction of constrained load
- Black node represents a constraint affecting all loads in the general vicinity
- Numbers serve as reference to the constraint description; they do not imply any ranking

MISO

1. **Constraints from Michigan to Ontario** (Belle River – St. Clair 345 kV)
2. **Constraints from Manitoba to Minnesota and N. Dakota**
3. **Constraints from Minnesota to Wisconsin** (Eau Claire-Arpin, Minnesota-Wisconsin Stability Interface)
 1. Limits current flows
 2. Limits wind and coal project development in the upper Midwest
4. **Constraints on the NIPS system that are impacted by ComEd to AEP flows** (Dune Acres-Michigan City)
5. **First Energy to APS** (the Wylie Ridge and Kammer transformers)
6. **Upper Peninsula of MI to Wisconsin** (Flow South)
7. **Constraints limiting flows into Wisconsin from Illinois and Iowa** (Paddock transformer)
8. **Limits W. Nebraska to W. Kansas** (Gentleman – Red Willow)
9. **Limits in the LGE system** (Blue Lick 345/161 Xfm, Frankfort East-Tyrone 138)
10. **Constraints within WI** (Stiles-Amberg 138, Stiles-Amberg 138 + Stiles-Crivitz 138, Kewaunee 345/138 Xfm, Highway V-Preble 138)
11. **Miami Fort 345-138 kV**
12. **Kentucky to Illinois**
13. **Western North Dakota to Eastern North Dakota** (low cost coal and wind development cited in MISO MTEP 05)
14. **Iowa and Southern Minnesota** (low cost coal and wind development cited in Iowa – Southern Minnesota Exploratory Study, June 22, 2005).

MISO



Note:

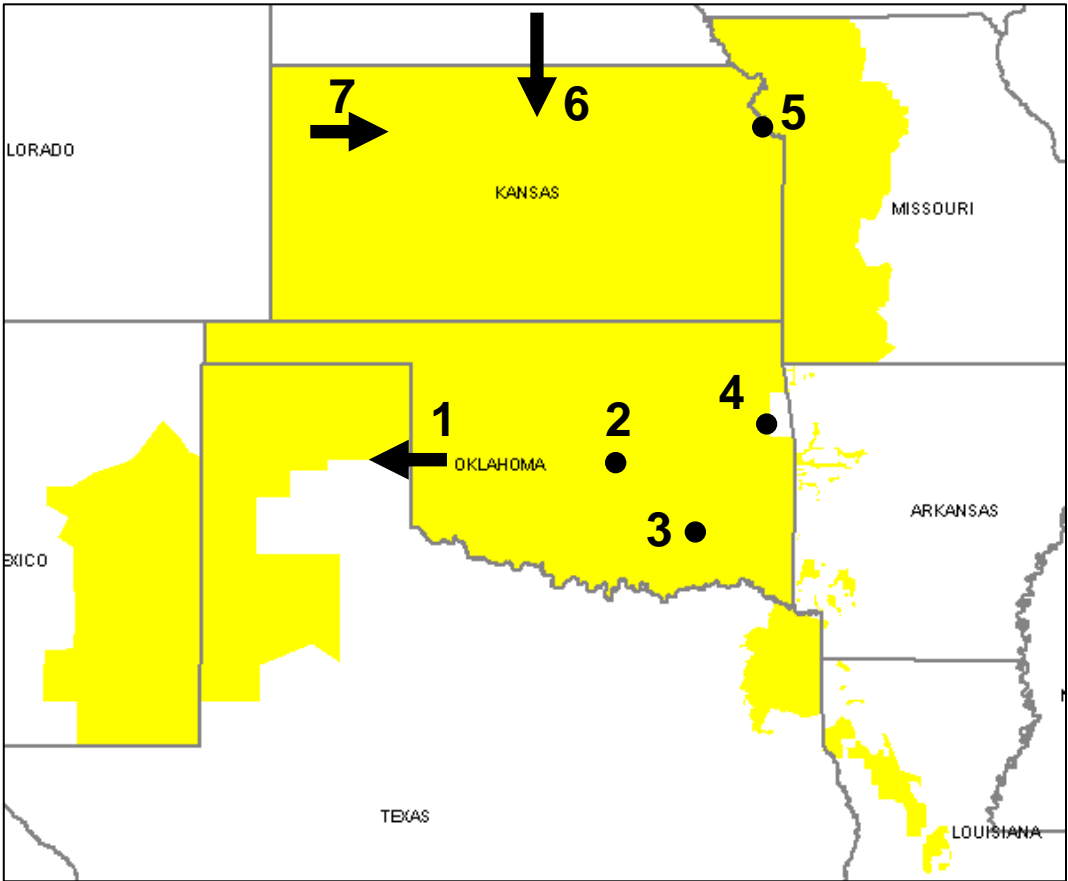
- Arrows point towards direction of constrained load
- Black node represents a constraint affecting all loads in the general vicinity
- Numbers serve as reference to the constraint description; they do not imply any ranking

SPP

The following constraints were provided by SPP as having the most firm refused requests for the first 3 quarters of 2005:

1. Elk City 230/138 kV Transformer
2. Redbud-Arcadia 345 kV
3. Valliant-Lydia 345 kV and Pittsburg-Seminole 345 kV
4. Ft. Smith 500/345 kV Transformer
5. Iatan-Stranger Creek 345 kV
6. Nebraska to Kansas (cited in SPP's "Summary of Congestion in SPP and Potential Economic Expansion Alternatives," February 2006)
7. Kansas panhandle wind development (cited in SPP's "Summary of Congestion in SPP and Potential Economic Expansion Alternatives," February 2006)

SPP



Note:

- Arrows point towards direction of constrained load
- Black node represents a constraint affecting all loads in the general vicinity
- Numbers serve as reference to the constraint description; they do not imply any ranking



SERC

Entergy:

1. Southeast Missouri to Northeast Arkansas
2. Central Arkansas to Southern Arkansas
3. Ft. Smith 500 kV
4. Southeast Louisiana to Western Louisiana
5. Flow into New Orleans
6. McAdams 500/230 kV Autotransformer

SERC

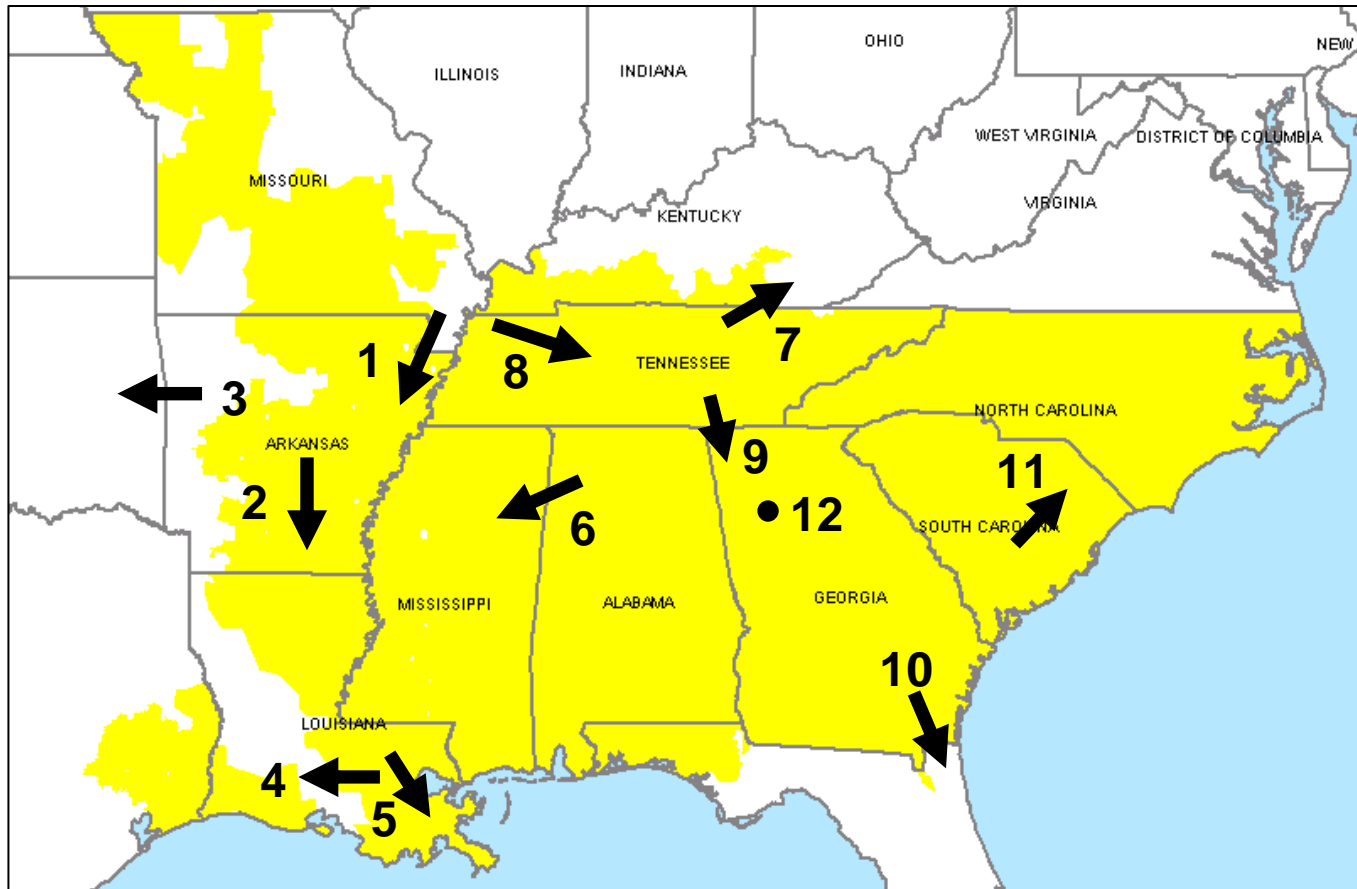
TVA:

7. Volunteer 500 kV Transformer Bank and Sullivan 500 kV Transformer Bank (upgrades have alleviated this historical constraint).
8. Cumberland-Davidson 500 kV Line and the Johnsonville-Davidson 500 kV lines
9. Tennessee to Georgia

SERC

- **Southern**
 10. Southern – FRCC Interface
 11. Eastern South Carolina
 12. Atlanta

SERC



Note:

- Arrows point towards direction of constrained load
- Black node represents a constraint affecting all loads in the general vicinity
- Numbers serve as reference to the constraint description; they do not imply any ranking



Task 1: Congestion Measurement and Data



INTERNATIONAL

March 15, 2006

Documents and Data

Documents/Data

- **Regional transmission expansion plans**
 - ISO-NE Regional System Plan 2005 (October 2005)
 - MISO 2003 Transmission Expansion Plan
 - MISO Transmission Expansion Plan 2005 (June 2005)
 - NYISO Comprehensive Transmission Plan
 - System Reliability Assurance Study, ConEd (December 2005)
 - PJM Regional Transmission Expansion Plan 2005 (September 2005)
 - SPP RTO Expansion Plan 2005-2010 (September 2005)

Documents/Data (continued)

- **Other regional reports**

- SERC Reliability Review Subcommittee's 2005 Report to the SERC Engineering Committee (June 2005)
- VACAR 2004-2005 Winter Stability Study Report (Mar 2004)
- VACAR 2005 Summer Reliability Study Report (Apr 2004)
- VACAR 2007 Summer Reliability Study Report (Feb 2002)
- NYISO 2005 Load & Capacity Data
- NYISO Operating Study Winter 2004-05 (November 2004)
- NYISO Transmission Performance Report (August 2005)
- NYISO 2004 Intermediate Area Transmission Review of the New York State
- Project Mountaineer, Work Group Meeting, Sheraton Four Points Hotel Baltimore, MD, August 3, 2005

Documents/Data (continued)

- **NERC reports**
 - NERC 2005 Long-Term Reliability Assessment
 - NERC 2005 Summer Assessment
 - NERC 2005/2006 Winter Assessment
- **Inter-Regional reports**
 - Florida-Southern Interface Study for 2005 Summer & 2005-06 Winter Bulk Electric Supply Conditions (Oct 2004)
 - MEN 2002 Interregional Transmission System Reliability Assessment
 - VASTE 2005 Summer Reliability Study Report (May 2005)
 - VASTE 2005-06 Winter Study Report (Nov 2005)
 - VEM 2004 Summer Reliability Study Report (May 2004)
 - VEM 2004-2005 Winter Reliability Study Report (Nov 2004)
 - VST(E) 2011 Summer Study Report (Nov 2004)
 - VSTE 2008 Summer Study Report (Nov 2005)
 - NPCC 2004 Report of the CP-10 Working Group Under the Task Force on Coordinated Planning

Documents/Data (continued)

- **Other documents**

- Cambridge Energy Research Associates, Inc. (CERA), “Grounded in Reality: Eastern Interconnection”
- Cambridge Energy Research Associates, Inc. (CERA), “Congestion Problems Identified”
- U.S. Department of Energy, “National Transmission Grid Study,” May 2002
- Electricity Advisory Board, Electric Resources Capitalization Subcommittee, U.S. Department of Energy, “Competitive Wholesale Electricity Generation: A Report of the Benefits, Regulatory Uncertainty, and Remedies to Encourage Full Realization Across All Markets,” September 2002
- Electricity Advisory Board, U.S. Department of Energy, “Transmission Grid Solutions Report,” September 2002
- PJM Interconnection, L.L.C., “Comments of PJM in Response to the MD PSC Notice of Inquiry” – Case Number 9047
- Electric Transmission Constraint Study, FERC OMTR, December 2001

Documents/Data (continued)

- **Other documents (continued)**

- Maryland Public Service Commission, “Reply Comments of the Staff of the Maryland Public Service Commission in the Matter of the Inquiry Into Locational Marginal Prices in Central Maryland During the Summer of 2005” – Case No. 9047
- Federal Energy Regulatory Commission, “Testimony of Karl Pfirrmann, President, PJM Western Region, PJM Interconnection, L.L.C.,” Promoting Regional Transmission Planning and Expansion to Facilitate Fuel Diversity Including Expanded Uses of Coal-Fired Resources – Docket No. AD05-3-000
- Federal Energy Regulatory Commission, “Remarks of Audrey Zibelman, Executive Vice President, PJM Western Region, PJM Interconnection, L.L.C.,” Transmission Independence and Investment – Docket No. AD05-5-000 and Pricing Policy for Efficient Operation and Expansion of the Transmission Grid – Docket No. PL03-1-000
- U.S. Department of Energy, “Comments to the Designation of National Interest Electric Transmission Bottlenecks (NIETB) Notice of Inquiry,” Appended 10/15/04
- Michigan Public Service Commission, “Final Staff Report of the Capacity Need Forum,” January 3, 2006

Documents/Data (continued)

- **Data**

- NERC TLR
- ISONE congestion
- NYISO congestion
- PJM congestion
- MISO congestion

Congestion Measurement and Transmission Expansion Methodologies

Types of Analyses

- **Reliability Assessment**

- Identify elements that limit flows under a range of load and generation conditions
- Identify constraints that would limit flows between and within regions as interregional transfers increases
- Determine whether load can be served reliably (e.g., LOLE, LOLP)

- **Economic Analysis**

- Quantify the location, duration and cost of congestion

Types of Analyses - Methodology

- **Reliability assessment**

- Uses load flow modeling with snapshots of load and generation conditions to locate limiting elements that need re-enforcement
- Often uses operating data
- Backward and forward looking

- **Economic Analysis**

- Based on actual operating experience or on modeled projections
- Generally forward looking

Regional Analytic Approaches

- **FRCC's approach: "There are currently no activities at this time"**
<http://www.frcc.org/PublicNotice.htm>
 - No TLRs in 2005
 - One TLR in 2004 related to hurricane Frances
 - No other transmission related data available
 - Florida-Georgia border congestion managed by contractual flow limits
- **SERC's uses reliability standards**
- **ISONE uses reliability standards**
- **NYISO uses reliability standards, including LOLE calculated by the GE Multi-Area Reliability Simulation ("MARS")**
- **SPP's approach is both reliability and economics**
 - Economic analysis is used to measure cost-benefit ratios to screen system upgrades

Regional Analytic Approaches - PJM

- **The PJM process is:**
 - Identify needs based on congestion
 - Determine the extent to which congestion can be hedged
 - If there is significant “unhedgeable” congestion, PJM opens a one-year “market window” in which it seeks congestion relief projects from the market
 - If no adequate, cost-effective proposal is made, PJM determines projects to be implemented through the RTEPP based on a cost-benefit analysis
- **PJM reports that 54 facilities have experienced sufficient levels of unhedgeable congestion to warrant a market window**

Regional Analytic Approaches – PJM (continued)

- **The PJM process uses congestion as the fundamental measure of need and recognizes that congestion is not a problem if it can be hedged via market mechanisms (FTRs) |**
- **The PJM process also implicitly recognizes that investment to relieve congestion is not necessarily going to have a “pure” market solution**
 - FTRs created by a new transmission project typically won't compensate an investor since their value may be small or zero
- **If an appropriate project is proposed during a market window, the successful bidder is paid for the project (not given FTRs)**

TVA's Transmission Load at Risk Metric

- **TVA uses a measure called Transmission Load at Risk (“TLAR”) to make an economic determination of transmission upgrade needs:**
 - TVA estimates the amount of load (MWh) that would have to be shed to maintain acceptable flows on the transmission system. This is the TLAR
 - TVA calculates the margin associated with those sales in terms of \$/MWh
 - The product of TLAR and margin is a measure of the value of a transmission upgrade

TVA's Transmission Load at Risk Metric (continued)

- TVA uses TLAR as a tool to prioritize problems
- TLAR could be used to estimate the cost and benefit of an upgrade:
 - For each hour of a year, calculate $TLAR_t$ and $Margin_t$
 - Sum the products of TLAR and margins over the year:

$$\text{Annual benefit of upgrade} = \sum TLAR_t * Margin_t$$

- Compare annual benefit to the annualized cost of a transmission project designed to eliminate the problem

Flowgates and TLRs

Transmission Loading Relief (TLR) Procedure

- **Mitigating transmission constraints:** A Reliability Coordinator may utilize the TLR Procedure to mitigate potential or actual System Operating Limit (SOL) violations or Interconnection Reliability Operating Limit (IROL) violations on any transmission facility modeled in the Interchange Distribution Calculator (IDC).
- **Order of TLR Levels and taking emergency action:** The Reliability Coordinator is not required to follow the TLR Levels in their numerical order. Furthermore, if a Reliability Coordinator deems that a transmission loading condition could jeopardize Bulk Electric System reliability, the Reliability Coordinator shall have the authority to enter TLR Level 6 directly, and immediately direct the Balancing Authorities or Transmission Operators to take such actions as redispatching generation, or reconfiguring transmission, or reducing load to mitigate the critical condition until Interchange Transactions can be reduced utilizing the TLR Procedure or other methods to return the system to a secure state.
- **TLR Notification:**
 - The Reliability Coordinator initiating the TLR Procedure shall inform all other Reliability Coordinators via the Reliability Coordinator Information System (RCIS) that the TLR Procedure has been implemented.
 - The Reliability Coordinator shall notify Transmission Operators and Balancing Authorities in its Reliability Area when entering and leaving any TLR level.
- **Updates:** At least once each hour, or when conditions change, the Reliability Coordinator implementing the TLR Procedure shall update all other Reliability Coordinators (via the RCIS). Transmission Operators and Balancing Authorities who have had Interchange Transactions impacted by the TLR will be updated by their Reliability Coordinator.
- **Obligations:** All Reliability Coordinators shall comply with the request of the Reliability Coordinator who initiated the TLR Procedure, unless the initiating Reliability Coordinator agrees otherwise.

TLR Level Criteria

TLR Levels		
TLR Level	Reliability Coordinator Action	Comments
1	Notify Reliability Coordinators of potential Operating Security Limit violations	
2	Hold Interchange Transactions at current levels to prevent Operating Security Limit violations	Of those transactions at or above the Curtailment Threshold, only those under existing Transmission Service reservations will be allowed to continue, and only to the level existing at the time of the hold. Transactions using Firm Point-to-Point Transmission Service are not held. See Appendix 9C1, Section B.1.
3a	Reallocation Transactions using Non-firm Point-to-Point Transmission Service are curtailed to allow Transactions using higher priority Point-to-Point Transmission Service	Curtailment follows Transmission Service priorities. Higher priority transactions are enabled to start by the Reallocation process. See Appendix 9C1, Section B.3.
3b	Curtailed Transactions using Non-firm Point-to-Point Transmission Service to mitigate Operating Security Limit Violation	Curtailment follows Transmission Service priorities. There are special considerations for handling Transactions using Firm Point-to-Point Transmission Service. See Appendix 9C1, Section B.4.
4	Reconfigure transmission system to allow Transactions using Firm Point-to-Point Transmission Service to continue	There may or may not be an Operating Security Limit violation. There are special considerations for handling Transactions using Firm Point-to-Point Transmission Service. See Appendix 9C1, Section B.5.
5a	Reallocation Transactions using Firm Point-to-Point Transmission Service are curtailed (pro rata) to allow new Transactions using Firm Point-to-Point Transmission Service to begin (pro rata).	Attempts to accommodate all Transactions using Firm Point-to-Point Transmission Service, though at a reduced (“pro rata”) level. Pro forma tariff also requires curtailment / Reallocation on pro rata basis with Network Integration Transmission Service and Native Load. See Appendix 9C1, Section B.6.
5b	Curtailed Transactions using Firm Point-to-Point Transmission Service to mitigate Operating Security Limit Violation	Pro forma tariff requires curtailment on pro rata basis with Network Integration Transmission Service and Native Load. See Appendix 9C1, Section B.7.
6	Emergency Action	Could include demand-side management, re-dispatch, voltage reductions, interruptible and firm load shedding. See Appendix 9C1, Section B.8.
0	TLR Concluded	Restore transactions. See Appendix 9C1, Section B.9.

Flowgates by Location

Security Coordinator	Flowgates	% of Total
MISO	698	48.0%
MISO, PJM	158	10.9%
PJM	97	6.7%
EES	88	6.1%
SWPP	68	4.7%
TVA	48	3.3%
VACS	37	2.5%
MISO,TVA	24	1.7%
TVA, MISO	24	1.7%
Other < 24	212	14.6%
Total	1,454	100.0%

MISO TLR Calls – 2004 to 2005

TLRs >= Level 3

Flowgate - Official	2004	2005	Grand Total
Flow South	2,917	832	3,749
EAU CLAIRE-ARPIN 345 KV	142	1,589	1,731
Dune Acres-Michigan City 138 1&2 (flo) Wilton Center-Dumont 765	1,369	173	1,542
Blue Lick-Bullitt Co 161 (flo) Baker-Broadford 765	153	1,135	1,288
N.PLATTE-STVL /GENTL-REDWIL	670	138	807
GENTLMN3 345 REDWILO3 345 1	58	707	765
MWSI	33	671	704
Highway V - Preble 138 (flo) Lost Dauphin - Red Maple 138	612	1	613
Crete-St Johns Tap 345 kV I/o Dumont-Wilton Center 765 kV line	389	127	516
MHEX_S	213	282	495
Smith- Green River Steel 138 (flo) Smith - Hardin Co 345	6	429	435
Lakefield-Fox lake 161 (flo) Lakefield-Wilmarth 345	428	5	434
Miami Fort 345/138 Xfm flo East Bend-Terminal 345	208	223	431
Smith-Hardin County 345 (flo) Hardinsburg-Harding Co. 138	145	252	397
Blue Lick 345/161 XFMR-Baker-Broadford 765	279	114	394
MHEX_N	381	3	384
St Francis - Lutesville 345 (flo) Bland - Franks 345	238	133	372
Frankfort East-Tyrone 138 (flo) Ghent-West Lexington 345	250	112	362
Arnold-Vinton 161 for D.Arnold-Hazleton 345	186	155	341
COOPER_S	20	297	317

EES TLRs – 2004 to 2005

Flowgate - Official	2,004	2,005	Grand Total
McAdams500-230 for loss of McAdams-Lakeover	134	1,235	1,369
Richard-Colonial Academy 138kV for loss of Richard-Scott 138kV	708	92	800

SWPP TLRs – 2004 to 2005

Flowgate - Official	2004	2005	Grand Total
SphWmcSumEmc	553	349	902
HppValPitVal	464	295	759

Top 10 SPP TLRs by Total MWs Curtailed

Constraint/Flowgate Monitored Element	Total MWs Curtailed (2005)	Firm MWs Curtailed (2005)	Firm Refused Requests (1st 3Q 2005)	Non-Firm Refused Requests (1st 3Q 2005)
Iatan-Stranger Creek 345 kV	32526	390		6.1%
Creswell-Kildare 138 kV	27793	315	32.6%	10.9%
Hugo Power Plant-Valliant 138 kV	22979	1106	24.2%	3.1%
Lang-Wichita 345 kV	12570	100		0.7%
Northeast Station-Delaware 345 kV	12036	221		
LaCygne-Neosho 345 kV	11258	0		
SPS North-South Stability Limit	11237	485		
S. Philips Junction-W. McPherson 115 kV	10611	526	1.8%	4.9%
Redbud-Arcadia 345 kV	9145	57	8.2%	19.0%
LaCygne-West Gardner 345 kV	8059	659	1.8%	1.5%

Source: SPP

TVA TLRs – 2004 to 2005

Flowgate - Official	2004	2005	Grand Total
Cumbland-Davidson&Cumbland-Jvill	1,138	561	1,700
Bull Run - Volunteer 500kV	0	441	441



ISONE

ISONE 2005 Regional System Plan

- **Table 4.4 has interface limits that in some cases vary by year**
- **Chapter 8 (page 86) has a list of major projects, some of which, if they are not there, probably should be included in our dataset:**
 - **Northeast Reliability Interconnect Project**
 - Ties NB to New England
 - 345 kV
 - In service planned end of 2007
 - **Northwest Vermont**
 - Construction supposed to have started by now
 - But seems like it's still fairly speculative
 - **NSTAR 345 kV**
 - Under construction
 - In-service late 2007
 - **Southwest Connecticut Reliability Project**
 - Phase I completion late 2006
 - *Phase II is too speculative to model*
- **Appendix C has description of locations across New England and problems they experience**
 - Most of the description is not very informative for modeling purposes
- **The two slides that follow show under-constructing projects**

Regional System Plan – Project List

Primary Equipment Owner	Projected In-Service Month/Year	Major Project	Project	July 05 Status
National Grid, USA	Dec-05	Central Massachusetts Reinforcements	Reconductor W-175 115 kV from Carpenter Hill to W. Charlton	Under Construction
National Grid, USA	Dec-05		Replace 69 kV circuit breakers at Fitch Rd. S/S in Clinton, MA.	Under Construction
Northeast Utilities-CT	Dec-05		Shaw's Hill Substation - add new 115/13.8 kV transformer and 115 kV tie breaker.	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (1) new 345 kV UG Cables from Stoughton to Mattapan Sq. to K Street and install new autotransformer at K. St.	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (1) 345/115 kV autotransformer at Hyde Park Substation	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (1) new 345 kV UG Cable from Stoughton to Mattapan Sq. to Hyde Park Substation	Under Construction

Regional System Plan – Project List

NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (1) 345 kV breaker at Hyde Park Substation	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (2) 115 kV circuit breakers at Hyde Park Substation	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (3) 345 kV circuit breakers at K St.	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add (2) Heat Exchangers on Baker-Hyde Park 115 kV circuits.	Under Construction
NSTAR	Jun-06	NSTAR 345 kV Transmission Reliability Project	Add 345 kV Stoughton switching station in ring bus configuration along with circuit breakers.	Under Construction
NSTAR	Dec-07	NSTAR 345 kV Transmission Reliability Project	Add 2nd 345 kV UG Cables from Stoughton to Mattapan Sq.to K Street and install another new autotransformer at K. St.	Under Construction

DA – Binding Constraints 2004-2005

Constraint Name	Contingency Name	Total Hours	CONT/ LINE	CONTINGENCY (DESCRIPTION)/ LINE (STATION A)	STATION B
NRST	Interface	2,947	#N/A	#N/A	#N/A
NS_ST	Interface	1,660	#N/A	#N/A	#N/A
Node_Highgate_Export	Generic Constraint	1,584	#N/A	#N/A	#N/A
BSTN	Interface	1,466	#N/A	#N/A	#N/A
SCOBIE 326-1 A LN	394	1,157	Contingency	LINE 394-1-2/	0
WALTHAM_282-520-2_A_LN	Actual	938	#N/A	#N/A	#N/A

RT - Binding Constraints 2004-2005

Constraint Name	Contingency Name	Total Hours	CONT/ LINE	CONTINGENCY (DESCRIPTION)/ LINE (STATION A)	STATION B
BASE_INTRFC_ORR-SO	BASE	1,935	#N/A	#N/A	#N/A
BASE_INTRFC_NRST	BASE	1,154	#N/A	#N/A	#N/A



NYISO

Regional System Plan – Project List

Redacted

Regional System Plan – Project List

Redacted

DA – Binding Constraints 2004-2005

Constraint Name	Total hours
DUNWODIE 345 SHORE_RD 345 1	11,428
FRESHKLS 138 WILLWBRK 138 1	6,227
VALLYSTR 138 EGRDNCTY 138 1	5,449
RAINEY__ 138 VERNON__ 138 1	4,427
W49TH_ST 345 SPRNBRK 345 1	2,887
RAINEY 138 VERNON 138 1	2,589
NEWBRDGE 138 FREEPORT 138 1	2,471
HUDS_AVE 138 JAMAICA_ 138 2	2,459
HUDS_AVE 138 JAMAICA 138 1	2,378
RAINEY__ 345 DUNWOD71 345 1	2,142
ASTORIAE 138 HELLGT_E 138 1	1,868
ELWOOD_W 138 GREENLWN 138 1	1,738
E179TH_W 138 HELLTP_W 138 1	1,428
E179THST 138 HELLGT_E 138 1	1,411
CENTRAL EAST - VC	1,389
BARRETT_ 138 VALLYSTR 138 2	1,197
NRTHPORT 138 PILGRIM 138 3	902
E13THSTA 345 W49TH_ST 345 1	880

RT - Binding Constraints 2004-2005

Constraint Name	Hours
VERNON/GREENWOOD	14,940
GREENWOOD/STATEN ISLAND	12,647
CONED CABLE INTERFACE	9,424
AST EAST/CORONA/JAMAICA	9,422
DUN-SHORE RD Y50	9,412
DUNWO-SHORR345 Y50	9,412
CONED IN CITY 345/138	9,268
ASTORIA WEST/QUEENSBRIDG	9,165
DUNWODIE 345 SHORE_RD 345 1	7,272
VALST-E.G.C138 262	6,643
AST E/CORONA/JAMAICA	6,129
CENT EAS L/O N.SCOT99BUS	5,808
DYSINGER EAST	5,337
SHORR-LAKSU138 367	5,261
VLY ST-EGARD262	5,181
SPRBR-E.G.C345 Y49	5,081
AST WEST/QUEENSBR/VERNON	5,045
SHORR-LAKSU138 368	4,757
SPR/DUN-SOUTH	4,476
IN-CITY 345/138 KV	4,230
AST W/QUEENSBRDG	4,208

Constraint Name	Hours
EAST RIVER	3,971
WEST-CENTRAL TIES	3,910
E.GARD-NEWBR 463	3,809
E.G.C-NEWBR138 463	3,781
SPRAINBROOK-E.GARD C Y49	3,679
CENTRAL EAST TIES	3,658
CENT-EAST L/O MARCY TWR	3,156
CENTRAL EAST - VC	2,972
LEEDS-PLTVL345 92	2,809
STOLLE-MEYER 67	2,543
ELWOOD_W 138 GREENLWN 138 1	2,382
ATHEN-PLTVL345 91	2,364
NRTHPORT 138 PILGRIM 138 2	2,194
STOLL-MEYER230 67	2,186
GREENLWN 138 SYOSSET 138 1	2,156
UPNY-CONED TIES	2,014
STATEN ISLAND	1,884
NIAG3-ROCH3345 NR2	1,856
AST W/QUEENSBRG/VERNON	1,853
E.G.C-NEWBR138 462	1,820
ROCH3-PANN2345 RP-1	1,767

Constraint Name	Hours
ROCH3-PANNE345 RP-2	1,757
PLSNTVLY 345 LEEDS 345 1	1,707
SHORR 345/138 BK;1	1,679
NRTHPORT 138 PILGRIM 138 1	1,464
PANN2-CLAY 345 PC-1	1,449
E.G.C-CARLP138 361	1,322
SCRIB-VOLNE345 20	1,301
GRNLN-SYOSS138 676	1,284
GRNLN-ELWO1138 673	1,262
ELWOOD_W 138 NRTHPORT 138 1	1,260
GLENS-CARLP138 363	1,223
MARCY 765/345 MAR-AT1	1,203
OAKWO-SYOSS138 675	1,167
BUCHN-EVW2N345 W93	1,091
E.GARD-NEWBR 462	1,066
E.G.C-ROSLY138 362	1,046
PLGM2-HAUPG138 871	1,043
SCRIBA 345 VOLNEY 345 1	1,038
ROSTN-FISHK345 RFK-305	989
ELWOOD_E 138 NRTHPORT 138 1	911



PJM

Regional System Plan – Project List

Projected In-Service Month/Year	Project	July 05 Status
Jun-07	Installation of 176 MVAR caps at various sub stations Install reactive sources in	Under Construction
Jun-05	Upgrade Midd Jct - Zions View 115 kV	Under Construction
Dec-05	Add 180 MVAR of distributed capacitors in JCP&L. 65 MVAR are being added in northern JCP&L and 115 MVAR are being added to southern	Under Construction
Jun-06	Build new Red Lion – Milford – Indian River 230 kV circuit	Under Construction
May-06	Indian River Sub - 230kV Terminal Position	Under Construction

Regional System Plan – Project List

Projected In-Service Month/Year	Project	July 05 Status
Dec-05	Red Lion Sub - 230kV Terminal Position	Under Construction
Apr-06	Sayreville 230kV	Under Construction
Sep-05	Upgrade Deans 230 kV breaker #1-5	Under Construction
Oct-05	Upgrade Deans 230 kV breaker #1-7	Under Construction
Nov-05	Upgrade Deans 230 kV breaker #1-9	Under Construction

DA – Binding Constraints 2004-2005

MONITORED FACILITY	CONTINGENCY FACILITY	DAY AHEAD CONTINGENCY EVENT	2004	2005	Grand Total
BED-BLA	Pruntytown-Mt. Storm (510) 500 kV line	BED-BLA L/O Pruntytown-Mt. Storm (510) 500 kV line	3,448	4,457	7,905
CEDARGRO230 KV CED-CLIK	Roseland-Cedar Grove- Clifton-Athenia (B-2228) 230	CEDARGRO230 KV CED-CLIK L/O Roseland-Cedar Grove-Clifton-Athenia (B- 2228) 230	606	2,907	3,513
Cedar Interface	ACTUAL	Cedar Interface	1,252	1,615	2,867
EAST	ACTUAL	Eastern Interface	1,385	1,301	2,686
HOMERCIT345 KV HOM-WAT	ACTUAL	HOMERCIT345 KV HOM-WAT	690	1,898	2,588
KAMMER2 765 KV .200	Belmont-Harrison 500 kV line (AP)	KAMMER2 765 KV .200 L/O Belmont- Harrison 500 kV line (AP)		2,065	2,065
Crete - St Johns Tap 345 kV	DUMONT WILTON CENTER 765KV LINE	Crete - St Johns Tap 345 kV L/O DUMONT WILTON CENTER 765KV LINE	1,191	817	2,008
CENTRAL	ACTUAL	Central Interface	674	1,332	2,006
BEDINGTO138 KV BED-NIP	BEDINGTON DOUBS LINE	BEDINGTO138 KV BED-NIP L/O BEDINGTON DOUBS LINE	142	1,494	1,636
TIDD_AEP138 KV MAH-TID	WEIRTON-CARNEGIE-TIDD (224) 138 KV (APS)	TIDD_AEP138 KV MAH-TID L/O WEIRTON- CARNEGIE-TIDD (224) 138 KV (APS)	601	1,034	1,635
BERGEN 230 KV BER-HOB	Hudson-Penhorn-Bellville-N. Bergen-Bergen (X-2250)	BERGEN 230 KV BER-HOB L/O Hudson- Penhorn-Bellville-N. Bergen-Bergen (X- 2250)	1,051	514	1,565

DA – Binding Constraints 2004-2005 (continued)

MONITORED FACILITY	CONTINGENCY FACILITY	DAY AHEAD CONTINGENCY EVENT	2004	2005	Grand Total
LAUREL 69 KV LAU- WOO	CUMBERLAND AE- CHURCHTOWN 230 LINE	LAUREL 69 KV LAU-WOO L/O CUMBERLAND AE-CHURCHTOWN 230 LINE	724	780	1,504
KAMMER2 765 KV .200	Belmont-Harrison 500 kV line (AP)	KAMMER2 765 KV .200 L/O Belmont- Harrison 500 kV line (AP)	199	1,116	1,315
50045005 4	Hunterstown-Conastone (5013) & Hunterstown #1 xfmr	50045005 4 L/O Hunterstown-Conastone (5013) & Hunterstown #1 xfmr		1,299	1,299
BERGEN 230 KV BER- LEO	ACTUAL	BERGEN 230 KV BER-LEO	365	875	1,240
BRANCHBU500 KV 500-5	BRANCHBURG-DEANS & DEANS 500-1 & SOMERVILLE RELAY	BRANCHBU500 KV 500-1 L/O BRANCHBURG-DEANS & DEANS 500-1 & SOMERVILLE RELAY	1,093	117	1,210
SHIELDAL69 KV SHI- VIN	CUMBERLAND AE- CHURCHTOWN 230 LINE	SHIELDAL69 KV SHI-VIN L/O CUMBERLAND AE-CHURCHTOWN 230 LINE	1,038	137	1,175
SHIELDAL69 KV SHI- VIN	CHAMBERS-CHURCHTOWN	SHIELDAL69 KV SHI-VIN L/O CHAMBERS-CHURCHTOWN	953	203	1,156
BRANCHBU500 KV 500-4	BRANCHBURG-DEANS & DEANS 500-1	BRANCHBU500 KV 500-1 L/O BRANCHBURG-DEANS & DEANS 500-1	736	158	894

RT - Binding Constraints 2004-2005

MONITORED FACILITY	CONTINGENCY FACILITY	2004	2005	Grand Total
BED-BLA	LINE 500 KV MTSTORM-PRUNTYTO	1,361	1,700	3,061
KAMMER2 765 KV KAMMER2 .200 XFORMER	LINE 500 KV BELMONT-HARR APS	121	1,613	1,734
LINE 69 KV LAUREL-WOODSTOW 0740	LINE 230 KV CHURCHTO-CUMB AE 2314	450	938	1,388
LINE 500 KV MTSTORM-PRUNTYTO	LINE 500 KV BEDINGTO-BLACKOAK 500KV	1	972	973
WYLIERID500 KV WYLIERID TRAN 5 XFORMER	WYLIERID500 KV WYLIERID TRAN 7 XFORMER	827	120	947
CEDAR	Actual	426	463	889

TLR Calls – 2004 to 2005

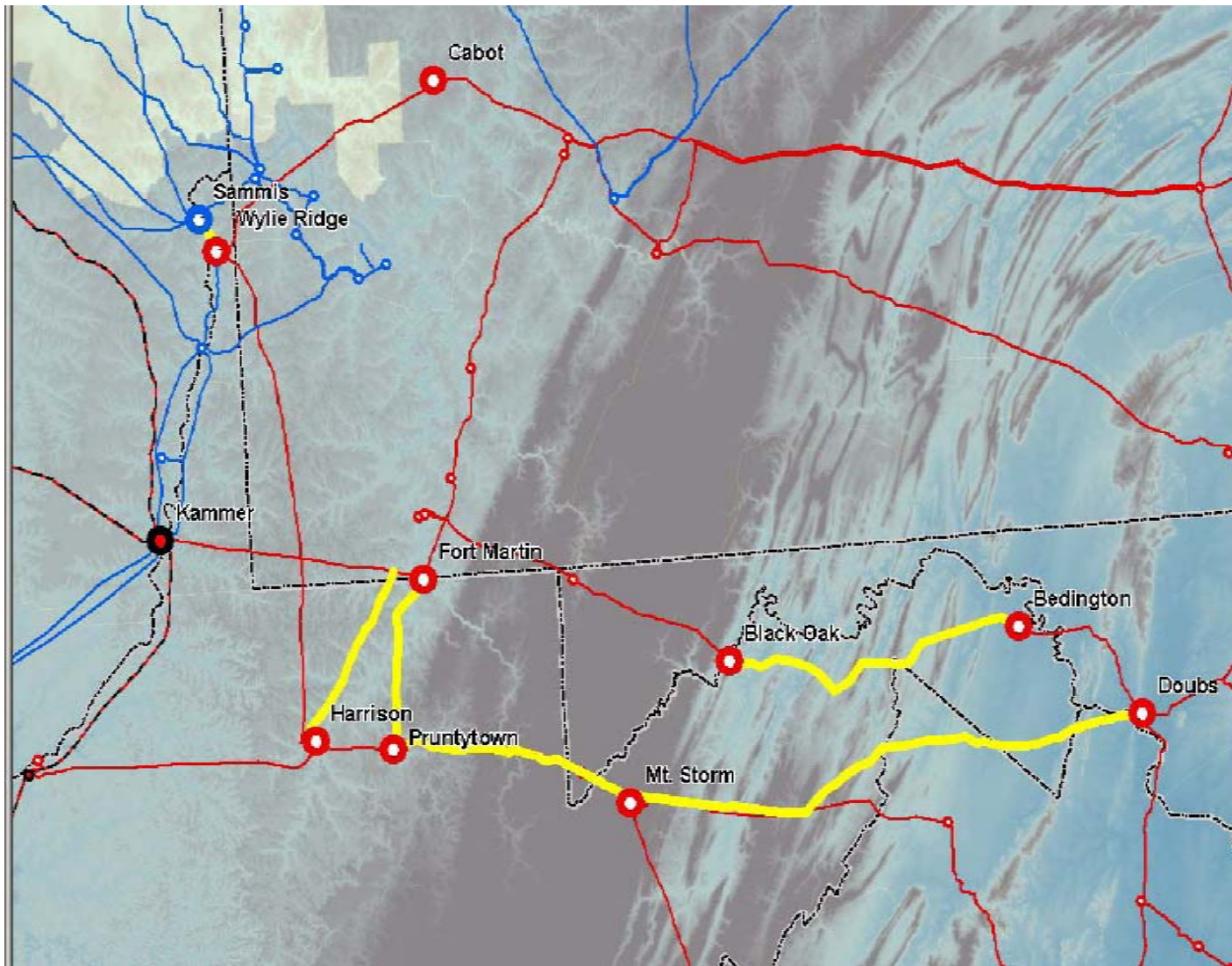
TLRs >= Level 3

RelCo or	Control Areas	FGID	Flowgate - Official	2004	2005	Grand Total
PJM	PJM	2358	Wylie Ridge #5 345/500 xfmr I/o Wylie Ridge #7 345/500 xfmr	3,422	116	3,537
PJM	PJM	100	Kammer #200 765/500 kV xfmr I/o Belmont-Harrison 500	191	1,190	1,381
PJM	PJM	23	Roseland-Cedar Grove F 230 kV I/o Roseland-Cedar Grove B	311	615	926

Project Mountaineer

- **Project Mountaineer is an effort by PJM to identify new transmission facilities needed to move power from west to east across PJM**
- **The focus is the area often referred to as the VEM constraints**
- **Project Mountaineer Working Group's mandate was to:**
 - Identify required transmission facilities
 - Taking into account costs and benefits, and
 - Regulatory, environmental and siting issues
 - Provide feedback to the Regional Planning Process Working Group

Project Mountaineer



MISO

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
May-06	Plymouth	Elm Creek	Planned
Jun-06	Adair–Thomas Hill	Install 161 kV Breaker at Adair	Planned
Jun-06	Cahokia	Meramec (Reconductor)	Planned
Jun-06	Cahokia	Meramec (Reconductor)	Planned
Jun-06	Campbell	Maline (reconductor)	Planned
Jun-06	Campbell	Maline (reconductor)	Planned
Jun-06	Casey	Breed (reconductor riv. Crossing)	Planned
Jun-06	Conway	Breaker Additions	Planned
Jun-06	Duck Creek	Tazewell (convert bus duct to OH)	Planned
Jun-06	Frederick	Meredosia (Increase ground clearance)	Planned
Jun-06	Havana	Ipava (reconductor)	Planned
Jun-06	Kinmundy	Salem (Increase ground clearance)	Planned
Jun-06	Line 1342C tap	Line 1342A (structure 423 to 467A reconductor)	Planned
Jun-06	Marion	CarrierMills	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-06	Newton	Effingham (reconductor)	Planned
Jun-06	Rising (138 kV breaker addition)	Bondville Rt. 10	Planned
Jun-06	Roxford	Mississippi Tap (reconductor)	Planned
Jun-06	Roxford	Mississippi Tap (reconductor)	Planned
Jun-06	Warson	Breaker Additions	Planned
Jun-06	Amberg	Crivitz (rebuild)	Planned
Jun-06	Columbia	North Madison (convert)	Planned
Jun-06	Crivitz	Stiles (rebuild)	Planned
Jun-06	Dewey Tap	Weston	Planned
Jun-06	Gardner Park (new Weston)	Weston	Planned
Jun-06	Gardner Park (new Weston)	Weston	Planned
Jun-06	Gardner Park (was Weston) 345-115		Planned
Jun-06	Gardner Park (was Weston) 345-116		Planned
Jun-06	Martin Road	South Fond du Lac	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-06	North Madison 345-138 (replace)		Planned
Jun-06	North Madison 345-138 (replace)		Planned
Jun-06	Northpoint	Dewey Tap	Planned
Jun-06	NOW	Amberg (rebuild)	Planned
Jun-06	Plains	NOW (rebuild)	Planned
Jun-06	Stiles	Amberg (rebuild)	Planned
Jun-06	Stone Lake 345-161 kV		Planned
Jun-06	Stone Lake 345-161 kV		Planned
Jun-06	Weston	Kelly	Planned
Jun-06	A B Brown (SIGE)	Northwest (SIGE)	Planned
Jun-06	Duff (SIGE)	Dubois (SIGE)	Planned
Jun-06	Airtech	Faribault Energy Center	Planned
Jun-06	Aldrich	St. Louis Park	Planned
Jun-06	Crooked Lake	Enterprise Park	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-06	Eastwood Tap	Eastwood	Planned
Jun-06	Eastwood Tap	Eastwood	Planned
Jun-06	Faribault Energy Center	Lake Marion	Planned
Jun-06	Fox Lake	Rutland	Planned
Jun-06	I94 Industrial Park tap	Salida Crossing	Planned
Jun-06	Inver Hills	Koch	Planned
Jun-06	Lawrence	Minnehaha	Planned
Jun-06	Minnehaha	Lincoln County	Planned
Jun-06	Oakdale	Tanners Lake	Planned
Jun-06	Prairie Island	Red Rock	Planned
Jun-06	Salida Crossing	Sherco	Planned
Jun-06	Sherco	Monticello	Planned
Jun-06	Sherco 345-115 kV		Planned
Jun-06	St Cloud	I94 Industrial Park tap	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-06	West Faribault	Airtech	Planned
Jun-06	Wilmarth	Eastwood	Planned
Nov-06	Herblet Lake	Sherridon	Planned
Dec-06	Callaway	Franks	Planned
Dec-06	Redwood Falls Tap	Franklin	Planned
Dec-06	Baxter	Southdale	Planned
Mar-07	Herblet Lake	Chisel Lake	Planned
Mar-07	Herblet Lake Transformer		Planned
Jun-07	Cahokia	W. Salem	Planned
Jun-07	Crab Orchard	N. Coulterville	Planned
Jun-07	Jefferson City 345 / 161	Marion South (reconductor)	Planned
Jun-07	Joachim 345 / 138	Jefferson City	Planned
Jun-07	Loose Creek	Sioux (breaker addition at Mason)	Planned
Jun-07	Mason	Labadie–Mason–3 Term. Equipment replacement	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-07	Mason	Replace 4-138 kV Breakers	Planned
Jun-07	Meramec Plant	Apache Flats	Planned
Jun-07	Moreau	N. Ottawa (new 3 terminal ring bus)	Planned
Jun-07	N. LaSalle (138 kV breaker addition)	Ottawa (2 new 138 kV breakers)	Planned
Jun-07	N. Ottawa	Wedron	Planned
Jun-07	N. Ottawa	Replace 6-138 kV	Planned
Jun-07	Wildwood	Gray Summit (reconductor)	Planned
Jun-07	Wildwood	Gray Summit (reconductor)	Planned
Jun-07	Wood River	Gillespie (reconductor)	Planned
Jun-07	Femrite	Sprecher (new 138 kV)	Planned
Jun-07	Jefferson	Lake Mills	Planned
Jun-07	Kegonsa	McFarland (conversion to 138 kV)	Planned
Jun-07	Lakehead Cambridge	Jefferson	Planned
Jun-07	Lawn Road	White Clay	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-07	McFarland	Femrite (conversion to 138 kV)	Planned
Jun-07	Morrison Ave	Sherman St	Planned
Jun-07	North Appleton	Lawn Road	Planned
Jun-07	Plymouth	Forest Junction / Charter Steel	Planned
Jun-07	Reiner	Sycamore (conversion to 138 kV)	Planned
Jun-07	Rockdale	Boxelder	Planned
Jun-07	Rockdale	Lakehead Cambridge	Planned
Jun-07	Sprecher	Reiner (conversion to 138 kV)	Planned
Jun-07	Weston	Hilltop	Planned
Jun-07	Weston	Morrison Ave	Planned
Jun-07	Weston	Sherman St	Planned
Jun-07	Air Lake	Vermillion River	Planned

Regional System Plan – Project List

MTEP-05 Expected in Service Date	From:	To:	Current Status
Jun-07	Lone Jack	Greenwood	Planned
Jul-07	Fenton	Chanarambie	Planned
Jul-07	Nobles Co	Lakefield Jct	Planned
Jul-07	Nobles Co	Fenton	Planned
Jul-07	Nobles Co 345-115 kV		Planned
Jul-07	Split Rock	Nobles Co	Planned
Dec-07	Rutland	Winnebago	Planned
Dec-07	Chisago	Lindstrom	Planned
Dec-07	Lawrence Creek	St Croix Falls	Planned
Dec-07	Lawrence Creek 161-115 kV		Planned
Dec-07	Lindstrom	Shafer	Planned
Dec-07	Shafer	Lawrence Creek	Planned
Dec-07	St Croix Falls	Apple River	Planned

DA – Binding Constraints

April 1, 2005 to December 21, 2005

CONSTRAINT	BRANCH INFO	Total
MWSI_PTDF	ARPIN ARPINEAU_C34_1 1(LN,ALTE,NSP); PR_ISLD PR_IS	1,262
CULLEY CULLEGRAND13_11 LN	CULLEY CULLEGRAND13_1 1(LN,SIGE,SIGE)	1,087
FLWSOU__PTDF	AMBERG 64443 64(LN,WEC,WEC); MGN 35321 35(LN,WEC,W	1,030
TYRONE TYRONE_FRNKF_E1 LN	TYRONE TYRONE_FRNKF_E 1(LN,LGEE,LGEE)	1,009
EAUARP__XCEL_PTDF	ARPIN ARPINEAU_C34_1 1(LN,ALTE,NSP)	650
HIGHWAYVHIGHWAYVPREB1 HILN	HIGHWAYV HIGHWAYVPREB1 HI(LN,WPS,WPS)	601
NEWTNV A XFMR	NEWTNV A A(XF,SIGE,N/A)	593
HENDERSOHENDEABBRO13_11 LN	HENDERSO HENDEABBRO13_1 1(LN,BREC,SIGE)	584
CRSW2 ALBS-NORN-1 A LN	CRSW2 ALBS-NORN-1 A(LN,AMRN,AMRN)	510
LIME_CK LIME_EMERY16_11 LN	LIME_CK LIME_EMERY16_1 1(LN,ALTW,ALTW)	495
DA WAY	WAY TX00 WAY_T10(XF,WEC,N/A)	461
HAZLTON HAZLTDUNDE16_11 LN	HAZLTON HAZLTDUNDE16_1 1(LN,ALTW,ALTW)	450
PADDOCK PAD_T210 XFMR	PADDOCK TX00 PAD_T210(XF,ALTE,N/A)	434
MHEX_S_PTDF	DSY5 ROSEADORSE50_1 1(LN,MHEB,NSP); GLEN2 GLENBRUG	402
DA DETOUR XFM	DETOUR T2 T2(XF,WEC,N/A)	362
COOPER_S_PTDF	COOPER COOPEFAIRP34_1 1(LN,NPPD,AECI); ST_JOE ST_J	358
GREEN_RLGRN_R_ST_GR_RV1 LN	GREEN_RL GRN_R_ST_GR_RV 1(LN,LGEE,LGEE)	339
PEAVYFAL_TX00_PEA_TR10_XF	PEAVYFAL TX00 PEA_TR10(XF,WEC,N/A)	335
PEAVYFAL_TX01_PEA_TR20_XF	PEAVYFAL TX01 PEA_TR20(XF,WEC,N/A)	334
HODENPYJHODENTIPPY13_11 LN	HODENPYJ HODENTIPPY13_1 1(LN,CONS,CONS)	324
PWR_JCT 38L13521 38LN	PWR_JCT 38L13521 38(LN,IP,CE)	319

RT - Binding Constraints

April 1, 2005 to December 21, 2005

CONSTRAINTNAME	BRANCH INFO	Total
Kammer_8_xfmr_l_o_Belmont_Harrison_500	KAMMER_200_200(XF,AEP,N/A)	1,095
Frankfort_East_Tyrone_138_flo_Ghent_West_Le_xingt	TYRONE TYRONE_FRNKF_E 1(LN,LGEE,LGEE)	1,023
EAU_CLAIRE_ARPIN_345_KV	ARPIN ARPINEAU_C34_1 1(LN,ALTE,NSP)	882
PRNTY_MTSTM500_BLACKO_BEDNGT500	8MT_STM 8MT_ST01PRN5_1 A(LN,VAP,AP)	464
BRE16X01_CULLEY_CULLEGRAND13_1_1	CULLEY CULLEGRAND13_1 1(LN,SIGE,SIGE)	392
	INTF: AMBERG 64443 64(LN,WEC,WEC); MGN 35321 35(LN	388
BRESIG02_CULLEY_CULLEGRAND13_1_1	CULLEY CULLEGRAND13_1 1(LN,SIGE,SIGE)	380
Wylie_Ridge_7_tx_l_o_Wylie_5_tx_SPS_in_servi ce	WYLIERID AN_7 TRAN_7(XF,AP,N/A)	371
MWSI	INTF: ARPIN ARPINEAU_C34_1 1(LN,ALTE,NSP); PR_ISLD	323

SERC

Regional System Plan – Project List

In-Service Date	Main Owner	From:	To:
Jun-06	Entergy Services, Inc.	Lakeover	Mansdale
Jun-06	Entergy Services, Inc.	Ninemile	Waggaman
Jun-06	Entergy Services, Inc.	Perryville	Sterlington
Jun-06	Entergy Services, Inc.	Waggaman	Waterford
Dec-06	Entergy Services, Inc.	Bogue Chitto	Bogalusa
Dec-06	Entergy Services, Inc.	Bogue Chitto	Franklin
Dec-06	Entergy Services, Inc.	Coly	Hammond
Dec-06	Entergy Services, Inc.	Hammond	Amite
Dec-06	Entergy Services, Inc.	Panama	Dutch Bayou
Jun-07	Entergy Services, Inc.	Cypress	Jacinto
Jun-07	Entergy Services, Inc.	Jacinto	Lewis Creek
Jun-07	Entergy Services, Inc.	Yandel	Bozeman
Dec-07	Entergy Services, Inc.	Mabelvale	Little Rock South
Dec-07	Entergy Services, Inc.	Mabelvale	Little Rock South

Regional System Plan – Project List

In-Service Date	Main Owner	From:	To:
Apr-07	Alabama Power Company	Ashland T.S.	Gaston S.P.
Apr-07	Alabama Power Company	Ashland T.S.	Roopville
May-07	Alabama Power Company	Prattville CT TS	County Line Road
Dec-07	Alabama Power Company	Turf Club T.S.	Boyles T.S.
Dec-07	Alabama Power Company	Turf Club T.S.	Gaston S.P.
Sep-06	Georgia Power Company	CEDARTOWN	ARAGON
Jun-07	Georgia Power Company	CUMMING	SHOAL CREEK
Jun-07	Georgia Power Company	HOPEWELL	MCGRAW FORD
Jun-07	Georgia Power Company	MCGRAU FORD	MOSTELLAR SPRINGS
Jun-06	Georgia Transmission Corporation	Dresden	South Coweta
Jun-07	Georgia Transmission Corporation	Anthony Shoals	Evans
Jun-07	Georgia Transmission Corporation	McGraw Ford	Cumming
Jun-07	Municipal Electric Authority of Georgia	Fort Valley Tap	Fort Valley #1
Jun-06	Tennessee Valley Authority	Cumberland	Montgomery

Regional System Plan – Project List

In-Service Date	Main Owner	From:	To:
May-06	Dominion Virginia Power	Clark	Idylwood
Nov-06	Dominion Virginia Power	Midlothian	Winterpock
May-07	Dominion Virginia Power	Morrisville	Brister
May-07	Dominion Virginia Power	Pleasant View	Hamilton
Dec-07	Dominion Virginia Power	Fredericksburg	Possum point
Jun-06	Progress Energy Carolinas	Clinton	Lee
Jun-07	Progress Energy Carolinas	Florence	Marion
Jun-07	Progress Energy Carolinas	Kinston DuPont	Greenville
Jun-07	Progress Energy Carolinas	Marion	Whiteville
Sep-06	South Carolina Public Service Authority	Cross	Kingstree No 2
Dec-06	South Carolina Public Service Authority	Hemingway	Red Bluff
Jun-07	South Carolina Public Service Authority	Mateeba	Johns Island No 2

SPP Expansion Planning - 2003

- **Phase I of the *SPP RTO Expansion Plan (2003)* identified five major projects and many smaller projects:**
 - Finney-Lamar 345 kV and DC tie (to WECC) -12/04
 - OGE Draper 345/138kV transformer – 6/05
 - AEP Chambers Springs – Tontitown 345 kV - 6/07
 - AEP Flint Creek – East Centerton 345 kV – 6/10
- **The criteria used for screening were reliability**

SPP Expansion Planning - 2005

- **The Phase II plan (*SPP RTO Expansion Plan 2005-2010*) initially screened 33 projects**
- **Four projects were selected for further analysis:**
 - Tulsa East Switching Station
 - Sooner-Cleveland 345 kV line
 - Rose Hill – Sooner 345 kV line
 - Tolk – Potter 345 kV line

SPP Phase II Economic Screening Methodology

- **SPP used Global Energy's MarketSym and the PowerWorld Simulator (AC OPF) to model SPP and first-tier companies**
- **SPP compared the NPV over a 10-year period of:**
 - The savings in dispatch costs *plus* the cost of violating constraints *with*
 - The project cost
- **The four projects identified all had benefit/cost ratios greater than 1.0**
- **The cost of violating constraints was set at:**
 - \$45/MWh for up to 2% over a flowgate limit
 - \$90/MWh for flowgate violations of more than 2%
 - Branches or transformers above normal rated capacity \$30/MWh

SPP Phase II Economic Screening Methodology (continued)

- **The screening methodology was:**
 - Simulate July 2005 using a typical week representation with and without the project
 - Double the July savings to represent a full year
 - Compute the 10-year NPV at 8%
- **Observations:**
 - The single month simulation is not sufficient
 - Allowing a 2% violation might be acceptable for a short duration, but may not be sustainable
 - “More than 2%” presumably can mean a very large overload
 - \$30, \$45 and \$90/MWh are quite low and could lead to odd results in which the PowerWorld Simulator overloads lines for economic savings

CERA Study

Overview

- **CERA used GE MAPS**
- **Used 2002 Series MMWG Summer 2003 Case load flow**
- **Added four new lines to the load flow**
 - Wyoming - Jackson's Ferry
 - Arrowhead - Weston
 - Callaway – Franks
 - Cross sound cable (CT to LI)
- **CERA assumed that by 2010 there would be no wheeling charges within the EI**
- **Losses modeled as wheeling fees between regions. According to a former CERA staff member with detailed knowledge of the analysis, loss costs did not play a major role in congestion cost results**

Methodology

- **Ran GE MAPS and identified constraints that resulted in significant congestion as measured by congestion costs**
 - Results were summarized by region and ranked by congestion costs within each region
 - The next set of slides compares CERA's results to available congestion data
- **CERA estimated the cost of relieving what they found to be the major transmission bottlenecks, and compared estimated costs to estimated congestion costs**
 - CERA had study participant input on the transmission projects
 - CERA used generic component costs

Classic PJM Results

Constraint	CERA 2010 Results		2004-2005 Market Data					
	Time Binding	Congestion Costs	Real Time		Day-Ahead		TLR	
	(percent)	(million dollars)	Hours Constrained	% Hours Constrained	Hours Constrained	% Hours Constrained	Hours	% of Hours
FG2353 Blackko-Bedngt500-Prnt	60%	\$ 377.0	3,061	17.5%	6,831	39.0%	336	1.9%
FG50 AP-South Interface	8%	\$ 61.0	60	0.3%	384	2.2%		
FG20 Erie West-Erie South	40%	\$ 42.0	204	1.2%	535	3.1%		
1-Trips, Midd Jct-Humlstn-1	5%	\$ 22.0	55	0.3%	51	0.3%		
FG2358 01 Wylier 345/500TX5-0	31%	\$ 20.0	1,465	8.4%	1,247	7.1%	3537	20.2%
VEM;HATFL-YUKON; BEDNG-DOUB	14%	\$ 15.0	19	0.1%				
FG2359 01DOUBS 500/230 XFMR	4%	\$ 14.0	1,341	7.7%	1,296	7.4%		
1-TRIPS, LEWIS RN-FARM.VLY-1	20%	\$ 13.0	19	0.1%				
INTERFACE=PJM-WESTERN	7%	\$ 13.0	436	2.5%	529	3.0%		
LINDEN 1 138-NORTH AV 138-1	26%	\$ 10.0	83	0.5%	304	1.7%		
FG2360 01AQUEDT STATIONH 230	5%	\$ 9.0						
1-TRIPS, RITCH058-BENN 230-1	36%	\$ 8.0						
PAR, O ST 138 1-O ST T5 1-1	73%	\$ 4.0						
PAR, O ST 138 1-O ST T6 1-1	73%	\$ 4.0						

Green Font Denotes Potential Corridor Components



INTERNATIONAL

PJM Classic Actual Binding DA Constraints 2004-2005

MONITORED FACILITY	CONTINGENCY FACILITY	DAY AHEAD CONTINGENCY EVENT	Grand Total	Identified by CERA?
BED-BLA	Pruntytown-Mt. Storm (510) 500 kV line	BED-BLA L/O Pruntytown-Mt. Storm (510) 500 kV line	7,905	Yes
CEDARGRO230 KV CED-CLIK	Roseland-Cedar Grove-Clifton-Athenia (B-2228) 230	CEDARGRO230 KV CED-CLIK L/O Roseland-Cedar Grove-Clifton-Athenia (B-2228) 230	3,513	No
Cedar Interface	ACTUAL	Cedar Interface	2,867	No
EAST	ACTUAL	Eastern Interface	2,686	No
HOMERCIT345 KV HOM-WAT	ACTUAL	HOMERCIT345 KV HOM-WAT	2,588	No
CENTRAL	ACTUAL	Central Interface	2,006	
BEDINGTO138 KV BED-NIP	BEDINGTON DOUBS LINE	BEDINGTO138 KV BED-NIP L/O BEDINGTON DOUBS LINE	1,636	No
BERGEN 230 KV BER-HOB	Hudson-Penhorn-Bellville-N. Bergen-Bergen (X-2250)	BERGEN 230 KV BER-HOB L/O Hudson-Penhorn-Bellville-N. Bergen-Bergen (X-2250)	1,565	No

PJM Classic Actual Binding DA Constraints 2004-2005 (continued)

MONITORED FACILITY	CONTINGENCY FACILITY	DAY AHEAD CONTINGENCY EVENT	Grand Total	Identified by CERA?
LAUREL 69 KV LAU- WOO	CUMBERLAND AE- CHURCHTOWN 230 LINE	LAUREL 69 KV LAU-WOO L/O CUMBERLAND AE-CHURCHTOWN 230 LINE	1,504	No
50045005 4	Hunterstown-Conastone (5013) & Hunterstown #1 xfmr	50045005 4 L/O Hunterstown-Conastone (5013) & Hunterstown #1 xfmr	1,299	No
BERGEN 230 KV BER- LEO	ACTUAL	BERGEN 230 KV BER-LEO	1,240	No
BRANCHBU500 KV 500-5	BRANCHBURG-DEANS & DEANS 500-1 & SOMERVILLE RELAY	BRANCHBU500 KV 500-1 L/O BRANCHBURG-DEANS & DEANS 500-1 & SOMERVILLE RELAY	1,210	No
SHIELDAL69 KV SHI- VIN	CUMBERLAND AE- CHURCHTOWN 230 LINE	SHIELDAL69 KV SHI-VIN L/O CUMBERLAND AE-CHURCHTOWN 230 LINE	1,175	No
SHIELDAL69 KV SHI- VIN	CHAMBERS-CHURCHTOWN	SHIELDAL69 KV SHI-VIN L/O CHAMBERS-CHURCHTOWN	1,156	No
BRANCHBU500 KV 500-4	BRANCHBURG-DEANS & DEANS 500-1	BRANCHBU500 KV 500-1 L/O BRANCHBURG-DEANS & DEANS 500-1	894	No

NYSIO Results

Constraint	CERA 2010 Results		2004-2005 Market Data			
	Time Binding	Congestion Costs	Real Time		Day-Ahead	
	(percent)	(million dollars)	Hours Constrained	% Hours Constrained	Hours Constrained	% Hours Constrained
13 INTERFACE=VOLNEY-EAST OPN	15	18				
STA 162 115-STA 158S 115-1	29	11				
LEEDS-PLVLLEY; A-PV	2	11	2,809	16.0%	735	4.2%
PAR, RAM PAR 3-RAMAPO 3-1	42	3	561	3.2%	10	0.1%
PAR, GOWNUS1R 1-GOWNUS1T 1-1	10	3				
PAR, GOWNUS2T 1-GOWNUS2R 1-1	10	3				
1-TRIPS, DUNWCDIE-SHORE RD-1	14	6	9,412	53.7%	11,428	65.2%
SPRBROOK 345-DVNPT NK 345-1	10	2				

Entergy Results

Constraint	CERA 2010 Results		2004-2005 Market Data	
	Time Binding	Congestion Costs	TLR	
	(percent)	(million dollars)	Hours	% of Hours
FG1307 RICHARD500-138(1) FOR	33%	188		
FG1375 BAGATELLE-SUNSHINE FLO WATERF-WGLEN	18%	56	15	0.1%
FG5076 FTSMTHANOVLT	17%	20		
FG1382 HAYTI-BLYTHEVILLE FLO NMAD-DEL	17%	23	30	0.2%
FG1380 BATESVILLE-MARKS FLO BATESV-ENID	13%	42	5	0.0%
FG1389 MURFREESBORO 138/115	21%	19		
FG1374 CONWAY-BAGATELLE FLOW WATERF-WGLEN	8%	17		
FG1376 COLY-VIGNES FLO WATERF-WGLEN	4%	15	7	0.0%
FG5058 TOLED-LEESV FLO CARMES	5%	8		

SPP Results

Constraint	CERA 2010 Results		2004-2005 Market Data	
	Time Binding	Congestion Costs	TLR	
	(percent)	(million dollars)	Hours	% of Hours
FG5037 MUSCLAMUSRSS	29%	125	7	0.0%
FG1002 THMMOBTHOMCC	73%	76		
FG5081 OSACANBUSDEA	51%	68		
FG5201 SILDIVNWSCIM	12%	44	5	0.0%
FG5098 PECXFRMUSCLA	12%	31	6	0.0%
FG:SPP-SPS TIES	60%	31	61	0.3%
FG5083 HARNICHARNIC	17%	24		
FG5096 MIDFRNPHAWET	7%	23		
FG5091 DRAXFRDRAXFR	3%	20		
FG:REDARCREDARC	12%	13	109	0.6%
FG:SPHWMCSUMEMC	23%	12	902	5.1%
FG:BRKCRABBTMTR	20%	9		
FG:JUDGRNSPEMUL	23%	7		
PAR,TXPHSF3 1-TEXCO3 1-1	38%	2		



INTERNATIONAL

TASK 1 REPORT

Prepared For:

U.S. Department of Energy –
Office of Electricity Delivery and Energy Reliability

1000 Independence Ave, SW

Washington, DC 20585

Review of Eastern Congestion Studies and Expansion Plans

Prepared By:

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1201 F St. NW – Suite 700

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March 15, 2006

CRA Project No.

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ISO NEW ENGLAND REGIONAL SYSTEM PLAN 2005 (RSP05)

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study: ISO-NE Regional System Plan, October 20, 2005

2. Provide the title(s) and completion dates of available report(s) regarding the study:

ISO New England relies on several types of studies to identify the resources required to meet future system reliability needs. The two most frequently used studies are the installed capacity (IC) analysis and the operable capacity (OC) analysis. RSP05 summarizes the status of a number of transmission planning studies that aim to identify needed transmission facilities. Two studies that have a significant impact on RSP05 results have focused on reliability issues in southern New England and the interface constraints for the Connecticut and Southwest Connecticut imports. RSP05 summarizes the status of a number of transmission planning studies that aim to identify needed transmission facilities. Two studies that have a significant impact on RSP05 results have focused on reliability issues in southern New England and the interface constraints for the Connecticut and Southwest Connecticut imports. Other studies include:

- 2005 CELT Report—Statistics of capacity, energy, load, and transmission, available at: <<http://www.iso-ne.com/trans/celt/report/index.html>>
- 2005 Load Forecast—Peak and energy load forecasts and supporting documentation, available at: <http://www.iso-ne.com/trans/celt/fsct_detail/index.html>
- Draft 2005 Resource Adequacy Analysis—Resource adequacy report issued to the Power Supply Planning Committee for review and comment. This report does not reflect the latest comments received from the PAC on RSP05. Available at: <http://www.iso-ne.com/committees/comm_wkgrps/reblty_comm/pwrsuppln_comm/mtrls/2005/au182005/Draft_ResAdqcy_Aug10.pdf>
- Transmission planning studies—Transmission planning and tariff reports, which can be accessed by calling ISO New England customer service (413-540-4220)
- ISO New England Project Listing Update—List of ISO-approved transmission system improvements, available at: <http://www.iso-ne.com/trans/rsp/2005/july05_update_final_redacted_072105.ppt>

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): Web address:<http://www.iso-ne.com/trans/rsp/index.html>

4. Provide a contact person to obtain project details - name, phone, email: ISO-NE System Planning Committee, 413-540-4220

5. What was the purpose of the study (e.g., what problem was the study intended to address)? ISO-NE's regional transmission expansion plan (Regional System Plan 2005 or

RSP05) focuses on the following initiatives in order to address the system's transmission issues: (1) Solving so-called "pure" transmission problems related to voltage and dynamic instability in the system and upgrade equipment where existing equipment ratings are limiting flows on the system; (2) Serving load pockets that are deficient because of load growth and/or limited sources of delivery and (3) In a broader sense, assure the reliability of the network if alternative resources do not emerge when and where needed based on market incentives.

6. Provide a brief summary description characterizing the study: RSP05 identifies system improvements needed over the next 10 years and provides information on what infrastructure improvements are needed and when and where they are needed to meet the system's peak demands in conformance with planning criteria. Plans for the region's future electric infrastructure must account for the uncertainty of assumptions over the next 10 years in terms of load growth, fuel prices, new technology, market changes, environmental requirements, and other relevant events. As with previous planning reports, formerly called Regional Transmission Expansion Plans (RTEPs), RSP05 provides technical information and data on various scenarios and identifies the requirements for maintaining, improving, and ensuring the reliability of the system in the short term.

7. What was the geography of the study? The ISONE Market consists of the entire New England area (all of the U.S. portion of the NPCC region excluding New York.)

8. What was the study period? 2005 through 2014

9. Describe the study type (such as who initiated the study and why): As an independent system operator (ISO), one of ISO-NE's core functions is to plan for the enhancement and expansion of transmission system capability. During 2004, the ISO signed the Northeast Planning Protocol, an agreement among ISO New England, the New York ISO (NYISO), and PJM Interconnection that commits the ISO and these transmission providers to cooperate in interregional planning studies. The protocol specifically aims to resolve interregional planning issues and identify the impacts that proposed generating units and transmission projects could have on neighboring systems. Additionally, the ISO participates in planning studies to ensure that contingencies in New England will not adversely affect neighboring systems.

10. Characterize the study participants: As part of the RSP05 effort, the ISO consulted with stakeholders about numerous topics, including analysis of data trends, possible future developments, and options related to the region's short- and long term electricity supply. The ISO met with the Planning Advisory Committee (PAC) eight times in 2005 to fully review RSP05 assumptions and study results. The transmission projects are the result of an ongoing planning process among the ISO and New England transmission owners. This open stakeholder process has provided benefits to regional planning in terms of study priority, scope, and quality. The ISO also fully participates with its neighboring electric power system control areas as well as interregional planning bodies, including the Northeast Power Coordinating Council (NPCC) and the North American Electric Reliability Council (NERC), to ensure the reliability and security of the widescale electric power system.⁵ The ISO complies with all the NERC planning criteria and procedures (as well as all internal planning procedures) to enhance resource adequacy and

transmission performance and to better coordinate the development of the interconnected power system in the Northeast.

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: The installed capacity analysis uses a well-established probabilistic method for determining the resources needed to meet a loss-of-load-expectation (LOLE) criterion that prevents the system from disconnecting firm load for a range of possible load levels and resource availabilities. The operable capacity analysis uses a deterministic method for identifying the amount of capacity needed to be operable to meet a specified peak load level including operating reserves. The operable capacity analysis methodology is very similar to the approach system operators use to identify the resources needed on a daily basis to meet the expected peak-load conditions. Thus, installed capacity studies identify bulk power system reliability issues related to the adequacy of system resources, and operable capacity analyses identify reliability issues related to system security.

Consistent with transmission reliability requirements, the ISO continues to study the southern New England region to identify and resolve its reliability issues. An overall goal of the study is to formulate a solution that better integrates load-serving and generating facilities within Massachusetts, Rhode Island, and Connecticut. The study report is scheduled to be completed by the end of 2005, and the project plan is scheduled for ISO approval by July 2006.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? The ISO complies with all the NERC planning criteria and procedures (as well as all internal planning procedures) to enhance resource adequacy and transmission performance and to better coordinate the development of the interconnected power system in the Northeast. A list and description of the criteria used in determining congestion can be found at: <http://www.npcc.org/publicFiles/reliability/criteriaGuidesProcedures/a-02.pdf>

13. Congestion identified: RSP05 identifies 272 transmission projects required throughout New England to meet planning criteria. These upgrades are required to reliably serve load and to reduce the need to commit generating units for operating reserves, voltage support, and relief of other transmission constraints. These 272 projects are estimated to cost about \$3.0 billion. Two-thirds of this cost is related to the following six major 345 kV projects:

- NSTAR 345 kV Reliability Project
- Northeast Reliability Interconnect (NRI) Project
- Southwest Connecticut Reliability Project Phase 1
- Southwest Connecticut Reliability Project Phase 2
- Northwest Vermont Reliability Project
- Southern New England Reinforcement Project

The load/generation pockets discussed in RSP05 include Middletown (CT); Norwalk–Stamford (CT); Southwest Connecticut; Springfield (MA); Boston; Wachusetts (MA); and the North Shore (MA). Additional studies are required to finalize many of the 272 projects, such as those required for increasing the northern New England transmission-transfer capability and improving the voltage performance of Downtown Boston.

Most of the transmission projects identified during the RSP process are reliability upgrades for ensuring the region continues to satisfy national and regional reliability standards while continuing to operate in an economical manner. Many of these upgrades will provide the additional benefit of enhancing the efficient operation of the region’s power markets.

14. Were non-transmission alternatives compared with transmission alternatives? ISONE states that transmission enhancements remain the most essential manner for improving the grid. Adding alternate resources (e.g. distributed generation) may solve a problem in a specific area, but a transmission solution often solves a number of problems; hence, ISONE typically considers it as a more robust alternative.

15. Were new transmission technologies considered? Yes. In many instances, applying advanced technology solutions has effectively solved system problems. The ISO is committed to the prudent use of new technologies and works closely with transmission owners to identify and evaluate opportunities for applying advanced technologies. The ISO also actively participates in projects sponsored by the Electric Power Research Institute (EPRI) and Power Systems Engineering Research Center (PSERC), two research organizations committed to advancing the electric power industry.

Improving the use of existing rights-of-way is a key concern. The use of compact structure design, high-temperature conductors, or real-time ratings of transmission lines can be effective techniques for increasing the thermal-transfer capabilities of the system within the existing rights-of-way land constraints. New types of underground cable, such as “XLPE,” are being proposed to resolve transient over voltages and other issues where underground transmission is needed. Voltage restrictions and stability concerns often require the addition of dynamic devices that can provide continuous control. Flexible alternating current controllers, known as FACTS, use power electronics to provide an exceptionally fast and dynamic system response. To date, New England has several installations of STATCOMs and SVCs, devices capable of providing instantaneous voltage support, and more are planned. The use of advanced control systems, possibly including adaptive control, also may provide system benefits. The power industry is developing new types of synchronous condensers, some of which use superconductors. All these innovative voltage-control technologies will become increasingly important for addressing load-pocket voltage concerns. In addition, improved methods and software can be applied to optimize the use of existing voltage-control equipment.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch):

The installed capacity (IC) analysis assumes the following:

- That no transmission constraints exist within New England so that all generating resources in the region are available to all loads.
- The load forecast is modeled as a probability distribution of the weekday peak loads that accounts for the effects of weather uncertainty.
- The availability of resources is modeled based on the probability of forced outages.
- The transmission system can be operated reliably when system-wide operating reserves have been fully depleted.
- No generating units will be added or removed from the system during the assessment period.
- To meet emergency needs throughout the assessment period, New England can rely on 2,000 MW of uncontracted or otherwise unscheduled capacity (called tie benefits) from New York, Québec, and the Maritimes to meet needs.
- All ISO New England emergency actions per Operating Procedure No. 4, Actions during a Capacity Deficiency (OP 4), will be fully available during a capacity deficiency.
- While over 1,700 MW of New England generating capacity has been retired since 1999, RSP05 assumes no additional generators will retire during the 10-year planning period.
- The long-run peak load forecasts in RSP05 assumed a constant load factor, which has been found to be inconsistent with historical data and short-term forecasts and has contributed to the under-forecasting of summer-peak loads. The ISO is in the process of improving its peak-forecast methodology by extending its declining summer-peak load factor over the entire forecast period.
- ISONE assumes the current approved levels of tie-reliability benefits are 2,000 MW
- The operable capacity analysis assumed 1,700 MW of operating reserves.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

ISO-NE TRANSMISSION EXPANSION PROJECTS

NYISO 2004 INTERMEDIATE AREA TRANSMISSION REVIEW OF THE NEW YORK STATE BULK POWER TRANSMISSION SYSTEM

PART I: CHARACTERIZATION OF THE STUDY

1. What was the name of the study? 2004 Intermediate Area Transmission Review of the New York State Bulk Power Transmission System (NYSBPTS) (Study Year 2009)

2. Provide the title(s) and completion dates of available report(s) regarding the study: NYISO 2005 Load and Capacity Data; NYISO Annual Transmission Planning And Evaluation Report (FERC Form NO. 715) April 2005

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): **Web address:** <http://www.nyiso.com/public/services/planning/index.jsp>. Report also may be obtained by contacting Steven Corey at scorey@nyiso.com

4. Provide a contact person to obtain project details: name, phone, email: Steven Corey, (518) 356-6134 , scorey@nyiso.com

5. What was the purpose of the study (e.g., what problem was the study intended to address)? The purpose of the study was to determine whether NYISO is in conformance with the Northeast Power Coordinating Council's (NPCC) "Basic Criteria for Design and Operation of Interconnected Power Systems" and the reliability criteria described in the NYSRC Reliability Rules. The study uses power flow and stability analyses to evaluate the thermal, voltage and stability performance of the New York State Bulk Power System for normal (or design) and extreme contingencies as defined in the NPCC and NYSRC reliability criteria and rules.

6. Provide a brief summary description characterizing the study: The study examined the 2004 through 2009 time frame based upon resource and transmission projects permitted or under construction for operation by 2009.

7. What was the geography of the study? The State of New York

8. What was the study period? 2009

9. Describe the study type (such as who initiated the study and why): The Guidelines for NPCC Area Transmission Reviews require each Area to conduct a Comprehensive Review at least every five years and either an Interim Review or an Intermediate Review in each of the intervening years between comprehensive reviews, as appropriate. The most recent comprehensive review of NYSBPTS was presented by NYISO staff in July 2000 and covered the year 2006. Since then, three intermediate reviews were conducted in 2001, 2002 and 2003 covering years 2006, 2007 and 2008, respectively. This intermediate review focuses on year 2009 with an updated forecast of system conditions, including a significant number of proposals for new generation in the New York Control Area (NYCA) since the last intermediate review.

10. Characterize the study participants: The study was conducted under the auspices of the NYISO Transmission Planning Staff for presentation to the NPCC Task Force on System Studies and the New York State Reliability Council. Principal contributors include Eric Allen, Laura Popa, and Thinh Nguyenand.

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: The procedure used to evaluate the performance of NYSBPTS consists of the following basic steps: (1) develop a mathematical model (or representation) of the New York State and external electrical systems for the period of study (in this case, the year 2009), (2) develop various power flow base cases to model the system conditions (load and power transfer levels, commitment and dispatch of generation and reactive power devices) to be tested, and (3) conduct power flow and stability analysis to determine whether or not the transmission system meets NYSRC Reliability Rules and NPCC Basic Criteria for thermal, voltage and stability performance. In actual practice, steps (2) and (3) are interwoven during the conduct of a study, and the detailed procedures differ for the various types of analyses conducted.

For thermal analyses, the contingencies examined include the individual opening of all lines connected between buses with base voltage between 100 kV and 765 kV. Phase angle regulators maintain their scheduled power flow pre-contingency but are fixed at their corresponding pre-contingency angle post-contingency. The general direction of generation shifts is from the North and West to Southeastern New York and New England. When an interface besides the one being studied became limiting, the general shift pattern was modified, within the base case conditions and limitations, to minimize this effect. However, no attempt was made to find the maximum thermal limit based on an ideal shift pattern.

The voltage analysis was conducted using PTI's PSS/E (Rev. 28) in conjunction with the NYISO Voltage Contingency Analysis Procedure (VCAP). VCAP is used to evaluate voltage-based transfer limits in accordance with the NYISO Transmission Planning Guideline #2-0 [8], and with consideration of the Voltage limit criteria (Exhibit A-3 of NYISO Emergency Operation Manual [11], formerly known as OP-1 criteria) which specifies minimum and maximum voltage limits at key NYSBPS buses. The required post-contingency voltage is typically within 5% of nominal. A set of power flow cases with increasing transfer levels was created from the 2009 summer peak load base case. The generation shifts that were employed for VCAP are similar to the ones used for the thermal analysis. These shifts were used to obtain an increase in transfers across the particular interface being studied.

In the stability analysis, three cases were used: two summer peak stability margin cases (margin case and West Central margin case) and a light load case. The UPNY-SENY interface of the margin case is loaded at 6,888 MW. This flow is 11.1% above the more restrictive of the emergency thermal or voltage limit. This case has all Oswego complex generation dispatched at an output of 4,460 MW and 1,180 MW of import from Hydro Quebec using only Beauharnois units. The dynamic representation used in this analysis was developed from the 2003 NPCC Base Case Development library. The real power load models used for various Areas were (1) constant current (power varies with the voltage magnitude) for Hydro Quebec, New Brunswick, MAAC, and ECAR, (2) constant impedance (power varies with the square of the voltage

magnitude) for New York and New England, and (3) 50% constant current/50% constant impedance for Ontario and Nova Scotia. Reactive load was modeled as constant impedance for all Areas except Hydro Quebec, which uses a 13% constant current/87% constant impedance model for reactive load.

For the extreme contingency analysis, each contingency was tested for dynamic stability, voltage, and thermal limits. A total of 38 extreme contingencies including loss of entire substations, loss of entire generation plants, and loss of all circuits along a transmission right-of-way were evaluated. All extreme contingencies start with the same initial conditions. Since extreme contingencies are considered low probability events they were not tested against the peak summer case used for normal contingencies. Instead, a power flow case was developed from the summer peak base case with the load reduced by approximately 20%. The generation dispatch of the NYCA system was modified to obtain transfer levels on the key NYCA interfaces of approximately the 75th percentile of expected maximum transfer levels. In order to test the ability of the system to return to a stable operating point after a disturbance, dynamic simulations are performed.

The study also performed a short circuit (SC) analysis. The SC Guideline requires that all lines, feeders, and generating units be placed in service regardless of whether or not the system can actually be operated that manner. This assumption would provide an adequate design margin of safety and reliability by yielding the worst case, most conservative fault levels. In addition, the SC Guideline requires that Flat Gen voltage profile (pre-fault voltage of 1.0 per unit behind the generator subtransient reactance) be used, 30 degree phase shift in delta-wye transformer configurations be taken into account, and all loads and shunts be ignored. Three phase, two phase to ground, and single line to ground faults were applied at selected substations obtained from the NY transmission and generation owners. The highest of these three faults was compared against the respective station lowest circuit breaker rating to determine whether or not the circuit breaker is overdutied.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? The study did not explicitly define the term "congestion." However, congestion was assumed to be occurring when transfer limits were exceeded with path limits removed. Also, the study examined whether voltage irregularities resulted from equipment being taken out of service.

13. Congestion identified: The thermal analysis results showed that Dysinger East and West Central transfer limits are lower than the 2000 comprehensive review by around 75 MW and 175 MW, respectively. This reduction was due to Russell generation retirement. In addition, the reduction in the closed versions of Dysinger East and West Central interfaces was also due to the change in definition of these interfaces. It is noted that Dysinger East and West Central emergency transfer limits of this year's review could be further reduced by 100 MW and 200 MW, respectively, if the exception of New York Power Pool Operating Policy #1 is recognized by NPCC or NYSRC. The first and second non-BPS limiting facilities are the Lappins Insulator-North Leroy Tap 115 kV line and the Sour114-Mortimer 115 kV line for the loss of Niagara-

Rochester 345 kV line. Sprain Brook Dunwoodie South transfer limits are lower than the previous intermediate review as the results of different generation dispatch. It is noted that Sprain Brook Dunwoodie South transfer limits could potentially be reduced by the Mott Haven project. It was noted that the potential reduction of the thermal limit of the Sprain Brook Dunwoodie South interface could be mitigated by implementing a special protection systems (SPS) device that cross-trips the Dunwoodie-South Bronx 345 kV line for the loss of the South Bronx-Rainey 345 kV circuit or changing the network configuration of South Bronx station. Long Island imports are higher than the previous intermediate review due to the addition of PJM-LI HVdc tie to the Long Island import interface definition. The other intra-area transfer limits were not evaluated because the system conditions near those interfaces have not changed significantly since the previous intermediate review or Flat Rock SRIS. Inter-area limits between New York and Ontario, and New York and New England were not calculated because system conditions near Ontario or New England border have not changed significantly since the previous intermediate review.

For the voltage analysis, the pre-contingency voltage profile of the bulk transmission system was found to be acceptable. OP-1 pre-contingency, normal, and emergency Dysinger East (open) and West Central (open) are somewhat higher than the previous comprehensive review as the results of more local generation being dispatched and the addition of shunt capacitors of the Rochester Transmission project. The voltage collapse points of Dysinger East (open) and West Central (open) are lower than the previous comprehensive review as the results of load growth and Russell generation retirement; however, Dysinger East (open) voltage-constrained transfer limit is still higher than the previous comprehensive review. As in thermal, the voltage-constrained transfer limits of the closed versions of these two interfaces are affected by the addition of the RECO ties to the interface definition. This addition changes the voltage limits across the closed versions of these two interfaces.

The stability analysis showed that for margin and light load cases, all contingencies were stable and damped. However, contingencies involving three-phase faults around the Edic and Marcy 345 kV substations (e.g., fault at Edic resulting in loss of Edic-New Scotland or fault at Marcy resulting in loss of Marcy-New Scotland) appear to adversely impact the Flat Rock Wind project. Investigation of these results revealed that the generator model used to simulate the response of the wind project to these contingencies needs to be modified and updated before these results can be finalized. PTI and GE are in the process of fine tuning and improving the model. Performance results for the Flat Rock wind project will be validated in the Annual Transmission Reliability Assessment.

In the extreme contingency analysis, most of the contingencies simulated were stable and showed no thermal overloads over the STE rating or significant voltage violations or deviations on bulk power facilities. Some contingencies showed voltage violations, significant voltage drops, and/or thermal overloads on the underlying 115 kV subtransmission system, but these conditions were local in nature. Five of the contingencies (EC12, EC30, EC31, EC32, and EC35) showed that Flat Rock project tripped because of overfrequency or undervoltage relay; however, the results of Flat Rock Wind project tripped by the overfrequency relay cannot be finalized because PTI GE wind model needs to be modified and updated.

Based on the short circuit study results, there are eleven stations with overdutied breakers. Of these stations, four are 345kV stations, one is 230 kV station, and six are 138 kV stations

14. Were non-transmission alternatives compared with transmission alternatives?

No.

15. Were new transmission technologies considered? No

16. Describe the most important study assumptions (e.g. fixed hydro dispatch):

One major modification was that all of the Class 2004 projects were dispatched to their maximum output levels (most were initially dispatched at zero output) and the corresponding redispatch required to accomplish this was done in a manner to relieve base case thermal overloads. The other major modification was to set Branchburg-Ramapo, Linden-Goethals, and Hudson-Farragut PAR schedules according to the 2004 Multi-Area Model Working Group (MMWG) schedules.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

PJM REGIONAL TRANSMISSION EXPANSION PLAN 2005

PART I: CHARACTERIZATION OF THE STUDY

1. What was the name of the study? PJM Regional Transmission Expansion Plan September 2005

2. Provide the titles and completion dates of available report(s) regarding the study: N/A

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): Web address: <http://www.pjm.com/planning/reg-trans-exp-plan.html>

4. Provide a contact person to obtain project details: name, phone, email: Transmission Expansion Advisory Committee, 866-400-8980

5. What was the purpose of the study (e.g., what problem was the study intended to address)? The Regional Transmission Expansion Plan (RTEP) is PJM's process to identify transmission system upgrades and enhancements to provide for the operational, economic and reliability requirements of its customers. RTEP applies planning and reliability criteria over a five-year horizon to identify transmission constraints and other reliability concerns. Then, RTEP looks for transmission upgrades and other projects that can mitigate constraints and reliability problems, examining their feasibility, impact and costs.

6. Provide a brief summary description characterizing the study: PJM establishes a baseline for a five-year period from which the need and responsibility for transmission system enhancements can be determined. PJM's approach is to use load flow modeling along with the following to ascertain its transmission planning needs:

- transmission-owner-identified project proposals
- long-term firm transmission service requests
- generation interconnection requests
- generation retirements
- load-serving entity capacity plans
- transmission enhancements to alleviate persistent congestion
- distributed generation and self-generation developments
- demand response and energy efficiency
- proposed merchant transmission projects

7. What was the geography of the study? The PJM Market, which consists of parts or all of the following states: Delaware, Maryland, New Jersey, Pennsylvania, Ohio, West Virginia, Virginia, Indiana, Illinois, Kentucky, and Michigan. A very small area of Tennessee is also included.

8. What was the study period? 2005 to 2010 time frame.

9. Describe the study type (such as who initiated the study and why): As a regional transmission organization (RTO), one of PJM's core functions is to plan for the enhancement and expansion of transmission system capability.

10. Characterize the study participants: PJM's RTEP process is collaborative from start to finish and includes opportunities for stakeholders to help PJM improve the grid. The Transmission Expansion Advisory Committee (TEAC) activities provide the primary forum for the ongoing exchange of ideas, discussion of issues and presentation of planning process results. PJM governing committees such as the PJM Members Committee, Planning Committee and Transmission Owners Agreement Administrative Committee provide additional opportunity for stakeholders to provide process input. PJM ad hoc stakeholder groups are periodically commissioned to address specific issues. Recent groups have addressed such issues as economic planning processes and FERC interconnection rulemakings. Jurisdictional liaisons foster two-way communication and resolution of planning issues with legislative and regulatory bodies.

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: PJM performs a comprehensive load flow analysis of the ability of the grid to meet reliability standards, taking into account forecasted firm loads, firm imports and exports to neighboring systems, existing generation and transmission assets, and anticipated new generation and transmission assets. The baseline reliability assessment identifies areas where the planned system is not in compliance with applicable NERC and regional reliability council (MAAC, ECAR, MAIN or SERC) standards, nuclear plant licensee requirements and PJM reliability standards. The baseline assessment develops and recommends enhancement plans to achieve compliance.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? The study does not explicitly state pre-set criteria that PJM uses for defining congestion. Instead, the study says that PJM determines transmission system reinforcements needed to maintain national and regional reliability standards. These reinforcements are built by transmission owners and paid for by customers in proportion to benefit.

13. Congestion identified: For this October update to the 2005 Plan, the 2010 baseline assessment resulted in the need for transmission upgrades in several transmission zones. Below are the major projects included in the 2005 Plan:

- PSE&G Zone: Convert existing Bergen – Leona 138 kV circuit to 230 kV - \$20 Million; Reconfigure New Freedom substation to provide for an operating spare 500/230 kV single phase transformer - \$6 M
- JCP&L Zone: Install 72 MVAR capacitor at Cookstown - \$1 M
- PECO Zone: Install 570 MVAR of capacitors at Planebrook, Newlinville and Heaton - \$8.2 M
- AE Zone: Installation of new 500 kV substation, new 230 kV substation and new 500/230 kV transformer - \$46 M; Reconductor Union – Corson 138 kV circuit - \$6 M; Install 50 MVAR capacitor at Cardiff - \$2.6 M

- Eastern MAAC Region: Modeling changes provided by the Transmission Owners and identification of specific capacitors locations resulted in the removal of 1000 MVAR of capacitor requirement in 2008 – (\$20 M)
- PEPCO Zone: Install two new Palmers Corner – Blue Plains 230 kV circuits - \$70 M
- AP Zone: Install 450 MVAR SVC at Black Oak 500 kV - \$27 M; Install third Wylie Ridge 500/345 kV transformer - \$12 M
- Met-Ed Zone: Install 230 kV series reactor and 2-100 MVAR PLC switched capacitors at Hunterstown - \$13 M

14. Were non-transmission alternatives compared with transmission alternatives? RTEP integrates alternative bulk power system factors including: distributed generation and self-generation developments and demand response and energy efficiency.

15. Were new transmission technologies considered? No

16. Describe the most important study assumptions (e.g., fixed hydro dispatch): None mentioned.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

PJM TRANSMISSION EXPANSION PROJECTS

MIDWEST ISO (MISO) TRANSMISSION EXPANSION PLAN 2005

PART I: CHARACTERIZATION OF THE STUDY

- 1. What was the name of the study?** Midwest ISO Transmission Expansion Plan 2005 (MTEP 05)
- 2. Provide the title(s) and completion dates of available report(s) regarding the study:** N/A
- 3. Provide the details regarding how to obtain any available reports (Web address if available on internet):** <http://www.midwestmarket.org/page/Expansion+Planning>
- 4. Provide a contact person to obtain project details: Name, phone, email:** Expansion Planning Group (EPG) and the Planning Subcommittee (PS), (651) 632-8400.
- 5. What was the purpose of the study (e.g., what problem was the study intended to address)?** MTEP05's objective is to ensure future system reliability. MISO has been developing a transmission pricing policy and additions to the planning protocol. These initiatives will help promote the development of system expansion needed to relieve constraints and by providing increased certainty to the cost responsibility and recovery for these expansions.
- 6. Provide a brief summary description characterizing the study:** The MTEP 05 report describes the currently recommended transmission needs for the MISO transmission system. MTEP 05 has identified 615 planned or proposed facility additions or upgrades, mainly for reliability purposes, through 2009. From the results of the Baseline Reliability study, MISO expects to be able to perform in accordance with NERC Planning Standards for normal system conditions, events involving loss of a single transmission facility, and for most events involving loss of more than one facility through 2009. This assessment assumes the implementation of MISO planned projects and that proposed projects or suitable alternatives are in place.
- 7. What was the geography of the study?** The MISO Market consists of parts or all of the following states: Montana, North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Illinois, Indiana, Michigan, Ohio, Kentucky, Pennsylvania, and Virginia.
- 8. What was the study period?** MTEP 05 identifies expansion needed for a planning horizon extending through the peak season of 2009.
- 9. Describe the study type (such as who initiated the study and why):** As an independent system operator (ISO), one of MISO's core functions is to plan for the enhancement and expansion of transmission system capability. MISO considers plans for load growth, generator interconnection requests, transmission and service requests, and MISO analyses of reliability and congestion to prepare its expansion plan.

10. Characterize the study participants: The Midwest ISO drafts its regional plan by first collaborating with Transmission Owners. Then, the Midwest ISO staff engages in several stages of stakeholder review of the plan. The plan is reviewed first by the Expansion Planning Group (EPG) and then by the Planning Subcommittee (PS). Next, the results are reviewed with the Organization of Midwest States (OMS) and the Advisory Committee before being presented to the Midwest ISO Board of Directors for approval. Once approved by the Board, the regional plan is implemented in accordance with the Transmission Owners agreement.

11. Describe methods (if any) used in studies to measure the magnitudes of the problem addressed: MISO measures the magnitude of problems addressed in the MTEP by examining the future system performance of the contingency studies of the 2009 planning horizon year. MISO identifies constraints using current operational experience, NERC Transmission Loading Reliefs (TLR), reductions in Available Flowgate Capability (AFC), and Firm Transmission Rights (FTR). Each of these operational issues presents a reliability concern unless a generation redispatch is performed as an operating adjustment to the desired dispatch that would otherwise occur. MISO's philosophy is to seek resolution to these reliability issues in the least cost manner, through either a transmission system switching operation, a generation redispatch, or an expansion to the system. MISO reviewed recent incidence of very low AFC, frequent TLR, or constraints to full FTR allocations and has drawn correlations between Planned and Proposed expansion projects and constraints causing low AFC, high incidents of TLR, or pro-rated FTR allocations. MISO notes that many of the binding constraints are associated with TLRs and low AFC values. The expansions in the MTEP 05 address most of the issues identified.

MISO also uses modeling analyses to measure the extent of its constraints. These analyses include the transmission system's steady-state power flow, dynamic system performance, small-signal perturbation simulation, load deliverability assessment, and voltage-stability.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? MISO uses NERC and regional reliability and planning standards. The Baseline Study was performed in two phases. Phase 1 of the Baseline Reliability Study determined if the planned projects in the current transmission expansion plan provide adequate system reliability. NERC category A, B, and C events were analyzed with steady-state and dynamic stability analysis. Planning criteria violations (thermal overloads and low or high voltage) were flagged using local limit criteria, as Midwest ISO member's systems have been designed to different standards. Load deliverability was determined for control areas in Midwest ISO by calculation of Loss of Load Probability (LOLP) value. Category C events were evaluated for cascading by using a tripping proxy to gauge the severity of the event and if cascading may occur.

Phase 2 of the Baseline Reliability Study added to the Phase 1 model projects that the Transmission Owners have proposed to meet reliability needs through the period. The critical analyses were repeated to determine if the Planned and Proposed projects in the current transmission expansion plan provide adequate system reliability. When Phase 2 of the Baseline Reliability Study was nearing completion, the RSG's reviewed operational issues associated with transmission service requests (TSR) by examining historical transmission line loading relief

(TLR) requests and future available flowgate capacity (AFC) values. Financial Transmission Rights (FTR) allocation binding constraints were also reviewed. Operational issues that will be addressed by the expansion plan were documented. A voltage stability screening of expected 2009 summer peak conditions was performed to determine areas that may have voltage stability issues and which are being further evaluated in continuing studies.

13. Congestion identified: MTEP 05 has identified, through its Baseline Reliability study process, 615 planned or proposed facility additions or enhancements representing an investment of \$2.91 billion through 2009, primarily to maintain reliability.

14. Were non-transmission alternatives compared with transmission alternatives?

The MTEP briefly mentioned that it considers all market perspectives, including demand-side options, generation location, and transmission expansion alternatives. No detail was provided on how these alternatives were considered.

15. Were new transmission technologies considered? Not mentioned.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch):

- MISO's baseline study uses MAPP member data from the MAPP 2003 Series model and SPP member data from the most recent SPP Series model.
- Baseline Reliability study includes planned transmission system upgrade projects in the Baseline models for Phase 1 of the analysis. Previous planning studies have demonstrated the need for these projects;
- Phase 2 of the analysis includes and any new proposals in the model to address outstanding issues identified in Phase 1.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

MISO TRANSMISSION EXPANSION PROJECTS

SOUTHEASTERN ELECTRIC RELIABILITY COUNCIL (SERC) TRANSMISSION PLANNING SUMMARY

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study: Reliability Review Subcommittee's 2005 Report to the SERC Engineering Committee

2. Provide the title(s) and the completion dates of available report(s) regarding the study: Subregional assessments referenced in report. These assessments are summaries primarily based on the FERC Form 715s submitted by the member companies:

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): The SERC form for ordering reports can be found at <http://www.serc1.org/Pages/DocumentDisplay.aspx?FN=SERC/SERC%20Publications/OrderPublications/publication.html>

To receive FERC Form 715s can be obtained only after completing a Critical Energy Infrastructure Information request. Instructions for this request can be found at <http://www.ferc.gov/help/how-to/file-ceii.asp>

4. Provide a contact person to obtain project details: name, phone, email: Rod Hardiman, SERC Reliability Review Subcommittee, (205) 257-6407

5. What was the purpose of the study (e.g., what problem was the study intended to address)? The Southeastern Electric Reliability Council (SERC) was created to strengthen the reliability of bulk power supply in the areas served by its member systems. The report provides an opportunity for SERC systems their concerns on current and future matters which may adversely affect the reliability of bulk power systems. The report documents the extent members are keeping other members informed on reliability matters and the coordination of expansion plans in the Region. Studies that have been made to determine the adequacy of interconnections between SERC systems and the contiguous Regions are reported.

6. Provide a brief summary description characterizing the study: The SERC Reliability Review Subcommittee (RRS) uses subregional studies results to assess the reliability of the bulk transmission system. Additionally, the RRS reviews the SERC member data submitted as part of the annual Energy Information Administration's (EIA) Form 411 to determine the adequacy of the Region's planned resources to meet projected demands.

7. What was the geography of the study? The SERC region covers all or part of Virginia, North Carolina, South Carolina, Georgia, Alabama, Louisiana, Mississippi, Tennessee, Kentucky, Arkansas, Missouri, Iowa, Oklahoma, and Florida. Entergy, Southern, TVA, and VACAR represent the major transmission areas covered by the study.

8. What was the study period? 2005 to 2014

9. Describe the study type (such as who initiated the study and why): SERC began conducting audits of its members in 2002 to examine the processes members use to demonstrate compliance. 2004 represented the end of the first three-year cycle in 2004. The cycle restarted in 2005.

SERC recognizes the need for regional review of reliability matters on a continuing basis. The member systems provide staff to performing system studies for the Region. Joint system studies also are conducted under a number of inter-regional and intra-regional coordination agreements.

10. Characterize the study participants: The Reliability Review Subcommittee (RRS) of the SERC Engineering Committee (EC) annually reviews and assesses the overall reliability (adequacy and security) of the SERC Region bulk electric systems. The review helps ensure that SERC members are meeting the NERC and regional reliability standards. As part of the review, SERC considers both existing and planned projects. The assessments consider a period of at least ten years into the future.

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: The SERC does not have staff performing system studies for the Region; instead, the member systems provide this function. The SERC report indicates that members follow the NERC Reliability Standards for assessing system performance under a variety of conditions. SERC members conduct a variety of independent studies on a continuing basis to assess the reliability of their respective transmission systems. The subregional sections below describe the various types of transmission reliability studies conducted on a periodic basis by the SERC member systems:

- Entergy conducts short-range and long-range area planning studies to determine the improvements on its transmission facilities. These planning studies are performed annually by the Technical System Planning group. Studies include load-flow, transient stability, and voltage stability studies.
- Southern subregion members participate in SERC VAST seasonal operating studies that determine the regional transmission system's performance. The studies identify critical facilities that may limit inter-area transfers and establish the inter-area transfer limits among VAST system members. Southern also participates in VST system studies which are similar to the VAST system studies except that the study horizon is normally four to five years ahead. The Southern Company and FRCC members also conduct a Joint Planning Study was to determine the Total Transfer Capability between the Southern Control Area and Peninsular Florida for both Southern to Florida and Florida to Southern transfers.
- TVA performs transmission planning studies on an annual basis to evaluate a ten-year planning horizon. TVA participates in joint studies with neighboring Regions and subregions to assess inter- and intra-regional power transfer capabilities. TVA routinely participates in the MAIN-ECAR-TVA (MET), VACAR-AEP-Southern-TVA-Entergy (VAST), and VACAR-Southern-TVA-Entergy (VST) studies. Internally, TVA also conducts daily, weekly, and monthly operational planning studies (current day to 13 months) on a routine schedule to assess specific transmission outage requests and calculate Total Transfer Capabilities (TTC). Special

studies are performed on an as needed basis to address specific transmission system reliability concerns.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? Screening studies are used to find areas that have a potential risk for voltage collapse. A typical criterion is that the MW load of the system must be at least 5% below the collapse point, or the nose, of the P-V (voltage versus load) curve. The P-V curve graphs voltage versus load. An overly optimistic calculation of security margin is obtained when P-V curve analysis is used for a system with no contingencies.

Other screenings using V-Q curves (voltage versus reactive power) are also used to identify areas that have a low voltage stability margin. In this method the voltage stability margin is calculated by the distance to the minimum point on the V-Q curve and is measured in terms of MVARs.

Members also conduct stability studies to support the NERC Reliability Standards must consider different categories of disturbance severity.

13. Congestion identified: Entergy lists 26 projects that are slated between the 2005 and 2014 time frame required to relieve congestion for current and projected areas of constraint. Alabama power lists 3; Dominion Virginia Power lists 5; Georgia Power lists 17; Georgia Transmission lists 20; Mississippi Power lists 2; Municipal Electric Authority of Georgia lists 2; Progress Energy lists 3; Savannah Electric and Power list 1; South Carolina Public Service Authority lists 5; South Mississippi Power Association lists 6; and Tennessee Valley Authority lists 2. The list of congestion specifying congestion elements is deemed Critical Energy Infrastructure Information and cannot be accessed without SERC's consent.

14. Were non-transmission alternatives compared with transmission alternatives? No.

15. Were new transmission technologies considered? None mentioned.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch): Specific study assumptions were not provided.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

TENNESSEE VALLEY AUTHORITY (TVA) ANNUAL TRANSMISSION PLANNING AND EVALUATION REPORT 2004

PART I: CHARACTERIZATION OF THE STUDY

- 1. Provide the name of the study:** Tennessee Valley Authority (TVA) Annual Transmission Planning and Evaluation Report 2004
- 2. Provide the title(s) and the completion dates of available report(s) regarding the study:**
N/A
- 3. Provide the details regarding how to obtain any available reports (Web address if available on internet):** This document is a FERC Form 715. FERC Form 715s can be obtained only after completing a Critical Energy Infrastructure Information request. Instructions for this request can be found at <http://www.ferc.gov/help/how-to/file-ceii.asp>
- 4. Provide a contact person to obtain project details: name, phone, email:** James T. Whitehead – Manager, Transmission Planning Department; (423) 751-3913; jtwhitehead@tva.gov
- 5. What was the purpose of the study (e.g., what problem was the study intended to address)?** FERC Form 715s are requirements by the FERC. They are intended for a firm, utility, RTO, or ISO to assess the reliability of its transmission system.
- 6. Provide a brief summary description characterizing the study:**
- 7. What was the geography of the study?** The TVA region includes Tennessee and parts of Mississippi, Alabama, Georgia, North Carolina, Virginia, and Kentucky.
- 8. What was the study period?** Study examines peak summer and winter conditions and off-peak spring and fall loading for the next 10 years.
- 9. Describe the study type (such as who initiated the study and why):** TVA performs power flow, stability, and fault analyses of the TVA network
- 10. Characterize the study participants:** TVA Transmission Planning Department
- 11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed:** TVA's uses power flow, stability, and fault analyses to analyze the TVA network.
- 12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)?** TVA is a member of the North American Electric Reliability Council (NERC) and SERC. TVA's planning practices incorporate the concepts of the NERC Planning Standards

and SERC supplements to the Standards. These NERC Standards and SERC supplements are available from the NERC and SERC offices, respectively.

13. Congestion identified: Not available for CEII reasons.

14. Were non-transmission alternatives compared with transmission alternatives? No.

15. Were new transmission technologies considered? Not mentioned.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch): Specific study assumptions were not provided.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

ENTERGY ANNUAL TRANSMISSION PLANNING AND EVALUATION REPORT 2004

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study: Entergy Annual Transmission Planning and Evaluation Report 2004

2. Provide the title(s) and the completion dates of available report(s) regarding the study:
N/A

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): This document is a FERC Form 715. FERC Form 715s can be obtained only after completing a Critical Energy Infrastructure Information request. Instructions for this request can be found at <http://www.ferc.gov/help/how-to/file-ceii.asp>

4. Provide a contact person to obtain project details: name, phone, email:

Kham Vongkhamchanh
Supervisor, Transmission Planning (Technical System Planning)
639 Loyola Avenue
L-MOB-18C
New Orleans, LA 70113
(504) 310-5812 / kvongkh@entergy.com

5. What was the purpose of the study (e.g., what problem was the study intended to address)? FERC Form 715s are requirements by the FERC. They are intended for a firm, utility, RTO, or ISO to assess the reliability of its transmission system.

6. Provide a brief summary description characterizing the study:

7. What was the geography of the study? The Entergy region includes parts or all of Arkansas, Louisiana, Texas, and Mississippi.

8. What was the study period? The study examines peak summer, fall, and spring conditions and winter conditions through 2013

9. Describe the study type (such as who initiated the study and why): The study defines areas of constraint based on power flow, thermal, and voltage stability analyses.

10. Characterize the study participants: Entergy Transmission Planning Group

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: Entergy uses thermal electric systems, voltage, and stability limits to analyze the Entergy network.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? Entergy is a member of the North American Electric Reliability Council (NERC) Planning Standards, and Southeastern Reliability Council (SERC). Entergy's planning practices therefore incorporate the concepts of the NERC Planning Standards and SERC supplements to the Standards. These NERC Standards and SERC supplements are available from the NERC and SERC websites, respectively.

13. Congestion identified: Not available for CEII reasons.

14. Were non-transmission alternatives compared with transmission alternatives? No

15. Were new transmission technologies considered? Yes

16. Describe the most important study assumptions (e.g. fixed hydro dispatch): Specific study assumptions were not provided

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

SOUTHWEST POWER POOL (SPP) EXPANSION PLAN 2005 – 2010

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study: Southwest Power Pool (SPP) Expansion Plan 2005 – 2010, September 14, 2005

2. Provide the title(s) and the completion dates of available report(s) regarding the study:
N/A

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): http://www.spp.org/Doc_Results.asp?Group_id=527

4. Provide a contact person to obtain project details: name, phone, email: Ronnie Frizell, Chairman of the Transmission Working Group, (501) 570-2433,

5. What was the purpose of the study (e.g., what problem was the study intended to address)? The SPP RTO Expansion Plan is divided into two phases. Phase I of the SPP RTO Expansion Plan focuses on reliability needs, and Phase II weighs market needs related to an economic expansion plan. Study results are being coordinated with other entities responsible for transmission needs assessment and planning.

Phase I is intended to provide an independent assessment of expansion plans required by SPP in order to meet NERC, regional and local planning standards. The study will review the summer peak conditions for 2005 through 2010. Major projects recommended through the reliability assessment are also being evaluated for 2013 summer peak conditions to verify the long-term effectiveness of these projects.

Phase II of the SPP RTO Expansion Plan addressed potential transmission projects that may be justified based on the expected economic benefits. The market assessment is intended to provide an independent market evaluation of potential transmission expansion projects that offer the greatest return on investment. The goal of Phase II is to have transmission installed that will economically alleviate congestion. SPP measures its potential projects by determining whether the savings from reduced congestion exceed the costs of transmission upgrades.

6. Provide a brief summary description characterizing the study: Phase I addresses reliability violations and recommends projects to meet planning standards. A market assessment was conducted during Phase II to determine potential projects for system reinforcement. Potential projects were identified from a variety of resources including stakeholder feedback, review of past transmission line loading relief, refused long-term transmission reservations and suggestions from summit participants. Thirty three projects were screened. The top four with the best cost to benefit ratio were considered. These projects were further studied by doing complete seasonal economic runs for 2005 and 2010.

7. What was the geography of the study? The SPP region includes part or all of New Mexico, Texas, Oklahoma, Kansas, Missouri, Arkansas, and Louisiana.

8. What was the study period? 2005 to 2010

9. Describe the study type (such as who initiated the study and why): SPP has been involved in regional planning for decades. SPP as an RTO is responsible for planning and for directing or arranging necessary transmission expansions, additions and upgrades that will enable it to provide efficient, reliable and non-discriminatory transmission service. SPP began the initial RTO expansion planning process in late 2003. The SPP RTO expansion planning process is open and collaborative using regional planning summits to present the process, discuss results, and collect feedback. A variety of parties attend the regional planning summits – regulators, SPP transmission owners, transmission owners from other regions, members of the Wind Coalition, load serving entities, consulting firms and independent system operators.

The SPP Transmission Working Group (TWG) has designed a formal process for planning and expansion for market solutions to relieve congestion. SPP works with state regulatory agencies and legislators and coordinates with programs of existing regional transmission groups to ensure that the regional planning process addresses all needs.

10. Characterize the study participants: The Transmission Working Group (TWG) has been assigned primary responsibility for the regional planning process. The TWG consists of both transmission owning and non-transmission owning members. SPP stakeholders are encouraged to actively participate in the regional planning process to ensure that the recommended expansion plans are the best solutions in and around the SPP footprint.

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed:*Phase 1*

Contingency analyses were performed for facilities above 100 kV, all generators in SPP, Associated Electric Cooperative, Inc. (AECI) and Entergy. Contingency analyses were also performed for facilities above 230 kV in SPP's first tier control areas as well as other first tier companies. Modeled facilities 69 kV and above were monitored for overloads and voltage violations in SPP. SPP monitored Entergy and AECI facilities above 100 kV plus other first-tier companies with 230 kV and above.

SPP solicited input from stakeholders and transmission owners to list potential stability simulations. Stability analyses were performed on the more severe Categories C and D outages. Knowing that stability analysis requires a great deal of time and resources, SPP staff requested the help of SPP stakeholders at TWG meetings to prioritize the list of stability simulations.

A basic three-phase fault study was performed on locations where system improvements were proposed. Results were shared with transmission owners to determine whether further fault studies are required. It is important to note that breaker replacements, due to an increase in fault currents, have not been included in the final list of SPP expansion projects.

Phase II

The projects include proposed and exploratory transmission projects provided by transmission owners and not used in Phase I, projects proposed by stakeholders, projects from breakout groups at the Planning Summit III, projects developed after reviewing transmission line loading relief history and projects after reviewing rejected transmission service. Thirty-three projects were included in the screening process.

The steps for the screening process include:

- 1) Rank the list of potential transmission projects
- 2) Used a typical week from July 2005 to run ProSym
- 3) Base MarketSym run made for 2005 with the OPF area including SPP and first tier companies
- 4) Change case created for each project on the list of potential transmission projects
- 5) MarketSym run made for each change case
- 6) Comparing the base case to the change case, the total dispatch savings (dispatch cost plus violation cost) extracted
- 7) 10-year savings estimated by calculating the savings over the summer period and assuming the yearly savings is twice the summer savings
- 8) Present worth of the future savings over a 10-year period calculated using an eight percent discount rate
- 9) Estimated cost developed for each project
- 10) Ratio number calculated by dividing the estimated dispatch savings by the cost of the project
- 11) Projects ranked by the ratio (Note: the ranking method used was solely for screening purposes)
- 12) List of projects presented in an open SPP TWG meeting for comments (List of screened projects can be found in Appendix C)

Based on project ranking, SPP staff recommended the top four that yielded the highest cost-benefit ratio, which are listed below in response to question 13.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)?

Contingency Simulations

Transmission facilities in the SPP footprint along with first tier companies were tested using NERC Table 1A guidelines, SPP reliability criteria, and transmission owner reliability criteria. If a transmission owner has more restrictive criteria than the SPP or NERC criteria, SPP will perform the analysis using the transmission owner's criteria.

13. Congestion identified:

The top four projects are as follows:

- Tulsa East Switching Station
- Sooner-Cleveland 345 kV line
- Rose Hill-Sooner 345 kV line
- Tolok-Potter 345 kV line

Detailed analysis of the four projects showed that the projects each have approximately 10-year return on investment. The Sooner-Cleveland 345 kV line had the best cost to benefit ratio. Summit participants showed interest in all four projects. A proposed economic upgrade process was presented at the Regional Planning Summit IV.

14. Were non-transmission alternatives compared with transmission alternatives? No.

15. Were new transmission technologies considered? Not mentioned.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch):

The report did not state any assumptions for Phase I analysis.

For the Phase II economic modeling analysis, SERC used the following assumptions in the Global Energy MarketSym package, which utilizes the PowerWorld load flow program:

- SPP region is modeled as 19 transmission areas encompassing the 17 tariff control areas
- Public Service Company of Oklahoma (PSO) and Southwestern Electric Power Company (SOEP) are dispatched as a single control area (AEPW)
- Oklahoma Municipal Power Authority (OMPA) loads are distributed within Oklahoma Gas and Electric (OGE), PSO/AEPW and Western Farmers Electric Coop (WFEC) transmission areas
- Arkansas Electric Cooperative Corporation loads are aggregated with other loads at buses within Entergy, SOEP and SWPA systems
- A portion of Grand River Dam Authority (GRDA) loads are embedded in the Associated Electric Cooperative, Incorporated (AECI) system
- Simulation of every other hour in a typical week to represent a month
- Control area peak load forecast based on SPP Energy Information Administration (EIA) 411 report and other information analyzed and documented by Henwood staff
- Peak loads are modeled based on total internal demand as reported by utilities
- Hourly load shapes are based on 'typical year' representation derived by Henwood from multiple years of historical data

- Interruptible loads reported in EIA 411 are modeled as dispatchable resources in ProSym
- More than 95% of total generation capacity of the optimal power flow (OPF) area is explicitly identified and mapped
- Thermal generator forced outage rates and equivalent schedule outage rates are estimated for classes of generators from NERC Generating Availability Data System (GADS) data reported through the year 1999
- The ProSym 'Converged Monte-Carlo' technique is used for forced outage rate
- Natural gas price estimates are generally tied to Henry Hub price
- Fuel oil prices are generally tied to NYMEX future prices
- Unit commitment/dispatch by ProSym
- Unit commitment by control area
- Spinning reserve requirement - 2% of load
- Regulation and load following - 3% of load
- Non-spinning requirement – 2% of load
- Must-run units modeled in SPS
- Additional must-run units will be modeled as information becomes available
- AC optimal power flow (AC is used to incorporate losses and VAR flows)
- Calculates nodal prices
- Monitor branches > 100 kV
- Monitor all flowgates > 100%
- Flowgate operating range for violation cost 0-2% (Penalty of \$45 per MW per hour)
- Flowgate operating range for violation cost > 2% (Penalty of \$90 per MW per hour)
- Branches or transformers above normal rated capacity (Penalty of \$30 per MW per hour)
- Hurdle rates
 - Between SPP areas - \$2
 - Between SPP and First Tier - \$5
- \$4 added to offer curves for independent power producers

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

SPP Transmission Expansion Projects

INTERREGIONAL STUDIES

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study:

- MAAC-ECAR-NPCC MEN Interregional Transmission System Reliability Assessment: Summer 2005
- MEN Interregional Transmission System Reliability Assessment: Winter 2005/06
- VACAR-ECAR-MAAC (VEM) Interregional Transmission System Reliability Assessment: Summer 2005
- VEM Interregional Transmission System Reliability Assessment: Winter 2005/06

2. Provide the title(s) and the completion dates of available report(s) regarding the study: N/A

3. Provide the details regarding how to obtain any available reports (Web address if available on internet):

These documents are considered Critical Energy Infrastructure Information. They may be obtained only after receiving permission from Reliability First.

4. Provide a contact person to obtain project details: name, phone, email: <http://www.rfirst.org>.

5. What was the purpose of the study (e.g., what problem was the study intended to address)?

The studies examine First Contingency Incremental Transfer Capability (FCITC) and First Contingency Total Transfer Capability (FCTTC) for selected transfers that may occur simultaneously among, or through, the regions. In addition, the studies provide a transmission appraisal of the member regions.

6. Provide a brief summary description characterizing the study:

The studies' objective is to identify corridors of the Bulk Power System where limits may be present for wide-area transfers under emergency and non-emergency conditions.

7. What was the geography of the study?

- *MEN*: The borders of MAAC (Pennsylvania, New Jersey, Maryland, Delaware), ECAR (Indiana, Ohio, Kentucky, West Virginia, Michigan, Pennsylvania), and NPCC (Ontario, Quebec, New York, Vermont, New Hampshire, Maine, Nova Scotia, Prince Edward Island Massachusetts, Rhode Island, Connecticut)
- *VEM*: The borders of VACAR (Virginia, North Carolina, South Carolina), ECAR (Indiana, Ohio, Kentucky, West Virginia, Michigan, Pennsylvania), and MAAC (Pennsylvania, New Jersey, Maryland, Delaware).

8. What was the study period?

- Summer 2005
- Winter 2005/2006

- 9. Describe the study type (such as who initiated the study and why):** These studies were created for reliability reasons to examine transfer limits between regions.
- 10. Characterize the study participants:** Members of the transmission working groups for each region
- 11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed:** Studies performed power flow, thermal analysis, and voltage stability.
- 12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)?** NERC and regional reliability standards are used for defining areas of congestion.
- 13. Congestion identified:** Not available for CEII reasons.
- 14. Were non-transmission alternatives compared with transmission alternatives?** No.
- 15. Were new transmission technologies considered?** No.
- 16. Describe the most important study assumptions (e.g. fixed hydro dispatch):** Assumes all transmission facilities are in service and all operational procedures are used when analyzing single element contingencies.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

ECAR AND MAIN SUMMER 2005 AND WINTER 2005/2006 ASSESSMENTS

PART I: CHARACTERIZATION OF THE STUDY

1. Provide the name of the study:

- East Central Area Reliability (ECAR) Council 2005 Summer Assessment of Transmission System Performance
- ECAR 2005/06 Winter Assessment of Transmission System Performance
- Mid-America Interconnected Network (MAIN) 2005 Summer Assessment of Transmission System Performance
- ECAR 2005/06 Winter Assessment of Transmission System Performance

2. Provide the title(s) and the completion dates of available report(s) regarding the study:

N/A

3. Provide the details regarding how to obtain any available reports (Web address if available on internet): As of January 1, 2006, ECAR and MAIN are part of Reliability First. These documents are considered Critical Energy Infrastructure Information. They may be obtained only after receiving permission from Reliability First.

4. Provide a contact person to obtain project details – name, phone, email:
<http://www.rfirst.org>.

5. What was the purpose of the study (e.g., what problem was the study intended to address)? These semiannually studies assess their respective bulk transmission systems. The assessments provide insight into the expected performance of the bulk transmission system and identify potential transmission constraints under a wide range of system conditions for the upcoming peak load season.

Note: The MAIN studies also provide interregional appraisals for MAIN-ECAR-TVA, MAIN-MRO-SPP, and MAIN-SERC WEST. The purposes of these interregional studies are similar in nature to the VEM and MEN studies discussed previously.

6. Provide a brief summary description characterizing the study: The studies define areas of constraint based on power flow, thermal, and voltage stability analyses.

7. What was the geography of the study?

- ECAR Indiana, Ohio, Kentucky, West Virginia, Michigan, and Western Pennsylvania
- MAIN: Wisconsin, Illinois, Iowa, Minnesota, and Missouri

8. What was the study period?

- Summer 2005
- Winter 2005/2006

9. Describe the study type (such as who initiated the study and why): The reports are designed to provide Reliability Coordinators, Transmission Operators, and Transmission Planners with an indication of where transmission constraints are anticipated for the upcoming peak load season.

10. Characterize the study participants: ECAR and MAIN Transmission System Performance Working Groups (TSPWG)

11. Describe methods (if any) used in studies to measure the magnitude of the problem addressed: Studies performed power flow, thermal analysis, and voltage stability.

12. What criteria and metrics did the study use when defining congestion and a solution (Indicate the metric used for measuring congestion, e.g. hourly LMP or annual production cost savings)? NERC and regional reliability standards are used for defining areas of congestion.

13. Congestion identified: Not available for CEII reasons.

14. Were non-transmission alternatives compared with transmission alternatives? No.

15. Were new transmission technologies considered? No.

16. Describe the most important study assumptions (e.g. fixed hydro dispatch): None mentioned.

PART II: CHARACTERIZATION OF PROPOSED PROJECTS

Project list considered Critical Energy Infrastructure Information (CEII).

Task 2



**Eastern Interconnection Modeling
Summary of Results and Analytical Approach
A Report to the US Department of Energy**



INTERNATIONAL

**DOE Congestion Study: Task 2
March 15, 2006
Revised April 28, 2006
Second Revision July 12, 2006**

Task 2 Project Team

CRA International

- Alex Rudkevich
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- Minghai Liu
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University of Illinois at Urbana Champaign

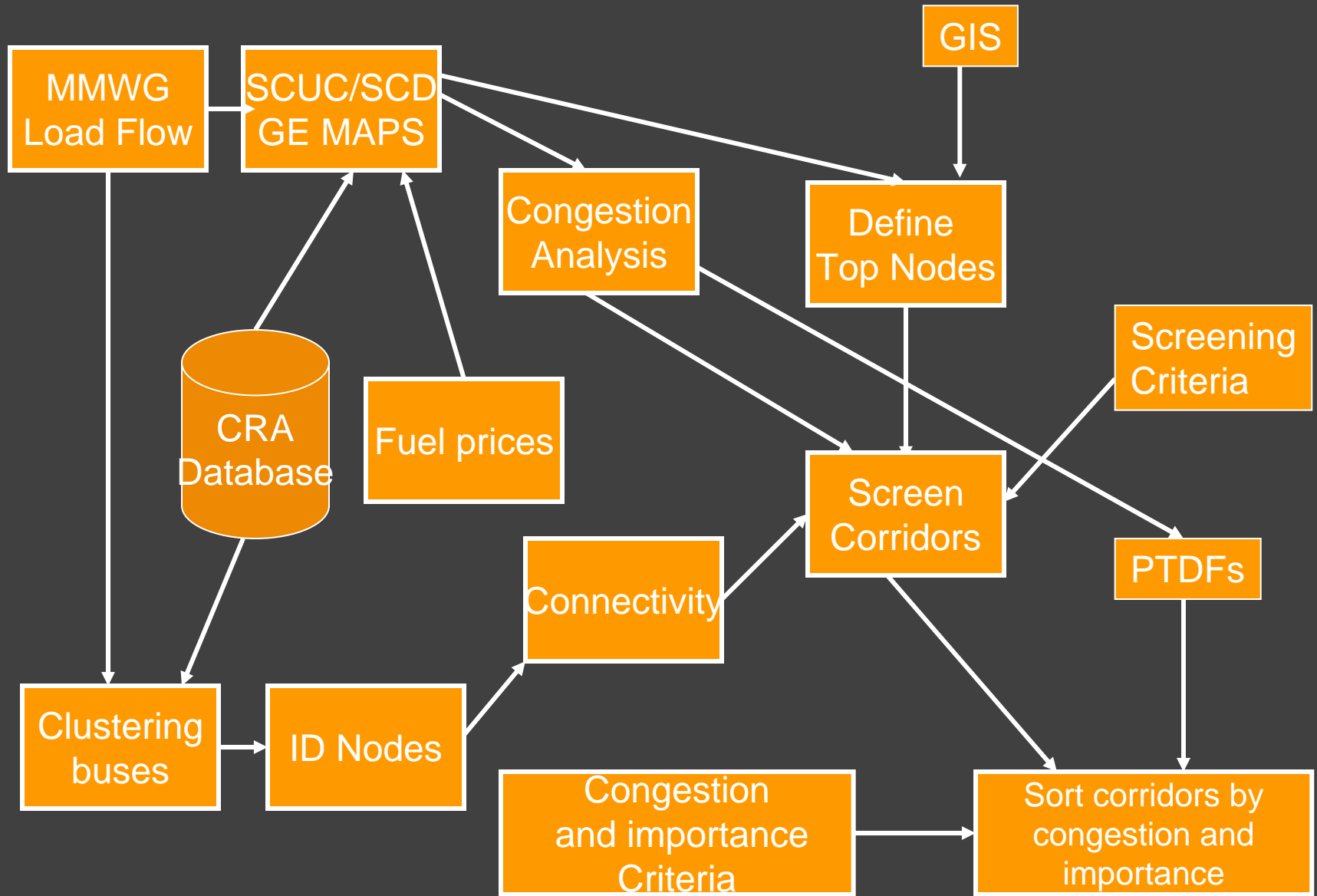
- Professor Thomas J. Overbye

Outline

- Objectives of Task 2
- Analytical Steps
- Scenarios
- **Step 1. Hourly simulations of Eastern Interconnection using GE MAPS**
 - Key Assumptions and Data Sources
 - Findings
- **Step 2. Defining key end markets for corridors**
 - Clustering analysis and results
 - Simulation results for major Nodes
- **Step 3. Defining corridors**
 - Connectivity
 - Pairing source Nodes with sink nodes
 - Flowgates and corridors
- **Step 4. Analysis of congestion of corridors**

Task 2 Objectives

- **Conduct a detailed simulation analysis of the Eastern Interconnection with the primary focus on the performance of the transmission system**
- **Identify major points of transmission congestion**
- **Develop a practical definition for modeling purposes of a transmission corridor and use it to identify major corridors within Eastern Interconnection**
- **Develop quantitative indicators of congestion and relative importance of major corridors and compute these indicators for identified corridors**



Analytical Steps

- **Step 1 – conduct an 8760-hour simulation of Eastern Interconnection using GE MAPS. Perform congestion analysis of transmission constraints/flowgates using simulation results**
- **Step 2 – define key end markets (nodes) for corridors, apply simulation results to nodes and compute major indicators for nodes**
- **Step 3 – define corridors as pairs of connected nodes, screen for corridors of interest**
- **Step 4 – Use PTDFs and GE MAPS results to establish a relationship between flowgates and corridors; measure corridor congestion; sort corridors by congestion and importance indicators**

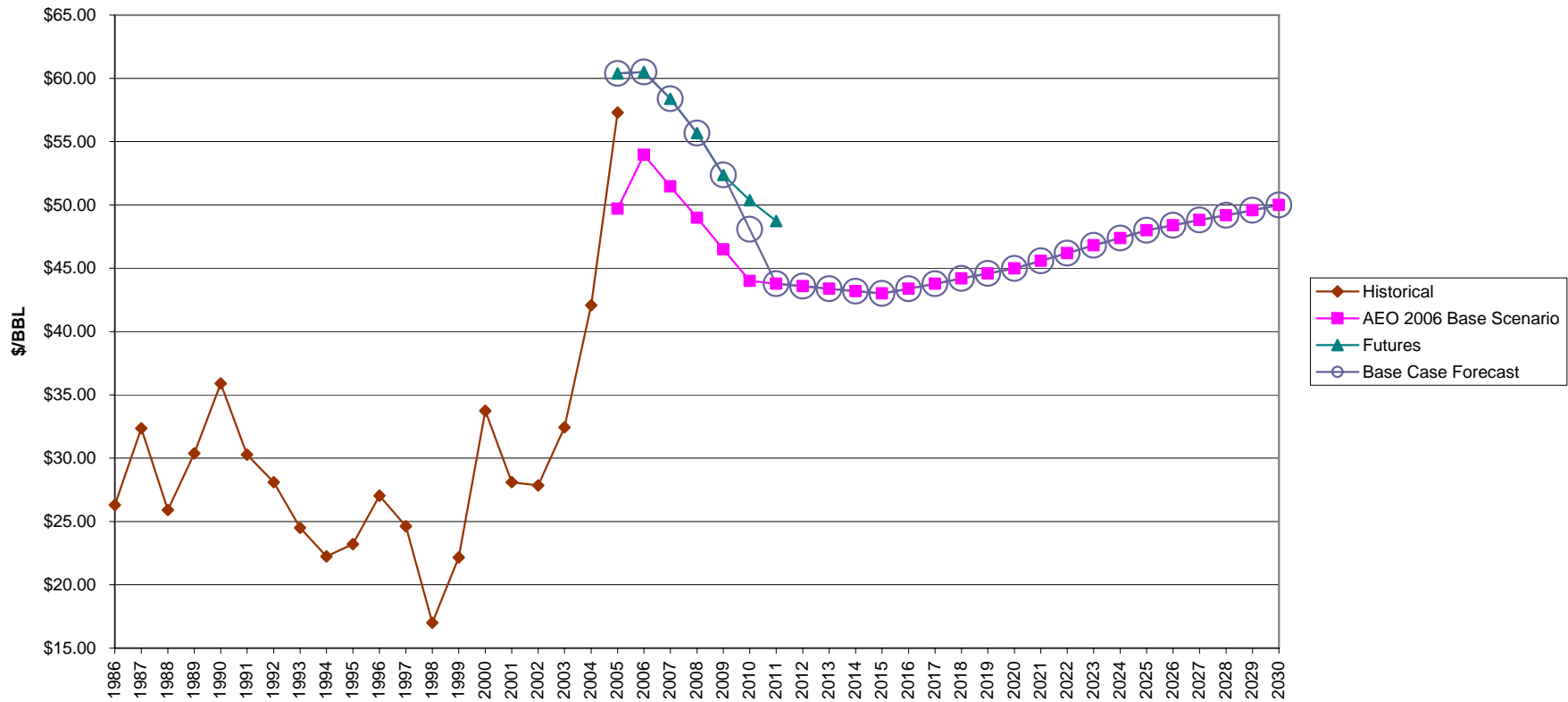
Scenarios

- **CRA performed congestion analysis of Eastern Interconnection for two study years: 2008 and 2011 with major emphasis placed on year 2008. Analysis for 2011 is rather indicative due to substantial uncertainty in future developments of the Eastern Interconnection system**
- **For each year, CRA performed simulations under three fuel scenarios:**
 - Base Case Scenario
 - High Fuel Price Scenario
 - Low Fuel Price Scenario
- **The key objective in considering alternative fuel scenarios is to assess the impact of fuel price on absolute and relative changes of congestion in various parts of the Eastern Interconnection**
- **Details of fuel price scenarios are provided in Appendix 7**

Crude Oil Price Forecast: Base Case

(Futures are as of November 3, 2005)

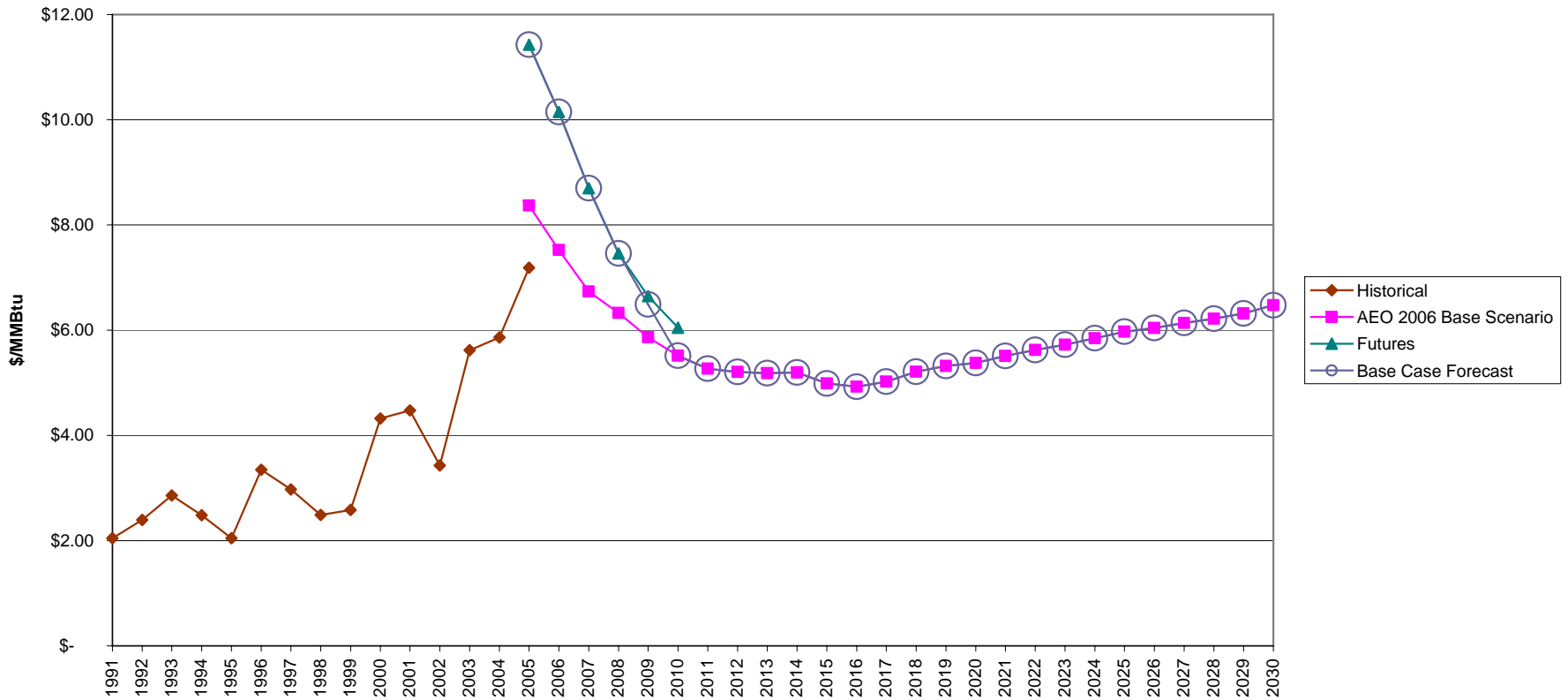
Figure 1: Crude Oil Prices: History and Basis Forecast (2004\$/BBL)



Natural Gas Price Forecast: Base Case

(Futures are as of November 3, 2005)

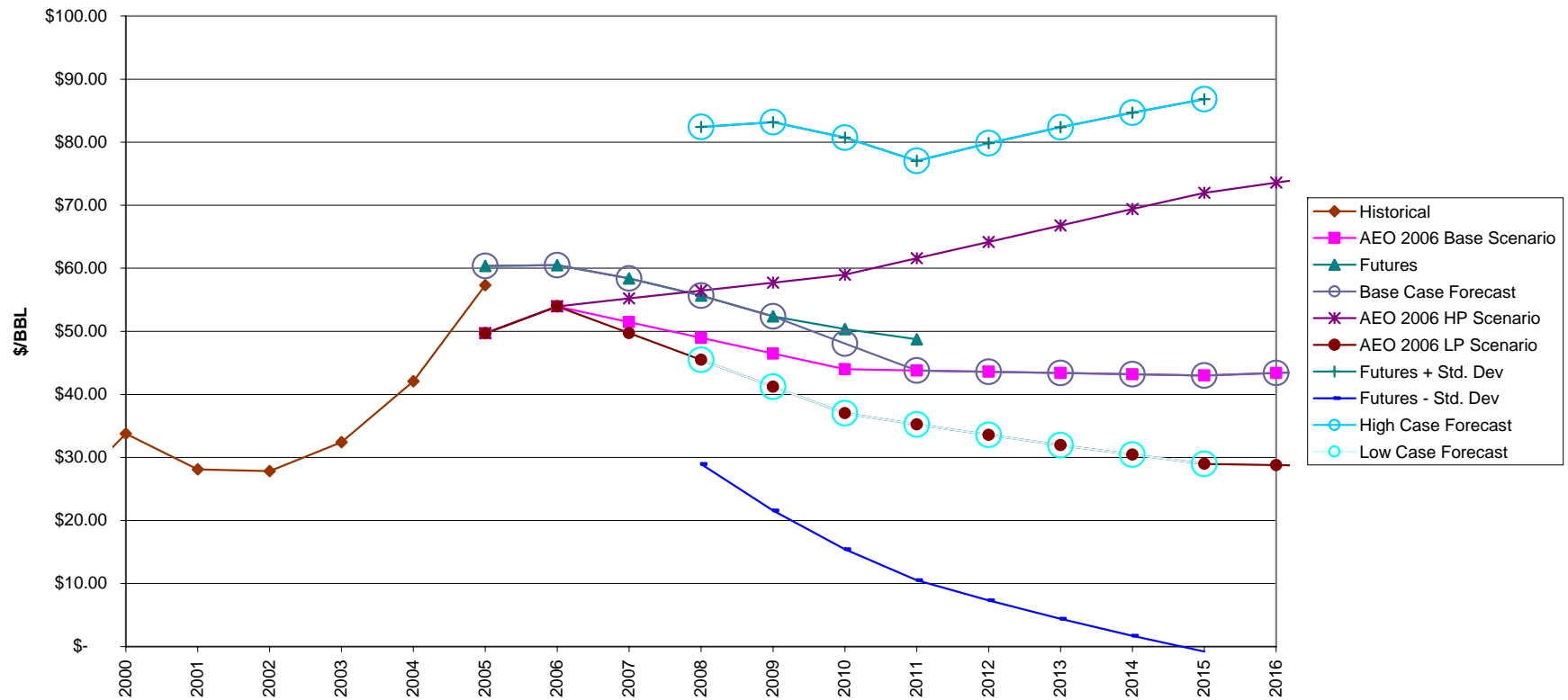
Figure 2: Natural Gas Spot Prices at Henry Hub: History and Basis Forecast (2004\$/MMBtu)



Crude Oil Forecast Scenarios

(Futures are as of November 3, 2005)

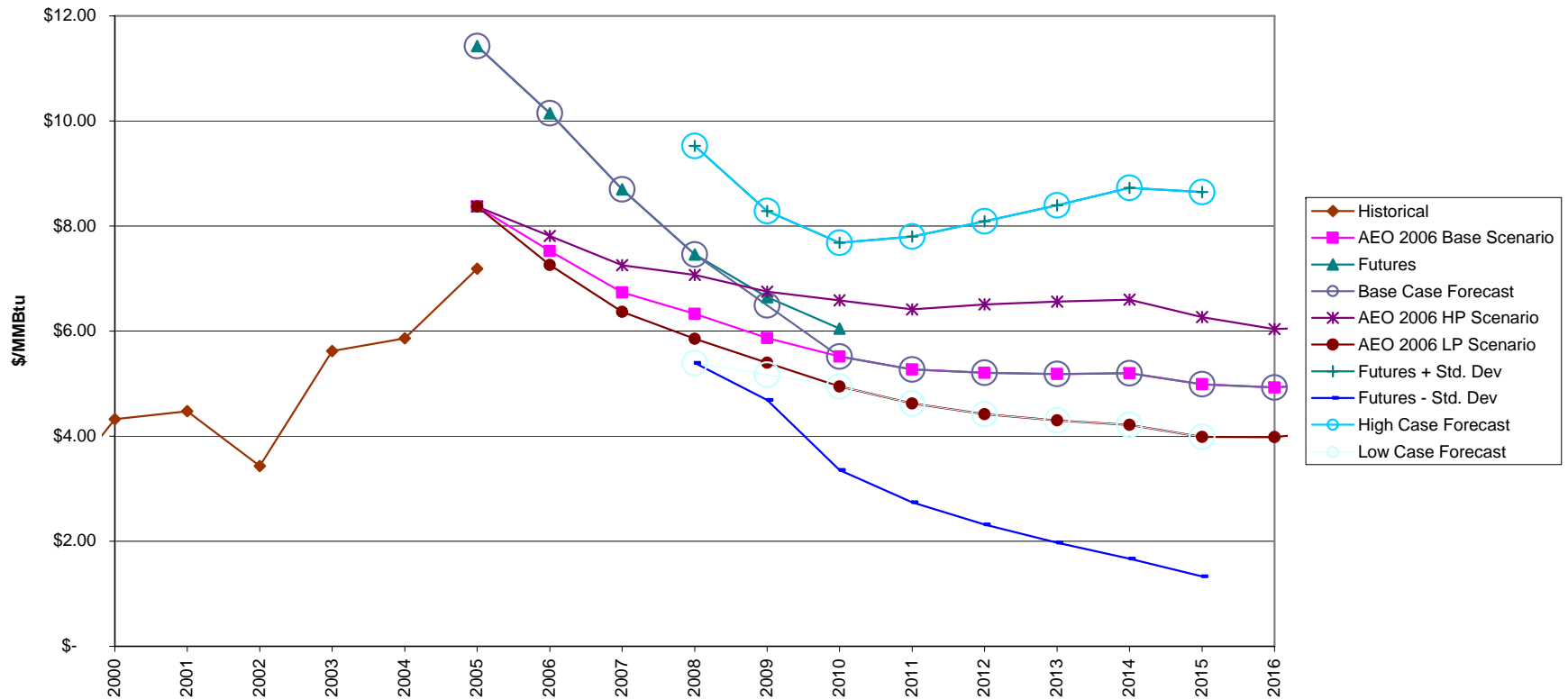
Figure 3: Crude Oil Prices: History and Various Projections (2004\$/BBL)



Natural Gas Price Forecast Scenarios

(Futures are as of November 3, 2005)

Figure 4: Natural Gas Spot Prices at Henry Hub: History and Various Projections (2004\$/MMBtu)





Simulation Analysis of Congestion in Eastern Interconnection



INTERNATIONAL

Step 1

Step 1. 8760 Simulations of Eastern Interconnection using GE MAPS: Data Sources and Assumptions

- **Load data:**
 - For each load serving entity GE MAPS requires an hourly load shape and an annual forecast of peak load and total energy.
 - Loads for forecast years are scaled based on these parameters. Load shapes are drawn from hourly actual demand for 2002, as published in FERC Form 714 submissions and on the websites of various Independent System Operators (ISOs) and NERC reliability regions.
 - Peak load and annual energy forecasts are taken from the most recent data available in FERC Form 714 submissions (2004) and from forecast reports published by ISOs and NERC regions (2005)
- **Generator data:**
 - The CRA generation database reflects unit-specific data for each generating unit based on a wide variety of sources. In cases where unit-specific data is not available, representative values based on unit type, fuel, and size are used.
- **Capacity additions and retirements**
 - In the 2008 simulation, CRA adds new generation based on projects in development or advanced stages of permitting, as indicated by trade press announcements, trade publications, environmental permit applications, and internal knowledge. CRA also adds generic capacity as required to maintain resource adequacy per installed capacity reserve margins published by various ISOs and NERC regions. Most additions were made for the 2011 scenario.
- **Environmental Regulations**
 - CRA models NO_x and SO₂ emission rates for all units where such data is available. In addition, CRA models compliance with various allowance trading programs, and attempts to capture the effect of future environmental regulations. All existing plant emission rates are drawn from the Emissions Scorecard published by the US Environmental Protection Agency. Emission rates for NO_x and SO₂ are obtained from industry futures, in particular those published by the Cantor Environmental Brokerage. In this analysis CRA uses allowance trading prices based on futures for the 2008 simulations. For the 2011 simulations, CRA uses the allowance price forecast applied by the Energy Information Administration in developing the 2006 Annual Energy Outlook.
- **Marginal Cost Based Pricing**
 - All generation units are assumed to bid marginal cost (opportunity cost of fuel plus non-fuel VOM plus opportunity cost of tradable permits). It is reasonable to assume that the real markets are not perfectly competitive and thus the model tends to underestimate the prices in the real markets.
- **Refer to Appendix 6 for details on data sources and input assumptions**

Transmission System Representation

- **The CRA model is based on load flow cases provided by the NERC Multiregional Modeling Working Group (MMWG). This analysis uses the MMWG 2005 series load flow cases for the summer of 2007 and the summer of 2010. The Cross-Sound and Neptune high voltage DC cables are added to these cases. Apart from these DC cables, no transmission upgrades are added apart from those included in the MMWG cases**
- **CRA explicitly modeled the US portion of Eastern Interconnection and Ontario. Flows across boundaries with other Canadian markets were modeled using historical data**
- **Monitored constraints originate in the following sources:**
 - The NERC flowgate book.
 - The list of flowgates published by the Midwest ISO on their website.
 - A list of flowgates provided by the Southwest Power Pool.
 - FERC Form 715 filings, seasonal transmission assessment reports, and studies published by NERC regions and Independent System Operators.
 - Regional Transmission Expansion Plan (RTEP) reports published by various ISOs.
 - The 2004 Intermediate Area Transmission Review published by the New York ISO.
 - The CP-10 Working Group report (2004) by the Northeast Power Coordinating Council.
 - Contingency analyses performed by General Electric and by CRA.
 - Historically binding constraints monitored by CRA.

Monitored constraints

- **GE MAPS has a limit of up to 5000 constraints it can monitor for**
- **The initial set of constraints CRA collected for the analysis from various sources was well in excess of that limit**
- **First, redundant constraints were eliminated**
- **Next, CRA performed a series of simulations with full representation of constraints on one part of the system and partial representation of constraints in other parts of the system to identify constraints that were least likely to bind and therefore could be eliminated from the analysis**
- **Monitored constraints included known interfaces, single monitored lines as well as numerous contingency constraints**
- **Monitored limits were based on thermal or voltage or stability considerations**
- **Limits for thermal constraints were set based on thermal ratings identified in the MMWG load flow case for monitored lines**
- **Voltage or stability limits were obtained from planning and operational studies where available**

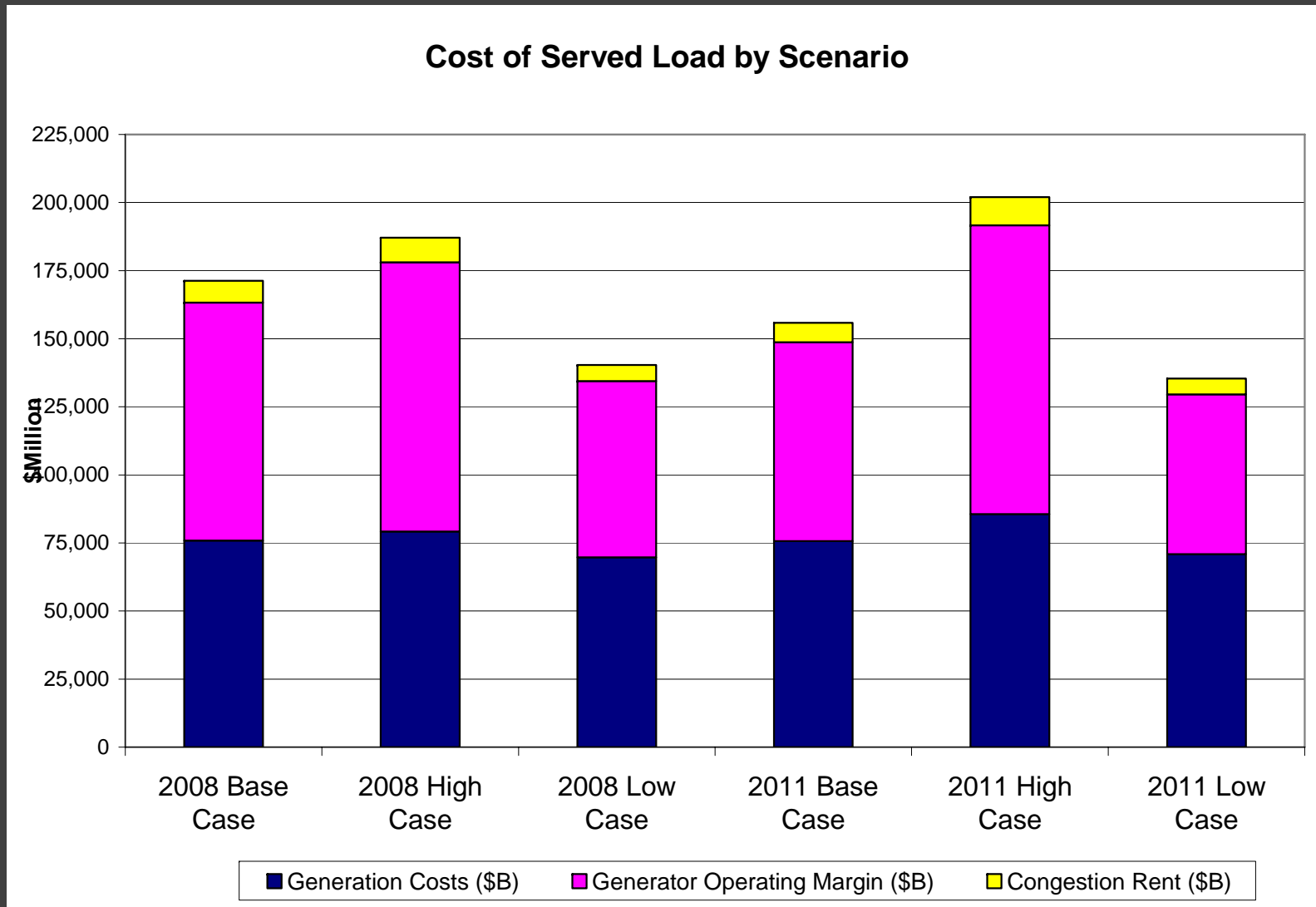
Indicators of Congestion Applied to Flowgates

- **Binding Hours:** Number of hours (or % of time annually) the flowgate was binding
- **U90:** Number of hours (or % of time annually) the flowgate was loaded in excess of 90% of its limit
- **All-hours shadow price:** average shadow price over all hours in a year
- **Binding hours shadow price:** average shadow price over hours during which the flowgate was binding
- **Congestion rent:** shadow price times flow times number of hours the flowgate is binding

Cost of Served Load and Congestion Rent

- **We define the wholesale cost of served load as the total amount loads pay for power (wholesale price times energy adjusted for transmission losses)**
- **If wholesale prices in the system are defined as locational marginal prices, then**
 - In absence of transmission congestion, cost of served load is equal to payments due to generators
 - When transmission system is congested, the cost of served load (based on prices at load locations) always exceeds the payment due to generators (based on prices at generator locations)
- **System-wide congestion rent represents the difference between the cost of served load and payments due to generators for energy they inject**
- **On the other hand, this system-wide congestion rent is equal to the sum of congestion rent of all individual constraints computed as the product of the shadow price times the flow on each constraint**
- **As graphically shown on the next slide, cost of served load could always be presented as a sum of three components:**
 - Variable generation cost
 - Generator operating margin (payments to generators less variable generation costs)
 - Congestion rent

Congestion Rent in the Context of Total Cost of Served Load (includes US portion of Eastern Interconnection and Ontario)



Summary of Simulation Results (US portion of Eastern Interconnection and Ontario)

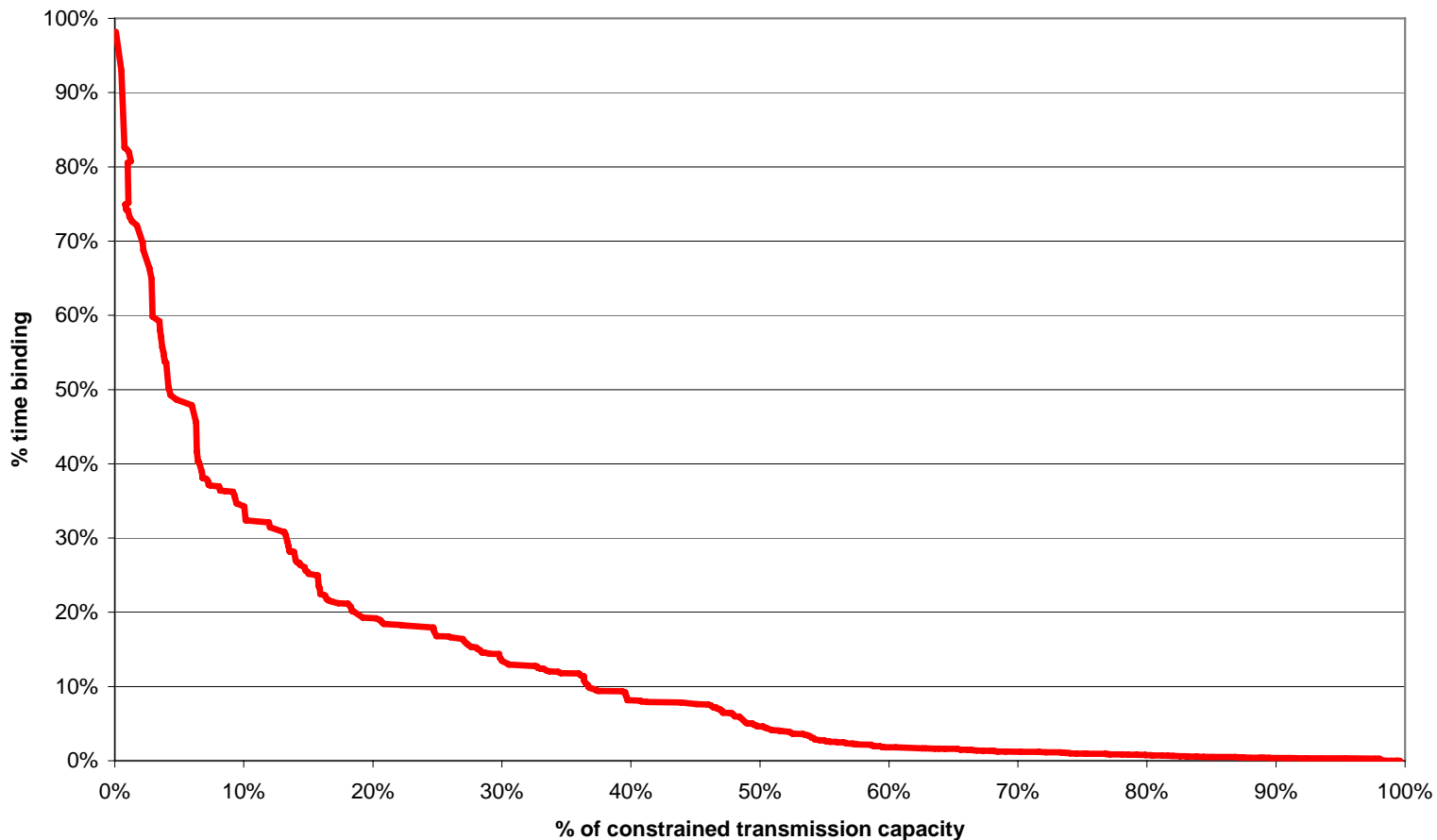
	2008 Base Case	2008 High Case	2008 Low Case	2011 Base Case	2011 High Case	2011 Low Case
Generation Costs (\$B)	75,888	79,189	69,663	75,681	85,640	70,883
Generator Operating Margin (\$B)	87,347	98,830	64,778	73,069	106,013	58,648
Congestion Rent (\$B)	8,090	9,064	5,924	7,044	10,311	5,809
Total generation (TWh)						
	3,224	3,223	3,225	3,381	3,378	3,378
Installed summer capacity (GW)						
	737			759		
Total non-coincident peak (GW)						
	632			667		

Several observations regarding Base Case results

- **10% of constrained flowgate capacity binds more than 3000 (35% of the time) hours a year**
- **10% of constrained flowgate capacity operates above 90% of the limit for over 4900 (57% of the time) hours**
- **46% of constrained flowgate capacity experience all-hours average shadow prices above \$1.00/MWh;**
- **10% show all-hours congestion prices above \$10/MWh**
- **20% of constrained flowgate capacity account for 60% of congestion rent**
- **42% of constrained flowgate capacity account for 90% of congestion rent**

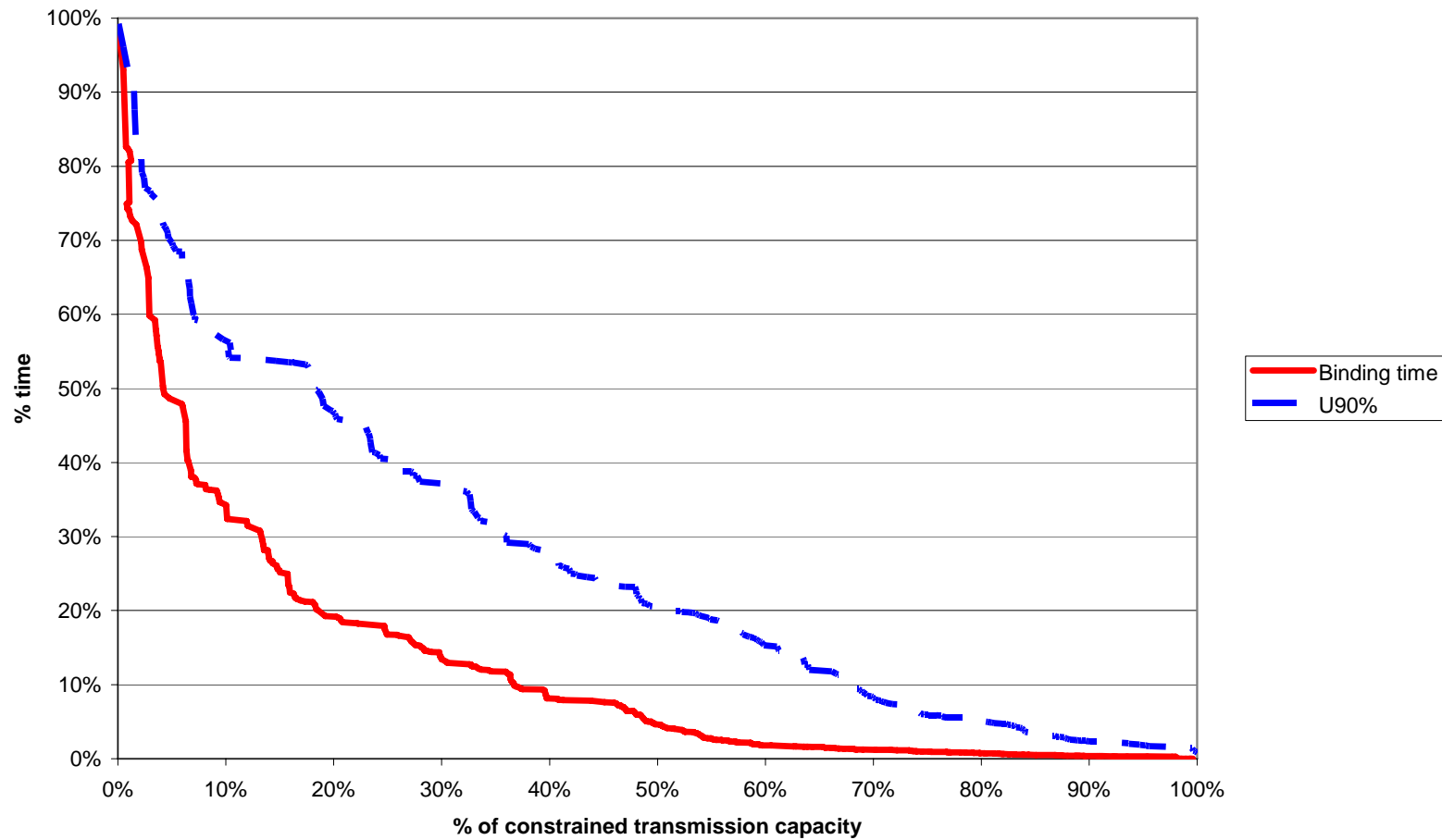
Flowgates: Distribution of Binding Hours

Eastern Interconnection
Base Case 2008: binding time vs. constrained transmission capacity



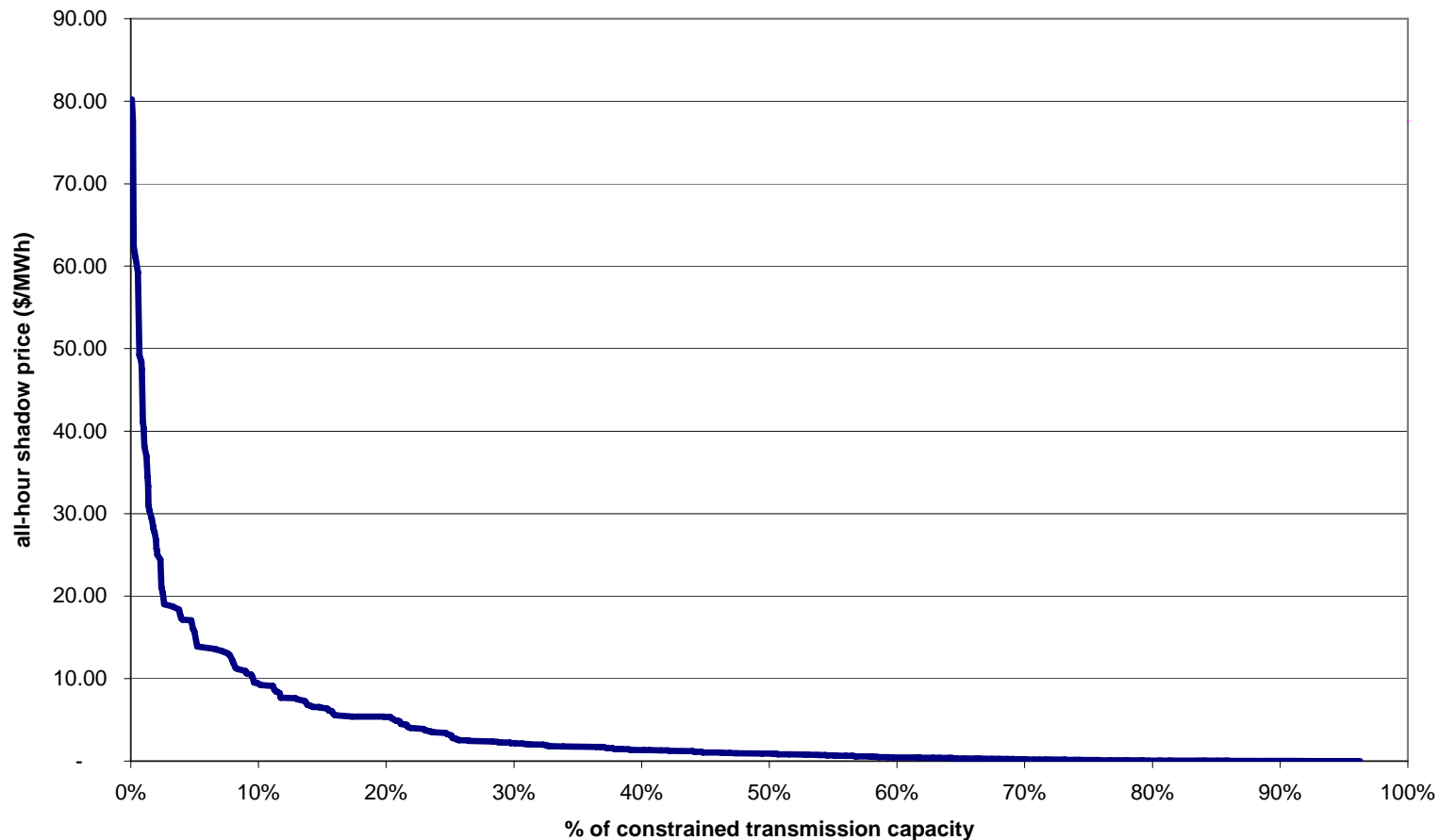
Flowgates: Distribution of Binding Hours and U90

Eastern Interconnection
Base Case 2008: binding time and U90% vs. constrained transmission capacity

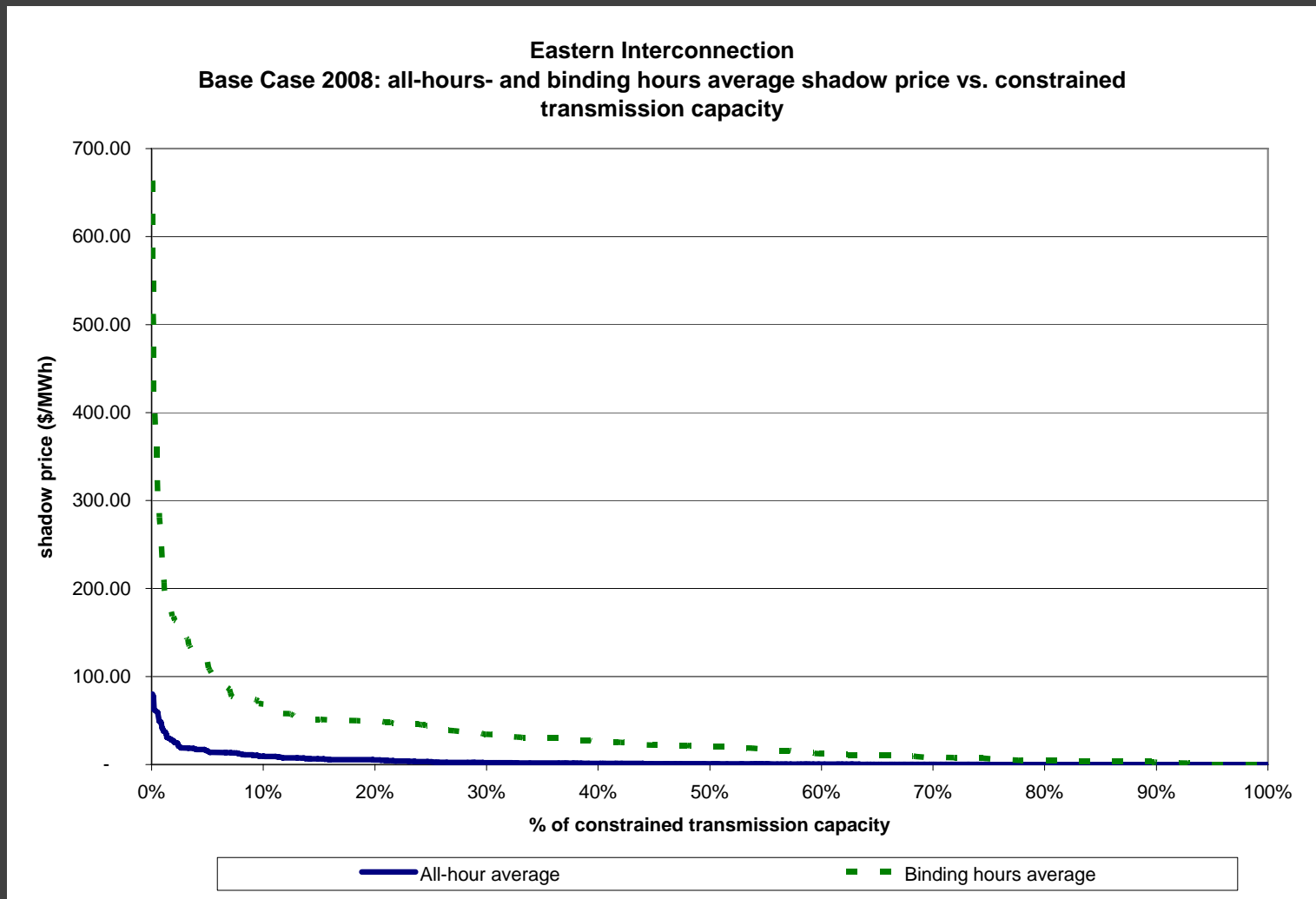


Flowgates: Distribution of All-hours Congestion Price

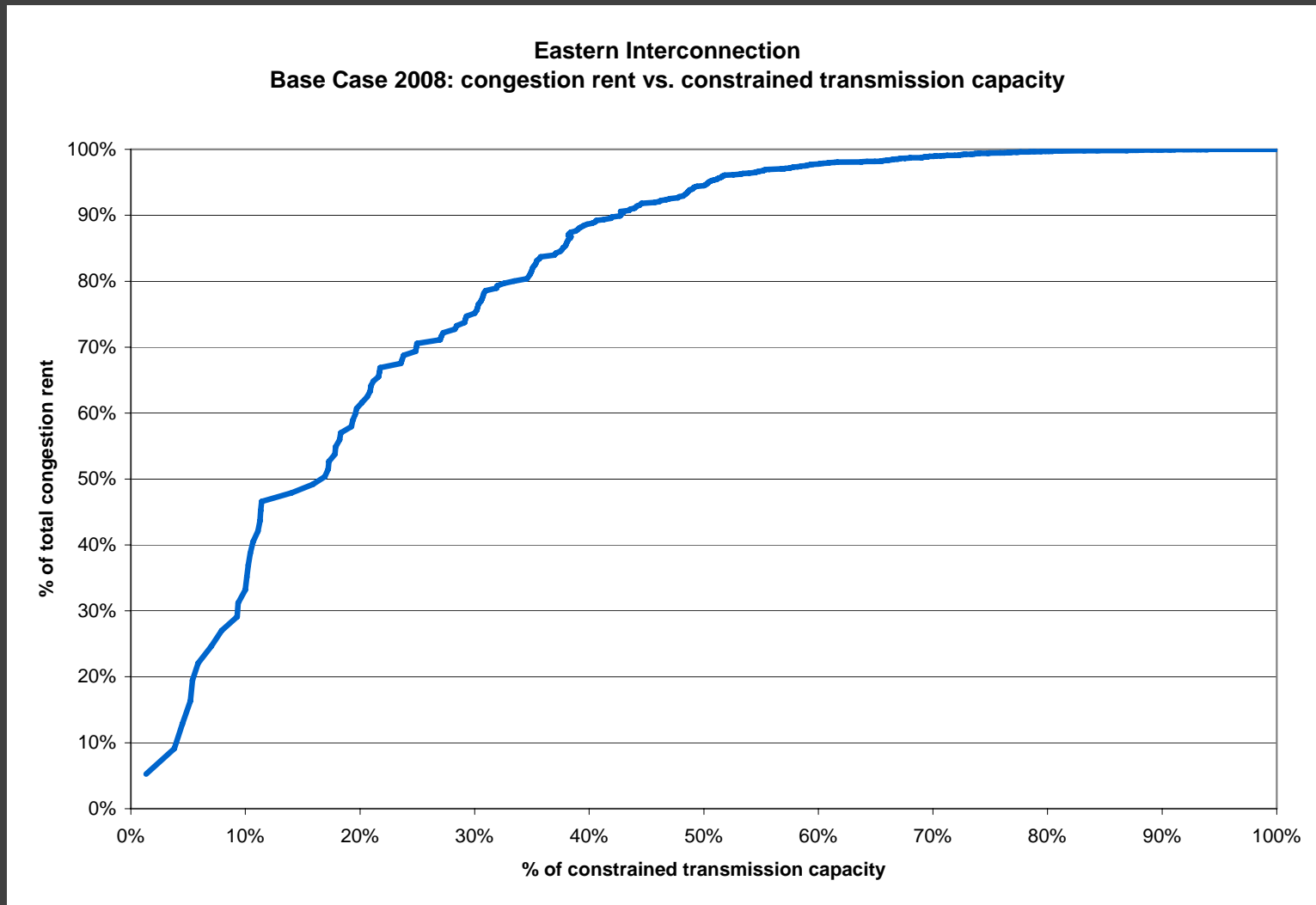
Eastern Interconnection
Base Case 2008: all-hours average shadow price vs. constrained transmission capacity



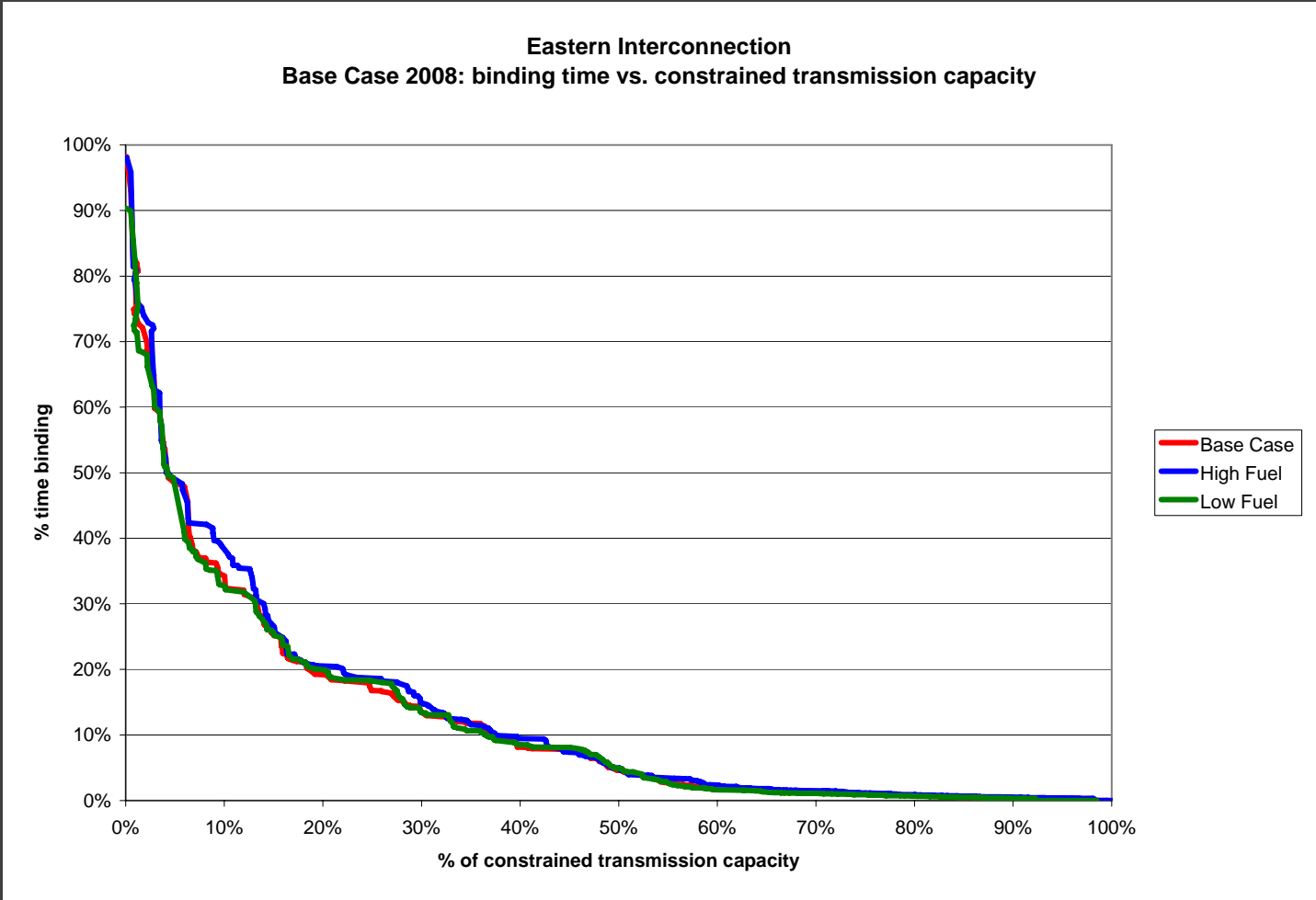
Flowgates: All-hours and Binding Hours Congestion Price



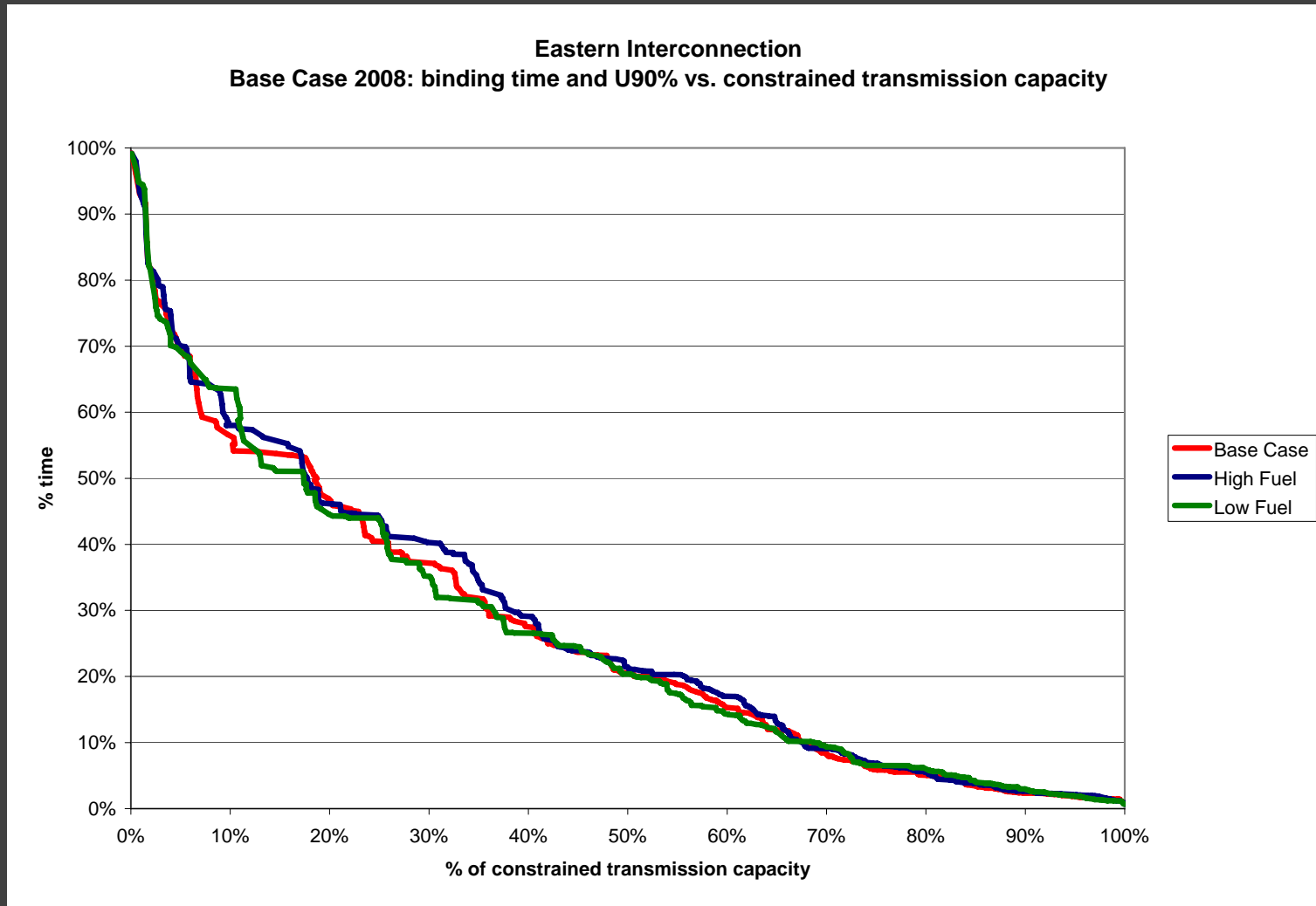
Flowgates: Cumulative Distribution of Congestion Rent



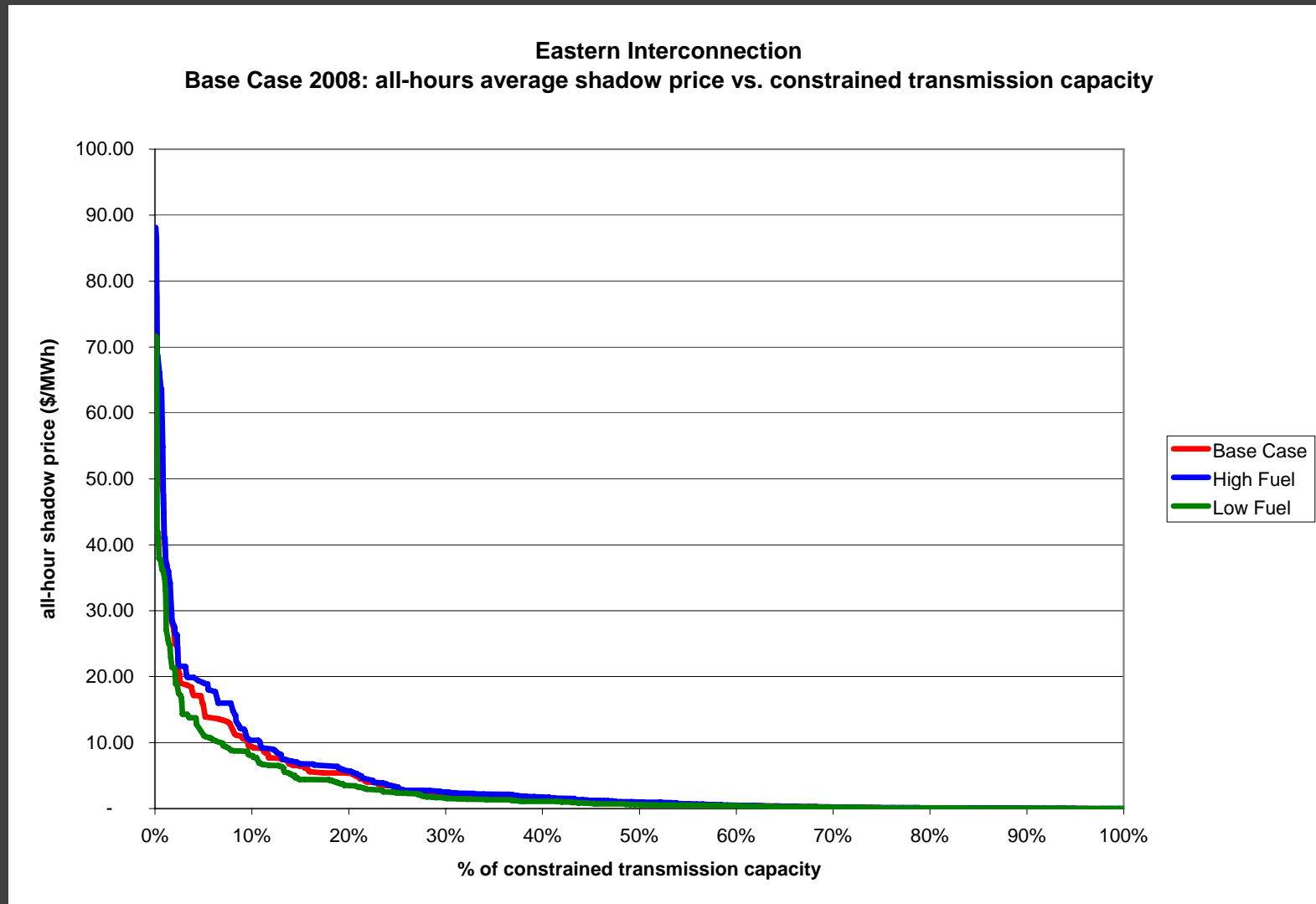
For constraints that bind over 10% of the time distribution of binding time appears sensitive to fuel prices



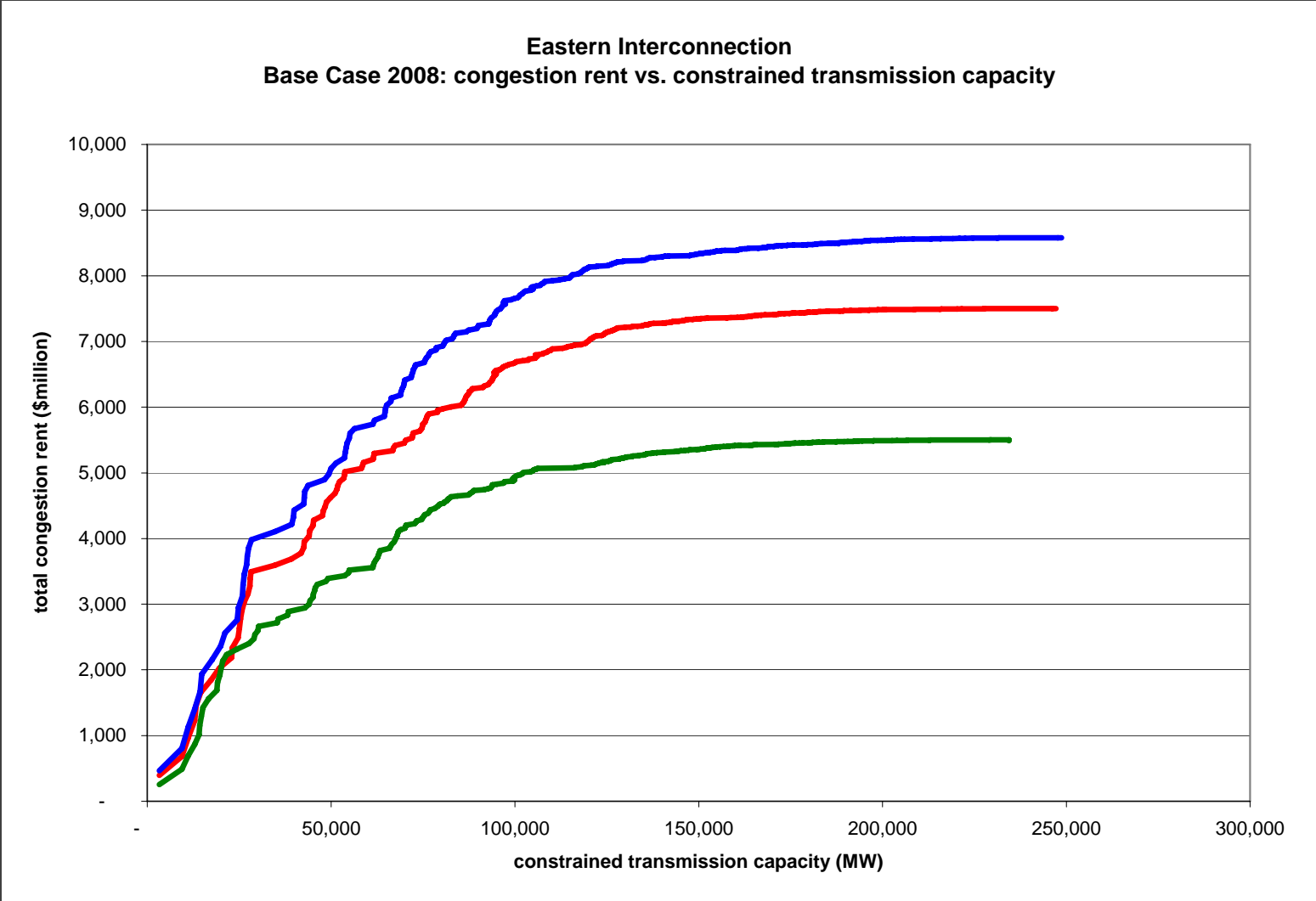
For constraints with U90 over 25% distribution of U90 is quite sensitive to fuel prices



Shadow prices are very sensitive to fuel prices



Congestion rent is very sensitive to fuel prices



Developing a list of top flowgates

- **Selected 100 top flowgates in each category:**
 - 100 highest binding hours
 - 100 highest U90
 - 100 highest shadow price
 - 100 highest congestion rent
- **Merged this list into a set of 171 flowgates – top flowgates of 2008 base case**
- **Obtained the top flowgate list for each of the 5 other scenarios (high/low fuel 2008, base/high/low fuel 2011) using similar approach**
- **The top flowgates of 2008 base case are shown below by market area, with their appearance in top flowgate lists of other scenarios indicated by color coding**

Developing a list of top flowgates (cont'd)

- We identified 118 flowgates (shown below in white) that appear on the top list in all six scenarios. These are most chronic and persistent constraints in Eastern Interconnection, because they appear under all fuel scenarios and not resolved by planned transmission upgrades between 2007 and 2010
- We also identified 19 flowgates (shown in yellow) which are on the top list in the 2008 Base Case but not on the top list either in the High Fuel or Low Fuel scenarios in the same year
- Finally, we identified 34 flowgates (shown in blue) that are on the top list in 2008, but no longer on the top list in 2011. Presumably, transmission upgrades embedded in the 2010 MMWG case alleviate congestion on these 34 constraints

Top New England constraints with overall ranking by category

Interties with Hydro Quebec and New Brunswick were modeled using historical flow data and congestion across these interties was not analyzed

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	32	18	16	88
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	104	10	10	92
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	223	96	48	205
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	234	13	8	195
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	105	140	96	206

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in NYISO area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO	NYPP	NYPP	2	73	44	30
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	9	49	43	45
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO	NYPP	NYPP	25	27	18	71
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	31	19	53	82
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	34	54	54	167
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	41	12	12	95
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	43	57	56	144
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	44	116	117	190
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	67	5	3	120
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	70	25	20	40
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	79	2	2	127
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	85	58	38	41
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	88	7	5	76
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	100	124	73	52
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	112	53	6	177
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	114	80	86	220
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	117	17	11	98
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	123	89	146	93
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	130	136	92	97

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in NYISO area with overall ranking by category (cont'd) (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	137	15	9	67
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	187	32	39	160
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	357	3	180	356
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	360	65	34	358
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	365	23	366	365
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	368	64	370	368
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	371	86	371	371
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	372	94	373	372
14 I/F WEST CENTRAL CLOSE H	NYISO	NYISO	NYPP	NYPP	56	165	148	172
14 I/F WEST CENTRAL CLOSE L	NYISO	NYISO	NYPP	NYPP	60	144	97	174
1454 - IMO-NYIS	IESO	NYISO	ONTARIO	NYPP	90	151	84	146
Actual:SPRBROOK-TREMONT	NYISO	NYISO	NYPP	NYPP	157	41	65	165
1TSPBKTRMT:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	175	11	57	168
Actual:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	219	16	14	158
Actual:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	220	24	25	159
Actual:RAINEY8W-VERNON-W	NYISO	NYISO	NYPP	NYPP	237	115	90	211
CP10_15_ASTE-WRG_HG A 1_Bas	NYISO	NYISO	NYPP	NYPP	238	29	100	184
Actual:E179 ST-HG 4	NYISO	NYISO	NYPP	NYPP	332	33	338	304
Actual:E179 ST-HG 1	NYISO	NYISO	NYPP	NYPP	333	36	310	308
Actual:L SUCSPH-JAMAICA	NYISO	NYISO	NYPP	NYPP	338	87	46	326

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in PJM area with overall ranking by category ("from – to" does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
APS South Interface	VAP	AP	PJM	PJM	1	50	98	38
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	3	60	101	100
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	4	84	74	34
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	7	153	168	62
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	6	92	130	78
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	22	126	149	137
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	26	95	81	49
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	30	43	45	39
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	68	99	223	192
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	82	127	124	21
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	144	70	13	203
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	203	114	60	258
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	322	131	69	342
147 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	55	183	203	145
97 - Benton Harbor-Palisades	AEP	METC	PJM	MISO	96	293	242	199
1348 - Erie West-Erie South	PENELEC	PENELEC	PJM	PJM	99	178	132	119
669 - S. Mahwah 1-Waldwick 3	PSEG	NYISO	PJM	NYPP	369	75	368	369
670 - S. Mahwah 2-Waldwick 3	PSEG	NYISO	PJM	NYPP	370	79	369	370
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	21	111	162	161
70 - Branchburg-Flagtown 230	PSEG	PSEG	PJM	PJM	29	34	37	47
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	39	91	94	27
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	64	162	298	176
1-TRIP MANOR-SAKRON BRUNNERI	PL	PL	PJM	PJM	93	207	247	117
NFG3263 - Nelson-Dixon B FLO	NI	NI	PJM	PJM	113	218	259	94

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in MISO area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	8	52	80	2
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	14	62	66	4
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	28	66	51	17
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	33	206	147	19
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	36	37	64	13
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	42	69	50	35
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	46	48	23	48
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	47	122	119	44
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	52	209	215	31
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	57	61	71	54
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	61	159	120	33
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	63	44	29	12
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	66	39	52	53
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	78	30	41	56
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	80	47	32	24
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	87	247	187	37
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	97	232	189	69
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	109	100	68	20
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	126	185	126	74
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	129	51	21	75
249 - ATC Flow South	WEC	WPS	MISO	MISO	158	121	67	118

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in MISO area with overall ranking by category (cont'd) ("from – to" does not indicate direction of congestion)

SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	177	59	31	103
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	216	77	184	128
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	235	316	294	91
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	289	105	63	317
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	345	28	17	348
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	49	152	137	29
1240 - Coal Creek Tap-Stanto	GRE	GRE	MISO	MISO	94	135	95	104
1074 - Smith-Hardin Co 345 (	LGEE	LGEE	MISO	MISO	373	97	372	373
246 - Frankfort East-Tyrone	LGEE	LGEE	MISO	MISO	23	72	59	8
81 - Blue Lick-Bullitt Co. 1	LGEE	EKPC	MISO	MISO	24	129	127	11
NFG3033 - Arpin Xformer+Arpi	ALTE	ALTE	MISO	MISO	75	174	143	68
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	83	125	121	61
268 - Greenfield-Lakeview 13	FE	FE	MISO	MISO	84	172	116	55
SPP to MAIN Interface	AECI	AMRN	ENTERGY	MISO	92	239	159	138
1194 - Smith XFM 345/138 Xfm	LGEE	LGEE	MISO	MISO	95	88	140	90
650 - Seneca-Maple 138 (flo)	FE	FE	MISO	MISO	145	193	197	106
1197 - Green River Steel-Clo	LGEE	LGEE	MISO	MISO	151	81	173	112
1133 - Smith 345/138 Xfm (fl	LGEE	LGEE	MISO	MISO	153	63	166	131
861 - Center-Heskett 230	OTP	WAPA	MISO	MAPP	155	142	89	143
664 - State Line-Wolf Lake 1	NIPS	NI	MISO	PJM	167	90	78	156
1552 - MP-IMO_N	MP	IESO	MISO	ONTARIO	367	42	367	367

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in MAPP area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	17	4	7	15
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	37	74	36	7
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	65	108	88	14
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	159	109	49	51
SPP 90-FTCAL_S	OPPD	OPPD	MAPP	MAPP	86	154	102	101
1-TRIPS,GARRISN4-GARRISN7- 1	WAPA	WAPA	MAPP	MAPP	148	160	99	80

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in SPP area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
SPP 59-REDARCREARC	OKGE	OKGE	SPP	SPP	5	38	35	32
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	10	68	40	1
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	8	15	18
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	12	78	61	5
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	19	45	33	3
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	35	14	19	10
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	38	56	77	9
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERGY	40	93	82	25
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	48	82	72	6
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERGY	50	104	85	16
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERGY	58	110	62	23
SPP109-SCOBONCOCVIL	LAFB	EES	SPP	ENTERGY	74	130	131	46
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	76	184	108	60
SPP 27-EUFXFRWELXFR	SWPA	SWPA	SPP	SPP	141	233	211	58
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	215	118	75	129
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES	SPP	ENTERGY	253	55	42	166
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	364	9	364	364
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	366	35	365	366
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	125	205	218	84
1-TRIPS,AUBURN 6-JEC 6- 1	WERE	WERE	SPP	SPP	54	107	115	73
1-TRIPS,TEC E 3-TECHILE3- 1	WERE	WERE	SPP	SPP	150	85	55	115

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in Entergy area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERGY	ENTERGY	16	20	30	22
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERGY	ENTERGY	20	6	4	28
NFG1314 - Little Gypsy-South	EES	EES	ENTERGY	ENTERGY	27	83	111	36
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERGY	ENTERGY	45	98	106	26
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERGY	ENTERGY	59	164	144	148
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERGY	ENTERGY	71	180	160	85
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERGY	ENTERGY	72	1	1	42
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	110	21	22	79
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	111	22	24	81
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	115	26	27	87
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERGY	ENTERGY	154	31	26	83
FG 1380 Batesville-Marks for	EES	EES	ENTERGY	ENTERGY	171	40	28	77
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERGY	ENTERGY	228	101	83	139
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERGY	ENTERGY	281	76	58	194

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in TVA area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	103	113	107	66
930 - Hopkins Co.-Barkley 16	TVA	BREC	TVAUTHOR	MISO	77	139	109	57
1-TRIPS,5DAVAN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	98	197	164	108
1-TRIPS,5J VIL 2-5DICKSON- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	119	106	134	86
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	124	133	138	89
1215 - Cumberland-Johnsonvil	TVA	TVA	TVAUTHOR	TVAUTHOR	212	71	327	309
1216 - Cumberland-Davidson 5	TVA	TVA	TVAUTHOR	TVAUTHOR	13	46	79	96
1-TRIPS,5DAVSN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	53	158	112	65

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in Southern area with overall ranking by category

- **No flowgates monitored within Southern control area appear on the top flowgates list**

Top flowgates in VACAR (excluding Dominion) with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	89	145	87	59
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	91	117	76	43
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	138	155	113	63

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in Florida area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHERN	15	102	70	111
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	106	161	114	70
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	136	120	122	72
FG 1519 8THALMAN 500 DUVAL 5	SOCO	FPL	SOUTHERN	FRCC	81	119	154	204
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	18	123	93	99
1-TRIPS,RIVER-N -GANNON - 1	TECO	TECO	FRCC	FRCC	51	128	91	50

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Top flowgates in Ontario area with overall ranking by category (“from – to” does not indicate direction of congestion)

Constraint	From	To	From Market	To Market	Cong Rent	U90	Bind Hrs	Price
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	62	225	169	133
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	69	67	47	64
1456 - Buchannon Longwood In	IESO	IESO	ONTARIO	ONTARIO	73	200	150	208

Color coding:

In all scenarios

NOT in high/low fuel

NOT in 2011

Several Important Observations

- **Top flowgates are located both within regional markets and span across market boundaries**
- **A significant portion of top flowgates appear on the tie lines between two control areas**
- **A significant portion of top flowgates are located within individual control areas**

Supporting Materials for Step 1

- Detailed results of congestion analysis of all flowgates by year by scenario are provided in an Appendix 1

Definition and Analysis of Key Nodes within Eastern Interconnection



INTERNATIONAL

Step 2

Objectives of step 2

- **We envision transmission corridors as means of connecting end markets, or nodes, on the power grid**
- **For that purpose**
 - nodes should represent significant concentrations of loads and/or generation within electrically and geographically contiguous areas;
 - That should help identify nodes with surplus of generating capacity and those short on generation capacity
 - Major transmission facilities should lie outside of nodes
 - That should help identify where congestion occurs between nodes
- **Control areas are not a good proxy for nodes because congestion frequently occurs within control areas, as congestion analysis of flowgates clearly demonstrates**

Defining Nodes

- **Our approach in defining nodes varied by market:**
 - For markets administered by NY ISO and ISO New England, we used their respective LMP zones as a proxy for nodes. This is because congestion typically occurs between these zones rather than within these zones. An exception is NYISO Zone J (New York City) but it has been decided not to break Zone J into multiple nodes
 - For all other markets, cluster analysis of buses was used to determine nodes

Cluster Analysis

- **Starting with the summer peak load flow case we cluster load and generation buses within each ACPF area (except NYCA and NEPOOL) using shift factors**
 - Two buses are electrically similar if shift factors on all monitored flowgates are similar. Similar buses are placed in one cluster. Clustering algorithms minimize diversion within each cluster while maximizing diversion among clusters
- **1 cluster = 1 node**
- **We used FASTCLUS algorithm in SAS**
- **The number of clusters in each ACPF area were determined to reduce the index of diversion within largest clusters to the level below 10%: this index represents the average level of dissimilarity of flow patterns caused by power injection at different buses within the same cluster**
- **For each cluster two weight indicators were measured – load weight equal to peak demand at all load buses within a cluster and generation weight – total installed generation capacity within a cluster**

Highlights of Node Definition Results

- **Cluster analysis identifying approximately 1079 clusters of load and generation buses within Eastern Interconnection (excluding NYISO and ISO-NE)**
- **Using cluster weights, we determined the following lists**
 - List A (top 90 clusters based on total weight)
 - List B (top 90 clusters based on net generation weight)
 - List C (top 90 clusters based on net load weight)
- **From these we defined 6 categories of clusters**
 - 1: A&(-B)&(-C) [meaning clusters that are on A list but neither on B list, nor on C list]
 - 2: A&B
 - 3: A&C
 - 4: B&(-A)
 - 5: C&(-A)
 - 6: all other
- **All category 1 through 5 clusters were designated as nodes**
- **In addition, in control areas which had only category 6 clusters, a cluster with the largest total weight was designated as a node**
- **We identified 234 nodes based on the above cluster analysis. In addition, we defined 11 nodes in NYISO (Zones A through K) and 10 nodes in New England. In total we defined 255 nodes in Eastern Interconnection**

New England and New York nodes coincide with LMP Zones

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
NEPOOL	CT	1	1	8,164	4,244	3,920	8,164	4,244	3,920	100.00%	100.00%	100.00%
NEPOOL	ME	1	1	5,824	3,301	2,522	5,824	3,301	2,522	100.00%	100.00%	100.00%
NEPOOL	NEBOS	1	1	8,306	2,401	5,904	8,306	2,401	5,904	100.00%	100.00%	100.00%
NEPOOL	NH	1	1	6,653	4,032	2,621	6,653	4,032	2,621	100.00%	100.00%	100.00%
NEPOOL	NWKST	1	1	2,293	769	1,524	1,908	385	1,524	83.23%	100.00%	100.00%
NEPOOL	RI	1	1	4,004	1,801	2,203	4,004	1,801	2,203	100.00%	100.00%	100.00%
NEPOOL	SEMA	1	1	12,790	8,812	3,978	10,056	6,078	3,978	78.62%	100.00%	100.00%
NEPOOL	SWCT	1	1	6,702	4,853	1,850	4,276	2,426	1,850	63.80%	100.00%	100.00%
NEPOOL	VT	1	1	1,962	772	1,190	1,962	772	1,190	100.00%	100.00%	100.00%
NEPOOL	WCMA	1	1	7,412	3,995	3,417	7,412	3,995	3,417	100.00%	100.00%	100.00%
NYISO	NYA	1	1	7,366	4,866	2,500	7,366	4,866	2,500	100.00%	100.00%	100.00%
NYISO	NYB	1	1	2,402	643	1,759	2,402	643	1,759	100.00%	100.00%	100.00%
NYISO	NYC	1	1	9,199	6,542	2,657	9,199	6,542	2,657	100.00%	100.00%	100.00%
NYISO	NYD	1	1	1,860	1,180	681	1,860	1,180	681	100.00%	100.00%	100.00%
NYISO	NYE	1	1	1,872	963	909	1,872	963	909	100.00%	100.00%	100.00%
NYISO	NYF	1	1	5,858	3,875	1,983	5,858	3,875	1,983	100.00%	100.00%	100.00%
NYISO	NYG	1	1	5,482	3,288	2,195	5,482	3,288	2,195	100.00%	100.00%	100.00%
NYISO	NYH	1	1	2,991	2,018	973	2,991	2,018	973	100.00%	100.00%	100.00%
NYISO	NYI	1	1	1,478	2	1,476	1,478	2	1,476	100.00%	100.00%	100.00%
NYISO	NYJ	1	1	21,924	10,432	11,493	21,924	10,432	11,493	100.00%	100.00%	100.00%
NYISO	NYK	1	1	10,584	5,295	5,289	10,584	5,295	5,289	100.00%	100.00%	100.00%

Clustering results for PJM and Ontario

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
ONTARIO	IESO	6	15	55,383	29,028	26,355	40,644	20,278	20,366	73.39%	76.59%	77.28%
PJM	AE	1	10	4,025	1,259	2,766	913	77	836	22.68%	41.75%	30.22%
PJM	AEP	5	10	53,942	29,431	24,511	48,967	26,920	22,048	90.78%	92.12%	89.95%
PJM	AP	4	10	18,638	9,954	8,684	13,159	6,938	6,221	70.60%	70.01%	71.64%
PJM	BGE	5	10	10,924	3,943	6,981	9,660	3,564	6,096	88.43%	89.48%	87.32%
PJM	DLCO	2	10	6,246	3,441	2,805	2,303	1,644	659	36.88%	46.88%	23.51%
PJM	DP&L	1	10	7,692	3,528	4,164	3,164	1,399	1,765	41.13%	39.18%	42.39%
PJM	DPL	2	8	7,684	4,076	3,608	6,545	3,892	2,652	85.17%	95.23%	73.52%
PJM	JCPL	2	10	10,378	4,090	6,288	5,734	1,207	4,527	55.25%	28.36%	71.99%
PJM	METED	1	10	5,962	3,240	2,722	1,714	860	854	28.75%	26.18%	31.39%
PJM	NI	7	20	49,112	26,012	23,100	43,316	22,612	20,704	88.20%	88.51%	89.63%
PJM	OVEC	1	4	3,727	3,692	35	1,490	1,480	10	39.98%	41.29%	28.57%
PJM	PECO	3	10	16,871	8,401	8,470	8,072	3,944	4,128	47.84%	48.03%	48.74%
PJM	PENELEC	1	10	7,592	4,800	2,792	3,811	2,615	1,196	50.20%	53.52%	42.84%
PJM	PEPCO	5	10	12,750	6,090	6,660	8,229	3,493	4,736	64.54%	58.80%	71.12%
PJM	PJM500	6	10	16,286	16,286	-	13,776	13,776	-	84.59%	86.62%	0.00%
PJM	PL	3	10	15,175	8,311	6,864	5,121	2,788	2,333	33.75%	34.58%	33.99%
PJM	PSEG	4	10	19,010	8,328	10,682	16,423	7,089	9,334	86.39%	88.65%	87.38%
PJM	RECO	1	8	476	-	476	146	-	146	30.62%	0.00%	30.62%
PJM	UGI	1	10	273	98	176	95	42	53	34.58%	48.54%	30.16%
PJM	VAP	6	35	41,180	22,630	18,550	26,826	16,985	9,841	65.14%	75.43%	53.05%

Clustering Results for MISO

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
MISO	ALTE	1	10	7,294	4,475	2,819	2,198	1,574	624	30.14%	31.82%	22.15%
MISO	ALTW	1	10	9,085	4,563	4,522	2,084	980	1,103	22.93%	26.09%	24.39%
MISO	AMRN	2	15	26,931	13,766	13,165	12,445	5,170	7,275	46.21%	37.76%	55.26%
MISO	BREC	1	10	3,437	1,810	1,627	1,915	1,355	560	55.71%	74.86%	34.41%
MISO	CILC	1	10	2,314	1,152	1,162	1,266	756	510	54.71%	65.51%	43.90%
MISO	CIN	5	8	28,328	14,333	13,995	26,347	13,359	12,988	93.01%	94.12%	92.80%
MISO	CWLP	1	10	1,106	620	486	527	300	227	47.68%	48.74%	46.77%
MISO	DPC	1	10	2,037	1,071	966	939	601	338	46.09%	54.42%	34.98%
MISO	EEI	1	3	1,382	1,292	90	543	507	36	39.29%	38.73%	39.91%
MISO	EKPC	1	10	4,730	2,519	2,211	1,861	1,396	465	39.34%	47.39%	21.02%
MISO	FE	7	10	27,315	13,246	14,070	23,640	11,176	12,464	86.54%	84.92%	88.59%
MISO	GRE	1	10	4,522	2,944	1,578	1,383	272	1,111	30.59%	11.01%	70.42%
MISO	HE	1	10	1,943	1,399	544	1,120	1,000	120	57.61%	70.75%	21.97%
MISO	IP	2	10	10,119	5,535	4,584	5,697	4,058	1,639	56.30%	62.44%	35.75%
MISO	IPL	3	10	6,325	3,250	3,074	4,872	2,457	2,414	77.03%	71.97%	78.53%
MISO	ITC	4	10	24,902	11,876	13,026	21,373	9,775	11,598	85.83%	82.52%	89.04%

Clustering Results for MISO (cont'd)

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
MISO	LGEE	4	10	15,948	8,250	7,698	8,717	3,613	5,103	54.66%	50.57%	66.30%
MISO	METC	3	10	22,996	12,480	10,516	16,969	10,172	6,796	73.79%	79.26%	64.63%
MISO	MGE	1	10	1,252	438	813	769	366	403	61.41%	82.95%	49.51%
MISO	MIPU	1	10	4,340	2,418	1,922	1,800	1,249	551	41.46%	51.57%	28.64%
MISO	MP	1	10	3,813	2,134	1,679	1,333	508	824	34.96%	40.69%	49.11%
MISO	NIPS	1	10	6,883	3,436	3,447	4,573	2,880	1,693	66.44%	73.01%	49.11%
MISO	OTP	2	10	3,352	1,457	1,895	1,941	1,166	775	57.92%	86.51%	40.91%
MISO	SIGE	1	10	3,441	1,478	1,963	909	135	774	26.41%	10.49%	39.42%
MISO	SIPC	1	10	675	412	263	465	412	53	68.84%	100.00%	20.03%
MISO	SMPA	1	10	697	309	388	193	111	82	27.77%	41.83%	21.28%
MISO	SUNC	1	10	1,815	1,462	353	956	840	116	52.67%	54.38%	32.80%
MISO	UPPC	1	10	223	53	169	77	2	75	34.63%	48.75%	44.20%
MISO	WEC	3	10	15,435	8,048	7,387	12,423	6,645	5,777	80.48%	84.80%	78.21%
MISO	WEPL	1	10	948	372	576	261	137	124	27.48%	36.83%	21.45%
MISO	WPS	1	10	5,753	3,084	2,669	1,003	399	604	17.43%	29.84%	22.63%
MISO	XEL	1	10	19,501	9,287	10,215	17,489	9,867	7,622	89.68%	79.07%	74.62%

Clustering Results for SPP

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
SPP	AEPW	3	10	26,358	16,633	9,725	23,747	15,344	8,403	90.10%	91.94%	86.40%
SPP	CELE	1	10	6,333	4,083	2,250	2,562	1,820	742	40.46%	48.75%	32.98%
SPP	EMDE	1	10	2,426	1,338	1,088	1,510	1,052	458	62.26%	79.30%	42.12%
SPP	GRDA	1	10	2,387	1,595	792	1,027	849	179	43.03%	52.74%	22.53%
SPP	INDN	1	10	606	288	318	220	143	77	36.26%	49.65%	24.15%
SPP	KACP	2	10	8,039	4,403	3,636	1,961	670	1,291	24.39%	28.18%	35.49%
SPP	KACY	1	10	1,179	680	499	413	316	97	35.00%	46.47%	19.37%
SPP	Lafa	1	10	731	295	436	282	175	107	38.60%	59.32%	24.58%
SPP	LEPA	1	10	452	201	251	162	89	73	35.93%	45.37%	29.24%
SPP	MIDW	1	10	377	32	345	111	19	92	29.46%	78.16%	26.68%
SPP	OKGE	1	10	13,768	7,931	5,837	4,462	2,059	2,403	32.41%	25.48%	41.17%
SPP	OMPA	1	10	800	163	637	481	163	318	60.07%	100.00%	49.86%
SPP	SPRM	1	10	1,457	689	768	582	236	346	39.93%	40.93%	45.02%
SPP	SPS	1	10	11,914	7,175	4,740	7,393	4,420	2,973	62.05%	63.18%	62.72%
SPP	SWPA	1	10	3,016	2,186	830	866	478	388	28.71%	21.86%	46.75%
SPP	WERE	3	10	12,806	7,356	5,450	10,320	6,536	3,783	80.58%	89.87%	69.42%
SPP	WFEC	1	10	2,396	1,131	1,265	659	337	322	27.52%	35.36%	25.49%

Clustering Results for VACAR (except Dominion) and MAPP

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
MAPP	MEC	1	10	11,569	6,115	5,454	5,049	3,115	1,933	43.64%	56.07%	35.45%
MAPP	MPW	1	7	418	253	165	201	151	50	47.98%	59.68%	30.04%
MAPP	NPPD	3	10	7,789	4,648	3,142	5,387	3,281	2,106	69.15%	69.83%	67.02%
MAPP	OPPD	1	10	4,679	2,187	2,492	2,102	416	1,686	44.92%	16.38%	67.65%
MAPP	WAPA	1	10	11,077	7,970	3,107	3,173	2,360	813	28.65%	27.90%	26.18%
VACAR	CPLW	2	10	24,266	12,105	12,161	19,285	9,910	9,375	79.47%	81.01%	77.09%
VACAR	CPLW	1	10	2,177	1,389	788	898	712	186	41.24%	49.26%	23.56%
VACAR	DUK	4	10	42,741	22,228	20,512	40,388	21,046	19,341	94.49%	94.68%	94.29%
VACAR	SCEG	2	10	11,957	6,929	5,029	10,603	5,906	4,696	88.67%	88.26%	93.39%
VACAR	SCPSA	2	10	8,992	4,348	4,644	6,523	3,287	3,236	72.54%	68.63%	69.68%
VACAR	YAD	1	1	17	13	4	31	27	4	177.07%	100.00%	100.00%

Clustering Results for Entergy and TVA

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
ENTERGY	AECI	4	10	8,245	4,190	4,055	4,743	2,270	2,472	57.52%	52.65%	60.97%
ENTERGY	CWLD	1	9	301	-	301	48	-	48	15.95%	0.00%	15.95%
ENTERGY	DENL	1	9	293	14	279	81	-	81	27.47%	100.00%	28.85%
ENTERGY	DERS	1	1	143	75	68	143	75	68	100.00%	100.00%	100.00%
ENTERGY	EES	9	10	68,561	39,819	28,743	67,181	38,894	28,287	97.99%	97.92%	98.42%
ENTERGY	LAGN	1	10	3,427	2,349	1,078	2,342	2,179	163	68.32%	92.24%	15.09%
TVAUTHOR	BCA	1	1	94	80	14	94	80	14	100.00%	100.00%	100.00%
TVAUTHOR	DOE	1	5	1,374	474	900	783	474	309	56.96%	100.00%	34.30%
TVAUTHOR	TVA	7	10	75,333	42,281	33,053	75,120	42,281	32,839	99.72%	100.00%	99.35%

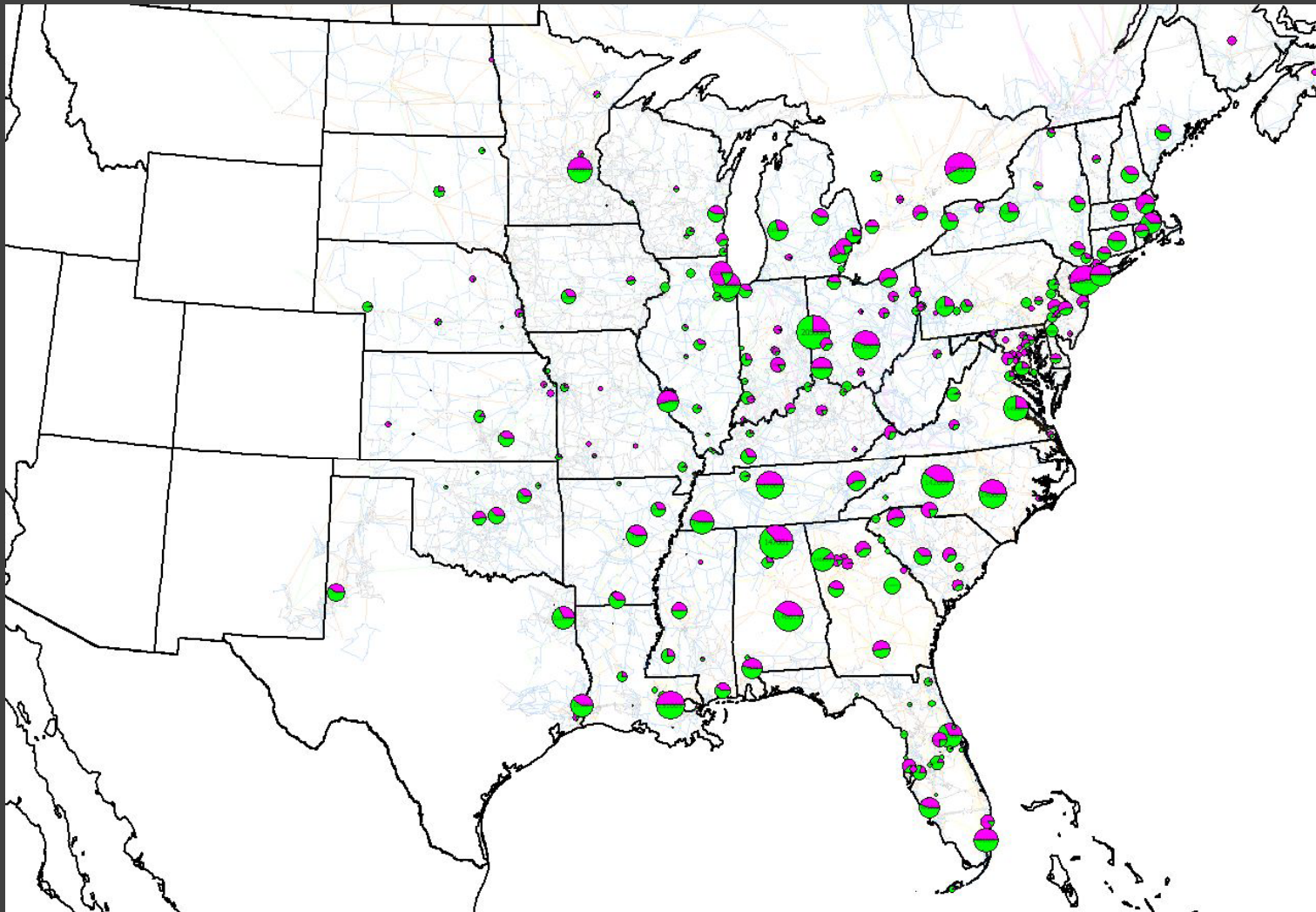
Clustering Results for Southern and Florida

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
FRCC	FMP	1	8	299	137	162	167	137	30	56.06%	100.00%	18.81%
FRCC	FPC	4	10	21,255	10,286	10,969	15,060	7,791	7,269	70.85%	72.91%	66.27%
FRCC	FPL	4	10	45,594	23,197	22,397	42,621	22,424	20,197	93.48%	97.34%	90.18%
FRCC	FTP	1	7	261	142	119	171	142	29	65.34%	100.00%	24.09%
FRCC	GVL	1	10	1,052	549	503	536	423	113	50.91%	69.00%	22.41%
FRCC	HST	1	1	78	-	78	78	-	78	100.00%	0.00%	100.00%
FRCC	JEA	1	10	6,521	3,628	2,893	2,787	1,605	1,182	42.74%	37.06%	40.85%
FRCC	KEY	1	1	949	811	138	949	811	138	100.00%	100.00%	100.00%
FRCC	KIS	1	10	722	421	302	411	358	53	56.85%	62.30%	17.54%
FRCC	LAK	1	10	1,991	1,331	660	895	777	118	44.95%	65.65%	17.87%
FRCC	LWU	1	1	287	205	82	287	205	82	100.00%	100.00%	100.00%
FRCC	NSB	1	1	566	480	86	566	480	86	100.00%	100.00%	100.00%
FRCC	OUC	1	10	3,021	1,785	1,236	960	887	73	31.77%	57.27%	5.88%
FRCC	RCU	1	8	195	-	195	38	-	38	19.42%	0.00%	19.42%
FRCC	SEC	1	7	2,381	2,125	256	1,316	1,316	-	55.26%	70.19%	0.00%
FRCC	STK	1	1	17	-	17	17	-	17	100.00%	0.00%	100.00%
FRCC	TAL	1	10	1,258	652	606	507	295	211	40.27%	52.76%	34.88%
FRCC	TECO	2	10	10,282	6,266	4,016	6,007	3,499	2,507	58.42%	59.05%	62.43%
SOUTHERN	AEC	1	10	2,495	1,481	1,014	1,129	881	248	45.26%	57.80%	24.50%
SOUTHERN	SMEPA	1	10	1,374	684	690	433	248	184	31.48%	53.10%	26.74%
SOUTHERN	SOCO	15	35	107,931	60,597	47,335	91,634	52,053	39,582	84.90%	84.90%	83.62%

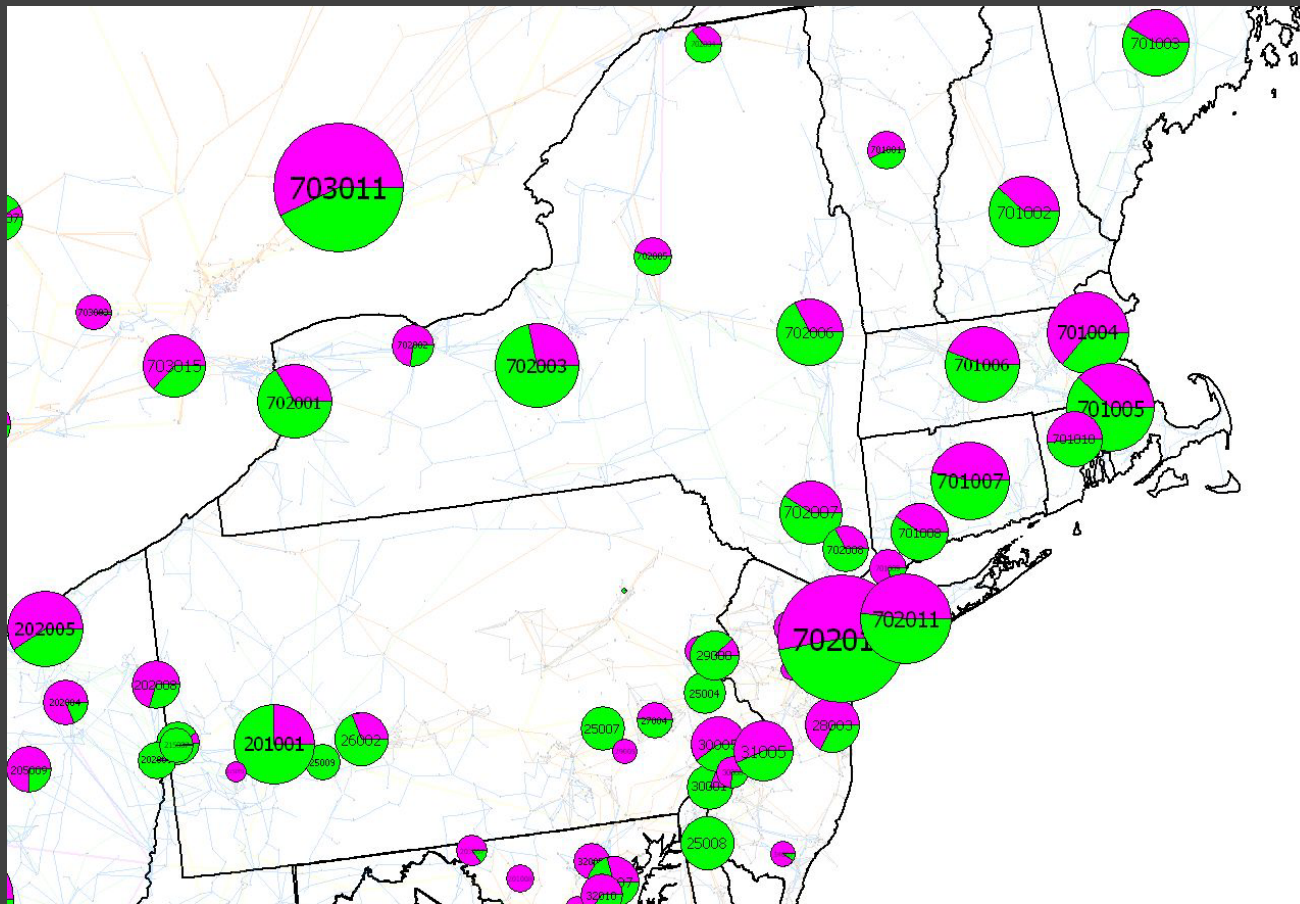
Geographical attributes and naming convention

- Prof. Tom Overbye from University of Illinois at Urbana-Champaign provided geographical coordinates for generator and load buses at substation level
- CRA then used a GIS database to identify for each bus its state, county and nearest metropolitan statistical area (MSA) as well as basic population and economic statistics
- GIS information was used to develop a naming convention of nodes:
 - Node name =
ACPF area name +
unique cluster number +
identifier such as
 - “MSA” if node weight is predominantly in that MSA, or
 - “County” if node weight is predominantly in that county or
 - “STA” if only the state name is apparent or
 - “GEN” if cluster is named after the largest generating unit it contains
 - name of the identifier +
“G” for clusters with higher generation weight and “L” for clusters with higher load weight

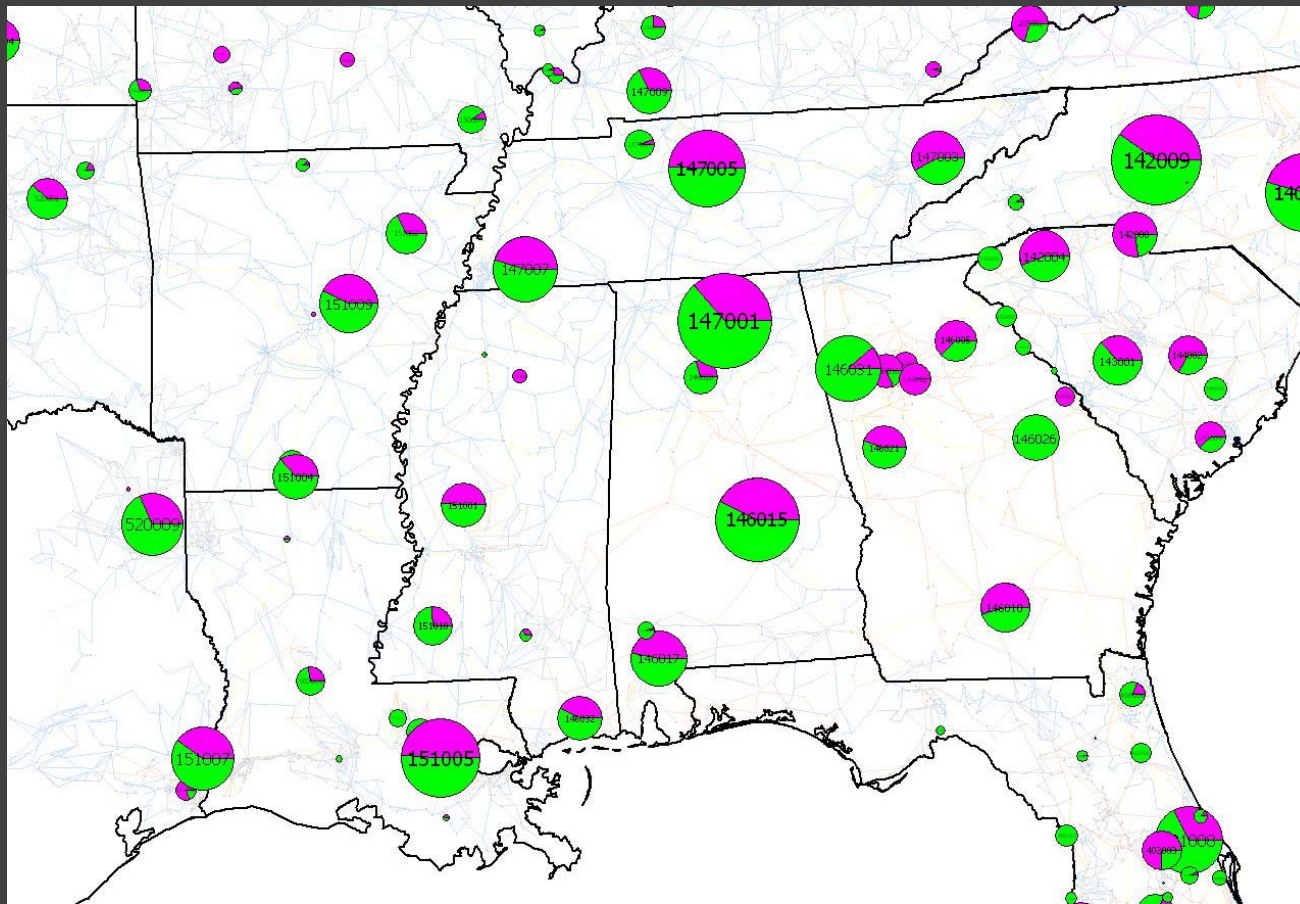
Nodes Visualized (Circle area reflects node weight, green reflects generation, magenta reflects load)



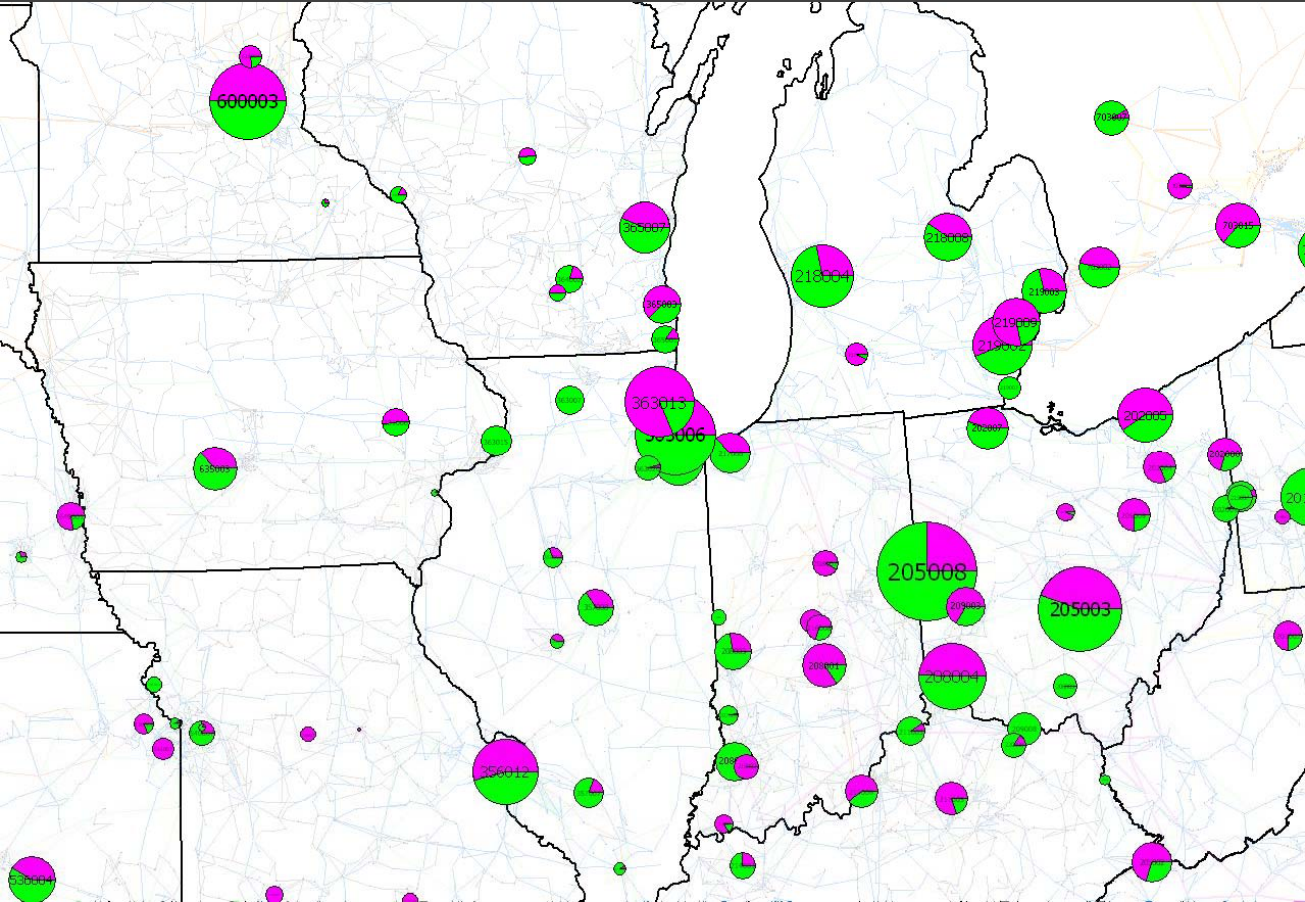
Northeastern Nodes (Circle area reflects node weight, green reflects generation, magenta reflects load)



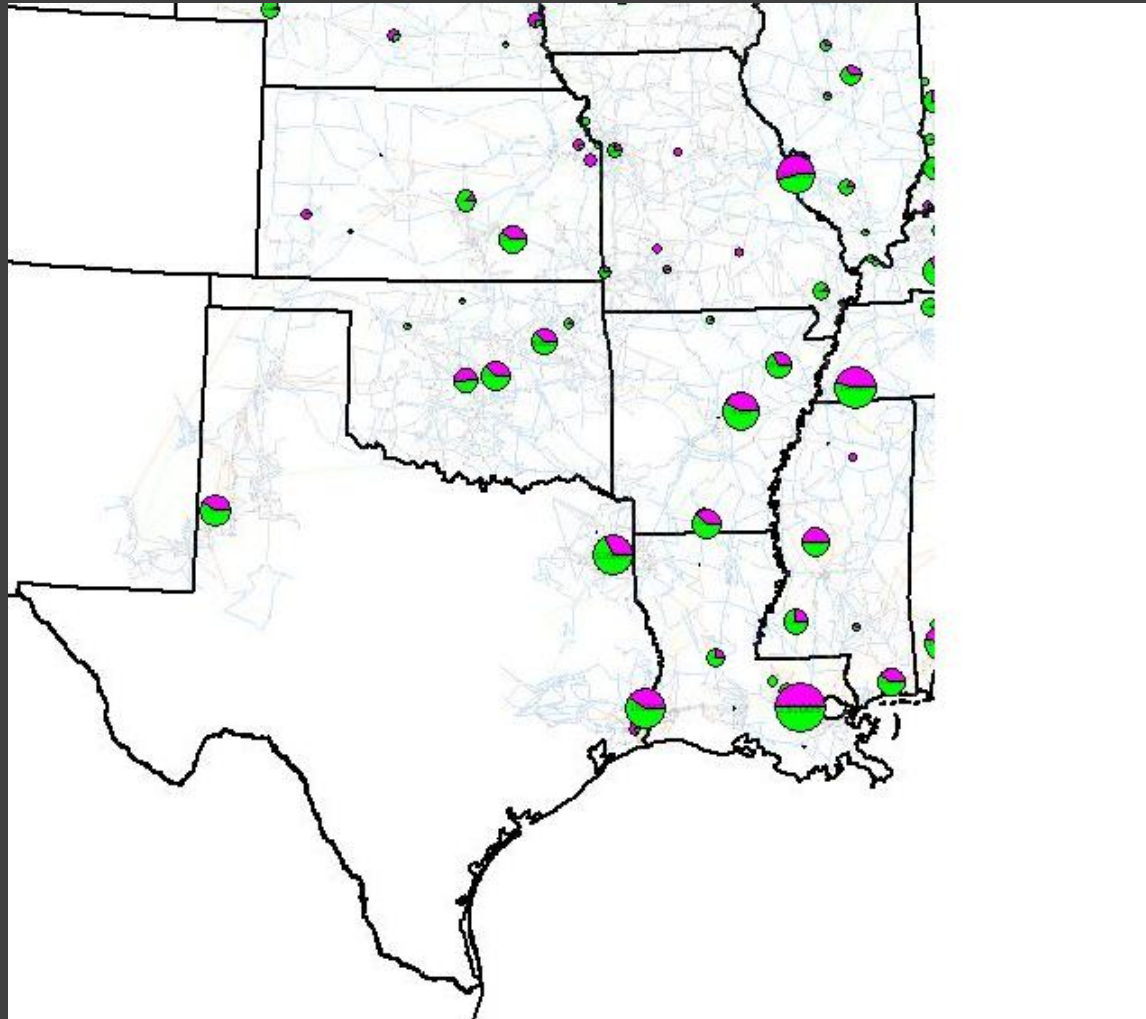
Southeastern Nodes (Circle area reflects node weight, green reflects generation, magenta reflects load)



Midwest Nodes (Circle area reflects node weight, green reflects generation, magenta reflects load)



Southwest Nodes (Circle area reflects node weight, green reflects generation, magenta reflects load)



Indicators computed for each node by years by scenario

- **For each node compute**
 - Average net injection
 - Number of hours with positive net injection (node acts as a source)
 - Average and maximum positive net injection
 - Number of hours with negative net injection (node acts as a sink)
 - Average and max negative net injection
 - Average price and standard deviation over a one year period
 - Average price and standard deviation of prices over hours when node acts as a source
 - Average price and standard deviation of prices over hours when node acts as a sink
 - Revenue surplus for source nodes: a product of average net injection times price times number of hours node acts as a source
 - Revenue shortage for sink nodes: a product of average net injection times price times number of hours node acts as a sink

Top 20 Sink Nodes in Eastern Interconnection (2008 Base Case)

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,670	-5,413	68.19	20.03	-2,198	1
PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	20.86	-1,865	2
ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	19.55	-1,421	3
FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	61.50	24.14	-1,344	4
ONTARIO	IESO_11_G	8784	9,529	12,779	-3,007	-6,111	44.34	17.06	-1,171	5
NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,802	-2,670	69.74	19.67	-1,104	6
FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	24.03	-1,053	7
VACAR	DUK_8_MSA_Charlotte_L	8784	1,407	4,886	-2,115	-3,574	50.47	17.76	-937	8
FRCC	FPC_3_MSA_Orlando_L	8784	1,232	3,649	-1,856	-3,553	57.11	18.72	-931	9
PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,730	-2,599	60.40	22.76	-918	10
MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	43.40	16.91	-831	11
MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,072	-4,218	45.13	17.50	-822	12
SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	50.79	17.62	-816	13
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,807	-2,983	50.78	17.72	-806	14
NEPOOL	NEPOOL_4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	15.74	-759	15
FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,471	-2,335	58.48	19.77	-756	16
MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,652	-2,690	51.03	21.34	-740	17
NEPOOL	NEPOOL_6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	15.83	-739	18
TVAUTHOR	TVA_5_MSA_Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	18.90	-655	19
PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	17.89	-638	20

Top 20 Source Nodes in Eastern Interconnection (2008 Base Case)

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	16.80	2,394	1
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	-	5,109	5,796	50.67	17.43	2,274	2
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	11,765	1,583	3,912	9,527	50.80	17.52	1,744	3
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	19.56	1,736	4
PJM	PJM500_8_MSA_Philadelphia_G	8784	3,914	-	3,134	3,868	61.77	20.82	1,701	5
VACAR	DUK_9_MSA_Charlotte_G	8780	14,681	9,966	3,106	5,530	50.48	20.13	1,377	6
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	17.09	1,374	7
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,494	4,092	39.26	19.12	1,205	8
PJM	PJM500_7_MSA_York-Hanover_G	8784	2,696	-	2,195	2,570	60.81	20.77	1,172	9
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,546	3,985	51.13	17.39	1,144	10
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,952	3,703	63.66	15.71	1,092	11
FRCC	TECO_3_MSA_Tampa_G	8784	3,733	1,026	2,075	3,069	58.32	19.39	1,063	12
FRCC	FPL_8_MSA_PortStLucie_G	8763	10,364	4,623	1,943	5,374	58.77	19.82	1,001	13
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	44.36	17.02	975	14
MISO	CIN_8_MSA_Evansville_G	8784	3,657	260	2,476	3,391	43.10	16.97	937	15
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	13.72	934	16
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	65.27	17.22	906	17
PJM	DPL_8_GEN_Killen_G	8784	2,964	-	2,184	2,940	45.08	16.69	865	18
PJM	PJM500_5_MSA_DC_G	8784	1,730	-	1,516	1,730	61.31	22.59	817	19
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	15.94	800	20

Supporting Materials for Step 2

- A summary of clustering results are provided in Appendix 2
- Results for all source nodes and all sink nodes are provided in Appendix 3



**Defining corridors as pairs of connected nodes,
screening for corridors of interest**



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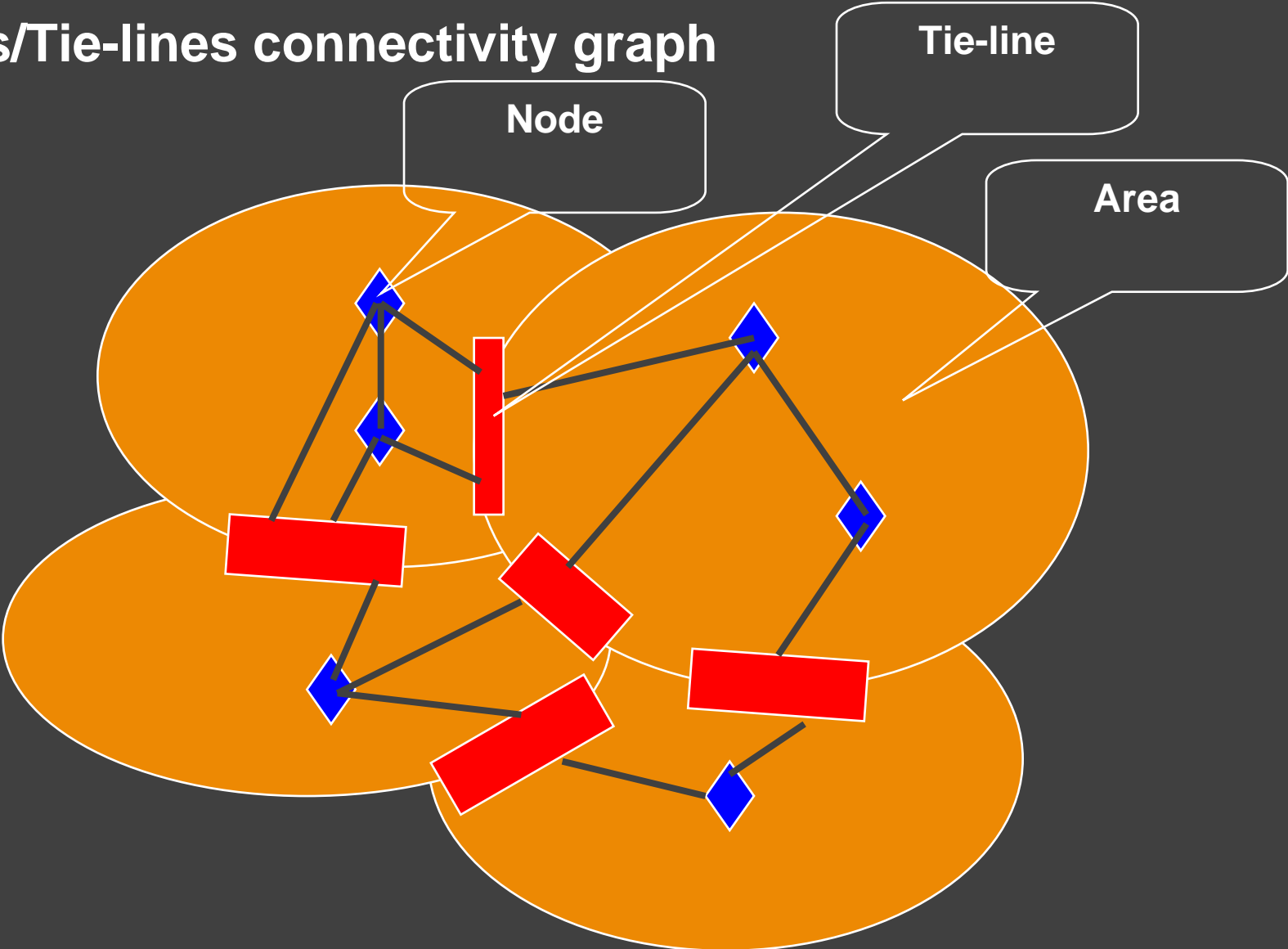
Step 3

Preliminary Definition of a “transmission corridor”

For purpose of modeling, we define transmission corridor as a complex transmission path between two nodes

- A corridor may have one or more of the following characteristics:
 - **It may extend across transmission owners or control areas**
 - **It may contain one or more existing transmission system facilities**
 - **It may or may not be chosen as a NIETC**

Nodes/Tie-lines connectivity graph



Nodes/Tie-lines network

- **We establish direct node-to-node connectivity for nodes that belong to the same ACPF area**
- **Nodes in neighboring areas are connected only through a tie-line connecting these areas**
- **Nodes contain only generation and load buses and by construction all constrained elements are most likely outside of nodes**
- **Corridor are defined on two levels:**
 - On a high level, corridor is defined as paths on the nodes/tie-lines network
 - On a low level, each segment of the nodes/tie-line network is defined by all transmission elements comprising the segment (e.g. all paths connecting one node to another inside an area or a node to a tie-line)
- **For the above identified set of nodes we constructed this connectivity graph for the Eastern Interconnection considering 255 nodes identified at Step 2**
- **This connectivity graph contains 4376 direct corridors. Analysis of congestion in that many corridors appears impractical**
- **Screening of corridors based on reasonable screening criteria is needed**

Screening of corridors: PTDF analysis

- **First we computed Power Transfer Distribution Factors (PTDFs) for all corridors with respect to top flowgates identified at step 1**
- **It is a common practice in the industry that a request for a point-to-point power transfer to be denied if the transfer has a PTDF on a limiting constraint in excess of 5%**
- **A corridor could effectively be considered as a direction of a power transfer**
- **If this corridor's PTDF with respect to a flowgate exceeds 5%, we assume that the flowgate could potentially limit the corridor and therefore is significant for that corridor analysis. At the same time, power flow along the corridor makes a significant impact on that flowgate**
- **Based on that consideration, we screened for all corridor/flowgate combinations which resulted in PTDFs of 5% or higher in absolute value**
- **That screening indicated the following:**
 - 3434 corridors (out of 4376) have significant PTDFs with respect to at least one of the top flowgates. Thus, only 942 corridors could be screened out on that basis
 - 125 top flowgates (out of 154 initially identified in the 2008 Base Case) impact at least one corridor. 29 flowgates appear to impact no corridors and could be considered as local constraints

Screening by paring sources and sinks

- **It appears that a much more efficient screening approach is based on paring source and sink corridors using very simple screening rules:**
 - All source nodes should have at least 1000 MW of maximum net injection
 - All sink nodes should have at least 1000 MW of maximum net withdrawal
 - There should be at least \$1/MWh average over a year price differential between a source and a sink
- **Application of these screening rules dramatically reduces the number of corridors**
- **Thus, in the 2008 Base Case the number of corridors is reduced to 405. 2011 Base Case shows 357 corridors**

Why not reduce number of corridors further down?

- **Our approach at this time is to be inclusive rather than exclusive**
- **We consider this screening as preliminary until all screening criteria have been finalized and agreed upon**
- **Reducing number of screened corridors prior to applying a comprehensive set of criteria could unjustifiably eliminate important corridors**

Supporting Materials for Step 3

- **Appendix 4 contains basic information for screened corridors by year by scenario**



**Analysis of corridor congestion
Sorting corridors by congestion and importance
indicators**



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Step 4

Congestion indices for corridors

- **For each pre-screened corridor we compute two congestion indices:**
 - U90 index
 - Price differential between source node and sink node
- **These indices as applied to corridor are discussed below**

A U90 Congestion Index for a Corridor

- Let F_1, F_2, \dots, F_n be flowgates affecting a corridor $A \rightarrow B$
- The limit each flowgate F_j places on a corridor is given by the formula:

$$K_j = \frac{L_j - F_j}{PTDF(F_j | A \rightarrow B)}$$

L_j – flowgate limit

F_j – flowgate flow

- Using that formula we can find the most limiting flowgate for the corridor $A \rightarrow B$ in each hour

$J = \arg \min_j K_j$ – index of the most

binding flowgate

- For the most limiting flowgate, we determine its level of utilization (% loading relative to its limit)
- That percentage is taken as the utilization index of the entire corridor in the hour
- U90 for the corridor is defined as number of hours or percent of time corridor's utilization index exceeds 90%

$$Index = \frac{L_J - F_J}{L_J}$$

Price differential for the corridor

- Imagine that we connect end markets (nodes) with a new notional line carrying 1 MW
- If this line carries 1 MW flow, this flow is diverted from other parts of the transmission system and, as a result, some constrained elements become relieved, while congestion in other elements may become exacerbated
- The underlying mathematics demonstrates that the resulting flow reduction for each flowgate F would be equal to $PTDF(F|A \rightarrow B)$
- If we price flow reduction on each flowgate at its shadow price, the overall system-wide marginal cost reduction will be exactly equal to price differential between the source and sink points of the hypothetical 1 MW line
- Enforcing corridors with a higher price differential have a greater on the margin potential for congestion relief than enforcing corridors with a lower price differential

Examples of corridor screening by congestion

- **Following are examples of corridor screenings performed on the 2008 Base Case set of candidate corridors using the following rules:**
 - Source node must serve as a source for over 4000 hours
 - Sink node must serve as a sink for over 4000 hours
 - Choose one corridor per SOURCE market area with the highest price differential between source and sink
 - Choose one corridor per SINK market area with the highest price differential between source and sink
 - Choose one corridor per SOURCE market area with the highest U90 indicator
 - Choose one corridor per SINK market area with the highest U90 indicator

Regional corridors with the highest price differential one corridor per source market area

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_2_MSA_Batesville_G	8784	SPP	OKGE_4_MSA_OklahomaCity_L	8783	13.2	5940	68%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_7_MSA_Miami_L	8784	5.1	4748	54%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	16.7	8367	95%
MISO	OTP_9_GEN_BigStone_G	8784	MISO	XEL_3_MSA_Minneapolis_G	4672	23.0	7840	89%
NEPOOL	NEPOOL_2_NH	8426	NYPP	NYISO_11_NYK	8784	7.9	8784	100%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_11_NYK	8784	22.2	6963	79%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_11_NYK	8784	25.4	6963	79%
PJM	PENELEC_2_MSA_DuBois_G	8336	NYPP	NYISO_11_NYK	8784	17.3	6963	79%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPL_7_MSA_Miami_L	8784	11.0	5655	64%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	OKGE_4_MSA_OklahomaCity_L	8783	23.3	8329	95%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	10.2	5564	63%
VACAR	CPLD_1_MSA_Durham_G	7843	PJM	VAP_33_MSA_DC_L	8784	7.4	7574	86%

Regional corridors with the highest price differentials one corridor per sink market area

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_9_MSA_MountPleasant_G	7676	ENTERGY	EES_5_MSA_NewOrleans_G	8784	8.3	8744	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPL_7_MSA_Miami_L	8784	11.0	5655	64%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	16.7	8367	95%
MISO	OTP_9_GEN_BigStone_G	8784	MISO	XEL_3_MSA_Minneapolis_G	4672	23.0	7840	89%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_9_NWKST	8784	17.3	6972	79%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_11_NYK	8784	25.4	6963	79%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_8_MSA_DC-VA-MD_L	8784	16.7	8036	91%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	10.2	5564	63%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	OKGE_4_MSA_OklahomaCity_L	8783	23.3	8329	95%
MISO	BREC_3_County_Webster_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	13.6	7759	88%
PJM	AEP_8_GEN_Amos01_G	8783	VACAR	DUK_4_MSA_Greenville_L	6816	5.2	5209	59%

Regional corridors with the highest U90 one corridor per source market area

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_10_MSA_Vicksburg_G	8088	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.2	6331	72%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_3_MSA_Miami_L	8784	4.2	5135	58%
MAPP	MEC_3_MSA_DesMoines_G	7991	MAPP	OPPD_5_MSA_Omaha_L	8784	1.0	2138	24%
MISO	ITC_3_MSA_Detroit_G	8784	MISO	FE_5_MSA_Cleveland_L	6473	3.5	8397	96%
NEPOOL	NEPOOL_2_NH	8426	NYPP	NYISO_11_NYK	8784	7.9	8784	100%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_10_NYJ	8784	20.7	8784	100%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_10_NYJ	8784	23.9	8784	100%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	8.9	8698	99%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.2	7077	81%
SPP	AEPW_9_MSA_MountPleasant_	7676	ENTERGY	EES_5_MSA_NewOrleans_G	8784	8.3	8744	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	5.8	5984	68%
VACAR	CPL_1_MSA_Durham_G	7843	PJM	VAP_33_MSA_DC_L	8784	7.4	7574	86%

Regional corridors with the highest U90 one corridor per sink market area

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_9_MSA_MountPleasant_G	7676	ENTERGY	EES_5_MSA_NewOrleans_G	8784	8.3	8744	100%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPL_7_MSA_Miami_L	8784	10.7	5894	67%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	16.7	8367	95%
ONTARIO	IESO_7_G	8784	MISO	ITC_2_MSA_Detroit_L	8541	1.3	8724	99%
NEPOOL	NEPOOL_2_NH	8426	NEPOOL	NEPOOL_9_NWKST	8784	3.0	8780	100%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_10_NYJ	8784	23.9	8784	100%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	8.9	8698	99%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_17_MSA_Mobile_G	6709	5.8	5844	67%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	AEPW_1_MSA_Tulsa_G	7434	5.5	8634	98%
MISO	BREC_3_County_Webster_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	13.6	7759	88%
PJM	AEP_8_GEN_Amos01_G	8783	VACAR	DUK_4_MSA_Greenville_L	6816	5.2	5209	59%

Identifying Most Limiting Flowgates

- **In the process of computing congestion indices for corridors, we conducted a comprehensive analysis of flowgates that are:**
 - Most limiting for that corridor (determine the ATC)
 - Second most limiting
 - Third most limiting
- **We placed this information for each scenario in a database structure**
- **The following examples demonstrate how this database could be used to assess which transmission constraints need to be resolved in order to reduce congestion within a given corridor and how to identify all corridors that will benefit from resolving congestion associated with a particular flowgate**
- **Further application of this analysis is demonstrated in Task 4**

Analysis of limiting flowgates for corridors with highest price differentials

Rank 1 – most limiting constraint, Rank 2 – second most limiting, Rank 3 – third most limiting
only three most limiting flowgates are shown for each corridor

From Hub	To Hub	Flowgate	Rank 1 Hours	Rank 2 Hours	Rank 3 Hours
EES_2_MSA_Batesville_G	OKGE_4_MSA_OklahomaCity_L	SPP111-SUMHE_BULSLD	3539	844	420
EES_2_MSA_Batesville_G	OKGE_4_MSA_OklahomaCity_L	SPP 57-PITSEMPITSUN	928	1691	936
EES_2_MSA_Batesville_G	OKGE_4_MSA_OklahomaCity_L	SPP 68-SILDIVNWSCIM	620	1510	2260
SEC_6_MSA_Palatka_G	FPL_7_MSA_Miami_L	CENTRAL-SOUTHEAST	4647	1981	955
SEC_6_MSA_Palatka_G	FPL_7_MSA_Miami_L	RICE 40477-RICE 404621	1064	1148	1816
SEC_6_MSA_Palatka_G	FPL_7_MSA_Miami_L	NORTHEAST-CENTRAL	363	2143	1624
NPPD_4_G	OPPD_5_MSA_Omaha_L	SPP 93-WNE_WKS	6468	1583	535
NPPD_4_G	OPPD_5_MSA_Omaha_L	1441 - Grand Island-Aurora 1	1518	3504	2492
NPPD_4_G	OPPD_5_MSA_Omaha_L	1502 - 70th & Bluff Xfm (flo	399	2567	3536
NEPOOL_2_NH	NYISO_11_NYK	North New England Scobie Low	5306	488	43
NEPOOL_2_NH	NYISO_11_NYK	CP10_12_1-tips, ReacBus-Dvnp	962	2240	2124
NEPOOL_2_NH	NYISO_11_NYK	2TRIP Norwalk H-Northport	217	826	1563
NYISO_1_NYA	NYISO_11_NYK	NFG7105 - ADIRONDACK - IMO	2615	785	23
NYISO_1_NYA	NYISO_11_NYK	NFG7010 - IMO - ADIRONDACK	1645	2203	547
NYISO_1_NYA	NYISO_11_NYK	CP10_12_1-tips, ReacBus-Dvnp	692	1430	1780
IESO_15_G	NYISO_11_NYK	NFG7105 - ADIRONDACK - IMO	2615	785	22
IESO_15_G	NYISO_11_NYK	NFG7010 - IMO - ADIRONDACK	1645	2202	543
IESO_15_G	NYISO_11_NYK	CP10_12_1-tips, ReacBus-Dvnp	690	1426	1725
PENELEC_2_MSA_DuBois_G	NYISO_11_NYK	NFG7105 - ADIRONDACK - IMO	2614	785	23
PENELEC_2_MSA_DuBois_G	NYISO_11_NYK	NFG7010 - IMO - ADIRONDACK	1647	2203	539
PENELEC_2_MSA_DuBois_G	NYISO_11_NYK	CP10_12_1-tips, ReacBus-Dvnp	700	1429	1743

Analysis of limiting flowgates for corridors with highest price differentials (cont'd)

Rank 1 – most limiting constraint, Rank 2 – second most limiting, Rank 3 – third most limiting
only three most limiting flowgates are show for each corridor

From Hub	To Hub	Flowgate	Rank 1 Hours	Rank 2 Hours	Rank 3 Hours
SOCO_15_MSA_Birmingham_G	FPL_7_MSA_Miami_L	CENTRAL-SOUTHEAST	3288	1452	707
SOCO_15_MSA_Birmingham_G	FPL_7_MSA_Miami_L	FG 1519 8THALMAN 500 DUVAL 5	809	1611	1805
SOCO_15_MSA_Birmingham_G	FPL_7_MSA_Miami_L	FG 1518 8HATCH 500 DUVAL 500	0	252	1634
WERE_1_MSA_Manhattan_G	OKGE_4_MSA_OklahomaCity_L	FG 5196 SPS North - South	5740	940	322
WERE_1_MSA_Manhattan_G	OKGE_4_MSA_OklahomaCity_L	1-TRIPS,AUBURN 6-JEC 6- 1	1085	2508	1067
WERE_1_MSA_Manhattan_G	OKGE_4_MSA_OklahomaCity_L	SPP 26-ELPFARWICWDR	620	2019	1633
TVA_4_MSA_Clarksville_G	SOCO_10_L	1216 - Cumberland-Davidson 5	7126	1316	265
TVA_4_MSA_Clarksville_G	SOCO_10_L	1215 - Cumberland-Johnsonvil	250	7002	1091
TVA_4_MSA_Clarksville_G	SOCO_10_L	1-TRIPS,6MITCHEL-3MITCHLL- 1	76	90	3541
CPLD_1_MSA_Durham_G	VAP_33_MSA_DC_L	148 - Cloverdale-Lexington 5	2316	1207	682
CPLD_1_MSA_Durham_G	VAP_33_MSA_DC_L	APS South Interface	2080	1665	1097
CPLD_1_MSA_Durham_G	VAP_33_MSA_DC_L	FG 1720 Loudoun 500/230 out1	210	819	1479

Supporting Materials for Step 4

- **Appendix 5 contains congestion indices by corridor by scenario**

Conclusions

- **CRA completed simulation of Eastern Interconnection for the purpose of quantifying the spread and magnitude of transmission congestion of that part of the US power grid**
- **On the basis of this analysis we identified the most critical and chronically congested elements (flowgates) in the Eastern Interconnection and quantified their impact on the system**
- **Next we identified critical nodes in Eastern Interconnection which are likely candidates for end markets for transmission corridors and identified candidate corridors. For each node, we computed several indicators of their importance. In addition, we collected GIS-based information for each node**
- **For each corridor we computed two indicators of corridor congestion – price differential and U90**
- **These data will be used in Task 7 of this project**

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
APS South Interface	VAP	AP	PJM	PJM	1	50	98	38	67
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	2	73	44	30	102
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	3	60	101	100	177
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	4	84	74	34	73
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	5	38	35	32	145
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	6	92	130	78	106
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	7	153	168	62	38
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	8	52	80	2	5
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	9	49	43	45	168
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	10	68	40	1	12
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	8	15	18	141
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	12	78	61	5	25
1216 - Cumberland-Davidson 5	TVA	TVA	TVAUTHOR	TVAUTHOR	13	46	79	96	204
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	14	62	66	4	11
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHERN	15	102	70	111	235
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERGY	ENTERGY	16	20	30	22	92
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	17	4	7	15	147
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	18	123	93	99	192
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	19	45	33	3	28
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERGY	ENTERGY	20	6	4	28	196
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	21	111	162	161	212
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	22	126	149	137	194
246 - Frankfort East-Tyrone	LGEE	LGEE	MISO	MISO	23	72	59	8	29
81 - Blue Lick-Bullitt Co. 1	LGEE	EKPC	MISO	MISO	24	129	127	11	7
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	25	27	18	71	241
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	26	95	81	49	117
NFG1314 - Little Gypsy-South	EES	EES	ENTERGY	ENTERGY	27	83	111	36	50
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	28	66	51	17	63
70 - Branchburg-Flagtown 230	PSEG	PSEG	PJM	PJM	29	34	37	47	195
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	30	43	45	39	152
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	31	19	53	82	224
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	32	18	16	88	291
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	33	206	147	19	8
11 I/F UPNY - SENY OPEN LO	PJM500	NYISO	PJM	NYPP	34	54	54	167	314
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	35	14	19	10	74

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	36	37	64	13	40
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	37	74	36	7	44
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	38	56	77	9	20
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	39	91	94	27	41
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERGY	40	93	82	25	39
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	41	12	12	95	297
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	42	69	50	35	126
7 I/F CENTRAL EAST LO	NYISO	NEPOOL	NYPP	NEPOOL	43	57	56	144	303
11 I/F UPNY - SENY CLOSE LO	PJM500	NYISO	PJM	NYPP	44	116	117	190	299
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERGY	ENTERGY	45	98	106	26	30
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	46	48	23	48	218
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	47	122	119	44	59
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	48	82	72	6	19
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	49	152	137	29	24
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERGY	50	104	85	16	33
1-TRIPS,RIVER-N -GANNON - 1	TECO	TECO	FRCC	FRCC	51	128	91	50	100
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	52	209	215	31	2
1-TRIPS,5DAVSN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	53	158	112	65	101
1-TRIPS,AUBURN 6-JEC 6- 1	WERE	WERE	SPP	SPP	54	107	115	73	131
147 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	55	183	203	145	86
14 I/F WEST CENTRAL CLOSE H	PJM500	NYISO	PJM	NYPP	56	165	148	172	227
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	57	61	71	54	153
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERGY	58	110	62	23	55
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERGY	ENTERGY	59	164	144	148	214
14 I/F WEST CENTRAL CLOSE L	PJM500	NYISO	PJM	NYPP	60	144	97	174	296
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	61	159	120	33	35
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	62	225	169	133	164
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	63	44	29	12	78
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	64	162	298	176	22
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	65	108	88	14	32
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	66	39	52	53	178
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	67	5	3	120	321
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	68	99	223	192	135
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	69	67	47	64	202
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	70	25	20	40	203

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERGY	ENTERGY	71	180	160	85	65
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERGY	ENTERGY	72	1	1	42	237
1456 - Buchannon Longwood In	IESO	IESO	ONTARIO	ONTARIO	73	200	150	208	264
SPP109-SCOBONCOCVIL	LAFA	EES	SPP	ENTERGY	74	130	131	46	49
NFG3033 - Arpin Xformer+Arpi	ALTE	ALTE	MISO	MISO	75	174	143	68	64
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	76	184	108	60	84
930 - Hopkins Co.-Barkley 16	TVA	BREC	TVAUTHOR	MISO	77	139	109	57	80
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	78	30	41	56	198
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	79	2	2	127	327
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	80	47	32	24	91
FG 1519 8THALMAN 500 DUVAL 5	SOCO	FPL	SOUTHERN	FRCC	81	119	154	204	248
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	82	127	124	21	16
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	83	125	121	61	76
268 - Greenfield-Lakeview 13	FE	FE	MISO	MISO	84	172	116	55	77
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	85	58	38	41	169
SPP 90-FTCAL_S	OPPD	OPPD	MAPP	MAPP	86	154	102	101	175
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	87	247	187	37	9
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	88	7	5	76	294
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	89	145	87	59	133
1454 - IMO-NYIS	IESO	NYISO	ONTARIO	NYPP	90	151	84	146	286
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	91	117	76	43	88
SPP to MAIN Interface	AECI	AMRN	ENTERGY	MISO	92	239	159	138	182
1-TRIP MANOR-SAKRON BRUNNERI	PL	PL	PJM	PJM	93	207	247	117	17
1240 - Coal Creek Tap-Stanto	GRE	GRE	MISO	MISO	94	135	95	104	205
1194 - Smith XFM 345/138 Xfm	LGEE	LGEE	MISO	MISO	95	88	140	90	97
97 - Benton Harbor-Palisades	AEP	METC	PJM	MISO	96	293	242	199	96
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	97	232	189	69	31
1-TRIPS,5DAVAN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	98	197	164	108	113
1348 - Erie West-Erie South	PENELEC	PENELEC	PJM	PJM	99	178	132	119	188
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	100	124	73	52	144
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	103	113	107	66	110
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	104	10	10	92	295
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	105	140	96	206	312
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	106	161	114	70	121
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	109	100	68	20	43

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	110	21	22	79	246
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	111	22	24	81	247
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	112	53	6	177	326
NFG3263 - Nelson-Dixon B FLO	NI	NI	PJM	PJM	113	218	259	94	6
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	114	80	86	220	324
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	115	26	27	87	250
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	117	17	11	98	300
1-TRIPS,5J VIL 2-5DICKSON- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	119	106	134	86	104
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	123	89	146	93	85
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	124	133	138	89	108
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	125	205	218	84	15
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	126	185	126	74	107
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	129	51	21	75	249
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	130	136	92	97	193
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	136	120	122	72	103
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	137	15	9	67	255
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	138	155	113	63	89
SPP 27-EUFXFRWELXFR	SWPA	SWPA	SPP	SPP	141	233	211	58	10
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	144	70	13	203	332
650 - Seneca-Maple 138 (flo)	FE	FE	MISO	MISO	145	193	197	106	52
1-TRIPS,GARRISN4-GARRISN7- 1	WAPA	WAPA	MAPP	MAPP	148	160	99	80	161
1-TRIPS,TEC E 3-TECHILE3- 1	WERE	WERE	SPP	SPP	150	85	55	115	268
1197 - Green River Steel-Clo	LGEE	LGEE	MISO	MISO	151	81	173	112	90
1133 - Smith 345/138 Xfm (fl	LGEE	LGEE	MISO	MISO	153	63	166	131	159
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERGY	ENTERGY	154	31	26	83	244
861 - Center-Heskett 230	OTP	WAPA	MISO	MAPP	155	142	89	143	272
Actual:SPRBROOK-TREMONT	NYISO	NYISO	NYPP	NYPP	157	41	65	165	308
249 - ATC Flow South	WEC	WPS	MISO	MISO	158	121	67	118	240
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	159	109	49	51	176
664 - State Line-Wolf Lake 1	NIPS	NI	MISO	PJM	167	90	78	156	298
FG 1380 Batesville-Marks for	EES	EES	ENTERGY	ENTERGY	171	40	28	77	242
1TSPBKTRMT:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	175	11	57	168	313
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	177	59	31	103	285
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	187	32	39	160	319
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	203	114	60	258	342

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1215 - Cumberland-Johnsonvil	TVA	TVA	TVAUTHOR	TVAUTHOR	212	71	327	309	215
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	215	118	75	129	265
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	216	77	184	128	111
Actual:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	219	16	14	158	331
Actual:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	220	24	25	159	325
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	223	96	48	205	329
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERGY	ENTERGY	228	101	83	139	279
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	234	13	8	195	339
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	235	316	294	91	1
Actual:RAINEY8W-VERNON-W	NYISO	NYISO	NYPP	NYPP	237	115	90	211	318
CP10_15_ASTE-WRG_HG A 1_Bas	NYISO	NYISO	NYPP	NYPP	238	29	100	184	302
1-TRIPS,BC PST 4-3BVRCRK - 1	CELE	EES	SPP	ENTERGY	253	55	42	166	320
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERGY	ENTERGY	281	76	58	194	323
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	289	105	63	317	350
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	322	131	69	342	355
Actual:E179 ST-HG 4	NYISO	NYISO	NYPP	NYPP	332	33	338	304	187
Actual:E179 ST-HG 1	NYISO	NYISO	NYPP	NYPP	333	36	310	308	231
Actual:L SUCSPH-JAMAICA	NYISO	NYISO	NYPP	NYPP	338	87	46	326	354
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	345	28	17	348	358
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	357	3	180	356	356
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	360	65	34	358	360
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	364	9	364	364	364
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	365	23	366	365	365
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	366	35	365	366	366
1552 - MP-IMO_N	MP	IESO	MISO	ONTARIO	367	42	367	367	367
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	368	64	370	368	368
669 - S. Mahwah 1-Waldwick 3	PSEG	NYISO	PJM	NYPP	369	75	368	369	369
670 - S. Mahwah 2-Waldwick 3	PSEG	NYISO	PJM	NYPP	370	79	369	370	370
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	371	86	371	371	371
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	372	94	373	372	372
1074 - Smith-Hardin Co 345 (LGEE	LGEE	MISO	MISO	373	97	372	373	373

Appendix 1 SortedFlowgatesAll Revised 7-12-06.xls
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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
APS South Interface	VAP	AP	PJM	PJM	1	55	101	41	61
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	2	58	99	86	171
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	3	70	47	30	91
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	4	32	39	27	108
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	5	83	77	38	73
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	6	92	122	68	88
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	7	43	37	35	146
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	8	159	172	59	36
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	9	56	89	2	6
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	10	78	58	5	25
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	7	15	16	129
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	12	63	40	1	11
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHERN	13	102	67	107	228
1216 - Cumberland-Davidson 5	TVA	TVA	TVAUTHOR	TVAUTHOR	14	51	84	91	199
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	15	124	91	96	185
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	16	69	68	4	12
70 - Branchburg-Flagtown 230	PSEG	PSEG	PJM	PJM	17	27	32	36	164
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	18	98	149	157	212
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	19	46	33	3	27
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERGY	ENTERGY	20	6	3	29	194
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	21	30	36	129	313
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERGY	ENTERGY	22	20	30	25	103
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	23	87	81	46	89
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	24	3	7	23	162
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	25	130	150	139	191
81 - Blue Lick-Bullitt Co. 1	LGEE	EKPC	MISO	MISO	26	129	123	8	8
246 - Frankfort East-Tyrone	LGEE	LGEE	MISO	MISO	27	77	63	10	29
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	28	16	42	64	217
NFG1314 - Little Gypsy-South	EES	EES	ENTERGY	ENTERGY	29	85	110	39	49
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	30	25	19	75	246
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	31	62	73	165	306
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	32	66	54	17	59
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	33	49	48	44	154
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	34	200	143	15	7
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	35	13	12	77	283

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	36	73	38	6	40
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	37	52	51	132	300
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	38	17	20	11	70
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	39	38	66	14	39
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERGY	40	95	87	21	38
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	41	57	78	7	23
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	42	68	52	34	96
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	43	45	22	48	211
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	44	11	10	98	297
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	45	93	98	28	42
14 I/F WEST CENTRAL CLOSE H	NYISO	NYISO	NYPP	NYPP	46	142	134	146	221
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERGY	47	88	74	12	33
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	48	144	126	26	24
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	49	131	124	45	53
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	50	96	82	9	22
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERGY	ENTERGY	51	111	118	31	31
14 I/F WEST CENTRAL CLOSE L	NYISO	NYISO	NYPP	NYPP	52	121	80	166	298
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	53	209	217	32	2
1-TRIPS,RIVER-N -GANNON - 1	TECO	TECO	FRCC	FRCC	54	128	92	57	109
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERGY	ENTERGY	55	172	145	142	206
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERGY	56	108	62	20	54
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	57	61	72	53	151
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	58	157	121	33	35
1-TRIPS,AUBURN 6-JEC 6- 1	WERE	WERE	SPP	SPP	59	106	114	82	135
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	60	222	169	133	161
1-TRIPS,5DAVSN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	61	164	112	70	111
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	62	21	18	37	186
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	63	50	29	13	75
147 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	64	181	202	160	116
930 - Hopkins Co.-Barkley 16	TVA	BREC	TVAUTHOR	MISO	65	137	104	49	72
SPP109-SCOBONCOCVIL	LAFA	EES	SPP	ENTERGY	66	132	129	43	44
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	67	5	4	115	322
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	68	41	53	56	180
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	69	101	61	162	312
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	70	120	113	51	69

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	71	115	94	18	32
NFG3033 - Arpin Xformer+Arpi	ALTE	ALTE	MISO	MISO	72	176	144	61	57
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERGY	ENTERGY	73	183	161	81	58
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	74	67	49	60	203
1456 - Buchannon Longwood In	IESO	IESO	ONTARIO	ONTARIO	75	187	151	210	248
FG 1519 8THALMAN 500 DUVAL 5	SOCO	FPL	SOUTHERN	FRCC	76	117	148	197	240
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	77	2	2	125	335
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	78	36	43	55	198
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	79	100	241	212	119
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	80	64	45	40	150
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERGY	ENTERGY	81	1	1	47	236
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	82	169	304	194	30
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	83	133	125	19	17
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	84	53	34	24	93
SPP 90-FTCAL_S	OPPD	OPPD	MAPP	MAPP	85	150	105	101	175
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	86	9	5	72	288
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	87	31	6	112	318
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	88	251	192	42	9
1240 - Coal Creek Tap-Stanto	GRE	GRE	MISO	MISO	89	138	96	104	202
1-TRIP MANOR-SAKRON BRUNNERI	PL	PL	PJM	PJM	90	198	254	113	18
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	91	10	9	71	271
268 - Greenfield-Lakeview 13	FE	FE	MISO	MISO	92	180	117	62	80
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	93	205	119	73	101
SPP to MAIN Interface	AECI	AMRN	ENTERGY	MISO	94	241	160	144	178
SPP 18-DOLXFRELDXFR	CELE	CELE	SPP	SPP	95	145	167	127	144
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	96	158	103	52	79
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	97	231	191	67	28
97 - Benton Harbor-Palisades	AEP	METC	PJM	MISO	98	288	249	207	94
1454 - IMO-NYIS	IESO	NYISO	ONTARIO	NYPP	99	152	90	161	292
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	100	125	83	50	97
1194 - Smith XFM 345/138 Xfm	LGEE	LGEE	MISO	MISO	101	97	142	95	90
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	104	168	106	69	137
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	105	119	76	76	179
650 - Seneca-Maple 138 (flo)	FE	FE	MISO	MISO	107	177	176	79	50
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	111	202	209	66	13

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
NFG3263 - Nelson-Dixon B FLO	NI	NI	PJM	PJM	112	219	267	92	5
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	113	19	13	94	295
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	114	74	137	80	86
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	116	103	69	22	51
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	117	165	115	78	128
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	118	22	24	89	252
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	120	24	27	90	254
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	122	47	21	74	239
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	123	80	86	230	332
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	125	28	28	97	255
1-TRIP EDISON-MDWRD PBRG-TRN	PSEG	PSEG	PJM	PJM	127	114	95	110	216
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	128	127	130	93	124
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	134	18	11	63	241
SPP 27-EUFXRWELXFR	SWPA	SWPA	SPP	SPP	135	233	203	54	10
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	137	186	132	88	117
1197 - Green River Steel-Clo	LGEE	LGEE	MISO	MISO	139	84	163	106	84
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	140	156	111	65	98
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	142	122	128	84	112
7 I/F CENTRAL EAST HI	NYISO	NYISO	NYPP	NYPP	146	91	200	263	296
1-TRIPS,GARRISN4-GARRISN7- 1	WAPA	WAPA	MAPP	MAPP	149	161	100	83	163
249 - ATC Flow South	WEC	WPS	MISO	MISO	153	123	71	114	234
1-TRIPS,TEC E 3-TECHILE3- 1	WERE	WERE	SPP	SPP	154	86	55	122	269
861 - Center-Heskett 230	OTP	WAPA	MISO	MAPP	155	146	97	145	244
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	158	89	16	184	343
Actual:SPRBROOK-TREMONT	NYISO	NYISO	NYPP	NYPP	159	34	60	172	316
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERGY	ENTERGY	161	35	25	87	250
1133 - Smith 345/138 Xfm (fl	LGEE	LGEE	MISO	MISO	162	72	175	147	168
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	164	112	50	58	189
1TSPBKTRMT:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	167	12	57	158	310
NFG1399 - Wyatt-Parnell 115k	EES	EES	ENTERGY	ENTERGY	169	281	229	100	15
1TGOWNGOTN:GOWANUSS-GOTHLS	NYISO	NYISO	NYPP	NYPP	173	151	93	222	324
FG 1380 Batesville-Marks for	EES	EES	ENTERGY	ENTERGY	176	42	26	85	249
664 - State Line-Wolf Lake 1	NIPS	NI	MISO	PJM	177	94	88	176	301
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	184	60	31	103	262
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	191	40	46	169	321

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
W Rutland Tap - Blissville 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	205	15	8	168	340
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	206	76	166	120	114
1215 - Cumberland-Johnsonvil	TVA	TVA	TVAUTHOR	TVAUTHOR	207	71	328	305	213
Actual:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	210	14	14	150	333
Actual:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	211	23	23	151	328
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	217	105	56	201	331
CP10_15_ASTE-WRG_HG A 1_Bas	NYISO	NYISO	NYPP	NYPP	226	33	102	173	290
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	227	126	70	270	348
Actual:RAINEY8W-VERNON-W	NYISO	NYISO	NYPP	NYPP	230	82	64	200	326
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	232	118	75	138	267
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERGY	ENTERGY	235	99	85	152	272
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	244	318	305	99	1
1-TRIPS,BC PST 4-3BVRCRK - 1	CELE	EES	SPP	ENTERGY	257	54	41	171	325
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERGY	ENTERGY	285	75	59	188	327
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	298	110	65	316	353
Actual:E179 ST-HG 4	NYISO	NYISO	NYPP	NYPP	314	39	299	275	173
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	322	143	79	342	357
Actual:E179 ST-HG 1	NYISO	NYISO	NYPP	NYPP	326	44	284	299	231
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	347	29	17	349	360
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	357	4	196	356	355
Actual:L SUCSPH-JAMAICA	NYISO	NYISO	NYPP	NYPP	361	81	44	359	363
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	364	65	35	363	365
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	370	8	370	370	370
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	371	26	371	371	371
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	372	37	372	372	372
1552 - MP-IMO_N	MP	IESO	MISO	ONTARIO	373	48	373	373	373
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	374	59	374	374	374
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	375	79	375	375	375
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	376	90	376	376	376

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APS South Interface	VAP	AP	PJM	PJM	1	37	95	54	93
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	2	71	87	96	186
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	3	76	46	33	120
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	4	90	86	36	66
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	5	33	30	29	142
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	6	41	70	1	4
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	7	32	38	38	157
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	8	144	152	69	52
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	9	3	4	9	107
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	10	45	56	2	7
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	4	7	19	154
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERGY	ENTERGY	12	23	32	13	72
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	13	105	142	115	143
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	14	89	55	3	15
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	15	25	22	60	222
1216 - Cumberland-Davidson 5	TVA	TVA	TVAUTHOR	TVAUTHOR	16	53	85	111	204
246 - Frankfort East-Tyrone	LGEE	LGEE	MISO	MISO	17	56	58	7	22
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERGY	ENTERGY	18	7	5	30	193
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	19	52	35	4	23
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	20	34	37	145	310
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	21	139	114	113	184
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	22	65	81	154	294
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	23	84	76	57	131
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	24	66	75	10	25
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	25	68	49	17	56
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	26	11	13	79	280
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	27	94	120	22	21
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	28	72	100	6	9
NFG1314 - Little Gypsy-South	EES	EES	ENTERGY	ENTERGY	29	91	126	49	51
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	30	43	43	48	159
81 - Blue Lick-Bullitt Co. 1	LGEE	EKPC	MISO	MISO	31	155	145	18	8
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHERN	32	132	97	158	285
70 - Branchburg-Flagtown 230	PSEG	PSEG	PJM	PJM	33	50	42	61	194
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	34	19	16	89	289
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	35	29	61	14	38

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INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	36	152	163	175	213
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	37	73	60	5	16
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	38	12	20	11	100
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERGY	ENTERGY	39	98	103	21	27
1-TRIPS,5DAVSN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	40	140	109	55	75
1-TRIPS,RIVER-N -GANNON - 1	TECO	TECO	FRCC	FRCC	41	123	89	43	78
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	42	129	184	204	219
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	43	61	69	149	296
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	44	217	154	25	10
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	45	103	93	46	77
268 - Greenfield-Lakeview 13	FE	FE	MISO	MISO	46	104	64	27	62
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	47	205	213	23	1
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	48	80	68	8	17
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	49	93	39	15	55
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	50	64	48	40	144
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERGY	51	99	102	28	45
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	52	86	50	31	111
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	53	160	92	37	63
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	54	28	71	119	257
1-TRIPS,AUBURN 6-JEC 6- 1	WERE	WERE	SPP	SPP	55	112	121	80	126
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	56	63	62	32	80
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	57	58	28	76	224
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERGY	ENTERGY	58	1	1	35	215
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	59	214	167	138	167
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	60	70	78	59	150
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	61	159	267	173	36
178 - Crete-E. Frankfort 345	NI	NI	PJM	PJM	62	128	134	130	190
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	63	48	25	16	99
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERGY	64	119	74	24	53
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	65	79	84	39	87
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERGY	ENTERGY	66	177	160	86	60
SPP109-SCOBONCOCVIL	LAFA	EES	SPP	ENTERGY	67	136	136	50	42
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	68	5	3	125	318
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	69	110	72	34	67
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	70	47	27	20	105

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5ROBBINS 161-5SANTEET 161- 1	DUK	TVA	VACAR	TVAUTHOR	71	185	137	51	40
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	72	67	45	68	199
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	73	22	18	44	201
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	74	167	127	41	44
50 - Axton 765/138 Xfm (flo)	AEP	AEP	PJM	PJM	75	181	214	126	50
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	76	51	53	63	181
1-TRIPS,5DAVAN 2-5GRASL T- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	77	183	155	92	84
1-TRIP MANOR-SAKRON BRUNNERI	PL	PL	PJM	PJM	78	220	234	109	14
1456 - Buchannon Longwood In	IESO	IESO	ONTARIO	ONTARIO	79	204	164	206	277
1194 - Smith XFM 345/138 Xfm	LGEE	LGEE	MISO	MISO	80	55	119	72	114
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	81	2	2	133	324
1-TRIPS,5J VIL 2-5DICKSON- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	82	78	110	56	83
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	83	59	36	45	164
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	84	39	44	66	198
489 - Nelson-Electric Jct. 3	NI	NI	PJM	PJM	85	108	191	159	152
SPP to MAIN Interface	AECI	AMRN	ENTERGY	MISO	86	229	151	135	180
NFG3033 - Arpin Xformer+Arpi	ALTE	ALTE	MISO	MISO	87	156	131	85	109
1-TRIPS,6MCINTOS-6WMCNTH1- 1	SOCO	SOCO	SOUTHERN	SOUTHERN	88	236	174	157	177
1454 - IMO-NYIS	IESO	NYISO	ONTARIO	NYPP	89	158	90	148	282
SPP 90-FTCAL_S	OPPD	OPPD	MAPP	MAPP	90	170	123	107	163
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERGY	91	164	132	42	35
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	92	30	6	120	316
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	93	17	19	64	231
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	94	18	21	65	232
CRYSTAL RIVER-SOUTH	FPC	FPC	FRCC	FRCC	95	157	168	196	242
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERGY	ENTERGY	96	184	165	190	225
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	97	109	233	222	149
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	98	121	125	26	20
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	99	21	23	71	233
14 I/F WEST CENTRAL CLOSE L	NYISO	NYISO	NYPP	NYPP	100	191	135	212	301
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	101	249	193	53	12
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	102	10	11	87	291
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	104	107	73	12	28
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	105	9	8	97	303
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	107	172	122	70	102

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	108	130	79	58	136
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	109	182	124	62	90
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	110	227	194	84	30
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	111	137	104	47	68
1-TRIPS,5OGLETHR-5WIDCRK2- 2	TVA	TVA	TVAUTHOR	TVAUTHOR	112	124	138	81	91
1133 - Smith 345/138 Xfm (fl	LGEE	LGEE	MISO	MISO	114	35	130	102	140
5NANTAHA 161-5ROBBINS 161- 1	DUK	DUK	VACAR	VACAR	117	216	182	83	37
NFG3263 - Nelson-Dixon B FLO	NI	NI	PJM	PJM	118	188	248	91	5
New England East-West Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	119	131	98	211	315
1-TRIPS,14REID 5-14DAVIS5- 1	BREC	BREC	MISO	MISO	122	126	176	98	59
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	123	146	143	99	116
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	124	120	128	67	76
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	125	88	144	94	110
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	127	138	94	93	179
650 - Seneca-Maple 138 (flo)	FE	FE	MISO	MISO	129	197	201	100	34
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	131	14	10	112	309
1-TRIPS,TEC E 3-TECHILE3- 1	WERE	WERE	SPP	SPP	135	82	57	108	248
249 - ATC Flow South	WEC	WPS	MISO	MISO	136	115	63	105	217
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	137	20	12	73	278
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	138	57	26	95	284
FG 1516 6PURVIS 230 5PURVIS	SMEPA	SOCO	SOUTHERN	SOUTHERN	139	125	118	90	148
1-TRIPS,GARRISN4-GARRISN7- 1	WAPA	WAPA	MAPP	MAPP	142	165	105	82	146
751 - Warren-Falconer 115 (f	PENELEC	NYISO	PJM	NYPP	144	169	112	74	129
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERGY	ENTERGY	145	44	31	78	227
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	146	83	91	241	331
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	149	111	54	52	145
SPP 27-EUFXRWELXFR	SWPA	SWPA	SPP	SPP	155	240	217	77	11
861 - Center-Heskett 230	OTP	WAPA	MISO	MAPP	159	133	83	150	288
FG 1380 Batesville-Marks for	EES	EES	ENTERGY	ENTERGY	162	54	29	75	223
1197 - Green River Steel-Clo	LGEE	LGEE	MISO	MISO	163	87	175	127	130
Actual:SPRBROOK-TREMONT	NYISO	NYISO	NYPP	NYPP	166	49	66	174	312
664 - State Line-Wolf Lake 1	NIPS	NI	MISO	PJM	178	101	96	170	299
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	179	114	14	213	342
1TSPBKTRMT:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	180	13	59	172	313
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	181	62	33	106	287

Appendix 1 SortedFlowgatesAll Revised 7-12-06.xls
2008LowFuel

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	192	38	40	167	317
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	206	118	82	124	243
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERGY	ENTERGY	214	102	88	132	264
Actual:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	218	27	24	164	322
Actual:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	220	16	15	165	327
Actual:RAINEY8W-VERNON-W	NYISO	NYISO	NYPP	NYPP	223	106	77	194	314
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	224	15	9	186	338
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	226	100	47	200	328
CP10_15_ASTE-WRG_HG A 1_Bas	NYISO	NYISO	NYPP	NYPP	229	31	99	178	300
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	230	320	304	88	2
1-TRIPS,BC PST 4-3BVRCRK - 1	CELE	EES	SPP	ENTERGY	263	75	51	183	321
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	265	95	52	298	348
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	266	116	65	302	347
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	286	77	224	210	155
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERGY	ENTERGY	297	85	67	218	325
Actual:E179 ST-HG 4	NYISO	NYISO	NYPP	NYPP	315	40	326	286	178
Actual:E179 ST-HG 1	NYISO	NYISO	NYPP	NYPP	322	42	300	301	226
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	331	26	17	338	355
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	333	143	80	347	354
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	344	69	272	334	323
Actual:L SUCSPH-JAMAICA	NYISO	NYISO	NYPP	NYPP	353	81	41	348	358
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	354	6	183	352	353
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	359	74	34	358	361
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	363	8	286	363	363
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	364	24	285	364	364
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	365	36	282	365	365
1552 - MP-IMO_N	MP	IESO	MISO	ONTARIO	366	46	281	366	366
1074 - Smith-Hardin Co 345 (	LGEE	LGEE	MISO	MISO	367	60	280	367	367
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	368	92	278	368	368
1215 - Cumberland-Johnsonvil	TVA	TVA	TVAUTHOR	TVAUTHOR	369	96	276	369	369
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	370	97	274	370	370

Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	1	70	67	27	70
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	2	1	1	3	35
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	3	4	4	1	7
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	4	54	65	86	194
APS South Interface	VAP	AP	PJM	PJM	5	43	102	57	107
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	6	31	41	4	19
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	7	73	48	37	130
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	8	9	11	2	15
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	9	37	40	45	175
726 - Turkey Hill-S. Bellevi	IP	IP	MISO	MISO	10	14	36	6	25
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	11	44	81	5	6
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	12	10	15	12	91
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	13	15	14	20	146
1100 - Trimble Co.-Clifty Cr	OVEC	LGEE	PJM	MISO	14	47	46	49	170
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERG	ENTERG	15	28	34	17	90
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	16	146	163	85	57
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	17	68	50	7	18
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	18	149	117	11	8
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	19	96	132	104	159
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	20	120	80	69	161
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	21	66	85	8	10
849 - C33 (DOE)-Grahamville	DOE	LGEE	TVAUTH	MISO	22	76	96	19	22
NFG1314 - Little Gypsy-South	EES	EES	ENTERG	ENTERG	23	56	103	36	58
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERG	ENTERG	24	8	7	35	192
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHE	25	60	72	123	256
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	26	33	31	75	217
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	27	6	6	21	158
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	28	86	55	13	29
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	29	21	19	82	273
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	30	17	20	14	89
426 - McGulpin-Straits 138 #	METC	WEC	MISO	MISO	31	53	44	10	32
NFG6079 - TEST_MHEB_OTDF_Sha	MP	MP	MISO	MISO	32	42	35	34	168
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	33	5	5	9	73
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	34	75	88	87	184
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	35	124	136	159	220

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	36	50	53	40	128
FG 1518 8HATCH 500 DUVAL 500	SOCO	FPL	SOUTHE	FRCC	37	67	87	132	258
249 - ATC Flow South	WEC	WPS	MISO	MISO	38	58	43	23	104
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	39	81	78	30	69
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	40	141	86	31	63
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERG	41	71	45	15	56
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERG	ENTERG	42	84	92	24	34
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	43	89	90	61	134
CLAN/CLAS INT	IESO	IESO	ONTARIC	ONTARIC	44	132	97	96	189
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	45	35	28	101	280
SPP109-SCOBONCOCVIL	Lafa	EES	SPP	ENTERG	46	112	112	33	38
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	47	52	69	151	283
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	48	125	170	32	9
1-TRIPS,01BLCKCO-01HATFLD- 1	AP	AP	PJM	PJM	49	82	213	156	123
500 - Newton-Effingham 138 (	AMRN	AMRN	MISO	MISO	50	104	118	46	50
5ROBBINS 161-5SANTEET 161- 1	DUK	TVA	VACAR	TVAUTH	51	123	93	39	65
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERG	52	106	111	41	52
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	53	148	138	99	145
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	54	131	122	66	80
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERG	ENTERG	55	2	2	38	206
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	56	162	126	43	37
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	57	119	133	206	281
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	58	78	70	44	98
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERG	ENTERG	59	172	139	145	203
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERG	ENTERG	60	140	135	80	83
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	61	118	148	42	20
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERG	62	122	106	29	43
ONT Hydro to Michigan	IESO	ITC	ONTARIC	MISO	63	151	99	129	230
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	64	72	73	204	301
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	65	46	59	22	61
1348 - Erie West-Erie South	PENELEC	PENELEC	PJM	PJM	66	143	113	93	167
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	67	85	47	90	215
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	68	100	241	178	118
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	69	178	150	173	231
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	70	128	77	54	133

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
319 - Hoytdale-Maple 138 (fl	FE	FE	MISO	MISO	71	155	175	73	23
SPP 67-SEMFRSEMFR	OKGE	OKGE	SPP	SPP	72	343	264	92	4
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	73	138	124	77	99
1038 - Reasnor-Des Moines 16	ALTW	MEC	MISO	MAPP	74	251	180	51	13
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	75	97	94	53	101
1-TRIPS,16PEGE -16THOMPS- 2	IPL	IPL	MISO	MISO	76	136	202	130	72
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	77	129	89	25	41
147 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	78	173	231	162	86
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	79	34	12	105	288
New Freedm 500-230 XFormer	PJM500	PSEG	PJM	PJM	80	195	162	116	122
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	81	49	71	52	136
1593 - Webster-Walton 230 (f	CIN	CIN	MISO	MISO	82	186	156	78	60
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	83	137	98	55	106
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	84	109	84	47	88
97 - Benton Harbor-Palisades	AEP	METC	PJM	MISO	85	241	200	168	157
SPP 27-EUFXFRWELXFR	SWPA	SWPA	SPP	SPP	86	214	165	28	11
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	87	153	160	56	21
14 I/F WEST CENTRAL CLOSE H	NYISO	NYISO	NYPP	NYPP	88	194	249	185	114
1-TRIPS,6W.RINGO-3W.RINGG- 1	TVA	TVA	TVAUTH	TVAUTH	89	95	101	58	110
1-TRIPS,6PERRY R-3PERRY R- 2	SCPSA	SCPSA	VACAR	VACAR	90	161	129	79	87
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	91	110	114	26	24
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	92	25	22	65	226
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	93	36	30	59	205
1-TRIPS,CHARLOTE-HARDCHAR- 1	FPL	FPC	FRCC	FRCC	94	165	128	128	191
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	95	108	60	48	132
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	96	87	82	50	109
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	97	166	134	84	93
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	98	88	63	16	36
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	99	182	224	259	236
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	100	22	26	70	225
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	101	23	27	72	227
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	103	39	32	62	208
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	104	24	29	76	228
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	106	64	54	81	197
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	107	157	110	63	95

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	108	7	8	147	306
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	115	150	120	88	142
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	116	94	66	180	300
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	117	40	121	165	268
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	118	3	3	154	315
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	120	223	183	91	39
New England East-West Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	126	127	91	203	296
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	127	18	17	121	291
1-TRIPS,10NEWTNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	129	154	153	98	116
1-TRIPS,5OGLETHR-5WIDCRK2- 2	TVA	TVA	TVAUTH	TVAUTH	130	135	147	95	111
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	131	233	211	18	1
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERG	ENTERG	132	27	24	64	221
5NANTAHA 161-5ROBBINS 161- 1	DUK	DUK	VACAR	VACAR	133	188	177	94	55
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	135	12	10	118	294
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	136	134	95	89	180
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	137	274	218	83	16
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	138	114	100	222	302
FG 1380 Batesville-Marks for	EES	EES	ENTERG	ENTERG	140	20	18	60	219
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	142	41	33	67	210
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	146	187	173	74	27
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	147	26	25	71	232
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	148	101	16	164	311
823LYLES 3LEXNGT	SCEG	SCPSA	VACAR	VACAR	157	77	56	97	223
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	158	57	155	127	149
1-TRIPS,3CAMPFLD-3GTWN S - 1	SCPSA	SCPSA	VACAR	VACAR	159	69	62	103	233
1-TRIPS,3GTWN S -3IPCOPMP- 1	SCPSA	SCPSA	VACAR	VACAR	162	74	64	106	229
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	163	30	23	136	298
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	164	107	51	68	188
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	167	45	37	108	279
1-TRIPS,3CAMPFLD-3IPCOPMP-99	SCPSA	SCPSA	VACAR	VACAR	176	92	74	117	234
NFG1399 - Wyatt-Parnell 115k	EES	EES	ENTERG	ENTERG	181	226	199	100	40
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	185	59	39	134	287
1-TRIPS,3JAXISW -3R.BRAS -99	EES	EES	ENTERG	ENTERG	186	111	83	122	237
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	211	48	38	256	329
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERG	ENTERG	212	79	76	126	255

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CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	225	91	52	193	305
1-TRIPS,SPRBROOK-W 49 ST - 2	NYISO	NYISO	NYPP	NYPP	229	105	79	238	309
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	231	61	49	200	308
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	235	32	21	187	321
1-TRIPS,BC PST 4-3BVRCRK - 1	CELE	EES	SPP	ENTERG	242	83	58	160	289
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	243	115	75	283	330
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERG	ENTERG	276	98	68	183	299
Minong - Stone Lake 138kV	XEL	MP	MISO	MISO	301	99	154	276	303
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	306	13	9	307	340
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	310	65	42	326	341
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	334	19	13	328	344
690 - St. Clair 345/230 Xfm	ITC	ITC	MISO	MISO	336	103	57	342	346
1T Jamaica-ValSt SprBrk-EGC	NYISO	NYISO	NYPP	NYPP	341	55	233	339	333
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	345	90	61	344	347
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	348	63	115	348	348
1-TRIPS,DOLHILL6-DOLHILL7- 1	NYISO	NYISO	NYPP	NYPP	349	16	351	350	350
NFG7007 - WESTCHESTER - LONG	NYISO	NYISO	NYPP	NYPP	350	11	350	351	351
FG 5204 SphWmcSumEmc	NYISO	NYISO	NYPP	NYPP	351	29	352	352	352
ONTARIO-NEW YORK ST LAW INT	NYISO	NYISO	NYPP	NYPP	352	38	353	353	353
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	353	51	354	354	354
1-TRIP CEDARGROVE-ROSELAND	NYISO	NYISO	NYPP	NYPP	354	62	355	355	355
FG 1519 8THALMAN 500 DUVAL 5	NYISO	NYISO	NYPP	NYPP	355	80	356	356	356
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	356	93	357	357	357

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	1	38	62	67	175
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	2	66	70	28	62
APS South Interface	VAP	AP	PJM	PJM	3	33	99	48	74
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	4	63	31	3	22
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	5	68	5	1	10
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	6	37	35	31	135
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	7	29	1	4	49
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	8	57	52	36	97
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	9	41	10	2	15
726 - Turkey Hill-S. Bellevi	IP	IP	MISO	MISO	10	347	34	5	29
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	11	36	84	6	5
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	12	76	126	79	99
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	13	3	19	18	121
1100 - Trimble Co.-Clifty Cr	OVEC	LGEE	PJM	MISO	14	354	49	43	147
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	15	125	168	70	44
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	16	59	50	7	17
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHE	17	348	69	102	214
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	18	177	109	8	8
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	19	4	16	17	104
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERG	ENTERG	20	17	37	27	102
NFG1314 - Little Gypsy-South	EES	EES	ENTERG	ENTERG	21	67	93	33	51
FN/FS INT	IESO	IESO	ONTARIC	ONTARIC	22	188	81	65	149
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERG	ENTERG	23	52	7	35	181
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	24	130	59	11	32
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	25	103	130	130	194
East West Transfer West	IESO	IESO	ONTARIC	ONTARIC	26	50	6	19	152
849 - C33 (DOE)-Grahamville	DOE	LGEE	TVAUTH	MISO	27	294	120	26	27
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	28	49	78	9	16
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	29	30	72	44	93
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	30	140	92	16	28
FG 1518 8HATCH 500 DUVAL 500	SOCO	FPL	SOUTHE	FRCC	31	349	82	112	218
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	32	23	28	80	226
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	33	5	23	13	82
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	34	14	15	82	267
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	35	53	76	29	56

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
249 - ATC Flow South	WEC	WPS	MISO	MISO	36	101	42	22	84
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	37	45	57	41	106
NFG6079 - TEST_MHEB_OTDF_Sha	MP	MP	MISO	MISO	38	172	36	40	162
426 - McGulpin-Straits 138 #	METC	WEC	MISO	MISO	39	346	48	12	41
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERG	40	88	64	14	33
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	41	25	97	94	172
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERG	42	82	46	15	54
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	43	34	4	10	87
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	44	46	56	138	285
1-TRIPS,01BLCKCO-01HATFLD- 1	AP	AP	PJM	PJM	45	166	212	142	77
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERG	ENTERG	46	80	102	30	37
97 - Benton Harbor-Palisades	AEP	METC	PJM	MISO	47	239	178	127	89
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERG	48	93	108	32	38
CLAN/CLAS INT	IESO	IESO	ONTARIO	ONTARIO	49	286	96	98	180
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	50	44	67	176	300
CENTRAL-SOUTHEAST	FPL	FPL	FRCC	FRCC	51	112	136	143	196
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	52	74	132	93	100
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	53	108	103	186	286
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	54	181	176	34	6
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	55	12	26	104	277
INTERFACE= PJM - EASTERN	PJM500	PJM500	PJM	PJM	56	84	193	200	206
SPP109-SCOBONCOCVIL	Lafa	EES	SPP	ENTERG	57	104	106	37	43
ONT Hydro to Michigan	IESO	ITC	ONTARIO	MISO	58	297	88	108	208
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	59	106	137	57	52
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	60	155	105	52	69
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	61	15	74	117	223
319 - Hoytdale-Maple 138 (fl	FE	FE	MISO	MISO	62	137	171	53	25
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERG	ENTERG	63	135	143	137	187
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	64	184	152	39	20
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	65	10	47	71	207
500 - Newton-Effingham 138 (	AMRN	AMRN	MISO	MISO	66	224	131	49	42
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	67	55	122	58	73
1593 - Webster-Walton 230 (f	CIN	CIN	MISO	MISO	68	219	147	61	47
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	69	97	12	46	202
1348 - Erie West-Erie South	PENELEC	PENELEC	PJM	PJM	70	144	119	89	136

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Constraints	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	71	54	8	96	281
1-TRIPS,10NEATNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	72	100	94	55	88
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERG	ENTERG	73	154	139	78	83
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	74	32	85	21	36
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	75	114	44	153	297
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	76	51	165	45	23
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	77	62	53	24	72
14 I/F WEST CENTRAL CLOSE L	NYISO	NYISO	NYPP	NYPP	78	132	98	172	279
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERG	ENTERG	79	1	2	50	221
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	80	79	240	179	94
1038 - Reasnor-Des Moines 16	ALTW	MEC	MISO	MAPP	81	277	183	47	13
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	82	107	110	20	24
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	83	20	25	51	192
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	84	70	60	38	92
147 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	85	153	205	161	125
14 I/F WEST CENTRAL CLOSE H	NYISO	NYISO	NYPP	NYPP	86	151	155	182	220
New Freedm 500-230 XFormer	PJM500	PSEG	PJM	PJM	87	355	160	111	108
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	88	27	86	54	91
1-TRIPS,16PEGE -16THOMPS- 2	IPL	IPL	MISO	MISO	89	146	211	133	71
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	90	48	40	56	189
SPP 67-SEMFRSEMFR	OKGE	OKGE	SPP	SPP	91	344	276	100	7
5ROBBINS 161-5SANTEET 161- 1	DUK	TVA	VACAR	TVAUTH	92	204	123	64	79
1-TRIPS,CHARLOTE-HARDCHAR- 1	FPL	FPC	FRCC	FRCC	93	165	133	128	186
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	94	24	65	74	184
SPP 27-EUFXRWELXFR	SWPA	SWPA	SPP	SPP	95	193	175	42	12
1240 - Coal Creek Tap-Stanto	GRE	GRE	MISO	MISO	96	111	101	106	182
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	97	141	95	66	118
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	98	190	177	73	34
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	99	94	100	68	115
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	100	136	307	197	55
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	101	95	87	60	103
1-TRIPS,10NEWTNV-14COLE 5- 1	SIGE	BREC	MISO	MISO	103	134	148	86	78
1-TRIPS,6PERRY R-3PERRY R- 2	SCPSA	SCPSA	VACAR	VACAR	105	179	135	97	105
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	106	56	13	156	311
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	107	98	80	62	133

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MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	108	78	66	23	58
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	109	6	9	101	289
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	110	121	141	99	107
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	112	119	116	83	134
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	114	18	29	85	235
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	116	2	3	162	315
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	117	19	30	88	234
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	119	39	17	113	293
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	120	22	32	91	237
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	122	150	115	76	109
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	123	64	91	204	303
1-TRIPS,6W.RINGO-3W.RINGG- 1	TVA	TVA	TVAUTH	TVAUTH	124	227	121	84	128
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	127	113	128	95	120
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	128	85	104	87	154
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	130	96	182	59	21
SPP 81-TUPTUPVALPIT	SWPA	WFEC	SPP	SPP	131	241	158	75	59
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	133	262	204	25	1
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	135	42	33	63	204
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERG	ENTERG	137	26	24	72	227
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	139	81	236	116	30
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	140	201	226	92	19
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	141	11	21	115	292
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	144	87	146	110	145
FG 1380 Batesville-Marks for	EES	EES	ENTERG	ENTERG	150	28	18	69	228
NFG1399 - Wyatt-Parnell 115k	EES	EES	ENTERG	ENTERG	154	238	190	90	35
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	160	102	27	81	231
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	165	35	38	123	288
7 I/F CENTRAL EAST HI	NYISO	NYISO	NYPP	NYPP	167	90	210	271	283
823LYLES 3LEXNGT	SCEG	SCPSA	VACAR	VACAR	171	157	63	118	229
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	176	89	54	77	200
1-TRIPS,3CAMPFLD-3GTWN S - 1	SCPSA	SCPSA	VACAR	VACAR	179	156	71	121	233
1-TRIPS,3GTWN S -3IPCOPMP- 1	SCPSA	SCPSA	VACAR	VACAR	180	161	73	124	232
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	182	133	43	126	284
1-TRIPS,5J VIL 2-5DICKSON- 1	TVA	TVA	TVAUTH	TVAUTH	185	92	185	144	116
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	186	40	14	201	325

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1-TRIPS,3CAMPFLD-3IPCOPMP-99	SCPSA	SCPSA	VACAR	VACAR	190	182	79	129	238
1-TRIPS,3JAXISW -3R.BRAS -99	EES	EES	ENTERG	ENTERG	200	124	89	140	239
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	204	69	51	173	304
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	216	13	22	169	313
1-TRIPS,SPRBROOK-W 49 ST - 2	NYISO	NYISO	NYPP	NYPP	218	91	83	212	308
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERG	ENTERG	220	77	75	132	250
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	224	99	39	256	332
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	226	72	68	188	305
1197 - Green River Steel-Clo	LGEE	LGEE	MISO	MISO	227	65	234	190	143
1-TRIPS,BC PST 4-3BVRCRK - 1	CELE	EES	SPP	ENTERG	228	43	45	151	295
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	235	86	77	279	329
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	ENTERG	ENTERG	242	61	58	160	296
664 - State Line-Wolf Lake 1	NIPS	NI	MISO	PJM	247	71	164	243	291
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	297	118	41	316	343
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	299	21	11	301	342
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	314	142	20	314	344
Actual:SPRBROOK-TREMONT	NYISO	NYISO	NYPP	NYPP	316	47	189	325	331
Actual:L SUCSPH-JAMAICA	NYISO	NYISO	NYPP	NYPP	324	58	127	318	337
690 - St. Clair 345/230 Xfm	ITC	ITC	MISO	MISO	330	173	61	340	346
PVSC 138-NORTH AV 138- 1	PSEG	PSEG	PJM	PJM	343	264	90	343	347
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	347	60	55	347	350
CP10_15_ASTE-WRG_HG A 1_Bas	NYISO	NYISO	NYPP	NYPP	348	73	201	348	348
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	351	75	117	350	351
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	352	7	280	353	353
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	353	8	274	354	354
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	354	9	277	355	355
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	355	16	275	356	356
1552 - MP-IMO_N	MP	IESO	MISO	ONTARIO	356	31	267	357	357
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	357	83	268	358	358

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1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	1	1	1	3	33
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	2	3	4	1	9
APS South Interface	VAP	AP	PJM	PJM	3	40	90	58	126
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	4	62	61	90	200
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	5	77	78	40	74
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	6	11	14	2	14
7 I/F MOSES SOUTH CLOSE HI	NYISO	NEPOOL	NYPP	NEPOOL	7	67	50	41	128
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	8	32	47	5	18
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	9	10	12	10	75
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	10	36	39	48	168
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	6	7	19	140
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERG	ENTERG	12	25	31	15	70
726 - Turkey Hill-S. Bellevi	IP	IP	MISO	MISO	13	13	37	8	29
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	14	41	82	7	10
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	15	142	150	79	56
1100 - Trimble Co.-Clifty Cr	OVEC	LGEE	PJM	MISO	16	49	44	50	163
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	17	83	94	4	4
849 - C33 (DOE)-Grahamville	DOE	LGEE	TVAUTH	MISO	18	48	71	16	25
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	19	119	81	72	151
7 I/F MOSES SOUTH CLOSE LO	NYISO	NEPOOL	NYPP	NEPOOL	20	33	35	69	204
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	21	158	126	11	8
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	22	106	138	121	160
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	23	7	6	22	148
NFG1314 - Little Gypsy-South	EES	EES	ENTERG	ENTERG	24	55	106	43	46
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERG	ENTERG	25	9	15	44	190
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	26	24	20	77	264
426 - McGulpin-Straits 138 #	METC	WEC	MISO	MISO	27	54	42	9	27
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	28	57	76	81	178
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	29	5	5	6	59
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	30	91	56	17	36
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHE	31	82	83	139	271
NFG6079 - TEST_MHEB_OTDF_Sha	MP	MP	MISO	MISO	32	44	34	33	147
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	33	105	68	12	21
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	34	129	75	27	54
5ROBBINS 161-5SANTEET 161- 1	DUK	TVA	VACAR	TVAUTH	35	86	57	21	44

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Constraint	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
249 - ATC Flow South	WEC	WPS	MISO	MISO	36	56	40	23	101
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	37	50	52	42	124
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERG	ENTERG	38	85	91	24	32
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	39	80	79	36	61
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERG	40	72	45	14	47
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	41	22	25	20	114
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	42	47	51	26	78
500 - Newton-Effingham 138 (	AMRN	AMRN	MISO	MISO	43	76	102	39	52
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	44	37	29	103	278
SPP109-SCOBONCOCVIL	Lafa	EES	SPP	ENTERG	45	114	112	35	31
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	46	74	48	38	116
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERG	ENTERG	47	2	2	29	191
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	48	102	122	187	279
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	49	140	148	180	259
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	50	109	160	32	12
CLAN/CLAS INT	IESO	IESO	ONTARIO	ONTARIO	51	132	103	99	187
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	52	87	118	28	23
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	53	58	77	158	280
1-TRIPS,5OGLATHR-5WIDCRK2- 1	TVA	TVA	TVAUTH	TVAUTH	54	63	64	37	87
FG 1518 8HATCH 500 DUVAL 500	SOCO	FPL	SOUTHE	FRCC	55	90	105	160	273
SPP 57-PITSEMPITSUN	AEPW	OKGE	SPP	SPP	56	84	98	108	195
1-TRIPS,01BLCKCO-01HATFLD- 1	AP	AP	PJM	PJM	57	71	210	166	135
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERG	ENTERG	58	136	137	75	73
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	59	61	69	196	303
1-TRIPS,16PEGE -16THOMPS- 2	IPL	IPL	MISO	MISO	60	127	188	123	71
1-TRIPS,6W.RINGO-3W.RINGG- 1	TVA	TVA	TVAUTH	TVAUTH	61	94	89	46	84
SPP 67-SEMFRSEMFR	OKGE	OKGE	SPP	SPP	62	345	270	80	3
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	63	134	116	78	112
1-TRIPS,6PERRY R-3PERRY R- 2	SCPSA	SCPSA	VACAR	VACAR	64	148	128	70	68
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	65	138	100	51	91
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	66	60	96	25	30
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	67	125	127	96	143
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	68	81	46	89	249
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	69	151	124	73	80
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	70	152	140	127	166

Appendix 1 SortedFlowgatesAll Revised 7-12-06.xls
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Constraint	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1270 - Newton-Casey 345 (flo	AMRN	AMRN	MISO	MISO	71	139	163	141	162
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	72	113	93	45	72
New Freedm 500-230 XFormer	PJM500	PSEG	PJM	PJM	73	218	174	118	93
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	74	17	23	56	213
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	75	19	24	57	212
1038 - Reasnor-Des Moines 16	ALTW	MEC	MISO	MAPP	76	238	171	53	16
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERG	ENTERG	77	21	26	63	216
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	78	88	88	47	90
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERG	79	124	130	64	58
1-TRIPS,CHARLOTE-HARDCHAR- 1	FPL	FPC	FRCC	FRCC	80	160	129	126	182
50 - Axton 765/138 Xfm (flo)	AEP	AEP	PJM	PJM	81	167	202	133	69
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	82	31	27	55	201
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERG	ENTERG	83	177	142	164	236
5NANTAHA 161-5ROBBINS 161- 1	DUK	DUK	VACAR	VACAR	84	146	145	61	38
1348 - Erie West-Erie South	PENELEC	PENELEC	PJM	PJM	85	144	110	104	175
460 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	86	145	283	182	51
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	87	92	65	13	24
335 - Kammer 765/500 Xfm (fl	AP	AEP	PJM	PJM	88	257	212	165	133
SPP 27-EUFXFRWELXFR	SWPA	SWPA	SPP	SPP	89	222	178	34	7
1-TRIPS,5OGLETHR-5WIDCRK2- 2	TVA	TVA	TVAUTH	TVAUTH	90	104	115	66	94
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERG	91	137	117	49	48
319 - Hoytdale-Maple 138 (fl	FE	FE	MISO	MISO	92	150	192	82	20
CRYSTAL RIVER-SOUTH	FPC	FPC	FRCC	FRCC	93	165	213	177	156
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	94	45	73	60	139
CAPE CANAVERAL-INDIAN RIVER	FPL	OUC	FRCC	FRCC	95	135	104	112	192
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	96	130	99	31	45
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	97	161	109	59	86
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	98	101	251	208	131
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	99	147	134	87	119
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	100	120	113	30	28
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	101	39	30	68	210
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	102	26	21	76	260
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	105	8	9	150	309
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	106	27	11	128	296
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	107	121	62	54	138

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Constraint	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	112	4	3	159	317
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	113	68	55	86	206
New England East-West Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	117	123	85	194	295
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	119	227	209	18	1
406 - Marengo-Pleasant Valle	NI	NI	PJM	PJM	121	163	179	92	49
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	122	209	183	88	42
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERG	ENTERG	124	28	28	62	208
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	125	18	17	124	292
New England North-South Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	126	118	86	201	298
1-TRIPS,5J VIL 2-5DICKSON- 1	TVA	TVA	TVAUTH	TVAUTH	128	128	149	85	83
1199 - New Hardinsburg 161/1	BREC	BREC	MISO	MISO	129	224	175	91	53
FG 1380 Batesville-Marks for	EES	EES	ENTERG	ENTERG	132	23	18	52	205
268 - Greenfield-Lakeview 13	FE	FE	MISO	MISO	133	169	139	97	127
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	134	131	92	84	176
SPP 26-ELPFARWICWDR	WERE	WERE	SPP	SPP	136	175	196	93	34
737 - Turkey River-Cassville	ALTW	DPC	MISO	MISO	137	185	151	95	105
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	140	155	153	67	37
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	141	278	218	83	17
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	142	15	10	131	299
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	143	35	32	71	215
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	144	112	95	226	306
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	145	46	36	74	221
823LYLES 3LEXNGT	SCEG	SCPSA	VACAR	VACAR	150	73	58	94	209
1-TRIPS,3CAMPFLD-3GTWN S - 1	SCPSA	SCPSA	VACAR	VACAR	157	75	66	98	217
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	158	108	53	65	171
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	159	65	158	125	141
1-TRIPS,3GTWN S -3IPCOPMP- 1	SCPSA	SCPSA	VACAR	VACAR	161	79	72	100	214
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	166	43	33	107	277
1-TRIPS,3CAMPFLD-3IPCOPMP-99	SCPSA	SCPSA	VACAR	VACAR	172	100	87	115	218
1-TRIPS,3JAXISW -3R.BRAS -99	EES	EES	ENTERG	ENTERG	173	103	80	109	219
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	178	29	22	143	304
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	182	59	38	136	289
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	183	42	159	246	287
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	190	116	16	212	327
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERG	ENTERG	192	69	74	116	243

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Constraint	From Area	To Area	From Market	To Market	CongRent	U90	BindHrs	All-hrs Price	Binding Hrs Price
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	225	66	49	198	310
1-TRIPS,SPRBROOK-W 49 ST - 2	NYISO	NYISO	NYPP	NYPP	228	97	84	233	312
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	229	96	54	204	308
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	236	30	19	191	322
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	237	107	67	275	329
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES	SPP	ENTERG	253	95	59	170	291
NFG7005 - ADIRONDACK - ISONE	NEPOOL	NYISO	NEPOOL	NYPP	257	110	97	235	307
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	263	51	41	291	333
1-TRIPS,3BVRCK -3STAND -99	EES	EES	ENTERG	ENTERG	277	99	70	195	302
Minong - Stone Lake 138kV	XEL	MP	MISO	MISO	295	98	141	260	305
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	305	12	8	306	338
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	318	78	43	329	341
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	330	20	13	328	343
690 - St. Clair 345/230 Xfm	ITC	ITC	MISO	MISO	332	115	60	339	345
1T Jamaica-ValSt SprBrk-EGC	NYISO	NYISO	NYPP	NYPP	338	53	241	334	331
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	344	89	63	342	347
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	348	64	121	348	348
NFG7007 - WESTCHESTER - LONG	NYISO	NYISO	NYPP	NYPP	349	14	263	349	350
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	350	16	262	350	351
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	351	34	260	351	352
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	352	38	259	352	353
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	353	52	256	353	354
1-TRIP CEDARGROVE-ROSELAND	PSEG	PSEG	PJM	PJM	354	70	255	354	355
1-TRIPS,HMP HRBR-DVNPT NK- 1	NYISO	NYISO	NYPP	NYPP	355	93	253	355	356

Task 2. Appendix 2: Summary of Cluster Analysis

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
ENTERGY	AECI	4	10	8,245	4,190	4,055	4,743	2,270	2,472	57.52%	52.65%	60.97%
ENTERGY	CWLD	1	9	301	-	301	48	-	48	15.95%	0.00%	15.95%
ENTERGY	DENL	1	9	293	14	279	81	-	81	27.47%	100.00%	28.85%
ENTERGY	DERS	1	1	143	75	68	143	75	68	100.00%	100.00%	100.00%
ENTERGY	EES	9	10	68,561	39,819	28,743	67,181	38,894	28,287	97.99%	97.92%	98.42%
ENTERGY	LAGN	1	10	3,427	2,349	1,078	2,342	2,179	163	68.32%	92.24%	15.09%
FRCC	FMP	1	8	299	137	162	167	137	30	56.06%	100.00%	18.81%
FRCC	FPC	4	10	21,255	10,286	10,969	15,060	7,791	7,269	70.85%	72.91%	66.27%
FRCC	FPL	4	10	45,594	23,197	22,397	42,621	22,424	20,197	93.48%	97.34%	90.18%
FRCC	FTP	1	7	261	142	119	171	142	29	65.34%	100.00%	24.09%
FRCC	GVL	1	10	1,052	549	503	536	423	113	50.91%	69.00%	22.41%
FRCC	HST	1	1	78	-	78	78	-	78	100.00%	0.00%	100.00%
FRCC	JEA	1	10	6,521	3,628	2,893	2,787	1,605	1,182	42.74%	37.06%	40.85%
FRCC	KEY	1	1	949	811	138	949	811	138	100.00%	100.00%	100.00%
FRCC	KIS	1	10	722	421	302	411	358	53	56.85%	62.30%	17.54%
FRCC	LAK	1	10	1,991	1,331	660	895	777	118	44.95%	65.65%	17.87%
FRCC	LWU	1	1	287	205	82	287	205	82	100.00%	100.00%	100.00%
FRCC	NSB	1	1	566	480	86	566	480	86	100.00%	100.00%	100.00%
FRCC	OUC	1	10	3,021	1,785	1,236	960	887	73	31.77%	57.27%	5.88%
FRCC	RCU	1	8	195	-	195	38	-	38	19.42%	0.00%	19.42%
FRCC	SEC	1	7	2,381	2,125	256	1,316	1,316	-	55.26%	70.19%	0.00%
FRCC	STK	1	1	17	-	17	17	-	17	100.00%	0.00%	100.00%
FRCC	TAL	1	10	1,258	652	606	507	295	211	40.27%	52.76%	34.88%
FRCC	TECO	2	10	10,282	6,266	4,016	6,007	3,499	2,507	58.42%	59.05%	62.43%
MAPP	MEC	1	10	11,569	6,115	5,454	5,049	3,115	1,933	43.64%	56.07%	35.45%
MAPP	MPW	1	7	418	253	165	201	151	50	47.98%	59.68%	30.04%
MAPP	NPPD	3	10	7,789	4,648	3,142	5,387	3,281	2,106	69.15%	69.83%	67.02%
MAPP	OPPD	1	10	4,679	2,187	2,492	2,102	416	1,686	44.92%	16.38%	67.65%
MAPP	WAPA	1	10	11,077	7,970	3,107	3,173	2,360	813	28.65%	27.90%	26.18%
MISO	ALTE	1	10	7,294	4,475	2,819	2,198	1,574	624	30.14%	31.82%	22.15%
MISO	ALTW	1	10	9,085	4,563	4,522	2,084	980	1,103	22.93%	26.09%	24.39%
MISO	AMRN	2	15	26,931	13,766	13,165	12,445	5,170	7,275	46.21%	37.76%	55.26%
MISO	BREC	1	10	3,437	1,810	1,627	1,915	1,355	560	55.71%	74.86%	34.41%
MISO	CILC	1	10	2,314	1,152	1,162	1,266	756	510	54.71%	65.51%	43.90%
MISO	CIN	5	8	28,328	14,333	13,995	26,347	13,359	12,988	93.01%	94.12%	92.80%
MISO	CWLP	1	10	1,106	620	486	527	300	227	47.68%	48.74%	46.77%
MISO	DPC	1	10	2,037	1,071	966	939	601	338	46.09%	54.42%	34.98%
MISO	EEL	1	3	1,382	1,292	90	543	507	36	39.29%	38.73%	39.91%
MISO	EKPC	1	10	4,730	2,519	2,211	1,861	1,396	465	39.34%	47.39%	21.02%
MISO	FE	7	10	27,315	13,246	14,070	23,640	11,176	12,464	86.54%	84.92%	88.59%
MISO	GRE	1	10	4,522	2,944	1,578	1,383	272	1,111	30.59%	11.01%	70.42%
MISO	HE	1	10	1,943	1,399	544	1,120	1,000	120	57.61%	70.75%	21.97%
MISO	IP	2	10	10,119	5,535	4,584	5,697	4,058	1,639	56.30%	62.44%	35.75%
MISO	IPL	3	10	6,325	3,250	3,074	4,872	2,457	2,414	77.03%	71.97%	78.53%
MISO	ITC	4	10	24,902	11,876	13,026	21,373	9,775	11,598	85.83%	82.52%	89.04%
MISO	LES	1	10	1,248	438	810	463	249	214	37.10%	55.71%	26.41%
MISO	LGEE	4	10	15,948	8,250	7,698	8,717	3,613	5,103	54.66%	50.57%	66.30%
MISO	METC	3	10	22,996	12,480	10,516	16,969	10,172	6,796	73.79%	79.26%	64.63%

Task 2. Appendix 2: Summary of Cluster Analysis

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
MISO	MGE	1	10	1,252	438	813	769	366	403	61.41%	82.95%	49.51%
MISO	MIPU	1	10	4,340	2,418	1,922	1,800	1,249	551	41.46%	51.57%	28.64%
MISO	MP	1	10	3,813	2,134	1,679	1,333	508	824	34.96%	40.69%	49.11%
MISO	NIPS	1	10	6,883	3,436	3,447	4,573	2,880	1,693	66.44%	73.01%	49.11%
MISO	OTP	2	10	3,352	1,457	1,895	1,941	1,166	775	57.92%	86.51%	40.91%
MISO	SIGE	1	10	3,441	1,478	1,963	909	135	774	26.41%	10.49%	39.42%
MISO	SIPC	1	10	675	412	263	465	412	53	68.84%	100.00%	20.03%
MISO	SMMPA	1	10	697	309	388	193	111	82	27.77%	41.83%	21.28%
MISO	SUNC	1	10	1,815	1,462	353	956	840	116	52.67%	54.38%	32.80%
MISO	UPPC	1	10	223	53	169	77	2	75	34.63%	48.75%	44.20%
MISO	WEC	3	10	15,435	8,048	7,387	12,423	6,645	5,777	80.48%	84.80%	78.21%
MISO	WEPL	1	10	948	372	576	261	137	124	27.48%	36.83%	21.45%
MISO	WPS	1	10	5,753	3,084	2,669	1,003	399	604	17.43%	29.84%	22.63%
MISO	XEL	1	10	19,501	9,287	10,215	17,489	9,867	7,622	89.68%	79.07%	74.62%
NEPOOL	CT	1	1	8,164	4,244	3,920	8,164	4,244	3,920	100.00%	100.00%	100.00%
NEPOOL	ME	1	1	5,824	3,301	2,522	5,824	3,301	2,522	100.00%	100.00%	100.00%
NEPOOL	NEBOS	1	1	8,306	2,401	5,904	8,306	2,401	5,904	100.00%	100.00%	100.00%
NEPOOL	NH	1	1	6,653	4,032	2,621	6,653	4,032	2,621	100.00%	100.00%	100.00%
NEPOOL	NWKST	1	1	2,293	769	1,524	1,908	385	1,524	83.23%	100.00%	100.00%
NEPOOL	RI	1	1	4,004	1,801	2,203	4,004	1,801	2,203	100.00%	100.00%	100.00%
NEPOOL	SEMA	1	1	12,790	8,812	3,978	10,056	6,078	3,978	78.62%	100.00%	100.00%
NEPOOL	SWCT	1	1	6,702	4,853	1,850	4,276	2,426	1,850	63.80%	100.00%	100.00%
NEPOOL	VT	1	1	1,962	772	1,190	1,962	772	1,190	100.00%	100.00%	100.00%
NEPOOL	WCMA	1	1	7,412	3,995	3,417	7,412	3,995	3,417	100.00%	100.00%	100.00%
NYISO	NYA	1	1	7,366	4,866	2,500	7,366	4,866	2,500	100.00%	100.00%	100.00%
NYISO	NYB	1	1	2,402	643	1,759	2,402	643	1,759	100.00%	100.00%	100.00%
NYISO	NYC	1	1	9,199	6,542	2,657	9,199	6,542	2,657	100.00%	100.00%	100.00%
NYISO	NYD	1	1	1,860	1,180	681	1,860	1,180	681	100.00%	100.00%	100.00%
NYISO	NYE	1	1	1,872	963	909	1,872	963	909	100.00%	100.00%	100.00%
NYISO	NYF	1	1	5,858	3,875	1,983	5,858	3,875	1,983	100.00%	100.00%	100.00%
NYISO	NYG	1	1	5,482	3,288	2,195	5,482	3,288	2,195	100.00%	100.00%	100.00%
NYISO	NYH	1	1	2,991	2,018	973	2,991	2,018	973	100.00%	100.00%	100.00%
NYISO	NYI	1	1	1,478	2	1,476	1,478	2	1,476	100.00%	100.00%	100.00%
NYISO	NYJ	1	1	21,924	10,432	11,493	21,924	10,432	11,493	100.00%	100.00%	100.00%
NYISO	NYK	1	1	10,584	5,295	5,289	10,584	5,295	5,289	100.00%	100.00%	100.00%
ONTARIO	IESO	6	15	55,383	29,028	26,355	40,644	20,278	20,366	73.39%	76.59%	77.28%
PJM	AE	1	10	4,025	1,259	2,766	913	77	836	22.68%	41.75%	30.22%
PJM	AEP	5	10	53,942	29,431	24,511	48,967	26,920	22,048	90.78%	92.12%	89.95%
PJM	AP	4	10	18,638	9,954	8,684	13,159	6,938	6,221	70.60%	70.01%	71.64%
PJM	BGE	5	10	10,924	3,943	6,981	9,660	3,564	6,096	88.43%	89.48%	87.32%
PJM	DLCO	2	10	6,246	3,441	2,805	2,303	1,644	659	36.88%	46.88%	23.51%
PJM	DP&L	1	10	7,692	3,528	4,164	3,164	1,399	1,765	41.13%	39.18%	42.39%
PJM	DPL	2	8	7,684	4,076	3,608	6,545	3,892	2,652	85.17%	95.23%	73.52%
PJM	JCPL	2	10	10,378	4,090	6,288	5,734	1,207	4,527	55.25%	28.36%	71.99%
PJM	METED	1	10	5,962	3,240	2,722	1,714	860	854	28.75%	26.18%	31.39%
PJM	NI	7	20	49,112	26,012	23,100	43,316	22,612	20,704	88.20%	88.51%	89.63%
PJM	OVEC	1	4	3,727	3,692	35	1,490	1,480	10	39.98%	41.29%	28.57%
PJM	PECO	3	10	16,871	8,401	8,470	8,072	3,944	4,128	47.84%	48.03%	48.74%

Task 2. Appendix 2: Summary of Cluster Analysis

Market	AREA	Number of Hubs	Number of Clusters	Total Weight	Gen Weight	Load Weight	Total Weight in Hubs	Total Gen Weight in Hubs	Total Load Weight in Hubs	Percent Total Weight	Percent Gen Weight	Percent Load Weight
PJM	PENELEC	1	10	7,592	4,800	2,792	3,811	2,615	1,196	50.20%	53.52%	42.84%
PJM	PEPCO	5	10	12,750	6,090	6,660	8,229	3,493	4,736	64.54%	58.80%	71.12%
PJM	PJM500	6	10	16,286	16,286	-	13,776	13,776	-	84.59%	86.62%	0.00%
PJM	PL	3	10	15,175	8,311	6,864	5,121	2,788	2,333	33.75%	34.58%	33.99%
PJM	PSEG	4	10	19,010	8,328	10,682	16,423	7,089	9,334	86.39%	88.65%	87.38%
PJM	RECO	1	8	476	-	476	146	-	146	30.62%	0.00%	30.62%
PJM	UGI	1	10	273	98	176	95	42	53	34.58%	48.54%	30.16%
PJM	VAP	6	35	41,180	22,630	18,550	26,826	16,985	9,841	65.14%	75.43%	53.05%
SOUTHERN	AEC	1	10	2,495	1,481	1,014	1,129	881	248	45.26%	57.80%	24.50%
SOUTHERN	SMEPA	1	10	1,374	684	690	433	248	184	31.48%	53.10%	26.74%
SOUTHERN	SOCO	15	35	107,931	60,597	47,335	91,634	52,053	39,582	84.90%	84.90%	83.62%
SPP	AEPW	3	10	26,358	16,633	9,725	23,747	15,344	8,403	90.10%	91.94%	86.40%
SPP	CELE	1	10	6,333	4,083	2,250	2,562	1,820	742	40.46%	48.75%	32.98%
SPP	EMDE	1	10	2,426	1,338	1,088	1,510	1,052	458	62.26%	79.30%	42.12%
SPP	GRDA	1	10	2,387	1,595	792	1,027	849	179	43.03%	52.74%	22.53%
SPP	INDN	1	10	606	288	318	220	143	77	36.26%	49.65%	24.15%
SPP	KACP	2	10	8,039	4,403	3,636	1,961	670	1,291	24.39%	28.18%	35.49%
SPP	KACY	1	10	1,179	680	499	413	316	97	35.00%	46.47%	19.37%
SPP	LAFA	1	10	731	295	436	282	175	107	38.60%	59.32%	24.58%
SPP	LEPA	1	10	452	201	251	162	89	73	35.93%	45.37%	29.24%
SPP	MIDW	1	10	377	32	345	111	19	92	29.46%	78.16%	26.68%
SPP	OKGE	1	10	13,768	7,931	5,837	4,462	2,059	2,403	32.41%	25.48%	41.17%
SPP	OMPA	1	10	800	163	637	481	163	318	60.07%	100.00%	49.86%
SPP	SPRM	1	10	1,457	689	768	582	236	346	39.93%	40.93%	45.02%
SPP	SPS	1	10	11,914	7,175	4,740	7,393	4,420	2,973	62.05%	63.18%	62.72%
SPP	SWPA	1	10	3,016	2,186	830	866	478	388	28.71%	21.86%	46.75%
SPP	WERE	3	10	12,806	7,356	5,450	10,320	6,536	3,783	80.58%	89.87%	69.42%
SPP	WFEC	1	10	2,396	1,131	1,265	659	337	322	27.52%	35.36%	25.49%
TVAUTHOR	BCA	1	1	94	80	14	94	80	14	100.00%	100.00%	100.00%
TVAUTHOR	DOE	1	5	1,374	474	900	783	474	309	56.96%	100.00%	34.30%
TVAUTHOR	TVA	7	10	75,333	42,281	33,053	75,120	42,281	32,839	99.72%	100.00%	99.35%
VACAR	CPL	2	10	24,266	12,105	12,161	19,285	9,910	9,375	79.47%	81.01%	77.09%
VACAR	CPLW	1	10	2,177	1,389	788	898	712	186	41.24%	49.26%	23.56%
VACAR	DUK	4	10	42,741	22,228	20,512	40,388	21,046	19,341	94.49%	94.68%	94.29%
VACAR	SCEG	2	10	11,957	6,929	5,029	10,603	5,906	4,696	88.67%	88.26%	93.39%
VACAR	SCPSA	2	10	8,992	4,348	4,644	6,523	3,287	3,236	72.54%	68.63%	69.68%
VACAR	YAD	1	1	17	13	4	31	27	4	177.07%	100.00%	100.00%
Systemwide		255	1100	1,355,573	738,554	617,019	1,035,734	569,134	466,600	76.41%	77.06%	75.62%

Nodes (Hubs) Summary

Unique Cluster	Cluster Long Name	AREA	CLUSTER	Gen Weight	Load Weight	Number of Buses	MAPS Units	Full Name
AE-7	AE_7_MSA_OceanCity_G	AE	7	90	836	55	MIDDLE03	Middle 3
AEC-8	AEC_8_G	AEC	8	903	60	9	MINTOSH1	McIntosh (Washington County)
AECI-3	AECI_3_L	AECI	3	-	915	125		
AECI-4	AECI_4_GEN_NewMadrid1_G	AECI	4	2,315	248	40	NEW MA01	New Madrid 1
AECI-7	AECI_7_MSA_KansasCity_L	AECI	7	-	615	102		
AECI-9	AECI_9_L	AECI	9	-	694	85		
AEP-1	AEP_1_MSA_Lynchburg_G	AEP	1	843	2,162	87	AEP HY01	
AEP-2	AEP_2_STA_TN-WV_L	AEP	2	1,284	2,977	175	AMOS 02	John E Amos 2
AEP-3	AEP_3_MSA_Columbus_L	AEP	3	10,204	8,244	221	AMOS 02	John E Amos 2
AEP-8	AEP_8_GEN_Amos01_G	AEP	8	19,694	6,544	262	AMOS 01	John E Amos 1
AEP-9	AEP_9_MSA_Canton-Massillon_L	AEP	9	733	2,120	63	DRESDNRG	Dresden Energy
AEPW-1	AEPW_1_MSA_Tulsa_G	AEPW	1	3,295	2,000	90	TULSA	Congentrix/Tulsa (Jenks)
AEPW-5	AEPW_5_MSA_Tulsa_G	AEPW	5	4,226	2,571	206	FLINTC01	Flint Creek
AEPW-9	AEPW_9_MSA_MountPleasant_G	AEPW	9	8,168	3,832	247	WELSHDC	DC Link - Welsh
ALTE-2	ALTE_2_MSA_Madison_G	ALTE	2	1,665	441	53	COLUMB01	Columbia 1
ALTW-6	ALTW_6_MSA_CedarRapids_L	ALTW	6	996	1,103	59	ARNOLD01	Duane Arnold
AMRN-12	AMRN_12_MSA_StLouis_L	AMRN	12	5,059	6,066	107	RUSH I01	Rush Island 1
AMRN-2	AMRN_2_County_Macon_L	AMRN	2	174	1,209	26	AMGIBSON	Ameren/Gibson City CTs (#1/#
AP-1	AP_1_County_Harrison_G	AP	1	6,563	2,223	83	HARRSN01	Harrison 1
AP-2	AP_2_GEN_Albright3_L	AP	2	603	1,748	127	ALBRIG03	Albright 3
AP-7	AP_7_MSA_Hagerstown-Martinsburg_L	AP	7	203	1,153	31	SMITH 03	R P Smith (9)
AP-8	AP_8_MSA_DC-VA-MD_L	AP	8	-	1,097	21		
BCA-1	BCA_1_GEN_NRGBatesville_G	BCA	1	87	14	5	NRGBATES	NRG Batesville
BGE-10	BGE_10_MSA_Baltimore-Towson_L	BGE	10	845	1,565	51	WAGNER03	Herbert A Wagner 3
BGE-5	BGE_5_MSA_Baltimore-Towson_L	BGE	5	263	1,462	48	CRANE 02	C P Crane2
BGE-7	BGE_7_MSA_Baltimore-Towson_G	BGE	7	2,548	1,043	46	BRAND001	Brandon Shores1
BGE-8	BGE_8_MSA_Baltimore-Towson_L	BGE	8	-	840	27		
BGE-9	BGE_9_MSA_Baltimore-Towson_L	BGE	9	-	1,186	32		
BREC-3	BREC_3_County_Webster_G	BREC	3	1,355	476	3	D B WI01	D B Wilson
CELE-10	CELE_10_MSA_Alexandria_G	CELE	10	1,895	742	28	CLCEVAN	Cleco Evangeline
CILC-8	CILC_8_MSA_Peoria_G	CILC	8	756	349	10	EDWARD03	E D Edwards 3
CIN-1	CIN_1_MSA_Indianapolis_L	CIN	1	816	4,274	176	NOBLES03	Noblesville 3
CIN-3	CIN_3_MSA_TerreHaute_G	CIN	3	3,230	1,015	64	DUKEVERM	Duke Energy Vermillion
CIN-4	CIN_4_MSA_Cincinnati-Middletown_G	CIN	4	6,026	5,727	296	ZIMMER01	W H Zimmer
CIN-7	CIN_7_MSA_Lafayette_L	CIN	7	144	1,712	84	WESTEND	West End
CIN-8	CIN_8_MSA_Evansville_G	CIN	8	3,657	260	17	GIBSON01	Gibson 1
CPLE-1	CPLE_1_MSA_Durham_G	CPLE	1	10,224	8,563	264	HARRIS01	Shearon-Harris
CPLE-9	CPLE_9_MSA_NewBern_L	CPLE	9	53	811	18	SAVANNAH	Savannah River Plant
CPLW-3	CPLW_3_Asheville_G	CPLW	3	764	93	7	ASHVIL01	Asheville ST 1
CWLD-2	CWLD_2_MSA_Columbia_L	CWLD	2	-	48	1		
CWLP-1	CWLP_1_MSA_Springfield_G	CWLP	1	310	227	13	DALLMA01	Dallman 1
DENL-7	DENL_7_MSA_LittleRock_L	DENL	7	-	81	1		
DERS-1	DERS_1_MSA_Ruston_G	DERS	1	75	68	3	RUSTON23	Ruston 2 & 3
DLCO-1	DLCO_1_MSA_Pittsburgh_L	DLCO	1	-	635	12		
DLCO-7	DLCO_7_MSA_Pittsburgh_G	DLCO	7	1,644	25	3	BEAVER01	Beaver Valley 1
DOE-2	DOE_2_MSA_Paducah_G	DOE	2	520	309	1	CLVRTCTY	Enron Calvert City
DP&L-6	DP&L_6_MSA_Seafood_L	DP&L	6	1,438	1,523	116	INDPJM04	Indian River 4
DPC-10	DPC_10_G	DPC	10	615	140	39	MADGET01	John P. Madgett
DPL-3	DPL_3_MSA_Dayton_L	DPL	3	1,350	2,652	47	PIQUA 03	Piqua 3
DPL-8	DPL_8_GEN_Killen_G	DPL	8	2,964	-	2	KILLEN	Killen Station GT1
DUK-4	DUK_4_MSA_Greenville_L	DUK	4	3,546	4,489	77	DUKEHY01	
DUK-5	DUK_5_MSA_Seneca_G	DUK	5	1,911	-	3	BAD CR04	Bad Creek 1-4

Nodes (Hubs) Summary

Unique Cluster	Cluster Long Name	AREA	CLUSTER	Gen Weight	Load Weight	Number of Buses	MAPS Units	Full Name
DUK-8	DUK_8_MSA_Charlotte_L	DUK	8	1,407	4,886	57	DUKEHY01	0
DUK-9	DUK_9_MSA_Charlotte_G	DUK	9	14,681	9,966	146	MC GUI01	McGuire 1
EEL-2	EEL_2_MSA_Paducah_G	EEL	2	507	36	3	JOPPA 01	Joppa Steam 1
EES-1	EES_1_MSA_Jackson_L	EES	1	3,218	3,066	160	ANDRUS01	Gerald Andrus
EES-10	EES_10_MSA_Vicksburg_G	EES	10	3,544	1,249	86	GRAND 01	Grand Gulf
EES-2	EES_2_MSA_Batesville_G	EES	2	3,525	1,697	84	WHITE 02	White Bluff 2
EES-3	EES_3_MSA_Beaumont-PortArthur_L	EES	3	265	1,099	84	NECHES04	Neches 4
EES-4	EES_4_G	EES	4	6,345	2,417	176	CGXOUACH	Ouachita Power (Cogentrix)
EES-5	EES_5_MSA_NewOrleans_G	EES	5	9,735	9,294	271	WATERF03	Waterford 3
EES-7	EES_7_MSA_Beaumont-PortArthur_G	EES	7	7,393	4,949	419	TNSKFRNT	Tenaska Frontier (Shiro)
EES-8	EES_8_MSA_BatonRouge_G	EES	8	1,060	-	1	RIVERB01	Riverbend 1
EES-9	EES_9_MSA_Russellville_G	EES	9	6,123	4,517	227	ARKANS02	Arkansas Nuclear One #2
EKPC-8	EKPC_8_MSA_Maysville_G	EKPC	8	1,396	272	17	SPURLO02	H L Spurlock 2
EMDE-1	EMDE_1_MSA_Joplin_G	EMDE	1	1,102	458	54	STATEL03	Stateline 3
FE-10	FE_10_MSA_Mansfield_L	FE	10	46	859	27	GALION	Galion Generating Facilities
FE-4	FE_4_MSA_Akron_L	FE	4	531	2,277	61	BURGER04	R E Burger 4
FE-5	FE_5_MSA_Cleveland_L	FE	5	3,216	4,680	154	PAINES02	Painesville 2
FE-6	FE_6_MSA_Pittsburgh_G	FE	6	2,371	213	3	MANSFI03	Bruce Mansfield 3
FE-7	FE_7_MSA_Toledo_L	FE	7	2,586	2,106	93	FREMONT	Fremont Energy Center
FE-8	FE_8_MSA_Youngstown_L	FE	8	939	2,217	72	SAMMIS01	W H Sammis 1
FE-9	FE_9_MSA>Weirton_G	FE	9	1,860	112	5	SAMMIS06	W H Sammis 6
FMP-8	FMP_8_MSA_Sebastian_G	FMP	8	145	20	4	VERO B04	Vero Beach Municipal 4
FPC-10	FPC_10_MSA_Lakeland_G	FPC	10	3,561	747	52	HINESCC2	Hines CC2
FPC-2	FPC_2_MSA_HomosassaSprings_G	FPC	2	1,584	-	2	CRYSTA03	Crystal River 3
FPC-3	FPC_3_MSA_Orlando_L	FPC	3	1,232	3,649	133	DEBARYCT	Debary CT
FPC-4	FPC_4_MSA_Tampa_L	FPC	4	2,239	2,873	81	ANCLOT01	Anclote 1
FPL-2	FPL_2_MSA_FortMyers_G	FPL	2	5,929	4,563	131	MANATE03	Manatee 3
FPL-3	FPL_3_MSA_Miami_L	FPL	3	6,944	7,089	196	TURKEY03	Turkey Point 3
FPL-7	FPL_7_MSA_Miami_L	FPL	7	570	3,923	80	BROWARDN	Broward Res. Rec.
FPL-8	FPL_8_MSA_PortStLucie_G	FPL	8	10,364	4,623	236	SANFOR04	Sanford 4
FTP-7	FTP_7_MSA_PortStLucie_G	FTP	7	93	-	4	H D KI08	Henry D. King 8
GRDA-2	GRDA_2_G	GRDA	2	849	179	20	GRDA_01	GRDA 1
GRE-4	GRE_4_MSA_Minneapolis_L	GRE	4	331	1,111	102	CAMBRICT	Cambridge New CT
GVL-3	GVL_3_MSA_Gainesville_G	GVL	3	433	15	6	DEERHA02	Deerhaven 2
HE-9	HE_9_MSA_TerreHaute_G	HE	9	1,016	27	8	MEROM 01	Merom 1
HST-1	HST_1_MSA_Miami_L	HST	1	-	78	1		
IESO-11	IESO_11_G	IESO	11	9,529	12,779	354	OTTAWAMD	Ottawa Cogen
IESO-15	IESO_15_G	IESO	15	1,964	3,375	102	NANTICO5	Nanticoke 5
IESO-2	IESO_2_G	IESO	2	2,437	2,116	75	GRNFLD1	Greenfield Energy Centre 1
IESO-3	IESO_3_L	IESO	3	39	1,696	54	MELGREY1	Melancthon Grey Wind 1
IESO-6	IESO_6_G	IESO	6	2,146	147	11	BRUCE 3	Bruce 3
IESO-7	IESO_7_G	IESO	7	2,953	253	12	BRUCE 8	Bruce 8
INDN-6	INDN_6_MSA_KansasCity_G	INDN	6	143	27	1	BLUE V01	Blue Valley GT1
IP-7	IP_7_GEN_Baldwin_G	IP	7	1,900	444	18	BALDWI02	Baldwin Energy Complex 2
IP-8	IP_8_GEN_Clinton_G	IP	8	2,302	1,195	49	CLINTO01	Clinton
IPL-2	IPL_2_MSA_Jasper_G	IPL	2	1,678	0	4	PETERS04	Petersburg 4
IPL-5	IPL_5_MSA_Indianapolis_L	IPL	5	306	1,187	25	GORGETWN	Georgetown GT#1-#3
IPL-8	IPL_8_MSA_Indianapolis_L	IPL	8	547	1,227	25	STOUTF07	Elmer W Stout IC7
ITC-2	ITC_2_MSA_Detroit_L	ITC	2	4,001	5,247	112	FERMI -2	Fermi 2
ITC-3	ITC_3_MSA_Detroit_G	ITC	3	3,815	1,600	37	GREENW_1	Greenwood 1
ITC-7	ITC_7_MSA_Monroe_G	ITC	7	1,500	-	2	MONROE01	Monroe 1
ITC-9	ITC_9_MSA_Detroit_L	ITC	9	1,340	4,751	77	RIVER_3	River Rouge 3

Nodes (Hubs) Summary

Unique Cluster	Cluster Long Name	AREA	CLUSTER	Gen Weight	Load Weight	Number of Buses	MAPS Units	Full Name
JCPL-1	JCPL_1_MSA_NewYork_L	JCPL	1	-	1,792	145		
JCPL-3	JCPL_3_MSA_NewYork_L	JCPL	3	1,315	2,735	179	OYSTER01	Oyster Creek 1
JEA-6	JEA_6_MSA_Jacksonville_G	JEA	6	1,665	358	13	ST JOH02	St. Johns River Power 2
KACP-4	KACP_4_MSA_KansasCity_G	KACP	4	670	-	1	IATAN 01	Iatan
KACP-7	KACP_7_MSA_KansasCity_L	KACP	7	-	1,291	24		
KACY-10	KACY_10_MSA_KansasCity_G	KACY	10	316	40	3	QUINDA01	Quindaro GT1
KEY-1	KEY_1_MSA_KeyWest_G	KEY	1	880	138	11	STANTO03	Stanton Energy Center 3 CC
KIS-10	KIS_10_MSA_Orlando_G	KIS	10	410	-	5	KUCANE03	KUA Cane 3
LAFA-7	LAFA_7_MSA_Lafayette_G	LAFA	7	175	-	1	BONIN 03	Bonin 3
LAGN-1	LAGN_1_MSA_BatonRouge_G	LAGN	1	2,199	163	13	BIG CA22	Big Cajun 2 #2
LAK-1	LAK_1_MSA_Lakeland_G	LAK	1	819	28	6	MCINT05C	Mc Intosh 5 CC
LEPA-5	LEPA_5_MSA_Houma-Bayou_G	LEPA	5	93	73	1	HOUMA 14	Houma 14
LES-5	LES_5_MSA_Lincoln_G	LES	5	264	108	9	ROKEBY02	Rokeyby 2
LGEE-3	LGEE_3_GEN_Gehrt2_G	LGEE	3	2,000	225	8	GHENT 02	Ghent 2
LGEE-5	LGEE_5_MSA_Lexington_L	LGEE	5	595	2,345	126	HARDDPL	Hardinsburg Station
LGEE-8	LGEE_8_L	LGEE	8	33	771	68	KU PAR03	Pineville
LGEE-9	LGEE_9_MSA_Louisville_G	LGEE	9	1,136	1,763	52	BLUGRSS	Blue Grass Generation I
LWU-1	LWU_1_MSA_Miami_G	LWU	1	250	82	3	LK WORTH	Lake Worth
MEC-3	MEC_3_MSA_DesMoines_G	MEC	3	3,307	1,933	115	COUNCI03	Council Bluffs 3
METC-4	METC_4_MSA_Holland-GrandHaven_G	METC	4	7,365	2,900	136	MIWIND	Michigan Wind Energy
METC-8	METC_8_MSA_BayCity_G	METC	8	3,795	2,562	113	MIDLAND	Midland Cogeneration
METC-9	METC_9_MSA_Kalamazoo_L	METC	9	118	1,334	44	KLMAZOO	Kalamazoo River Generating C
METED-4	METED_4_MSA_Reading_G	METED	4	913	854	57	NTEMPLE	North Temple/Ontelaune
MGE-7	MGE_7_MSA_Madison_L	MGE	7	399	403	23	UNIVWISC	University of Wisconsin CG
MIDW-7	MIDW_7_MSA_Hays_L	MIDW	7	19	92	5	HAYS 01	Hays
MIPU-7	MIPU_7_MSA_KansasCity_G	MIPU	7	1,307	437	28	AQUILA	Pleasant Hill (MO) 1
MP-7	MP_7_MSA_Duluth_L	MP	7	514	824	54	MNPOHY01	
MPW-1	MPW_1_MSA_Muscataine_G	MPW	1	151	16	2	MUSCAT09	Muscataine Plant #1 9
NEPOOL-1	NEPOOL_1_VT	NEPOOL	1	821	1,115	146	VT.YK	VERMONT YANKEE
NEPOOL-10	NEPOOL_10_RI	NEPOOL	10	2,062	2,203	99	RIHOPE	R.I. Hope Energy (RISEP)
NEPOOL-2	NEPOOL_2_NH	NEPOOL	2	4,204	2,621	112	SEA1	SEABROOK
NEPOOL-3	NEPOOL_3_ME	NEPOOL	3	3,494	2,522	150	WYMAN4	YARMOUTH 4 (Wyman)
NEPOOL-4	NEPOOL_4_NEBOS	NEPOOL	4	3,262	5,904	152	SIMYST2	Sithe Mystic 9
NEPOOL-5	NEPOOL_5_SEMA	NEPOOL	5	6,454	3,978	163	PLGRM1	PILGRIM
NEPOOL-6	NEPOOL_6_WCMA	NEPOOL	6	4,285	3,417	205	NORTHFIE	Northfield Mountain 1-4
NEPOOL-7	NEPOOL_7_CT	NEPOOL	7	4,447	3,920	103	MILL3	MILLSTONE POINT 3
NEPOOL-8	NEPOOL_8_SWCT	NEPOOL	8	2,678	1,850	60	BridgPCC	BRIDGEPORT ENERGY 1
NEPOOL-9	NEPOOL_9_NWKST	NEPOOL	9	405	1,524	28	NORW2	NORWALK HARBOR 2
NI-13	NI_13_MSA_Chicago_L	NI	13	2,396	10,556	196	DUPAGE	Reliant DuPage County LP (Au
NI-15	NI_15_MSA_Davenport_G	NI	15	2,479	-	4	QUAD C01	Quad Cities 1
NI-2	NI_2_MSA_Chicago_G	NI	2	5,342	1,283	53	BRAIDW01	Braidwood 1
NI-20	NI_20_MSA_Chicago_G	NI	20	1,632	83	8	DRESDE03	Dresden 3
NI-3	NI_3_MSA_Chicago_L	NI	3	26	1,205	22	WINNETKA	Winnetka ST (4-6-7)
NI-6	NI_6_MSA_Chicago_G	NI	6	9,759	7,577	253	DIESEL 1	Joliet 9
NI-7	NI_7_MSA_Rochelle_G	NI	7	2,290	-	2	BYRON 01	Byron 1
NIPS-8	NIPS_8_MSA_Chicago_G	NIPS	8	2,892	1,694	41	SCHAHF15	R M Schahfer 15
NPPD-1	NPPD_1_MSA_GrandIsland_L	NPPD	1	376	983	52	NPPDHY01	
NPPD-4	NPPD_4_GEN_Gentleman_G	NPPD	4	2,702	148	15	GENTLE02	Gentleman 2
NPPD-7	NPPD_7_L	NPPD	7	210	975	56	NPPDHY01	
NSB-1	NSB_1_MSA_DaytonaBeach_G	NSB	1	514	86	6	N SMYRNA	Duke New Smyrna
NYISO-1	NYISO_1_NYA	NYISO	1	4,946	2,500	162	MOSESNIA	Moses Niagara
NYISO-10	NYISO_10_NYJ	NYISO	10	10,283	11,493	123	RAVENS03	Ravenswood 3

Nodes (Hubs) Summary

Unique Cluster	Cluster Long Name	AREA	CLUSTER	Gen Weight	Load Weight	Number of Buses	MAPS Units	Full Name
NYISO-11	NYISO_11_NYK	NYISO	11	5,681	5,289	143	NORTH04	Northport 4
NYISO-2	NYISO_2_NYB	NYISO	2	650	1,759	79	GINNA 01	GINNA 1
NYISO-3	NYISO_3_NYC	NYISO	3	6,711	2,657	156	9 MILE02	Nine Mile Pt 2
NYISO-4	NYISO_4_NYD	NYISO	4	1,206	681	40	MOSESSTL	Moses Power Dam
NYISO-5	NYISO_5_NYE	NYISO	5	1,098	909	87	NMPCHYE2	NMPC Hydro Zone E
NYISO-6	NYISO_6_NYF	NYISO	6	4,103	1,983	126	GILBOA01	Gilboa
NYISO-7	NYISO_7_NYG	NYISO	7	3,156	2,195	104	ROSETO02	Roseton 1
NYISO-8	NYISO_8_NYH	NYISO	8	2,021	973	15	INDIAN03	Indian Pt 3
NYISO-9	NYISO_9_NYI	NYISO	9	2	1,476	10	KENSIC0H	Kensico
OKGE-4	OKGE_4_MSA_OklahomaCity_L	OKGE	4	2,102	2,403	93	SEMINO02	Seminole 2
OMPA-9	OMPA_9_MSA_PoncaCity_G	OMPA	9	163	147	8	PONCA 01	Ponca (1&2)
OPPD-5	OPPD_5_MSA_Omaha_L	OPPD	5	480	1,686	62	SARPY 03	Sarpy County 3
OTP-1	OTP_1_L	OTP	1	-	640	54		
OTP-9	OTP_9_GEN_BigStone_G	OTP	9	1,189	136	10	BIG ST01	Big Stone
OUC-1	OUC_1_MSA_Orlando_G	OUC	1	889	73	8	STANTO02	Stanton Energy Center 2
OVEC-3	OVEC_3_G	OVEC	3	1,620	10	1	CGNTRXCC	Cogentrix (Jackson County)
PECO-1	PECO_1_MSA_Philadelphia_G	PECO	1	2,323	554	35	MARCUS1	FPL Marcus Hook 1
PECO-5	PECO_5_MSA_Philadelphia_L	PECO	5	1,656	2,510	76	LIMERI01	Limerick 1
PECO-8	PECO_8_MSA_Philadelphia_L	PECO	8	399	1,064	25	SCHUYL01	Schuylkill 1
PENELEC-2	PENELEC_2_MSA_DuBois_G	PENELEC	2	2,724	1,196	150	HOMERC01	Homer City 1
PEPCO-1	PEPCO_1_MSA_DC_L	PEPCO	1	-	1,439	5		
PEPCO-4	PEPCO_4_MSA_DC_L	PEPCO	4	-	825	3		
PEPCO-5	PEPCO_5_MSA_DC_L	PEPCO	5	-	710	3		
PEPCO-7	PEPCO_7_MSA_DC_L	PEPCO	7	-	655	7		
PEPCO-8	PEPCO_8_MSA_DC_G	PEPCO	8	3,786	1,108	31	CHALK 03	Chalk Point3
PJM500-3	PJM500_3_MSA_Pittsburgh_G	PJM500	3	1,705	-	3	KEYSTO01	Keystone 1
PJM500-4	PJM500_4_MSA_Philadelphia_G	PJM500	4	2,383	-	10	LIMERI02	Limerick 2
PJM500-5	PJM500_5_MSA_DC_G	PJM500	5	1,730	-	2	CALVER02	Calvert Cliffs2
PJM500-7	PJM500_7_MSA_York-Hanover_G	PJM500	7	2,696	-	4	SUSQUE02	Susquehanna 2
PJM500-8	PJM500_8_MSA_Philadelphia_G	PJM500	8	3,914	-	6	SALEM 01	Salem 1
PJM500-9	PJM500_9_MSA_Pittsburgh_G	PJM500	9	1,700	-	2	CONEMA01	Conemaugh 1
PL-5	PL_5_MSA_Lancaster_L	PL	5	-	897	12		
PL-7	PL_7_MSA_Allentown_L	PL	7	245	1,051	41	MTBETHEL	PP&L Mount Bethel
PL-8	PL_8_MSA_Allentown_G	PL	8	2,853	385	22	MARTIN08	Martins Creek 4
PSEG-3	PSEG_3_MSA_NewYork_L	PSEG	3	1,843	2,275	66	LINDEN01	Linden 1
PSEG-5	PSEG_5_MSA_Philadelphia_L	PSEG	5	2,143	2,766	76	MERCER01	Mercer 1
PSEG-6	PSEG_6_MSA_NewYork_L	PSEG	6	-	639	13		
PSEG-8	PSEG_8_MSA_NewYork_G	PSEG	8	3,860	3,654	102	BERGEN01	Bergen1
RCU-6	RCU_6_MSA_Orlando_L	RCU	6	-	38	2		
RECO-1	RECO_1_MSA_NewYork_L	RECO	1	-	146	3		
SCEG-1	SCEG_1_MSA_Columbia_G	SCEG	1	4,954	2,752	127	SUMMER01	VC Summer 1
SCEG-9	SCEG_9_MSA_Charleston_G	SCEG	9	1,152	1,944	56	WILLMS01	Williams ST1
SCPSA-10	SCPSA_10_MSA_Charleston_G	SCPSA	10	1,680	-	3	CROSS 03	Cross 3
SCPSA-2	SCPSA_2_MSA_Charleston_L	SCPSA	2	1,607	3,236	149	WINYAH03	Winyah 3
SEC-6	SEC_6_MSA_Palatka_G	SEC	6	1,330	-	2	SEMINO02	Seminole 2
SIGE-9	SIGE_9_MSA_Evansville_L	SIGE	9	159	774	12	BROADW02	Broadway 2
SIPC-9	SIPC_9_MSA_Marion-Herrin_G	SIPC	9	432	37	7	MARION04	Marion 4
SMEPA-5	SMEPA_5_MSA_Laurel_G	SMEPA	5	341	184	22	MOSELL01	Moselle 1
SMMPA-9	SMMPA_9_MSA_Rochester_G	SMMPA	9	128	58	1	CASCAD01	Rochester Cascade Cr
SOCO-10	SOCO_10_MSA_Albany-Valdosta_L	SOCO	10	3,431	4,125	74	E I HA01	Edwin I Hatch
SOCO-15	SOCO_15_MSA_Birmingham_G	SOCO	15	12,464	9,217	133	ALAPHY01	
SOCO-16	SOCO_16_MSA_Atlanta_L	SOCO	16	694	3,058	25	MC DON02	Jack McDonough 2

Nodes (Hubs) Summary

Unique Cluster	Cluster Long Name	AREA	CLUSTER	Gen Weight	Load Weight	Number of Buses	MAPS Units	Full Name
SOCO-17	SOCO_17_MSA_Mobile_G	SOCO	17	5,205	4,575	66	BARRY 05	Barry 5
SOCO-2	SOCO_2_GEN_Hartwll_G	SOCO	2	2,186	46	9	HARTWLL	
SOCO-21	SOCO_21_MSA_Atlanta_G	SOCO	21	3,334	2,733	43	GEPCHY01	
SOCO-22	SOCO_22_MSA_Atlanta_L	SOCO	22	41	661	5	BOWEN 06	Bowen 6
SOCO-26	SOCO_26_MSA_Macon_G	SOCO	26	6,802	-	20	VOGTLE01	Vogtle 1
SOCO-28	SOCO_28_MSA_Birmingham_G	SOCO	28	2,535	1,090	40	ALAPHY01	
SOCO-31	SOCO_31_MSA_Atlanta_G	SOCO	31	11,765	1,583	58	BOWEN 04	Bowen 4
SOCO-32	SOCO_32_MSA_Pascagoula_G	SOCO	32	3,574	2,674	50	DANIEL03	Victor J Daniel Jr. 3
SOCO-33	SOCO_33_MSA_Atlanta_L	SOCO	33	3	3,305	26	DECALBRF	DeCalb Refuse (Seminole Rd)
SOCO-5	SOCO_5_GEN_GEPCHY_L	SOCO	5	2,098	3,403	62	GEPCHY01	
SOCO-6	SOCO_6_MSA_Augusta-Richmond_L	SOCO	6	-	1,187	15		
SOCO-8	SOCO_8_MSA_Atlanta_L	SOCO	8	-	1,925	34		
SPRM-10	SPRM_10_MSA_Springfield_L	SPRM	10	236	346	18	JAMES 05	James River Power St 5
SPS-2	SPS_2_GEN_Tolk1_G	SPS	2	4,480	2,973	356	TOLK 01	Tolk 1
STK-1	STK_1_L	STK	1	-	17	2		
SUNC-3	SUNC_3_MSA_GardenCity_G	SUNC	3	840	18	2	LAMARDC	DC Link - Lamar
SWPA-2	SWPA_2_MSA_MountainHome_G	SWPA	2	478	70	12	BULLSHL5	
TAL-3	TAL_3_MSA_Tallahassee_G	TAL	3	336	-	5	PURDOM05	S. O. Purdom 5
TECO-3	TECO_3_MSA_Tampa_G	TECO	3	3,733	1,026	87	BAYSIDE2	TECO Bayside 2
TECO-7	TECO_7_MSA_Tampa_L	TECO	7	-	1,481	82		
TVA-1	TVA_1_MSA_Chatt-Hunts_G	TVA	1	17,334	9,966	318	TVA HY01	
TVA-10	TVA_10_MSA_Grenada_L	TVA	10	-	651	23		
TVA-3	TVA_3_MSA_Knoxville_L	TVA	3	3,684	5,102	158	TVA HY01	
TVA-4	TVA_4_MSA_Clarksville_G	TVA	4	2,544	150	3	CUMBRL02	Cumberland 2
TVA-5	TVA_5_MSA_Nashville_L	TVA	5	9,154	8,858	297	TVA HY01	
TVA-7	TVA_7_MSA_Memphis_L	TVA	7	7,215	5,982	203	TVA HY01	
TVA-9	TVA_9_MSA_Paducah_G	TVA	9	4,470	2,130	81	TVA HY01	
UGI-2	UGI_2_MSA_Scranton_G	UGI	2	48	8	2	HUNLOCK4	Hunlock 4
UPPC-9	UPPC_9_MSA_Houghton_L	UPPC	9	2	75	11	UPPPHY01	
VAP-1	VAP_1_MSA_Richmond_G	VAP	1	10,524	3,579	93	NORTHA01	North Anna 1
VAP-15	VAP_15_MSA_VB-Norfolk_L	VAP	15	435	1,297	19	CMNWLATL	Commonwealth Atlantic LP
VAP-26	VAP_26_MSA_DC_G	VAP	26	1,981	631	15	POSSUM04	Possum Point 4
VAP-27	VAP_27_MSA_DC_L	VAP	27	-	1,048	9		
VAP-33	VAP_33_MSA_DC_L	VAP	33	910	2,983	38	GTVACA06	#N/A
VAP-7	VAP_7_G	VAP	7	4,179	303	17	BATH C04	Bath County 1-6
WAPA-2	WAPA_2_MSA_RapidCity_G	WAPA	2	2,405	813	61	OAHE	
WEC-1	WEC_1_MSA_Chicago_G	WEC	1	1,728	303	16	PL PRA01	Pleasant Prairie 1
WEC-3	WEC_3_MSA_Milwaukee_G	WEC	3	1,429	2,423	71	DIESWI01	Valley 3
WEC-7	WEC_7_MSA_Milwaukee_G	WEC	7	3,850	3,052	116	PT BEA02	Point Beach 2
WEPL-7	WEPL_7_MSA_DodgeCity_G	WEPL	7	137	124	9	J. LAR04	Judson Large
WERE-1	WERE_1_MSA_Manhattan_G	WERE	1	2,988	409	40	JEFFRE01	Jeffrey EC 1
WERE-4	WERE_4_GEN_Wolfcreek_G	WERE	4	3,510	2,459	199	WOLF C01	Wolfcreek
WERE-5	WERE_5_MSA_KansasCity_L	WERE	5	204	915	40	LAWREN04	Lawrence EC 4
WFEC-7	WFEC_7_MSA_Woodward_G	WFEC	7	342	193	57	MOOREL02	Mooreland 2
WPS-4	WPS_4_MSA_Marshfield_L	WPS	4	411	442	26	NGCONSIL	NUG Consolidated Paper
XEL-3	XEL_3_MSA_Minneapolis_G	XEL	3	7,596	7,622	304	SHERBU03	Sherburne Co 3
YAD-1	YAD_1_MSA_Albemarle_G	YAD	1	13	4	3	DUKEHY01	

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,670	-5,413	68.19	20.03	-2,198	1
PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	20.86	-1,865	2
ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	19.55	-1,421	3
FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	61.50	24.14	-1,344	4
ONTARIO	IESO_11_G	8784	9,529	12,779	-3,007	-6,111	44.34	17.06	-1,171	5
NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,802	-2,670	69.74	19.67	-1,104	6
FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	24.03	-1,053	7
VACAR	DUK_8_MSA_Charlotte_L	8784	1,407	4,886	-2,115	-3,574	50.47	17.76	-937	8
FRCC	FPC_3_MSA_Orlando_L	8784	1,232	3,649	-1,856	-3,553	57.11	18.72	-931	9
PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,730	-2,599	60.40	22.76	-918	10
MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	43.40	16.91	-831	11
MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,072	-4,218	45.13	17.50	-822	12
SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	50.79	17.62	-816	13
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,807	-2,983	50.78	17.72	-806	14
NEPOOL	NEPOOL_4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	15.74	-759	15
FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,471	-2,335	58.48	19.77	-756	16
MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,652	-2,690	51.03	21.34	-740	17
NEPOOL	NEPOOL_6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	15.83	-739	18
TVAUTHOR	TVA_5_MSA_Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	18.90	-655	19
PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	17.89	-638	20
TVAUTHOR	TVA_7_MSA_Memphis_L	8773	7,215	5,982	-1,502	-4,034	47.91	16.64	-631	21
PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	20.07	-628	22
PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,122	-2,398	62.55	21.22	-617	23
PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	16.21	-585	24
SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,302	-2,646	50.79	17.60	-581	25
PJM	PSEG_5_MSA_Philadelphia_L	8784	2,143	2,766	-1,072	-2,213	61.65	20.70	-580	26
VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	19.43	-562	27
PJM	DPL_3_MSA_Dayton_L	8784	1,350	2,652	-1,370	-2,435	44.89	16.77	-540	28
ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,227	-1,983	48.92	16.12	-527	29
PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-951	-1,856	62.39	21.05	-521	30
FRCC	FPL_2_MSA_FortMyers_G	8506	5,929	4,563	-1,034	-2,343	59.29	21.26	-521	31
TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,209	-2,885	47.93	17.73	-509	32
FRCC	TECO_7_MSA_Tampa_L	8784	-	1,481	-951	-2,004	58.75	19.97	-491	33
MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,227	-1,849	45.16	18.05	-487	34
SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	-	1,925	-1,065	-1,811	50.79	17.63	-475	35
PJM	JCPL_1_MSA_NewYork_L	8784	-	1,792	-862	-1,934	62.32	21.08	-472	36
PJM	PEPCO_1_MSA_DC_L	8784	-	1,439	-847	-1,492	61.10	23.07	-455	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	66.87	17.32	-445	38
ONTARIO	IESO_3_L	8784	39	1,696	-1,140	-1,571	44.33	17.01	-444	39
ONTARIO	IESO_2_G	8711	2,437	2,116	-1,116	-1,779	45.33	17.02	-441	40
PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,036	-1,695	47.70	16.12	-434	41
SPP	OKGE_4_MSA_OklahomaCity_L	8783	2,102	2,403	-809	-1,550	59.89	22.89	-426	42
PJM	AP_8_MSA_DC-VA-MD_L	8784	-	1,097	-798	-1,144	60.64	23.62	-425	43
PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-750	-1,299	60.83	21.83	-401	44
MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	17.36	-396	45
SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	3,334	2,733	-888	-1,940	50.72	17.48	-395	46
NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	16.65	-392	47
MISO	FE_8_MSA_Youngstown_L	8784	939	2,217	-998	-1,539	44.61	17.66	-391	48
PJM	BGE_9_MSA_Baltimore-Towson_L	8784	-	1,186	-681	-1,226	61.38	22.60	-367	49
PJM	JCPL_3_MSA_NewYork_L	8784	1,315	2,735	-672	-1,985	62.09	20.91	-366	50
PJM	PL_5_MSA_Lancaster_L	8784	-	897	-660	-951	61.88	28.08	-359	51
MISO	LGEE_9_MSA_Louisville_G	8784	1,136	1,763	-957	-1,746	42.33	16.84	-356	52
PJM	AP_7_MSA_Hagerstown-Martinsburg	8784	203	1,153	-661	-1,009	59.93	22.97	-348	53
PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-643	-1,025	60.45	20.08	-341	54
PJM	VAP_27_MSA_DC_L	8784	-	1,048	-641	-1,075	60.24	22.32	-339	55
PJM	AEP_3_MSA_Columbus_L	7772	10,204	8,244	-999	-3,023	43.57	16.22	-338	56
NYPP	NYISO_7_NYG	7979	3,156	2,195	-673	-1,446	62.81	16.24	-337	57
PJM	PECO_8_MSA_Philadelphia_L	8784	399	1,064	-591	-918	61.39	20.57	-319	58
MISO	CIN_7_MSA_Lafayette_L	8784	144	1,712	-851	-1,422	41.48	17.13	-310	59
PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-571	-1,411	60.97	21.99	-306	60
MISO	METC_9_MSA_Kalamazoo_L	8784	118	1,334	-758	-1,367	45.73	17.51	-305	61
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	-	1,187	-657	-1,116	50.70	17.47	-293	62
MISO	GRE_4_MSA_Minneapolis_L	8784	331	1,111	-1,007	-1,827	32.63	20.92	-289	63
PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-572	-1,149	57.34	19.31	-288	64
NYPP	NYISO_2_NYB	8784	650	1,759	-710	-1,588	46.16	16.17	-288	65
MISO	IPL_5_MSA_Indianapolis_L	8784	306	1,187	-750	-1,193	43.47	16.87	-286	66
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	16.09	-285	67
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8784	265	1,099	-606	-999	50.73	15.32	-270	68
PJM	PEPCO_4_MSA_DC_L	8784	-	825	-486	-856	61.29	22.92	-262	69
MISO	FE_7_MSA_Toledo_L	8778	2,586	2,106	-665	-1,149	44.52	17.66	-260	70
PJM	BGE_8_MSA_Baltimore-Towson_L	8784	-	840	-482	-868	61.22	22.51	-259	71
MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	40.84	17.09	-257	72
SPP	KACP_7_MSA_KansasCity_L	8784	-	1,291	-691	-1,351	40.59	21.60	-246	73
PJM	AE_7_MSA_OceanCity_G	8784	90	836	-424	-884	61.69	20.74	-230	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MAPP	OPPD_5_MSA_Omaha_L	8784	480	1,686	-847	-1,521	30.69	21.18	-228	75
MISO	LGEE_8_L	8784	33	771	-540	-908	47.80	18.97	-227	76
PJM	PEPCO_5_MSA_DC_L	8784	-	710	-418	-737	61.27	22.63	-225	77
PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	39.52	20.34	-220	78
VACAR	CPL_9_MSA_NewBern_L	8784	53	811	-471	-757	52.70	19.41	-218	79
PJM	PEPCO_7_MSA_DC_L	8784	-	655	-385	-679	61.25	22.61	-207	80
MISO	METC_8_MSA_BayCity_G	8326	3,795	2,562	-544	-1,369	44.80	16.75	-203	81
VACAR	DUK_4_MSA_Greenville_L	6816	3,546	4,489	-587	-2,021	50.52	18.52	-202	82
NYPP	NYISO_5_NYE	8757	1,098	909	-392	-821	58.73	13.83	-201	83
MISO	FE_10_MSA_Mansfield_L	8784	46	859	-508	-799	45.13	16.49	-201	84
MISO	IPL_8_MSA_Indianapolis_L	8784	547	1,227	-521	-1,304	43.52	16.96	-199	85
MISO	CIN_4_MSA_Cincinnati-Middletown_C	6965	6,026	5,727	-652	-2,757	43.50	17.51	-197	86
TVAUTHOR	TVA_10_MSA_Grenada_L	8784	-	651	-457	-721	48.72	16.49	-196	87
SPP	AEPW_1_MSA_Tulsa_G	7434	3,295	2,000	-603	-1,182	42.10	14.71	-189	88
ENTERGY	AECI_3_L	8784	-	915	-469	-881	45.54	17.74	-188	89
PJM	PECO_5_MSA_Philadelphia_L	6653	1,656	2,510	-406	-2,442	68.54	16.86	-185	90
PJM	PSEG_6_MSA_NewYork_L	8784	-	639	-315	-657	64.28	22.70	-178	91
MISO	XEL_3_MSA_Minneapolis_G	4672	7,596	7,622	-853	-2,783	43.84	20.09	-175	92
SPP	WFEC_7_MSA_Woodward_G	8784	342	193	-327	-546	59.13	20.09	-170	93
NEPOOL	NEPOOL_10_RI	6570	2,062	2,203	-406	-1,222	62.60	17.05	-167	94
SOUTHERN	SOCO_22_MSA_Atlanta_L	8784	41	661	-365	-621	50.89	17.66	-163	95
MISO	FE_5_MSA_Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	16.95	-163	96
VACAR	SCEG_9_MSA_Charleston_G	8494	1,152	1,944	-360	-1,540	51.74	18.36	-158	97
ENTERGY	EES_7_MSA_Beaumont-PortArthur_C	6739	7,393	4,949	-473	-1,685	49.15	16.92	-157	98
MISO	WEC_7_MSA_Milwaukee_G	8069	3,850	3,052	-556	-1,659	34.50	16.98	-155	99
PJM	DP&L_6_MSA_Seaford_L	8407	1,438	1,523	-288	-883	62.21	20.94	-150	100
PJM	DLCO_1_MSA_Pittsburgh_L	8784	-	635	-399	-641	42.24	16.87	-148	101
SOUTHERN	SOCO_17_MSA_Mobile_G	6709	5,205	4,575	-434	-1,703	49.65	16.57	-145	102
ENTERGY	EES_9_MSA_Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	14.67	-137	103
ENTERGY	AECI_9_L	8784	-	694	-356	-668	42.23	16.03	-132	104
MISO	SIGE_9_MSA_Evansville_L	8784	159	774	-317	-572	43.67	20.40	-122	105
PJM	METED_4_MSA_Reading_G	7571	913	854	-272	-557	58.40	20.54	-120	106
PJM	VAP_7_G	1848	4,179	303	-1,012	-1,772	63.09	28.29	-118	107
ENTERGY	AECI_7_MSA_KansasCity_L	8784	-	615	-315	-592	41.06	17.48	-114	108
MISO	METC_4_MSA_Holland-GrandHaven	3005	7,365	2,900	-1,052	-2,906	34.41	15.06	-109	109
MISO	MP_7_MSA_Duluth_L	8784	514	824	-490	-761	24.19	13.69	-104	110
NEPOOL	NEPOOL_8_SWCT	5935	2,678	1,850	-267	-951	61.74	16.98	-98	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	WERE_5_MSA_KansasCity_L	8783	204	915	-276	-710	40.32	22.08	-98	112
SPP	WERE_4_GEN_Wolfcreek_G	3653	3,510	2,459	-485	-1,564	55.01	20.08	-97	113
MISO	OTP_1_L	8784	-	640	-412	-659	25.43	13.46	-92	114
SOUTHERN	SMEPA_5_MSA_Laurel_G	8784	341	184	-204	-366	51.33	18.01	-92	115
PJM	PECO_1_MSA_Philadelphia_G	6543	2,323	554	-221	-389	57.37	20.38	-83	116
ENTERGY	EES_4_GEN_Ouachita_G	3366	6,345	2,417	-599	-1,371	40.60	12.95	-82	117
TVAUTHOR	DOE_2_MSA_Paducah_G	8784	520	309	-190	-299	43.83	17.72	-73	118
MAPP	NPPD_7_L	8784	210	975	-357	-707	22.57	12.70	-71	119
MISO	WEC_3_MSA_Milwaukee_G	6898	1,429	2,423	-264	-1,143	37.53	17.43	-68	120
NEPOOL	NEPOOL_3_ME	4861	3,494	2,522	-227	-1,154	55.19	13.82	-61	121
MAPP	NPPD_1_MSA_GrandIsland_L	8784	376	983	-419	-793	16.32	12.81	-60	122
MISO	AMRN_12_MSA_StLouis_L	2085	5,059	6,066	-464	-1,852	56.60	17.89	-55	123
MISO	WPS_4_MSA_Marshfield_L	8774	411	442	-158	-288	36.60	19.97	-51	124
TVAUTHOR	TVA_9_MSA_Paducah_G	4950	4,470	2,130	-176	-674	49.00	20.07	-43	125
PJM	VAP_26_MSA_DC_G	4856	1,981	631	-162	-441	51.84	20.74	-41	126
MISO	SUNC_3_MSA_GardenCity_G	6623	840	18	-159	-229	36.62	17.11	-38	127
NEPOOL	NEPOOL_1_VT	3678	821	1,115	-149	-637	68.87	15.46	-38	128
MISO	MGE_7_MSA_Madison_L	7111	399	403	-144	-269	30.65	17.60	-31	129
PJM	RECO_1_MSA_NewYork_L	8784	-	146	-57	-137	62.41	20.00	-31	130
SPP	SPS_2_GEN_Tolk1_G	4407	4,480	2,973	-96	-289	72.41	16.88	-31	131
SPP	OMPA_9_MSA_PoncaCity_G	7879	163	147	-50	-127	65.00	20.84	-26	132
NEPOOL	NEPOOL_7_CT	1143	4,447	3,920	-296	-1,008	73.88	11.03	-25	133
MAPP	WAPA_2_MSA_RapidCity_G	5489	2,405	813	-248	-389	18.06	11.12	-25	134
MISO	WEPL_7_MSA_DodgeCity_G	8775	137	124	-59	-112	43.39	20.76	-23	135
MISO	CIN_3_MSA_TerreHaute_G	1750	3,230	1,015	-354	-588	34.37	14.09	-21	136
SPP	LEPA_5_MSA_Houma-Bayou_G	8784	93	73	-39	-74	52.15	18.32	-18	137
VACAR	DUK_5_MSA_Seneca_G	1596	1,911	-	-320	-1,100	32.81	8.43	-17	138
NYPP	NYISO_4_NYD	1203	1,206	681	-277	-952	50.00	15.59	-17	139
SPP	AEPW_9_MSA_MountPleasant_G	1108	8,168	3,832	-303	-1,116	47.31	9.14	-16	140
MISO	LES_5_MSA_Lincoln_G	8463	264	108	-55	-103	33.57	22.25	-16	141
ENTERGY	DENL_7_MSA_LittleRock_L	8784	-	81	-35	-81	46.81	15.69	-14	142
SOUTHERN	SOCO_32_MSA_Pascagoula_G	1253	3,574	2,674	-240	-1,091	47.76	15.69	-14	143
NYPP	NYISO_6_NYF	1315	4,103	1,983	-191	-1,000	56.90	15.17	-14	144
MISO	CWLP_1_MSA_Springfield_G	4853	310	227	-99	-184	29.60	12.02	-14	145
VACAR	CPLD_1_MSA_Durham_G	941	10,224	8,563	-313	-1,346	47.67	18.69	-14	146
SPP	MIDW_7_MSA_Hays_L	8784	19	92	-40	-93	40.19	18.92	-14	147
PJM	BGE_7_MSA_Baltimore-Towson_G	790	2,548	1,043	-342	-676	51.82	21.58	-14	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	UPPC_9_MSA_Houghton_L	8784	2	75	-40	-63	38.81	20.17	-13	149
ENTERGY	DERS_1_MSA_Ruston_G	8507	75	68	-31	-52	48.96	15.67	-13	150
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-364	-825	50.32	15.84	-13	151
ONTARIO	IESO_15_G	402	1,964	3,375	-665	-1,185	44.04	11.44	-12	152
SPP	AEPW_5_MSA_Tulsa_G	1358	4,226	2,571	-158	-626	51.63	15.66	-11	153
VACAR	SCEG_1_MSA_Columbia_G	816	4,954	2,752	-346	-1,094	37.54	11.42	-11	154
MAPP	MEC_3_MSA_DesMoines_G	793	3,307	1,933	-332	-663	38.49	17.96	-10	155
FRCC	RCU_6_MSA_Orlando_L	8784	-	38	-20	-35	57.19	18.74	-10	156
PJM	NI_6_MSA_Chicago_G	673	9,759	7,577	-321	-1,221	45.80	20.07	-10	157
SPP	EMDE_1_MSA_Joplin_G	2889	1,102	458	-81	-296	39.63	17.53	-9	158
PJM	PL_8_MSA_Allentown_G	1886	2,853	385	-77	-188	61.28	20.41	-9	159
ENTERGY	CWLD_2_MSA_Columbia_L	8784	-	48	-25	-46	40.98	17.94	-9	160
SPP	GRDA_2_G	1045	849	179	-207	-446	40.34	12.76	-9	161
MISO	MIPU_7_MSA_KansasCity_G	4961	1,307	437	-59	-282	28.31	15.95	-8	162
SPP	SPRM_10_MSA_Springfield_L	2930	236	346	-40	-172	53.28	18.02	-6	163
SOUTHERN	SOCO_2_GEN_Hartwll_G	5955	2,186	46	-23	-36	44.64	16.66	-6	164
MISO	ALTW_6_MSA_CedarRapids_L	556	996	1,103	-185	-766	57.18	19.76	-6	165
FRCC	FPC_10_MSA_Lakeland_G	763	3,561	747	-198	-399	38.67	12.29	-6	166
PJM	OVEC_3_G	7787	1,620	10	-17	-34	42.51	15.52	-6	167
NYPP	NYISO_1_NYA	530	4,946	2,500	-287	-1,166	36.60	12.08	-6	168
FRCC	STK_1_L	8784	-	17	-11	-18	56.85	18.80	-5	169
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	8038	87	14	-15	-23	44.90	14.81	-5	170
PJM	PENELEC_2_MSA_DuBois_G	448	2,724	1,196	-223	-740	51.81	16.79	-5	171
MISO	IP_8_GEN_Clinton_G	768	2,302	1,195	-154	-519	36.10	15.69	-4	172
NEPOOL	NEPOOL_2_NH	358	4,204	2,621	-194	-816	52.75	10.77	-4	173
PJM	UGI_2_MSA_Scranton_G	8784	48	8	-6	-9	59.75	19.56	-3	174
SPP	CELE_10_MSA_Alexandria_G	230	1,895	742	-263	-379	49.37	22.55	-3	175
SOUTHERN	SOCO_28_MSA_Birmingham_G	168	2,535	1,090	-285	-359	56.42	16.31	-3	176
SPP	SWPA_2_MSA_MountainHome_G	3373	478	70	-25	-42	32.53	12.67	-3	177
PJM	NI_20_MSA_Chicago_G	1570	1,632	83	-42	-65	38.52	16.35	-3	178
MISO	SIPC_9_MSA_Marion-Herrin_G	2315	432	37	-29	-51	35.57	13.62	-2	179
MISO	CILC_8_MSA_Peoria_G	771	756	349	-103	-193	26.44	11.36	-2	180
SOUTHERN	SOCO_15_MSA_Birmingham_G	113	12,464	9,217	-264	-772	64.79	12.55	-2	181
VACAR	CPLW_3_Ashville_G	972	764	93	-47	-67	41.03	14.91	-2	182
MISO	ALTE_2_MSA_Madison_G	168	1,665	441	-278	-363	31.35	13.01	-1	183
MISO	DPC_10_G	1014	615	140	-68	-115	17.25	4.75	-1	184
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-98	-137	45.50	17.47	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	HE_9_MSA_TerreHaute_G	288	1,016	27	-36	-54	45.88	17.80	0	186
MISO	FE_9_MSA>Weirton_G	213	1,860	112	-55	-64	39.70	15.17	0	187
FRCC	GVL_3_MSA>Gainesville_G	1128	433	15	-7	-14	53.80	15.45	0	188
MAPP	MPW_1_MSA>Muscatine_G	1445	151	16	-9	-13	25.51	15.37	0	189
FRCC	OUC_1_MSA>Orlando_G	168	889	73	-34	-46	55.36	13.39	0	190
FRCC	FPL_8_MSA>PortStLucie_G	21	10,364	4,623	-238	-521	45.23	17.27	0	191
MISO	SMMPA_9_MSA>Rochester_G	8550	128	58	-1	-20	31.41	17.72	0	192
FRCC	LWU_1_MSA>Miami_G	2192	250	82	-2	-3	48.93	23.93	0	193
FRCC	FMP_8_MSA>Sebastian_G	6965	145	20	0	-1	53.21	17.34	0	194
PJM	DLCO_7_MSA>Pittsburgh_G	168	1,644	25	-17	-22	46.34	14.58	0	195
MAPP	NPPD_4_GEN>Gentleman_G	24	2,702	148	-177	-209	31.06	14.09	0	196
FRCC	NSB_1_MSA>DaytonaBeach_G	1559	514	86	-2	-3	46.02	18.43	0	197
FRCC	KEY_1_MSA>KeyWest_G	540	880	138	-3	-5	59.80	18.02	0	198
FRCC	LAK_1_MSA>Lakeland_G	190	819	28	-10	-14	42.02	17.43	0	199
VACAR	DUK_9_MSA>Charlotte_G	4	14,681	9,966	-90	-133	82.73	0.44	0	200
SPP	WERE_1_MSA>Manhattan_G	13	2,988	409	-126	-163	16.05	6.72	0	201
SPP	INDN_6_MSA>KansasCity_G	180	143	27	-5	-9	18.51	14.73	0	202
MISO	NIPS_8_MSA>Chicago_G	19	2,892	1,694	-27	-77	25.87	5.06	0	203
TVAUTHOR	TVA_1_MSA>Chatt-Hunts_G	2	17,334	9,966	-173	-334	28.29	1.47	0	204
PJM	PEPCO_8_MSA>DC_G	1	3,786	1,108	-39	-39	73.90		0	205
PJM	AEP_8_GEN>Amos01_G	1	19,694	6,544	-86	-86	29.90		0	206
SOUTHERN	SOCO_31_MSA>Atlanta_G	9	11,765	1,583	-9	-18	23.20	0.70	0	207
SOUTHERN	AEC_8_G	2	903	60	-2	-2	24.31	0.01	0	208

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	27.09	-2,732	1
PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,386	-9,115	42.40	21.71	-2,006	2
ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	22.83	-1,541	3
FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	28.03	-1,469	4
NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	26.15	-1,407	5
ONTARIO	IESO_11_G	8784	9,529	12,779	-3,006	-6,111	47.22	20.10	-1,247	6
FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	27.91	-1,141	7
FRCC	FPC_3_MSA_Orlando_L	8784	1,232	3,649	-1,857	-3,553	62.09	21.89	-1,013	8
VACAR	DUK_8_MSA_Charlotte_L	8784	1,407	4,886	-2,097	-3,574	54.40	20.93	-1,002	9
PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	27.15	-999	10
NEPOOL	NEPOOL_6_WCMA	8762	4,285	3,417	-1,506	-3,982	72.25	20.38	-953	11
MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	46.47	20.02	-890	12
MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,073	-4,218	48.23	20.66	-878	13
SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	54.66	20.73	-878	14
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,808	-2,983	54.64	20.83	-868	15
FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	23.39	-827	16
MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	24.32	-789	17
NEPOOL	NEPOOL_4_NEBOS	8656	3,262	5,904	-1,161	-3,970	72.00	20.25	-724	18
TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	22.14	-706	19
PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,121	-2,452	70.38	26.94	-693	20
TVAUTHOR	TVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	19.70	-692	21
PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	20.59	-684	22
PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	23.14	-678	23
PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	19.29	-627	24
SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,297	-2,646	54.66	20.71	-623	25
VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	22.50	-598	26
FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	24.97	-584	27
PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-946	-1,857	70.18	26.73	-583	28
PJM	PSEG_5_MSA_Philadelphia_L	8784	2,143	2,766	-959	-1,990	68.62	25.93	-578	29
PJM	DPL_3_MSA_Dayton_L	8784	1,350	2,652	-1,354	-2,432	48.04	19.91	-571	30
ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,220	-1,970	53.10	19.13	-569	31
TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	20.82	-549	32
FRCC	TECO_7_MSA_Tampa_L	8784	-	1,481	-951	-2,004	64.08	23.54	-535	33
PJM	JCPL_1_MSA_NewYork_L	8784	-	1,792	-862	-1,934	70.02	26.72	-530	34
NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	23.75	-527	35
SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	-	1,925	-1,065	-1,811	54.65	20.74	-511	36
MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,209	-1,732	47.77	19.33	-507	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	PEPCO_1_MSA_DC_L	8784	-	1,439	-847	-1,492	66.76	27.62	-497	38
ONTARIO	IESO_3_L	8784	39	1,696	-1,140	-1,571	47.21	20.03	-473	39
ONTARIO	IESO_2_G	8715	2,437	2,116	-1,113	-1,779	48.38	20.20	-469	40
SPP	OKGE_4_MSA_OklahomaCity_L	8783	2,102	2,403	-821	-1,550	64.79	25.48	-467	41
PJM	AP_8_MSA_DC-VA-MD_L	8784	-	1,097	-798	-1,144	66.07	28.05	-463	42
NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	22.09	-454	43
PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,008	-1,587	51.03	19.51	-452	44
NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	22.44	-436	45
PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-733	-1,299	66.73	26.58	-429	46
MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	20.50	-424	47
SOUTHERN	SOCO_21_MSA_Atlanta_G	8768	3,334	2,733	-858	-1,940	54.60	20.59	-411	48
MISO	FE_8_MSA_Youngstown_L	8784	939	2,217	-977	-1,515	46.99	19.90	-403	49
PJM	BGE_9_MSA_Baltimore-Towson_L	8784	-	1,186	-681	-1,226	67.28	27.38	-403	50
PJM	JCPL_3_MSA_NewYork_L	8784	1,315	2,735	-651	-1,985	69.48	26.37	-397	51
PJM	PL_5_MSA_Lancaster_L	8784	-	897	-660	-951	68.28	33.06	-396	52
MISO	LGEE_9_MSA_Louisville_G	8784	1,136	1,763	-959	-1,756	45.30	20.00	-382	53
PJM	AP_7_MSA_Hagerstown-Martinsburg	8784	203	1,153	-661	-1,009	65.25	27.27	-379	54
PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-643	-1,025	66.98	25.04	(378)	55
PJM	VAP_27_MSA_DC_L	8784	-	1,048	-641	-1,075	65.61	26.67	-369	56
PJM	PECO_8_MSA_Philadelphia_L	8784	399	1,064	-596	-952	68.18	25.70	-357	57
PJM	AEP_3_MSA_Columbus_L	7710	10,204	8,244	-968	-3,258	46.37	19.24	-346	58
PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-572	-1,323	66.88	26.75	-336	59
MISO	CIN_7_MSA_Lafayette_L	8784	144	1,712	-851	-1,422	44.47	20.11	-332	60
MISO	METC_9_MSA_Kalamazoo_L	8784	118	1,334	-758	-1,367	48.95	20.76	-326	61
PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-594	-1,149	62.16	23.04	-324	62
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	-	1,187	-657	-1,116	54.61	20.61	-315	63
MISO	GRE_4_MSA_Minneapolis_L	8784	331	1,111	-1,007	-1,824	35.05	24.14	-310	64
MISO	IPL_5_MSA_Indianapolis_L	8784	306	1,187	-750	-1,193	46.54	20.00	-307	65
NYPP	NYISO_2_NYB	8784	650	1,759	-706	-1,572	48.73	19.51	-302	66
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8784	265	1,099	-606	-999	55.24	18.53	-294	67
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	19.01	-290	68
PJM	PEPCO_4_MSA_DC_L	8784	-	825	-486	-856	67.06	27.57	-286	69
PJM	BGE_8_MSA_Baltimore-Towson_L	8784	-	840	-482	-868	67.08	27.24	-284	70
MISO	FE_7_MSA_Toledo_L	8779	2,586	2,106	-673	-1,149	47.61	20.73	-281	71
MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	43.77	20.07	-276	72
SPP	KACP_7_MSA_KansasCity_L	8784	-	1,291	-691	-1,351	43.73	25.02	-265	73
PJM	AE_7_MSA_OceanCity_G	8784	90	836	-424	-884	68.66	25.97	-256	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MAPP	OPPD_5_MSA_Omaha_L	8784	480	1,686	-847	-1,503	33.20	24.60	-247	75
PJM	PEPCO_5_MSA_DC_L	8784	-	710	-418	-737	67.11	27.35	-247	76
MISO	LGEE_8_L	8784	33	771	-539	-908	51.36	21.85	-243	77
PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	42.36	21.55	-236	78
VACAR	CPL_9_MSA_NewBern_L	8784	53	811	-471	-757	56.89	21.49	-235	79
PJM	PEPCO_7_MSA_DC_L	8784	-	655	-385	-679	67.08	27.31	-227	80
MISO	METC_8_MSA_BayCity_G	8357	3,795	2,562	-547	-1,369	47.82	19.83	-219	81
VACAR	DUK_4_MSA_Greenville_L	6750	3,546	4,489	-589	-1,925	54.17	21.78	(215)	82
MISO	FE_10_MSA_Mansfield_L	8784	46	859	-508	-812	48.09	19.59	-215	83
MISO	IPL_8_MSA_Indianapolis_L	8784	547	1,227	-518	-1,286	46.60	20.09	-212	84
TVAUTHOR	TVA_10_MSA_Grenada_L	8784	-	651	-457	-721	52.61	19.51	-211	85
NYPP	NYISO_5_NYE	8757	1,098	909	-365	-731	65.58	17.67	-210	86
SPP	AEPW_1_MSA_Tulsa_G	7440	3,295	2,000	-608	-1,182	45.99	17.17	(208)	87
PJM	PECO_5_MSA_Philadelphia_L	6595	1,656	2,510	-403	-2,442	77.26	21.02	-206	88
PJM	PSEG_6_MSA_NewYork_L	8784	-	639	-315	-657	73.35	29.40	-203	89
ENTERGY	AECI_3_L	8784	-	915	-469	-881	49.28	20.42	-203	90
MISO	CIN_4_MSA_Cincinnati-Middletown_G	6874	6,026	5,727	-634	-2,757	46.29	20.89	-202	91
MISO	XEL_3_MSA_Minneapolis_G	4678	7,596	7,622	-853	-2,814	48.01	23.11	-192	92
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-489	-1,659	53.78	20.42	-184	93
SPP	WFEC_7_MSA_Woodward_G	8784	342	193	-327	-547	63.87	22.55	-184	94
SOUTHERN	SOCO_22_MSA_Atlanta_L	8784	41	661	-365	-621	54.72	20.74	-176	95
MISO	WEC_7_MSA_Milwaukee_G	8097	3,850	3,052	-563	-1,631	37.06	19.67	-169	96
MISO	FE_5_MSA_Cleveland_L	6258	3,216	4,680	-514	-2,089	52.20	18.76	-168	97
VACAR	SCEG_9_MSA_Charleston_G	8439	1,152	1,944	-355	-1,540	55.77	21.51	-167	98
PJM	DP&L_6_MSA_Seaford_L	8380	1,438	1,523	-279	-883	69.27	26.24	-162	99
PJM	DLCO_1_MSA_Pittsburgh_L	8784	-	635	-399	-641	44.67	19.86	-157	100
SOUTHERN	SOCO_17_MSA_Mobile_G	6738	5,205	4,575	-421	-1,892	53.83	19.67	-153	101
ENTERGY	EES_9_MSA_Russellville_G	6263	6,123	4,517	-444	-1,617	53.58	17.48	-149	102
ENTERGY	AECI_9_L	8784	-	694	-356	-668	45.46	18.80	-142	103
PJM	METED_4_MSA_Reading_G	7750	913	854	-277	-557	64.61	25.40	-138	104
MISO	SIGE_9_MSA_Evansville_L	8784	159	774	-317	-572	46.57	23.83	-130	105
PJM	VAP_7_G	1879	4,179	303	-1,021	-1,772	65.53	33.48	-126	106
NEPOOL	NEPOOL_8_SWCT	5755	2,678	1,850	-310	-984	69.61	22.37	-124	107
ENTERGY	AECI_7_MSA_KansasCity_L	8784	-	615	-315	-592	44.17	20.42	-122	108
MISO	METC_4_MSA_Holland-GrandHaven	3058	7,365	2,900	-1,041	-2,906	36.17	17.90	-115	109
NEPOOL	NEPOOL_10_RI	6111	2,062	2,203	-265	-926	70.17	22.21	-114	110
MISO	MP_7_MSA_Duluth_L	8784	514	824	-488	-784	25.08	14.98	-108	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	WERE_4_GEN_Wolfcreek_G	3670	3,510	2,459	-486	-1,564	60.17	23.46	-107	112
SPP	WERE_5_MSA_KansasCity_L	8783	204	915	-276	-710	43.32	25.45	-105	113
SOUTHERN	SMEPA_5_MSA_Laurel_G	8784	341	184	-204	-370	55.66	21.15	-100	114
MISO	OTP_1_L	8784	-	640	-412	-659	26.53	14.81	-96	115
PJM	PECO_1_MSA_Philadelphia_G	6720	2,323	554	-219	-404	63.54	25.69	-94	116
ENTERGY	EES_4_GEN_Ouachita_G	3309	6,345	2,417	-591	-1,371	43.31	15.42	-85	117
TVAUTHOR	DOE_2_MSA_Paducah_G	8784	520	309	-190	-299	47.15	20.80	-79	118
MAPP	NPPD_7_L	8784	210	975	-357	-707	23.55	13.98	-74	119
MISO	WEC_3_MSA_Milwaukee_G	6881	1,429	2,423	-261	-1,101	40.53	20.18	-73	120
MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	20.97	-60	121
NEPOOL	NEPOOL_3_ME	4436	3,494	2,522	-218	-1,038	61.25	18.16	-59	122
MAPP	NPPD_1_MSA_GrandIsland_L	8784	376	983	-421	-793	16.01	12.56	-59	123
MISO	WPS_4_MSA_Marshfield_L	8773	411	442	-158	-288	39.46	23.12	-55	124
PJM	VAP_26_MSA_DC_G	5249	1,981	631	-161	-461	55.84	24.39	-47	125
TVAUTHOR	TVA_9_MSA_Paducah_G	4963	4,470	2,130	-175	-709	52.74	23.33	-46	126
NEPOOL	NEPOOL_1_VT	3678	821	1,115	-149	-637	77.54	15.35	-42	127
MISO	SUNC_3_MSA_GardenCity_G	6433	840	18	-159	-228	36.30	17.34	-37	128
SPP	SPS_2_GEN_Tolk1_G	4622	4,480	2,973	-100	-296	79.38	18.84	-37	129
PJM	RECO_1_MSA_NewYork_L	8784	-	146	-57	-137	70.84	26.08	-35	130
MISO	MGE_7_MSA_Madison_L	7315	399	403	-142	-266	33.33	20.36	-35	131
NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	14.24	-33	132
SPP	OMPA_9_MSA_PoncaCity_G	7949	163	147	-51	-127	71.29	23.72	-29	133
MAPP	WAPA_2_MSA_RapidCity_G	5461	2,405	813	-247	-379	18.18	11.55	-25	134
MISO	WEPL_7_MSA_DodgeCity_G	8783	137	124	-60	-115	44.88	22.35	-23	135
MISO	CIN_3_MSA_TerreHaute_G	1740	3,230	1,015	-334	-588	35.88	16.44	-21	136
VACAR	DUK_5_MSA_Seneca_G	1675	1,911	-	-338	-1,100	33.94	10.31	-19	137
SPP	LEPA_5_MSA_Houma-Bayou_G	8784	93	73	-39	-74	56.60	21.46	-19	138
SOUTHERN	SOCO_32_MSA_Pascagoula_G	1396	3,574	2,674	-258	-1,156	51.96	18.04	-19	139
NYPP	NYISO_6_NYF	1254	4,103	1,983	-261	-1,145	54.41	20.08	-18	140
MISO	LES_5_MSA_Lincoln_G	8381	264	108	-55	-103	35.74	25.45	-17	141
NYPP	NYISO_4_NYD	1122	1,206	681	-266	-952	52.91	20.82	-16	142
ENTERGY	DENL_7_MSA_LittleRock_L	8784	-	81	-35	-81	50.50	18.53	-16	143
VACAR	CPL_1_MSA_Durham_G	933	10,224	8,563	-324	-1,346	49.43	22.30	-15	144
SPP	MIDW_7_MSA_Hays_L	8784	19	92	-40	-90	42.14	21.14	-15	145
MISO	UPPC_9_MSA_Houghton_L	8784	2	75	-40	-63	41.86	25.33	-15	146
MISO	CWLP_1_MSA_Springfield_G	4759	310	227	-99	-184	30.25	13.72	-14	147
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-361	-825	55.59	19.12	-14	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
ENTERGY	DERS_1_MSA_Ruston_G	8499	75	68	-31	-52	53.12	18.73	-14	149
MAPP	MEC_3_MSA_DesMoines_G	810	3,307	1,933	-352	-670	43.78	22.16	-12	150
VACAR	SCEG_1_MSA_Columbia_G	833	4,954	2,752	-355	-1,040	40.37	15.10	-12	151
PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	22.05	-11	152
FRCC	RCU_6_MSA_Orlando_L	8784	-	38	-20	-35	62.19	21.91	-11	153
PJM	PL_8_MSA_Allentown_G	2056	2,853	385	-76	-188	69.31	25.70	-11	154
PJM	BGE_7_MSA_Baltimore-Towson_G	572	2,548	1,043	-336	-583	54.82	27.98	-11	155
ONTARIO	IESO_15_G	399	1,964	3,375	-574	-1,177	45.64	13.75	-10	156
SPP	AEPW_5_MSA_Tulsa_G	1306	4,226	2,571	-139	-822	56.81	18.17	-10	157
SPP	AEPW_9_MSA_MountPleasant_G	806	8,168	3,832	-260	-972	49.15	12.13	-10	158
ENTERGY	CWLD_2_MSA_Columbia_L	8784	-	48	-25	-46	44.05	20.95	-10	159
SPP	GRDA_2_G	1083	849	179	-201	-451	43.73	15.84	-9	160
MISO	MIPU_7_MSA_KansasCity_G	5099	1,307	437	-60	-282	29.98	18.35	-9	161
SPP	EMDE_1_MSA_Joplin_G	2680	1,102	458	-80	-294	42.48	20.68	-9	162
SPP	SPRM_10_MSA_Springfield_L	2927	236	346	-40	-172	59.23	19.77	-7	163
MISO	ALTW_6_MSA_CedarRapids_L	554	996	1,103	-185	-766	64.24	22.92	-7	164
SOUTHERN	SOCO_2_GEN_Hartwl_G	5955	2,186	46	-23	-36	47.46	19.59	-7	165
PJM	OVEC_3_G	7998	1,620	10	-17	-34	45.61	18.35	-6	166
FRCC	FPC_10_MSA_Lakeland_G	756	3,561	747	-197	-399	40.77	14.67	-6	167
FRCC	STK_1_L	8784	-	17	-11	-18	61.75	22.05	-6	168
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	8021	87	14	-15	-22	48.32	17.42	-6	169
NYPP	NYISO_1_NYA	512	4,946	2,500	-300	-1,246	34.45	11.40	-5	170
MISO	IP_8_GEN_Clinton_G	769	2,302	1,195	-138	-484	37.99	18.16	-4	171
PJM	PENELEC_2_MSA_DuBois_G	380	2,724	1,196	-175	-644	53.73	22.75	-4	172
PJM	UGI_2_MSA_Scranton_G	8784	48	8	-6	-9	65.98	24.35	-3	173
SOUTHERN	SOCO_28_MSA_Birmingham_G	168	2,535	1,090	-285	-359	60.58	19.01	-3	174
SPP	CELE_10_MSA_Alexandria_G	221	1,895	742	-253	-379	51.56	24.62	-3	175
SOUTHERN	SOCO_15_MSA_Birmingham_G	161	12,464	9,217	-245	-772	72.85	14.68	-3	176
NEPOOL	NEPOOL_2_NH	265	4,204	2,621	-181	-1,019	57.99	12.28	-3	177
SPP	SWPA_2_MSA_MountainHome_G	3306	478	70	-25	-42	34.23	15.00	-3	178
PJM	NI_20_MSA_Chicago_G	1560	1,632	83	-42	-65	40.58	18.58	-3	179
MISO	SIPC_9_MSA_Marion-Herrin_G	2118	432	37	-29	-53	36.19	15.74	-2	180
MISO	CILC_8_MSA_Peoria_G	748	756	349	-103	-193	27.49	13.28	-2	181
VACAR	CPLW_3_Asheville_G	815	764	93	-46	-67	41.80	17.59	-2	182
MISO	ALTE_2_MSA_Madison_G	168	1,665	441	-278	-363	32.62	14.51	-2	183
MISO	DPC_10_G	993	615	140	-66	-115	17.18	4.97	-1	184
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-98	-137	49.65	21.42	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

HighCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	FPL_8_MSA_PortStLucie_G	37	10,364	4,623	-315	-613	42.76	17.44	0	186
MISO	HE_9_MSA_TerreHaute_G	288	1,016	27	-36	-54	47.78	19.66	0	187
FRCC	GVL_3_MSA_Gainesville_G	1128	433	15	-7	-14	57.95	18.01	0	188
MISO	FE_9_MSA>Weirton_G	174	1,860	112	-56	-64	39.22	16.12	0	189
MAPP	MPW_1_MSA_Muscataine_G	1455	151	16	-9	-13	26.36	16.79	0	190
FRCC	OUC_1_MSA_Orlando_G	168	889	73	-34	-46	59.10	15.35	0	191
MISO	SMMPA_9_MSA_Rochester_G	8553	128	58	-1	-20	33.57	20.27	0	192
FRCC	LWU_1_MSA_Miami_G	2151	250	82	-2	-3	52.29	27.77	0	193
FRCC	FMP_8_MSA_Sebastian_G	6948	145	20	0	-1	57.35	19.98	0	194
PJM	DLCO_7_MSA_Pittsburgh_G	168	1,644	25	-17	-22	50.05	18.48	0	195
MAPP	NPPD_4_GEN_Gentleman_G	24	2,702	148	-172	-209	33.17	15.64	0	196
FRCC	NSB_1_MSA_DaytonaBeach_G	1585	514	86	-2	-3	48.63	21.60	0	197
FRCC	KEY_1_MSA_KeyWest_G	537	880	138	-3	-5	64.29	20.91	0	198
FRCC	LAK_1_MSA_Lakeland_G	190	819	28	-10	-14	43.67	19.44	0	199
SPP	WERE_1_MSA_Manhattan_G	31	2,988	409	-127	-162	17.42	10.59	0	200
VACAR	DUK_9_MSA_Charlotte_G	4	14,681	9,966	-90	-133	92.97	0.77	0	201
MISO	NIPS_8_MSA_Chicago_G	20	2,892	1,694	-43	-144	26.26	7.83	0	202
SPP	INDN_6_MSA_KansasCity_G	199	143	27	-5	-9	18.46	15.99	0	203
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	2	17,334	9,966	-173	-334	28.84	2.03	0	204
SOUTHERN	SOCO_31_MSA_Atlanta_G	13	11,765	1,583	-27	-78	23.02	0.47	0	205
PJM	AEP_8_GEN_Amos01_G	2	19,694	6,544	-96	-106	32.51	3.07	0	206
MISO	CIN_8_MSA_Evansville_G	1	3,657	260	-106	-106	27.90		0	207
PJM	PEPCO_8_MSA_DC_G	1	3,786	1,108	-39	-39	74.77		0	208
ENTERGY	AECI_4_GEN_NewMadrid1_G	3	2,315	248	-5	-9	50.43	5.78	0	209
SOUTHERN	AEC_8_G	3	903	60	-2	-4	23.78	0.49	0	210

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	14.63	-1,833	1
PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	12.46	-1,524	2
ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	13.15	-1,128	3
FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	16.28	-1,065	4
ONTARIO	IESO_11_G	8784	9,529	12,779	-3,004	-6,111	37.70	10.60	-995	5
NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	14.13	-930	6
VACAR	DUK_8_MSA_Charlotte_L	8784	1,407	4,886	-2,232	-3,594	42.59	11.58	-835	7
FRCC	FPL_3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	16.21	-817	8
FRCC	FPC_3_MSA_Orlando_L	8784	1,232	3,649	-1,853	-3,468	45.78	11.96	-745	9
PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	14.44	-738	10
MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,176	-3,301	37.20	10.63	-711	11
MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,072	-4,218	38.20	11.07	-695	12
SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	42.45	11.24	-682	13
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,790	-2,847	42.52	11.39	-668	14
MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	13.72	-628	15
NEPOOL	NEPOOL_6_WCMA	8707	4,285	3,417	-1,409	-3,954	50.54	10.90	-620	16
FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	13.33	-609	17
PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	11.03	-553	18
NEPOOL	NEPOOL_4_NEBOS	8631	3,262	5,904	-1,262	-3,970	50.39	10.70	-549	19
TVAUTHOR	TVA_5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	11.62	-538	20
PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	13.09	-537	21
PJM	PSEG_5_MSA_Philadelphia_L	8784	2,143	2,766	-1,186	-2,037	50.63	13.43	-528	22
SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,410	-2,740	42.42	11.19	-526	23
VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	13.56	-514	24
PJM	DPL_3_MSA_Dayton_L	8784	1,350	2,652	-1,441	-2,435	38.46	10.53	-487	25
PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	10.30	-482	26
PJM	PSEG_8_MSA_NewYork_G	8779	3,860	3,654	-1,066	-2,403	51.21	13.83	-479	27
TVAUTHOR	TVA_7_MSA_Memphis_L	8725	7,215	5,982	-1,376	-4,095	39.25	10.06	-471	28
MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,274	-1,904	39.21	10.66	-439	29
ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,233	-2,026	39.26	9.89	-425	30
TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,211	-2,885	39.10	11.32	-416	31
SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	3,334	2,733	-1,117	-2,055	42.33	11.07	-415	32
FRCC	FPL_2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	14.26	-408	33
PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,114	-1,695	41.10	9.89	-402	34
SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	-	1,925	-1,065	-1,811	42.46	11.26	-397	35
PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-879	-1,841	51.11	13.69	-395	36
FRCC	TECO_7_MSA_Tampa_L	8784	-	1,481	-951	-2,004	47.11	13.46	-394	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_3_MSA_Columbus_L	8356	10,204	8,244	-1,210	-3,226	38.35	10.44	-388	38
PJM	JCPL_1_MSA_NewYork_L	8784	-	1,792	-862	-1,934	51.10	13.75	-387	39
ONTARIO	IESO_3_L	8784	39	1,696	-1,140	-1,571	37.68	10.54	-377	40
MISO	FE_8_MSA_Youngstown_L	8784	939	2,217	-1,108	-1,570	38.56	11.05	-375	41
PJM	PEPCO_1_MSA_DC_L	8784	-	1,439	-847	-1,492	50.14	14.71	-373	42
ONTARIO	IESO_2_G	8692	2,437	2,116	-1,089	-1,779	38.42	10.60	-364	43
NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	54.32	12.63	-362	44
PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-806	-1,325	50.17	13.95	-355	45
PJM	AP_8_MSA_DC-VA-MD_L	8784	-	1,097	-798	-1,144	49.61	15.15	-348	46
MISO	ITC_2_MSA_Detroit_L	8538	4,001	5,247	-1,016	-3,744	38.53	10.98	-334	47
NYPP	NYISO_7_NYG	8420	3,156	2,195	-732	-1,477	51.85	11.33	-320	48
SPP	OKGE_4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	15.47	-317	49
NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-692	-1,141	51.52	11.71	-313	50
MISO	LGEE_9_MSA_Louisville_G	8784	1,136	1,763	-959	-1,773	36.72	10.62	-309	51
PJM	BGE_9_MSA_Baltimore-Towson_L	8784	-	1,186	-681	-1,226	50.49	14.42	-302	52
PJM	PL_5_MSA_Lancaster_L	8784	-	897	-660	-951	51.59	22.55	-299	53
PJM	JCPL_3_MSA_NewYork_L	8784	1,315	2,735	-663	-1,960	50.92	13.59	-297	54
PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-654	-1,025	49.98	13.09	-287	55
PJM	AP_7_MSA_Hagerstown-Martinsburg	8784	203	1,153	-662	-1,009	49.08	14.61	-285	56
PJM	VAP_27_MSA_DC_L	8784	-	1,048	-641	-1,075	49.20	14.11	-277	57
MISO	CIN_7_MSA_Lafayette_L	8784	144	1,712	-851	-1,422	35.30	10.90	-264	58
MISO	METC_9_MSA_Kalamazoo_L	8784	118	1,334	-760	-1,339	38.86	10.91	-260	59
PJM	PECO_8_MSA_Philadelphia_L	8784	399	1,064	-581	-918	50.47	13.34	-258	60
PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-578	-1,460	50.26	14.05	-255	61
NYPP	NYISO_2_NYB	8784	650	1,759	-706	-1,571	39.58	9.58	-245	62
MISO	IPL_5_MSA_Indianapolis_L	8784	306	1,187	-749	-1,183	37.31	10.63	-245	63
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	10.14	-244	64
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	-	1,187	-657	-1,116	42.27	11.04	-244	65
MISO	GRE_4_MSA_Minneapolis_L	8784	331	1,111	-1,008	-1,827	27.10	14.00	-240	66
MISO	CIN_4_MSA_Cincinnati-Middletown_C	7772	6,026	5,727	-765	-2,785	38.09	11.00	-226	67
MISO	AMRN_2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	11.00	-217	68
PJM	PEPCO_4_MSA_DC_L	8784	-	825	-486	-856	50.34	14.61	-215	69
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8784	265	1,099	-604	-1,010	40.41	9.34	-215	70
PJM	BGE_8_MSA_Baltimore-Towson_L	8784	-	840	-482	-868	50.36	14.35	-213	71
PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	12.07	-205	72
SPP	KACP_7_MSA_KansasCity_L	8784	-	1,291	-691	-1,351	33.63	13.78	-204	73
MISO	FE_7_MSA_Toledo_L	8768	2,586	2,106	-624	-1,149	37.26	11.39	-204	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	LGEE_8_L	8784	33	771	-541	-908	40.05	11.85	-190	75
PJM	AE_7_MSA_OceanCity_G	8784	90	836	-424	-884	50.65	13.44	-189	76
MAPP	OPPD_5_MSA_Omaha_L	8784	480	1,686	-848	-1,521	24.99	13.92	-186	77
VACAR	DUK_4_MSA_Greenville_L	6956	3,546	4,489	-618	-2,091	43.29	12.26	-186	78
PJM	PEPCO_5_MSA_DC_L	8784	-	710	-418	-737	50.37	14.43	-185	79
PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	12.33	-184	80
VACAR	CPL_9_MSA_NewBern_L	8784	53	811	-471	-757	44.00	11.74	-182	81
SOUTHERN	SOCO_17_MSA_Mobile_G	7680	5,205	4,575	-584	-2,068	40.12	9.64	-180	82
MISO	FE_10_MSA_Mansfield_L	8784	46	859	-508	-799	38.79	10.42	-173	83
MISO	IPL_8_MSA_Indianapolis_L	8784	547	1,227	-522	-1,286	37.35	10.71	-171	84
PJM	PEPCO_7_MSA_DC_L	8784	-	655	-385	-679	50.35	14.40	-170	85
MISO	METC_8_MSA_BayCity_G	8119	3,795	2,562	-538	-1,369	37.60	10.04	-164	86
PJM	PECO_5_MSA_Philadelphia_L	6985	1,656	2,510	-424	-2,442	54.27	11.46	-161	87
TVAUTHOR	TVA_10_MSA_Grenada_L	8784	-	651	-457	-721	39.77	9.98	-160	88
PJM	DP&L_6_MSA_Seaford_L	8665	1,438	1,523	-362	-1,039	50.74	13.48	-159	89
MISO	FE_5_MSA_Cleveland_L	6639	3,216	4,680	-553	-2,419	42.00	10.27	-154	90
ENTERGY	AECI_3_L	8784	-	915	-469	-881	36.75	10.65	-151	91
VACAR	SCEG_9_MSA_Charleston_G	8611	1,152	1,944	-401	-1,540	43.63	12.30	-151	92
NYPP	NYISO_5_NYE	8764	1,098	909	-363	-766	46.85	8.93	-149	93
PJM	PSEG_6_MSA_NewYork_L	8784	-	639	-315	-657	52.33	14.83	-145	94
MISO	XEL_3_MSA_Minneapolis_G	4678	7,596	7,622	-853	-2,814	34.89	13.19	-139	95
SOUTHERN	SOCO_22_MSA_Atlanta_L	8784	41	661	-365	-621	42.58	11.33	-137	96
SPP	WFEC_7_MSA_Woodward_G	8784	342	193	-325	-547	45.84	14.01	-131	97
PJM	DLCO_1_MSA_Pittsburgh_L	8784	-	635	-399	-641	36.91	11.02	-129	98
SPP	AEPW_1_MSA_Tulsa_G	7156	3,295	2,000	-556	-1,182	32.47	8.71	-129	99
NEPOOL	NEPOOL_10_RI	6243	2,062	2,203	-366	-1,145	49.72	11.41	-114	100
ENTERGY	EES_9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	9.10	-112	101
MISO	WEC_7_MSA_Milwaukee_G	7702	3,850	3,052	-503	-1,514	28.25	10.89	-109	102
ENTERGY	AECI_9_L	8784	-	694	-356	-668	34.75	10.04	-109	103
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6142	7,393	4,949	-435	-1,610	39.49	10.69	-105	104
MISO	SIGE_9_MSA_Evansville_L	8784	159	774	-317	-564	37.77	13.31	-105	105
ENTERGY	AECI_7_MSA_KansasCity_L	8784	-	615	-315	-592	33.97	11.18	-94	106
MISO	MP_7_MSA_Duluth_L	8784	514	824	-491	-781	21.53	9.30	-93	107
PJM	METED_4_MSA_Reading_G	6649	913	854	-269	-591	48.07	13.94	-86	108
NEPOOL	NEPOOL_8_SWCT	5871	2,678	1,850	-285	-937	49.10	11.08	-82	109
MISO	OTP_1_L	8784	-	640	-412	-659	22.40	9.29	-81	110
SPP	WERE_5_MSA_KansasCity_L	8783	204	915	-271	-710	33.74	14.27	-80	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	METC_4_MSA_Holland-GrandHaven	2565	7,365	2,900	-1,026	-2,869	30.27	8.37	-80	112
SPP	WERE_4_GEN_Wolfcreek_G	3632	3,510	2,459	-481	-1,564	43.55	12.49	-76	113
PJM	VAP_7_G	1371	4,179	303	-974	-1,741	55.16	18.38	-74	114
MISO	WEC_3_MSA_Milwaukee_G	7208	1,429	2,423	-320	-1,202	30.99	11.27	-72	115
SOUTHERN	SMEPA_5_MSA_Laurel_G	8784	341	184	-189	-359	42.69	12.34	-71	116
ENTERGY	EES_4_GEN_Ouachita_G	3427	6,345	2,417	-572	-1,335	33.78	7.17	-66	117
MAPP	NPPD_7_L	8784	210	975	-354	-707	19.92	8.93	-62	118
TVAUTHOR	DOE_2_MSA_Paducah_G	8784	520	309	-190	-299	36.27	11.19	-60	119
MAPP	NPPD_1_MSA_GrandIsland_L	8784	376	983	-415	-793	16.08	8.73	-59	120
PJM	PECO_1_MSA_Philadelphia_G	5050	2,323	554	-212	-375	47.12	13.55	-50	121
NEPOOL	NEPOOL_3_ME	5032	3,494	2,522	-208	-1,038	44.51	9.54	-47	122
MISO	SUNC_3_MSA_GardenCity_G	7522	840	18	-167	-228	36.71	15.89	-46	123
MISO	AMRN_12_MSA_StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	11.86	-44	124
MISO	WPS_4_MSA_Marshfield_L	8781	411	442	-160	-288	30.07	13.13	-42	125
TVAUTHOR	TVA_9_MSA_Paducah_G	4970	4,470	2,130	-174	-709	39.63	12.01	-34	126
PJM	BGE_7_MSA_Baltimore-Towson_G	1718	2,548	1,043	-403	-704	46.73	13.42	-32	127
NEPOOL	NEPOOL_1_VT	3678	821	1,115	-149	-637	53.92	8.99	-30	128
MISO	MGE_7_MSA_Madison_L	7816	399	403	-133	-272	27.13	12.29	-28	129
PJM	RECO_1_MSA_NewYork_L	8784	-	146	-57	-137	51.85	13.31	-26	130
MAPP	WAPA_2_MSA_RapidCity_G	5528	2,405	813	-252	-389	16.85	8.20	-23	131
SPP	AEPW_9_MSA_MountPleasant_G	1800	8,168	3,832	-294	-1,361	39.92	6.61	-21	132
NEPOOL	NEPOOL_7_CT	1117	4,447	3,920	-320	-1,094	58.57	8.82	-21	133
PJM	VAP_26_MSA_DC_G	2973	1,981	631	-155	-434	43.38	13.30	-20	134
SPP	OMPA_9_MSA_PoncaCity_G	8084	163	147	-51	-127	47.92	13.49	-20	135
MISO	WEPL_7_MSA_DodgeCity_G	8656	137	124	-59	-115	38.65	16.54	-20	136
MISO	CIN_3_MSA_TerreHaute_G	1816	3,230	1,015	-326	-558	31.47	8.84	-19	137
MISO	CWLP_1_MSA_Springfield_G	5512	310	227	-103	-186	28.79	9.08	-16	138
SPP	EMDE_1_MSA_Joplin_G	4549	1,102	458	-106	-376	33.89	9.49	-16	139
SPP	SPS_2_GEN_Tolk1_G	3257	4,480	2,973	-86	-287	55.52	11.74	-16	140
VACAR	CPL_1_MSA_Durham_G	1229	10,224	8,563	-310	-1,503	39.64	10.64	-15	141
SPP	LEPA_5_MSA_Houma-Bayou_G	8784	93	73	-39	-74	41.71	12.16	-14	142
MISO	LES_5_MSA_Lincoln_G	8561	264	108	-55	-103	27.36	14.39	-13	143
VACAR	DUK_5_MSA_Seneca_G	1193	1,911	-	-330	-1,100	31.17	5.04	-12	144
NYPP	NYISO_4_NYD	1112	1,206	681	-269	-950	41.02	9.83	-12	145
SPP	MIDW_7_MSA_Hays_L	8784	19	92	-39	-88	35.59	13.96	-12	146
SPP	AEPW_5_MSA_Tulsa_G	1722	4,226	2,571	-181	-898	39.05	9.77	-12	147
ENTERGY	DENL_7_MSA_LittleRock_L	8784	-	81	-35	-81	37.87	9.53	-12	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2008R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	UPPC_9_MSA_Houghton_L	8784	2	75	-40	-63	32.97	15.34	-11	149
PJM	PENELEC_2_MSA_DuBois_G	1031	2,724	1,196	-228	-800	46.38	9.29	-11	150
ENTERGY	DERS_1_MSA_Ruston_G	8466	75	68	-31	-52	39.03	9.75	-10	151
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-351	-825	40.52	10.38	-10	152
NYPP	NYISO_6_NYF	1006	4,103	1,983	-230	-1,041	41.39	10.66	-10	153
ONTARIO	IESO_15_G	388	1,964	3,375	-608	-1,185	36.91	6.09	-9	154
FRCC	RCU_6_MSA_Orlando_L	8784	-	38	-20	-35	45.82	11.98	-8	155
ENTERGY	CWLD_2_MSA_Columbia_L	8784	-	48	-25	-46	34.05	11.41	-7	156
MAPP	MEC_3_MSA_DesMoines_G	775	3,307	1,933	-289	-663	30.03	11.54	-7	157
SPP	GRDA_2_G	1182	849	179	-166	-429	32.41	6.98	-6	158
SOUTHERN	SOCO_2_GEN_Hartwll_G	5955	2,186	46	-23	-36	38.73	10.85	-5	159
MISO	MIPU_7_MSA_KansasCity_G	3893	1,307	437	-54	-282	23.86	9.29	-5	160
FRCC	FPC_10_MSA_Lakeland_G	691	3,561	747	-208	-368	34.31	6.65	-5	161
VACAR	CPLW_3_Ashville_G	2582	764	93	-50	-67	38.37	9.38	-5	162
SPP	SPRM_10_MSA_Springfield_L	3025	236	346	-40	-172	40.51	11.45	-5	163
MISO	ALTW_6_MSA_CedarRapids_L	561	996	1,103	-187	-766	44.94	14.18	-5	164
NYPP	NYISO_1_NYA	461	4,946	2,500	-295	-1,180	33.45	6.58	-5	165
SOUTHERN	SOCO_32_MSA_Pascagoula_G	674	3,574	2,674	-177	-704	37.89	10.80	-5	166
PJM	PL_8_MSA_Allentown_G	1058	2,853	385	-89	-177	47.94	13.72	-5	167
VACAR	SCEG_1_MSA_Columbia_G	412	4,954	2,752	-335	-1,147	32.23	6.08	-4	168
FRCC	STK_1_L	8784	-	17	-11	-18	45.77	11.91	-4	169
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	8064	87	14	-15	-23	36.40	8.60	-4	170
PJM	OVEC_3_G	6444	1,620	10	-17	-34	35.43	9.13	-4	171
MISO	IP_8_GEN_Clinton_G	773	2,302	1,195	-156	-524	30.85	10.14	-4	172
PJM	NI_6_MSA_Chicago_G	463	9,759	7,577	-232	-1,050	33.83	13.58	-4	173
MISO	SIPC_9_MSA_Marion-Herrin_G	2965	432	37	-29	-53	33.20	9.23	-3	174
PJM	UGI_2_MSA_Scranton_G	8784	48	8	-6	-9	49.51	12.70	-3	175
SPP	SWPA_2_MSA_MountainHome_G	3526	478	70	-25	-42	28.17	7.40	-2	176
SOUTHERN	SOCO_28_MSA_Birmingham_G	168	2,535	1,090	-297	-397	44.84	9.42	-2	177
NEPOOL	NEPOOL_2_NH	283	4,204	2,621	-179	-774	42.41	4.09	-2	178
MISO	CILC_8_MSA_Peoria_G	752	756	349	-110	-213	24.71	8.51	-2	179
PJM	NI_20_MSA_Chicago_G	1550	1,632	83	-41	-65	31.82	10.14	-2	180
SPP	CELE_10_MSA_Alexandria_G	198	1,895	742	-232	-379	42.08	14.00	-2	181
MISO	ALTE_2_MSA_Madison_G	168	1,665	441	-278	-363	27.57	9.10	-1	182
MISO	DPC_10_G	951	615	140	-66	-115	16.20	3.06	-1	183
SOUTHERN	SOCO_15_MSA_Birmingham_G	89	12,464	9,217	-192	-605	48.83	7.01	-1	184
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-98	-137	37.83	10.99	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

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Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	HE_9_MSA_TerreHaute_G	288	1,016	27	-36	-54	37.25	9.76	0	186
FRCC	FPL_8_MSA_PortStLucie_G	33	10,364	4,623	-314	-613	35.25	8.08	0	187
FRCC	GVL_3_MSA_Gainesville_G	1176	433	15	-7	-14	42.70	9.10	0	188
MISO	FE_9_MSA_Weirton_G	156	1,860	112	-55	-64	35.72	9.41	0	189
MAPP	MPW_1_MSA_Muscatine_G	1479	151	16	-9	-13	21.29	10.54	0	190
PJM	PEPCO_8_MSA_DC_G	53	3,786	1,108	-84	-182	57.16	9.80	0	191
FRCC	OUC_1_MSA_Orlando_G	168	889	73	-34	-46	43.03	7.75	0	192
MISO	SMMPA_9_MSA_Rochester_G	8543	128	58	-1	-20	26.28	11.82	0	193
FRCC	LWU_1_MSA_Miami_G	2192	250	82	-2	-3	40.98	15.69	0	194
SPP	WERE_1_MSA_Manhattan_G	45	2,988	409	-143	-202	21.53	9.56	0	195
FRCC	FMP_8_MSA_Sebastian_G	6970	145	20	0	-1	42.77	10.37	0	196
PJM	DLCO_7_MSA_Pittsburgh_G	168	1,644	25	-17	-22	42.19	11.37	0	197
MAPP	NPPD_4_GEN_Gentleman_G	24	2,702	148	-181	-210	27.05	13.47	0	198
FRCC	NSB_1_MSA_DaytonaBeach_G	1461	514	86	-2	-3	39.48	11.33	0	199
FRCC	LAK_1_MSA_Lakeland_G	213	819	28	-10	-14	36.49	9.18	0	200
FRCC	KEY_1_MSA_KeyWest_G	535	880	138	-3	-5	46.58	10.95	0	201
SOUTHERN	SOCO_31_MSA_Atlanta_G	12	11,765	1,583	-83	-172	23.19	0.74	0	202
MISO	NIPS_8_MSA_Chicago_G	24	2,892	1,694	-37	-97	23.16	3.91	0	203
SPP	INDN_6_MSA_KansasCity_G	210	143	27	-5	-9	18.28	10.46	0	204
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	3	17,334	9,966	-119	-334	28.09	3.47	0	205
VACAR	DUK_9_MSA_Charlotte_G	1	14,681	9,966	-97	-97	64.50		0	206
MISO	CIN_8_MSA_Evansville_G	1	3,657	260	-106	-106	41.93		0	207
SOUTHERN	AEC_8_G	1	903	60	0	0	24.98		0	208

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

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Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	NI_13_MSA_Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	12.71	-1,782	1
NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	12.77	-1,653	2
ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	14.71	-1,236	3
FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	14.54	-1,187	4
ONTARIO	IESO_11_G	8760	9,529	12,779	-3,043	-7,371	44.44	10.23	-1,184	5
FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	14.70	-991	6
NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	12.73	-928	7
ONTARIO	IESO_15_G	8760	1,964	3,375	-2,360	-3,239	44.27	10.03	-915	8
FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	13.31	-877	9
VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,886	-2,234	-3,877	44.01	12.01	-861	10
PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	14.59	-852	11
MISO	ITC_9_MSA_Detroit_L	8760	1,340	4,751	-2,179	-4,538	41.85	11.73	-799	12
MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	11.89	-765	13
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,960	-3,169	44.31	12.18	-761	14
SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	44.21	12.10	-756	15
NEPOOL	NEPOOL_4_NEBOS	8727	3,262	5,904	-1,533	-3,500	51.56	10.73	-690	16
FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	14.09	-680	17
VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	13.36	-614	18
TVAUTHOR	TVA_7_MSA_Memphis_L	8745	7,215	5,982	-1,707	-4,409	41.06	11.46	-613	19
PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	12.48	-598	20
TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	12.38	-587	21
MISO	LGEE_5_MSA_Lexington_L	8760	595	2,345	-1,786	-2,997	37.32	11.85	-584	22
FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	14.36	-568	23
PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	15.27	-567	24
PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,225	-2,112	52.37	14.07	-562	25
PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	11.49	-554	26
PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,182	-2,500	51.96	13.42	-538	27
SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,372	-2,611	44.19	12.10	-531	28
ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,410	-2,066	42.17	11.19	-521	29
PJM	DPL_3_MSA_Dayton_L	8760	1,350	2,652	-1,453	-2,516	40.31	11.93	-513	30
MISO	FE_4_MSA_Akron_L	8760	531	2,277	-1,282	-1,778	40.86	11.28	-459	31
TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,315	-2,941	39.50	12.47	-455	32
NEPOOL	NEPOOL_6_WCMA	8554	4,285	3,417	-1,028	-3,107	51.63	10.79	-454	33
ONTARIO	IESO_3_L	8760	39	1,696	-1,181	-1,636	43.42	9.29	-449	34
SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	-	1,925	-1,139	-1,932	44.21	12.11	-441	35
PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-969	-2,093	51.97	13.41	-441	36
FRCC	TECO_7_MSA_Tampa_L	8760	-	1,481	-975	-2,089	50.29	13.79	-430	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

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Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	JCPL_1_MSA_NewYork_L	8760	-	1,792	-920	-2,073	51.83	13.33	-418	38
PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,115	-1,684	42.35	10.85	-414	39
PJM	PEPCO_1_MSA_DC_L	8760	-	1,439	-883	-1,547	52.59	14.81	-407	40
MISO	ITC_2_MSA_Detroit_L	8625	4,001	5,247	-1,114	-3,583	41.97	11.67	-403	41
SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	20.73	-389	42
NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	11.83	-380	43
PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-774	-1,495	52.56	14.09	-356	44
MISO	FE_8_MSA_Youngstown_L	8760	939	2,217	-975	-1,607	40.77	11.20	-348	45
NEPOOL	NEPOOL_9_NWKST	8760	405	1,524	-731	-1,289	53.08	11.80	-340	46
PJM	AEP_3_MSA_Columbus_L	7796	10,204	8,244	-1,103	-3,787	39.47	11.59	-339	47
PJM	JCPL_3_MSA_NewYork_L	8760	1,315	2,735	-739	-2,248	52.10	13.56	-337	48
PJM	AP_8_MSA_DC-VA-MD_L	8760	-	1,097	-728	-1,048	51.92	15.29	-331	49
PJM	PL_5_MSA_Lancaster_L	8760	-	897	-721	-1,027	51.75	13.61	-327	50
NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	10.89	-324	51
PJM	BGE_9_MSA_Baltimore-Towson_L	8760	-	1,186	-690	-1,231	53.00	14.51	-320	52
PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-695	-1,038	51.57	13.16	-314	53
PJM	AP_7_MSA_Hagerstown-Martinsburg	8760	203	1,153	-686	-1,101	51.50	15.14	-309	54
MISO	GRE_4_MSA_Minneapolis_L	8760	331	1,111	-1,099	-2,103	31.83	18.20	-307	55
SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	3,334	2,733	-780	-1,570	43.92	11.83	-297	56
MISO	METC_9_MSA_Kalamazoo_L	8760	118	1,334	-812	-1,476	41.72	12.00	-297	57
PJM	VAP_27_MSA_DC_L	8760	-	1,048	-643	-1,075	51.74	14.31	-291	58
MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-884	-1,480	37.57	13.06	-291	59
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	11.21	-284	60
NYPP	NYISO_2_NYB	8760	650	1,759	-733	-1,245	44.16	9.46	-284	61
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	-	1,187	-720	-1,220	44.25	11.97	-279	62
PJM	PECO_8_MSA_Philadelphia_L	8760	399	1,064	-606	-1,130	52.16	13.52	-277	63
MISO	IPL_5_MSA_Indianapolis_L	8760	306	1,187	-784	-1,258	38.66	12.07	-266	64
MISO	FE_7_MSA_Toledo_L	8701	2,586	2,106	-676	-1,252	41.13	11.57	-242	65
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8760	265	1,099	-614	-1,022	44.20	10.39	-238	66
PJM	PEPCO_4_MSA_DC_L	8760	-	825	-511	-895	52.82	14.68	-236	67
PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	12.43	-236	68
SPP	KACP_7_MSA_KansasCity_L	8760	-	1,291	-730	-1,422	36.39	17.73	-233	69
MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	36.57	11.78	-231	70
PJM	BGE_8_MSA_Baltimore-Towson_L	8760	-	840	-493	-880	52.84	14.44	-228	71
PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-478	-1,030	52.69	14.21	-220	72
MISO	XEL_3_MSA_Minneapolis_G	5875	7,596	7,622	-947	-2,499	38.26	16.81	-213	73
PJM	PEPCO_5_MSA_DC_L	8760	-	710	-454	-796	52.86	14.52	-210	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	METC_8_MSA_BayCity_G	8149	3,795	2,562	-600	-1,641	42.36	11.07	-207	75
PJM	NI_3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	36.47	12.65	-204	76
PJM	AE_7_MSA_OceanCity_G	8760	90	836	-441	-916	52.46	14.27	-203	77
VACAR	DUK_4_MSA_Greenville_L	7310	3,546	4,489	-613	-2,063	44.21	12.73	-198	78
VACAR	CPLE_9_MSA_NewBern_L	8760	53	811	-493	-792	45.78	11.78	-198	79
MISO	FE_10_MSA_Mansfield_L	8760	46	859	-536	-842	40.96	11.59	-192	80
MISO	FE_5_MSA_Cleveland_L	8040	3,216	4,680	-570	-2,443	41.75	11.39	-191	81
MISO	LGEE_8_L	8760	33	771	-559	-928	38.20	11.86	-187	82
MISO	IPL_8_MSA_Indianapolis_L	8760	547	1,227	-531	-1,094	38.73	12.19	-180	83
VACAR	SCEG_9_MSA_Charleston_G	8669	1,152	1,944	-460	-1,230	44.76	12.24	-179	84
ONTARIO	IESO_2_G	6842	2,437	2,116	-618	-1,367	42.07	9.71	-178	85
SOUTHERN	SOCO_17_MSA_Mobile_G	7378	5,205	4,575	-559	-1,701	42.60	10.62	-176	86
TVAUTHOR	TVA_10_MSA_Grenada_L	8760	-	651	-479	-809	41.81	11.36	-176	87
ENTERGY	AECI_3_L	8760	-	915	-503	-932	38.51	13.71	-170	88
NYPP	NYISO_5_NYE	8756	1,098	909	-392	-776	48.48	11.31	-166	89
SPP	WFEC_7_MSA_Woodward_G	8760	342	193	-346	-590	53.68	18.24	-163	90
MAPP	OPPD_5_MSA_Omaha_L	8760	480	1,686	-854	-1,534	21.57	10.43	-161	91
SPP	AEPW_1_MSA_Tulsa_G	8257	3,295	2,000	-739	-1,383	26.36	16.65	-161	92
SOUTHERN	SOCO_22_MSA_Atlanta_L	8760	41	661	-397	-673	44.34	12.27	-154	93
PJM	PECO_5_MSA_Philadelphia_L	6966	1,656	2,510	-394	-2,388	55.94	11.29	-153	94
PJM	PEPCO_7_MSA_DC_L	8760	-	655	-326	-570	52.89	14.62	-151	95
MISO	WEC_7_MSA_Milwaukee_G	8542	3,850	3,052	-620	-1,688	28.44	14.33	-151	96
PJM	PSEG_6_MSA_NewYork_L	8760	-	639	-329	-680	51.95	13.39	-150	97
PJM	DP&L_6_MSA_Seaford_L	8480	1,438	1,523	-330	-972	52.54	13.34	-147	98
PJM	DLCO_1_MSA_Pittsburgh_L	8760	-	635	-420	-667	39.52	11.50	-145	99
MISO	CIN_4_MSA_Cincinnati-Middletown_C	6000	6,026	5,727	-588	-2,107	40.71	12.63	-144	100
NEPOOL	NEPOOL_10_RI	6779	2,062	2,203	-410	-1,213	51.13	11.39	-142	101
ENTERGY	EES_7_MSA_Beaumont-PortArthur_C	6502	7,393	4,949	-497	-1,630	42.86	11.40	-138	102
PJM	VAP_7_G	1952	4,179	303	-1,013	-2,512	60.98	24.20	-121	103
ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	10.44	-120	104
ENTERGY	AECI_9_L	8760	-	694	-380	-704	35.36	10.97	-118	105
MISO	LGEE_9_MSA_Louisville_G	8355	1,136	1,763	-395	-1,420	35.03	13.20	-116	106
MISO	MP_7_MSA_Duluth_L	8760	514	824	-488	-747	26.19	12.35	-112	107
ENTERGY	AECI_7_MSA_KansasCity_L	8760	-	615	-351	-651	35.80	12.56	-110	108
MISO	SIGE_9_MSA_Evansville_L	8760	159	774	-314	-541	38.26	14.08	-105	109
PJM	METED_4_MSA_Reading_G	7450	913	854	-276	-569	50.81	13.81	-105	110
MISO	METC_4_MSA_Holland-GrandHaven	2628	7,365	2,900	-1,096	-2,762	32.59	9.88	-94	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	WERE_5_MSA_KansasCity_L	8760	204	915	-305	-897	35.12	17.17	-94	112
MISO	OTP_1_L	8760	-	640	-433	-692	24.51	11.16	-93	113
SPP	WERE_4_GEN_Wolfcreek_G	4485	3,510	2,459	-453	-1,676	45.34	15.90	-92	114
SOUTHERN	SMEPA_5_MSA_Laurel_G	8760	341	184	-216	-396	44.73	12.00	-85	115
MAPP	NPPD_1_MSA_GrandIsland_L	8760	376	983	-430	-837	20.33	14.94	-77	116
MAPP	NPPD_7_L	8760	210	975	-372	-751	20.95	9.65	-68	117
PJM	PECO_1_MSA_Philadelphia_G	5891	2,323	554	-228	-379	49.56	13.45	-66	118
NEPOOL	NEPOOL_3_ME	5139	3,494	2,522	-247	-1,052	44.96	9.27	-57	119
MISO	AMRN_12_MSA_StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	12.65	-46	120
ENTERGY	EES_4_GEN_Ouachita_G	2274	6,345	2,417	-543	-1,404	35.21	7.42	-43	121
MISO	WPS_4_MSA_Marshfield_L	8760	411	442	-150	-285	29.82	15.80	-39	122
NEPOOL	NEPOOL_1_VT	3999	821	1,115	-166	-694	54.74	8.63	-36	123
NEPOOL	NEPOOL_7_CT	1561	4,447	3,920	-397	-1,722	56.77	10.12	-35	124
MISO	SUNC_3_MSA_GardenCity_G	5859	840	18	-157	-231	36.69	15.59	-34	125
MISO	MGE_7_MSA_Madison_L	8125	399	403	-130	-272	29.31	12.58	-31	126
MAPP	WAPA_2_MSA_RapidCity_G	5583	2,405	813	-270	-419	18.81	10.00	-28	127
PJM	RECO_1_MSA_NewYork_L	8760	-	146	-60	-144	52.38	13.29	-28	128
VACAR	CPL_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	9.43	-25	129
PJM	VAP_26_MSA_DC_G	3301	1,981	631	-157	-461	46.16	13.67	-24	130
MISO	CIN_3_MSA_TerreHaute_G	2203	3,230	1,015	-343	-610	31.64	9.19	-24	131
MISO	CWLP_1_MSA_Springfield_G	7461	310	227	-94	-186	33.87	11.71	-24	132
NEPOOL	NEPOOL_8_SWCT	2664	2,678	1,850	-187	-832	46.82	12.19	-23	133
MISO	WEPL_7_MSA_DodgeCity_G	8569	137	124	-60	-117	43.93	18.93	-22	134
SPP	OMPA_9_MSA_PoncaCity_G	7849	163	147	-51	-137	54.21	17.79	-22	135
SPP	EMDE_1_MSA_Joplin_G	5980	1,102	458	-107	-346	33.56	13.76	-22	136
PJM	BGE_7_MSA_Baltimore-Towson_G	944	2,548	1,043	-412	-707	48.45	14.38	-19	137
VACAR	DUK_5_MSA_Seneca_G	1804	1,911	-	-320	-1,100	30.63	6.28	-18	138
SPP	LEPA_5_MSA_Houma-Bayou_G	8759	93	73	-40	-76	45.54	13.31	-16	139
SPP	AEPW_9_MSA_MountPleasant_G	1240	8,168	3,832	-258	-974	46.16	4.48	-15	140
SPP	AEPW_5_MSA_Tulsa_G	1682	4,226	2,571	-203	-904	42.51	13.18	-14	141
MISO	UPPC_9_MSA_Houghton_L	8755	2	75	-41	-64	40.57	30.36	-14	142
NYPP	NYISO_4_NYD	1187	1,206	681	-277	-961	43.16	10.79	-14	143
MISO	WEC_3_MSA_Milwaukee_G	3136	1,429	2,423	-139	-668	30.96	12.13	-13	144
ENTERGY	DENL_7_MSA_LittleRock_L	8760	-	81	-37	-86	40.86	11.45	-13	145
SPP	MIDW_7_MSA_Hays_L	8760	19	92	-40	-92	37.99	16.53	-13	146
MISO	ALTW_6_MSA_CedarRapids_L	1295	996	1,103	-221	-618	44.66	17.00	-13	147
SPP	SPS_2_GEN_Tolk1_G	2316	4,480	2,973	-86	-481	63.95	19.76	-13	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	LES_5_MSA_Lincoln_G	8758	264	108	-58	-109	23.75	10.81	-12	149
PJM	NI_6_MSA_Chicago_G	1095	9,759	7,577	-312	-1,427	35.18	13.00	-12	150
NYPP	NYISO_6_NYF	1184	4,103	1,983	-218	-1,044	43.58	11.40	-11	151
ENTERGY	DERS_1_MSA_Ruston_G	8379	75	68	-31	-56	42.52	10.97	-11	152
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-348	-639	45.59	13.78	-11	153
SPP	SPRM_10_MSA_Springfield_L	4163	236	346	-56	-236	38.50	16.64	-9	154
FRCC	RCU_6_MSA_Orlando_L	8760	-	38	-20	-36	49.74	13.28	-9	155
ENTERGY	CWLD_2_MSA_Columbia_L	8760	-	48	-29	-54	35.28	12.52	-9	156
TVAUTHOR	TVA_9_MSA_Paducah_G	1974	4,470	2,130	-106	-604	42.13	15.02	-9	157
SOUTHERN	SOCO_32_MSA_Pascagoula_G	797	3,574	2,674	-241	-827	39.72	10.63	-8	158
MISO	MIPU_7_MSA_KansasCity_G	4379	1,307	437	-67	-380	25.71	10.64	-8	159
VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	4.00	-7	160
SPP	GRDA_2_G	1241	849	179	-153	-444	34.37	11.66	-7	161
SOUTHERN	SOCO_2_GEN_Hartwll_G	6034	2,186	46	-26	-42	40.48	11.64	-6	162
VACAR	SCEG_1_MSA_Columbia_G	581	4,954	2,752	-322	-1,100	34.22	9.15	-6	163
PJM	PL_8_MSA_Allentown_G	1583	2,853	385	-74	-215	50.35	12.34	-6	164
MISO	IP_8_GEN_Clinton_G	758	2,302	1,195	-193	-619	38.43	9.87	-6	165
FRCC	STK_1_L	8760	-	17	-12	-20	50.07	13.37	-5	166
NYPP	NYISO_1_NYA	450	4,946	2,500	-306	-1,170	36.91	10.66	-5	167
SPP	CELE_10_MSA_Alexandria_G	435	1,895	742	-204	-450	53.25	17.43	-5	168
PJM	OVEC_3_G	7116	1,620	10	-17	-34	38.06	11.10	-5	169
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	7702	87	14	-14	-21	37.74	9.61	-4	170
NEPOOL	NEPOOL_2_NH	364	4,204	2,621	-219	-635	44.29	5.40	-4	171
MISO	SIPC_9_MSA_Marion-Herrin_G	3135	432	37	-30	-47	34.19	11.05	-3	172
MAPP	NPPD_4_GEN_Gentleman_G	520	2,702	148	-183	-270	32.98	12.81	-3	173
SOUTHERN	SOCO_15_MSA_Birmingham_G	322	12,464	9,217	-195	-875	47.97	7.82	-3	174
PJM	UGI_2_MSA_Scranton_G	8760	48	8	-6	-9	51.11	12.85	-3	175
FRCC	FPC_10_MSA_Lakeland_G	413	3,561	747	-145	-388	41.86	11.99	-3	176
MISO	DPC_10_G	1685	615	140	-74	-124	19.96	7.00	-2	177
SPP	SWPA_2_MSA_MountainHome_G	2925	478	70	-25	-43	28.05	9.37	-2	178
VACAR	CPLW_3_Ashville_G	928	764	93	-52	-74	38.48	10.09	-2	179
TVAUTHOR	DOE_2_MSA_Paducah_G	8754	520	309	-6	-10	34.74	12.95	-2	180
FRCC	KEY_1_MSA_KeyWest_G	8760	880	138	-3	-6	51.38	14.44	-2	181
PJM	NI_20_MSA_Chicago_G	886	1,632	83	-43	-69	36.58	11.80	-1	182
MISO	CILC_8_MSA_Peoria_G	340	756	349	-107	-178	25.48	7.21	-1	183
MAPP	MEC_3_MSA_DesMoines_G	333	3,307	1,933	-132	-612	20.96	11.53	-1	184
FRCC	FPL_8_MSA_PortStLucie_G	100	10,364	4,623	-217	-1,140	39.43	7.54	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

BaseCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	FE_6_MSA_Pittsburgh_G	168	2,371	213	-116	-133	41.25	18.02	-1	186
MISO	WEC_1_MSA_Chicago_G	168	1,728	303	-108	-132	39.76	11.03	-1	187
PJM	PEPCO_8_MSA_DC_G	132	3,786	1,108	-122	-330	44.36	15.33	-1	188
SPP	KACY_10_MSA_KansasCity_G	728	316	40	-24	-24	40.84	20.59	-1	189
PJM	PENELEC_2_MSA_DuBois_G	159	2,724	1,196	-73	-156	50.16	5.10	-1	190
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-84	-102	38.42	6.55	-1	191
FRCC	GVL_3_MSA_Gainesville_G	1152	433	15	-8	-15	49.08	12.73	0	192
SPP	WERE_1_MSA_Manhattan_G	119	2,988	409	-154	-226	23.11	11.35	0	193
MISO	OTP_9_GEN_BigStone_G	120	1,189	136	-85	-128	40.17	13.78	0	194
MAPP	MPW_1_MSA_Muscatine_G	1631	151	16	-10	-13	26.14	11.16	0	195
MISO	EEL_2_MSA_Paducah_G	274	507	36	-37	-92	36.60	11.82	0	196
PJM	DLCO_7_MSA_Pittsburgh_G	528	1,644	25	-16	-23	41.76	10.66	0	197
MISO	NIPS_8_MSA_Chicago_G	102	2,892	1,694	-110	-375	24.45	7.46	0	198
MISO	SMMPA_9_MSA_Rochester_G	8518	128	58	-1	-23	29.59	13.39	0	199
FRCC	OUC_1_MSA_Orlando_G	72	889	73	-49	-62	54.39	14.28	0	200
MISO	HE_9_MSA_TerreHaute_G	72	1,016	27	-41	-58	42.91	9.99	0	201
FRCC	FMP_8_MSA_Sebastian_G	6374	145	20	0	-1	44.91	10.21	0	202
FRCC	LWU_1_MSA_Miami_G	1736	250	82	-2	-3	43.35	13.81	0	203
FRCC	NSB_1_MSA_DaytonaBeach_G	1124	514	86	-2	-3	43.73	14.03	0	204
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	5	17,334	9,966	-359	-836	40.62	20.76	0	205
ENTERGY	EES_2_MSA_Batesville_G	17	3,525	1,697	-87	-146	41.96	0.93	0	206
FRCC	LAK_1_MSA_Lakeland_G	114	819	28	-12	-17	38.47	8.78	0	207
MISO	ITC_3_MSA_Detroit_G	15	3,815	1,600	-40	-91	47.42	4.94	0	208
MISO	ALTE_2_MSA_Madison_G	13	1,665	441	-15	-36	10.66	6.37	0	209
SPP	INDN_6_MSA_KansasCity_G	26	143	27	-4	-6	13.37	0.98	0	210

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	22.29	-2,441	1
PJM	NI_13_MSA_Chicago_L	8760	2,396	10,556	-5,616	-9,590	45.30	20.80	-2,229	2
ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	22.41	-1,601	3
FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,632	-4,256	67.17	22.83	-1,549	4
ONTARIO	IESO_11_G	8760	9,529	12,779	-3,043	-7,371	56.86	17.73	-1,515	5
NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	22.07	-1,349	6
FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,193	-4,333	67.19	22.97	-1,291	7
ONTARIO	IESO_15_G	8760	1,964	3,375	-2,360	-3,239	56.62	17.48	-1,171	8
FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	21.01	-1,134	9
PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	24.86	-1,129	10
VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,886	-2,150	-3,877	55.28	19.92	-1,041	11
MISO	ITC_9_MSA_Detroit_L	8760	1,340	4,751	-2,178	-4,518	52.48	20.08	-1,001	12
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,970	-3,246	55.44	19.77	-957	13
SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	55.32	19.67	-946	14
MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	19.56	-943	15
FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	21.61	-880	16
NEPOOL	NEPOOL_4_NEBOS	8715	3,262	5,904	-1,340	-3,500	71.29	18.70	-833	17
TVAUTHOR	TVA_7_MSA_Memphis_L	8753	7,215	5,982	-1,824	-4,409	51.92	18.89	-829	18
FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	22.40	-755	19
PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,202	-2,535	70.29	23.67	-740	20
TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	20.51	-738	21
PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	20.57	-737	22
NEPOOL	NEPOOL_6_WCMA	8644	4,285	3,417	-1,170	-3,529	71.38	18.72	-722	23
VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	21.01	-716	24
MISO	LGEE_5_MSA_Lexington_L	8760	595	2,345	-1,778	-2,923	45.68	19.03	-712	25
PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	24.38	-708	26
PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	19.49	-694	27
ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,418	-2,066	54.26	18.31	-674	28
SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,369	-2,611	55.30	19.65	-663	29
PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-1,004	-2,093	70.31	23.66	-618	30
PJM	DPL_3_MSA_Dayton_L	8760	1,350	2,652	-1,404	-2,430	50.11	20.06	-616	31
PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-961	-2,077	70.95	24.39	-597	32
TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,298	-2,941	50.62	19.73	-575	33
ONTARIO	IESO_3_L	8760	39	1,696	-1,181	-1,636	55.43	16.47	-574	34
PJM	JCPL_1_MSA_NewYork_L	8760	-	1,792	-920	-2,073	70.05	23.46	-565	35
FRCC	TECO_7_MSA_Tampa_L	8760	-	1,481	-975	-2,089	65.12	21.38	-556	36
SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	-	1,925	-1,139	-1,932	55.32	19.68	-552	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	PEPCO_1_MSA_DC_L	8760	-	1,439	-883	-1,547	70.14	25.40	-543	38
NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	77.00	20.88	-539	39
MISO	FE_4_MSA_Akron_L	8760	531	2,277	-1,214	-1,778	50.24	19.16	-534	40
SPP	OKGE_4_MSA_OklahomaCity_L	8737	2,102	2,403	-819	-1,686	73.28	27.24	-525	41
MISO	ITC_2_MSA_Detroit_L	8624	4,001	5,247	-1,113	-3,583	52.70	19.95	-506	42
NYPP	NYISO_7_NYG	8404	3,156	2,195	-826	-1,818	72.54	19.92	-503	43
PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,039	-1,618	52.94	19.00	-482	44
NEPOOL	NEPOOL_9_NWKST	8760	405	1,524	-736	-1,303	73.99	20.64	-477	45
PJM	JCPL_3_MSA_NewYork_L	8760	1,315	2,735	-719	-2,248	70.54	23.79	-444	46
PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-718	-1,436	70.39	24.50	-443	47
PJM	AP_8_MSA_DC-VA-MD_L	8760	-	1,097	-728	-1,048	69.06	26.14	-441	48
PJM	PL_5_MSA_Lancaster_L	8760	-	897	-721	-1,027	69.59	23.52	-439	49
PJM	BGE_9_MSA_Baltimore-Towson_L	8760	-	1,186	-690	-1,231	71.02	25.13	-429	50
PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-695	-1,038	69.49	23.16	-423	51
PJM	AP_7_MSA_Hagerstown-Martinsburg	8760	203	1,153	-686	-1,101	68.30	25.58	-411	52
MISO	FE_8_MSA_Youngstown_L	8760	939	2,217	-904	-1,569	49.85	19.08	-395	53
PJM	VAP_27_MSA_DC_L	8760	-	1,048	-643	-1,075	68.61	24.45	-386	54
MISO	GRE_4_MSA_Minneapolis_L	8760	331	1,111	-1,099	-2,124	39.95	27.05	-385	55
PJM	PECO_8_MSA_Philadelphia_L	8760	399	1,064	-614	-1,130	70.66	23.77	-380	56
MISO	METC_9_MSA_Kalamazoo_L	8760	118	1,334	-808	-1,473	52.62	20.53	-372	57
NYPP	NYISO_2_NYB	8760	650	1,759	-731	-1,245	56.33	17.11	-361	58
MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-883	-1,480	46.48	21.35	-360	59
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	-	1,187	-720	-1,220	55.53	19.59	-350	60
SOUTHERN	SOCO_21_MSA_Atlanta_G	8716	3,334	2,733	-721	-1,542	55.12	19.44	-346	61
PJM	AEP_3_MSA_Columbus_L	7457	10,204	8,244	-949	-3,468	48.63	19.90	-344	62
PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	21.35	-336	63
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	18.13	-331	64
MISO	IPL_5_MSA_Indianapolis_L	8760	306	1,187	-784	-1,258	47.74	19.84	-328	65
MISO	FE_7_MSA_Toledo_L	8710	2,586	2,106	-717	-1,342	51.37	19.69	-321	66
PJM	PEPCO_4_MSA_DC_L	8760	-	825	-511	-895	70.62	25.30	-316	67
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8760	265	1,099	-615	-992	57.15	17.35	-308	68
PJM	BGE_8_MSA_Baltimore-Towson_L	8760	-	840	-493	-880	70.74	25.00	-306	69
PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-475	-1,030	70.57	24.65	-294	70
SPP	KACP_7_MSA_KansasCity_L	8760	-	1,291	-730	-1,422	45.88	27.52	-293	71
MISO	XEL_3_MSA_Minneapolis_G	5869	7,596	7,622	-992	-2,499	49.87	25.19	-290	72
MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	19.34	-284	73
PJM	PEPCO_5_MSA_DC_L	8760	-	710	-454	-796	70.76	25.10	-282	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AE_7_MSA_OceanCity_G	8760	90	836	-441	-916	71.09	24.59	-275	75
MISO	METC_8_MSA_BayCity_G	8173	3,795	2,562	-603	-1,641	53.22	19.33	-262	76
VACAR	CPLE_9_MSA_NewBern_L	8760	53	811	-493	-792	58.42	19.82	-252	77
PJM	NI_3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	45.12	20.67	-252	78
MISO	FE_10_MSA_Mansfield_L	8760	46	859	-536	-844	50.80	19.64	-238	79
ONTARIO	IESO_2_G	6935	2,437	2,116	-635	-1,375	52.91	17.17	-233	80
MISO	LGEE_8_L	8760	33	771	-554	-928	47.68	19.20	-231	81
VACAR	DUK_4_MSA_Greenville_L	6832	3,546	4,489	-609	-2,063	54.71	21.32	-228	82
TVAUTHOR	TVA_10_MSA_Grenada_L	8760	-	651	-479	-809	53.15	18.71	-223	83
MISO	IPL_8_MSA_Indianapolis_L	8760	547	1,227	-528	-1,094	47.81	19.94	-221	84
NYPP	NYISO_5_NYE	8756	1,098	909	-382	-807	65.65	16.25	-220	85
ENTERGY	AECI_3_L	8760	-	915	-503	-932	48.96	21.93	-216	86
SPP	WFEC_7_MSA_Woodward_G	8760	342	193	-348	-590	70.13	24.23	-214	87
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-545	-1,645	55.69	19.12	-213	88
MISO	FE_5_MSA_Cleveland_L	7570	3,216	4,680	-537	-2,443	51.93	19.47	-211	89
SPP	AEPW_1_MSA_Tulsa_G	8026	3,295	2,000	-745	-1,373	35.02	24.33	-209	90
PJM	PSEG_6_MSA_NewYork_L	8760	-	639	-329	-680	70.28	23.57	-203	91
PJM	PEPCO_7_MSA_DC_L	8760	-	655	-326	-570	70.78	25.23	-202	92
VACAR	SCEG_9_MSA_Charleston_G	8571	1,152	1,944	-410	-1,082	56.48	20.01	-199	93
PJM	PECO_5_MSA_Philadelphia_L	6627	1,656	2,510	-372	-2,388	78.95	18.38	-195	94
MAPP	OPPD_5_MSA_Omaha_L	8760	480	1,686	-854	-1,549	25.78	16.17	-193	95
SOUTHERN	SOCO_22_MSA_Atlanta_L	8760	41	661	-397	-673	55.34	19.74	-193	96
MISO	WEC_7_MSA_Milwaukee_G	8553	3,850	3,052	-631	-1,697	35.10	20.06	-189	97
PJM	DLCO_1_MSA_Pittsburgh_L	8760	-	635	-420	-667	47.14	19.48	-174	98
PJM	DP&L_6_MSA_Seaford_L	8349	1,438	1,523	-288	-972	71.68	23.61	-172	99
PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	40.73	-169	100
SOUTHERN	SOCO_17_MSA_Mobile_G	6866	5,205	4,575	-445	-1,762	54.55	18.21	-167	101
ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	16.46	-162	102
PJM	METED_4_MSA_Reading_G	7944	913	854	-283	-573	68.42	23.84	-154	103
MISO	CIN_4_MSA_Cincinnati-Middletown_G	5473	6,026	5,727	-560	-2,100	50.20	21.55	-154	104
ENTERGY	AECI_9_L	8760	-	694	-380	-704	44.35	17.98	-148	105
NEPOOL	NEPOOL_10_RI	6427	2,062	2,203	-313	-1,073	70.36	20.31	-142	106
MISO	LGEE_9_MSA_Louisville_G	8306	1,136	1,763	-394	-1,429	42.10	20.48	-138	107
ENTERGY	AECI_7_MSA_KansasCity_L	8760	-	615	-351	-651	44.46	20.05	-137	108
MISO	MP_7_MSA_Duluth_L	8760	514	824	-489	-747	31.16	18.23	-134	109
MISO	SIGE_9_MSA_Evansville_L	8760	159	774	-314	-541	47.13	22.59	-130	110
MISO	METC_4_MSA_Holland-GrandHaven	2949	7,365	2,900	-1,065	-2,912	39.84	19.11	-125	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	25.20	-120	112
SPP	WERE_5_MSA_KansasCity_L	8760	204	915	-308	-897	43.89	26.57	-119	113
MISO	OTP_1_L	8760	-	640	-433	-692	29.02	15.99	-110	114
SOUTHERN	SMEPA_5_MSA_Laurel_G	8760	341	184	-223	-416	56.24	18.97	-110	115
PJM	PECO_1_MSA_Philadelphia_G	6496	2,323	554	-224	-379	66.59	24.07	-97	116
MAPP	NPPD_1_MSA_GrandIsland_L	8760	376	983	-435	-837	21.78	14.58	-83	117
MAPP	NPPD_7_L	8760	210	975	-374	-751	23.85	13.60	-78	118
NEPOOL	NEPOOL_3_ME	4973	3,494	2,522	-232	-1,137	62.13	16.56	-72	119
MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	20.15	-59	120
ENTERGY	EES_4_GEN_Ouachita_G	2241	6,345	2,417	-558	-1,389	42.45	13.74	-53	121
NEPOOL	NEPOOL_7_CT	1543	4,447	3,920	-416	-1,722	82.40	17.12	-53	122
NEPOOL	NEPOOL_1_VT	3999	821	1,115	-166	-694	75.76	14.02	-50	123
MISO	WPS_4_MSA_Marshfield_L	8760	411	442	-150	-264	37.11	23.23	-49	124
PJM	VAP_26_MSA_DC_G	4596	1,981	631	-165	-458	59.14	22.83	-45	125
PJM	RECO_1_MSA_NewYork_L	8760	-	146	-60	-144	71.62	23.45	-38	126
MISO	MGE_7_MSA_Madison_L	7115	399	403	-137	-269	32.71	18.13	-32	127
MAPP	WAPA_2_MSA_RapidCity_G	5538	2,405	813	-266	-405	20.51	12.79	-30	128
NEPOOL	NEPOOL_8_SWCT	2532	2,678	1,850	-187	-736	62.35	22.11	-30	129
SPP	OMPA_9_MSA_PoncaCity_G	7791	163	147	-50	-137	74.21	26.64	-29	130
MISO	WEPL_7_MSA_DodgeCity_G	8722	137	124	-60	-117	51.11	25.44	-27	131
MISO	SUNC_3_MSA_GardenCity_G	4846	840	18	-152	-231	35.85	16.79	-26	132
MISO	CIN_3_MSA_TerreHaute_G	2149	3,230	1,015	-322	-598	36.24	15.23	-25	133
PJM	NI_6_MSA_Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	21.69	-24	134
MISO	CWLP_1_MSA_Springfield_G	6676	310	227	-90	-181	39.57	19.57	-24	135
VACAR	DUK_5_MSA_Seneca_G	2099	1,911	-	-317	-1,100	33.87	11.35	-23	136
VACAR	CPLD_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	14.89	-21	137
SPP	LEPA_5_MSA_Houma-Bayou_G	8760	93	73	-40	-76	58.61	20.62	-20	138
SPP	SPS_2_GEN_Tolk1_G	2958	4,480	2,973	-82	-326	80.59	23.50	-20	139
SOUTHERN	SOCO_32_MSA_Pascagoula_G	1287	3,574	2,674	-282	-1,140	52.22	17.46	-19	140
MISO	UPPC_9_MSA_Houghton_L	8757	2	75	-41	-65	52.99	53.48	-19	141
SPP	EMDE_1_MSA_Joplin_G	4900	1,102	458	-91	-346	40.85	22.85	-18	142
NYPP	NYISO_6_NYF	1248	4,103	1,983	-276	-1,071	51.62	20.08	-18	143
NYPP	NYISO_4_NYD	1145	1,206	681	-275	-932	55.73	19.62	-18	144
ENTERGY	DENL_7_MSA_LittleRock_L	8760	-	81	-37	-86	52.15	18.50	-17	145
MISO	ALTW_6_MSA_CedarRapids_L	1251	996	1,103	-227	-618	59.24	25.28	-17	146
SPP	MIDW_7_MSA_Hays_L	8760	19	92	-40	-92	45.00	23.73	-16	147
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-365	-639	59.59	21.35	-15	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	LES_5_MSA_Lincoln_G	8743	264	108	-58	-110	28.64	16.98	-15	149
ENTERGY	DERS_1_MSA_Ruston_G	8423	75	68	-31	-56	54.84	18.00	-14	150
PJM	BGE_7_MSA_Baltimore-Towson_G	599	2,548	1,043	-355	-702	62.50	27.23	-13	151
MISO	WEC_3_MSA_Milwaukee_G	2647	1,429	2,423	-121	-761	38.91	15.95	-12	152
VACAR	SCEG_1_MSA_Columbia_G	762	4,954	2,752	-363	-1,100	43.09	18.50	-12	153
PJM	PL_8_MSA_Allentown_G	2328	2,853	385	-73	-240	69.59	21.03	-12	154
FRCC	RCU_6_MSA_Orlando_L	8760	-	38	-20	-36	64.34	20.96	-12	155
SPP	SPRM_10_MSA_Springfield_L	4011	236	346	-55	-236	51.21	25.73	-11	156
SPP	AEPW_5_MSA_Tulsa_G	1178	4,226	2,571	-163	-821	58.56	22.44	-11	157
ENTERGY	CWLD_2_MSA_Columbia_L	8760	-	48	-29	-54	43.52	20.01	-11	158
MISO	MIPU_7_MSA_KansasCity_G	5079	1,307	437	-72	-380	29.77	17.13	-11	159
TVAUTHOR	TVA_9_MSA_Paducah_G	1855	4,470	2,130	-101	-502	53.34	23.96	-10	160
VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	5.65	-10	161
SPP	GRDA_2_G	1138	849	179	-183	-444	43.08	19.07	-9	162
SOUTHERN	SOCO_2_GEN_Hartwll_G	6034	2,186	46	-26	-42	49.14	19.01	-8	163
SPP	CELE_10_MSA_Alexandria_G	467	1,895	742	-222	-450	71.34	31.07	-7	164
MISO	IP_8_GEN_Clinton_G	766	2,302	1,195	-191	-619	48.21	16.30	-7	165
FRCC	STK_1_L	8760	-	17	-12	-20	64.67	21.19	-7	166
PJM	OVEC_3_G	7549	1,620	10	-17	-34	46.98	18.76	-6	167
NYPP	NYISO_1_NYA	468	4,946	2,500	-302	-1,252	41.99	18.34	-6	168
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	7686	87	14	-14	-21	47.96	16.18	-5	169
SPP	AEPW_9_MSA_MountPleasant_G	356	8,168	3,832	-217	-830	54.90	5.83	-4	170
NEPOOL	NEPOOL_2_NH	335	4,204	2,621	-206	-635	58.48	11.79	-4	171
PJM	UGI_2_MSA_Scranton_G	8760	48	8	-6	-9	68.66	22.60	-4	172
FRCC	FPC_10_MSA_Lakeland_G	440	3,561	747	-141	-385	49.17	19.72	-3	173
MISO	SIPC_9_MSA_Marion-Herrin_G	2575	432	37	-30	-47	38.50	18.03	-3	174
MAPP	NPPD_4_GEN_Gentleman_G	513	2,702	148	-150	-270	38.97	17.47	-3	175
MISO	DPC_10_G	1769	615	140	-76	-124	21.86	10.29	-3	176
SOUTHERN	SOCO_15_MSA_Birmingham_G	253	12,464	9,217	-162	-807	62.12	13.08	-3	177
SPP	SWPA_2_MSA_MountainHome_G	2923	478	70	-25	-43	33.39	15.96	-2	178
TVAUTHOR	DOE_2_MSA_Paducah_G	8751	520	309	-6	-10	44.53	20.36	-2	179
FRCC	KEY_1_MSA_KeyWest_G	8760	880	138	-3	-6	67.08	22.70	-2	180
PJM	NI_20_MSA_Chicago_G	892	1,632	83	-43	-71	44.99	19.97	-2	181
FRCC	FPL_8_MSA_PortStLucie_G	132	10,364	4,623	-244	-996	45.16	13.66	-1	182
MAPP	MEC_3_MSA_DesMoines_G	389	3,307	1,933	-135	-676	26.32	18.16	-1	183
MISO	CILC_8_MSA_Peoria_G	367	756	349	-114	-180	29.80	13.97	-1	184
MISO	WEC_1_MSA_Chicago_G	168	1,728	303	-105	-130	55.83	19.45	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

High Case2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	FE_6_MSA_Pittsburgh_G	168	2,371	213	-116	-133	48.49	16.04	-1	186
SPP	KACY_10_MSA_KansasCity_G	728	316	40	-24	-24	51.94	32.26	-1	187
PJM	PEPCO_8_MSA_DC_G	89	3,786	1,108	-165	-575	55.02	28.14	-1	188
VACAR	CPLW_3_Ashville_G	342	764	93	-50	-74	42.66	18.91	-1	189
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-84	-102	50.43	12.61	-1	190
FRCC	GVL_3_MSA_Gainesville_G	1128	433	15	-8	-15	63.89	20.26	-1	191
MISO	OTP_9_GEN_BigStone_G	120	1,189	136	-85	-128	51.10	20.69	-1	192
MAPP	MPW_1_MSA_Muscatine_G	1620	151	16	-10	-13	31.32	17.29	0	193
MISO	EEI_2_MSA_Paducah_G	275	507	36	-37	-92	44.53	19.46	0	194
PJM	DLCO_7_MSA_Pittsburgh_G	528	1,644	25	-16	-23	51.55	17.71	0	195
MISO	NIPS_8_MSA_Chicago_G	117	2,892	1,694	-93	-294	25.75	12.16	0	196
MISO	SMPA_9_MSA_Rochester_G	8534	128	58	-1	-23	36.52	20.51	0	197
FRCC	OUC_1_MSA_Orlando_G	72	889	73	-49	-62	70.21	21.47	0	198
NEPOOL	NEPOOL_5_SEMA	21	6,454	3,978	-145	-522	70.34	20.42	0	199
SPP	WERE_1_MSA_Manhattan_G	76	2,988	409	-134	-196	17.90	11.83	0	200
MISO	HE_9_MSA_TerreHaute_G	72	1,016	27	-41	-58	54.53	17.61	0	201
FRCC	FMP_8_MSA_Sebastian_G	6394	145	20	0	-1	57.36	17.06	0	202
FRCC	LWU_1_MSA_Miami_G	1660	250	82	-2	-3	53.82	22.63	0	203
FRCC	NSB_1_MSA_DaytonaBeach_G	1127	514	86	-2	-3	53.62	23.08	0	204
ENTERGY	EES_2_MSA_Batesville_G	17	3,525	1,697	-87	-146	58.01	1.01	0	205
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	6	17,334	9,966	-314	-836	43.95	29.85	0	206
FRCC	LAK_1_MSA_Lakeland_G	123	819	28	-12	-17	45.95	16.21	0	207
PJM	PENELEC_2_MSA_DuBois_G	15	2,724	1,196	-62	-164	45.10	19.67	0	208
MISO	ITC_3_MSA_Detroit_G	16	3,815	1,600	-37	-91	59.85	13.13	0	209
SPP	INDN_6_MSA_KansasCity_G	26	143	27	-5	-6	13.35	2.16	0	210
MISO	ALTE_2_MSA_Madison_G	11	1,665	441	-16	-34	9.32	8.14	0	211

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	NI_13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	9.28	-1,550	1
NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	9.79	-1,401	2
ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	11.84	-1,049	3
FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	11.26	-1,019	4
ONTARIO	IESO_11_G	8760	9,529	12,779	-3,037	-7,371	38.29	7.36	-1,019	5
FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	11.39	-845	6
VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,886	-2,387	-4,010	39.32	9.23	-822	7
NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	9.70	-791	8
ONTARIO	IESO_15_G	8760	1,964	3,375	-2,360	-3,239	38.16	7.20	-789	9
FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	9.99	-754	10
PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	11.23	-722	11
MISO	ITC_9_MSA_Detroit_L	8760	1,340	4,751	-2,179	-4,527	36.89	8.22	-704	12
MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	8.65	-686	13
SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	9.18	-671	14
SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	9.30	-669	15
VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	10.67	-590	16
FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	10.98	-586	17
NEPOOL	NEPOOL_4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	8.10	-565	18
PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	8.88	-545	19
MISO	LGEE_5_MSA_Lexington_L	8760	595	2,345	-1,791	-2,997	33.56	8.90	-527	20
TVAUTHOR	TVA_5_MSA_Nashville_L	8689	9,154	8,858	-1,676	-5,752	35.84	8.92	-522	21
PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	10.93	-511	22
PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,281	-2,060	44.73	10.57	-502	23
TVAUTHOR	TVA_7_MSA_Memphis_L	8714	7,215	5,982	-1,577	-4,469	35.75	8.24	-491	24
PJM	DPL_3_MSA_Dayton_L	8760	1,350	2,652	-1,532	-2,516	35.92	8.47	-482	25
SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	9.16	-480	26
FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	11.21	-471	27
PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	8.31	-467	28
ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,414	-2,144	36.19	8.42	-448	29
PJM	PSEG_8_MSA_NewYork_G	8758	3,860	3,654	-1,146	-2,500	44.40	9.90	-446	30
MISO	FE_4_MSA_Akron_L	8760	531	2,277	-1,321	-1,947	36.78	8.28	-426	31
TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,372	-2,941	33.65	9.69	-405	32
PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,213	-1,748	37.49	7.78	-398	33
SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	-	1,925	-1,139	-1,932	39.21	9.19	-391	34
ONTARIO	IESO_3_L	8760	39	1,696	-1,181	-1,636	37.51	6.58	-388	35
NEPOOL	NEPOOL_6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	8.15	-378	36
FRCC	TECO_7_MSA_Tampa_L	8760	-	1,481	-975	-2,089	43.30	10.61	-370	37

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_3_MSA_Columbus_L	8275	10,204	8,244	-1,221	-3,809	35.73	8.23	-361	38
PJM	JCPL_1_MSA_NewYork_L	8760	-	1,792	-920	-2,073	44.32	9.84	-357	39
MISO	ITC_2_MSA_Detroit_L	8616	4,001	5,247	-1,118	-3,583	36.94	8.21	-356	40
PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-908	-2,093	44.40	9.90	-353	41
PJM	PEPCO_1_MSA_DC_L	8760	-	1,439	-883	-1,547	45.47	11.54	-352	42
MISO	FE_8_MSA_Youngstown_L	8760	939	2,217	-1,066	-1,657	36.66	8.34	-342	43
PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-821	-1,495	45.25	10.70	-325	44
NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	45.93	9.07	-322	45
SPP	OKGE_4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	17.80	-309	46
SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3,334	2,733	-892	-1,981	38.85	8.88	-299	47
NYPP	NYISO_7_NYG	8191	3,156	2,195	-811	-1,818	43.82	7.96	-291	48
PJM	JCPL_3_MSA_NewYork_L	8760	1,315	2,735	-741	-2,248	44.50	10.05	-289	49
NEPOOL	NEPOOL_9_NWKST	8760	405	1,524	-729	-1,217	44.85	9.01	-287	50
PJM	AP_8_MSA_DC-VA-MD_L	8760	-	1,097	-728	-1,048	44.81	12.05	-286	51
PJM	PL_5_MSA_Lancaster_L	8760	-	897	-721	-1,027	44.34	10.13	-280	52
PJM	BGE_9_MSA_Baltimore-Towson_L	8760	-	1,186	-690	-1,231	45.61	11.08	-276	53
PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-697	-1,038	44.15	9.70	-269	54
MISO	GRE_4_MSA_Minneapolis_L	8760	331	1,111	-1,099	-2,103	27.93	14.12	-269	55
PJM	AP_7_MSA_Hagerstown-Martinsburg	8760	203	1,153	-688	-1,101	44.37	11.60	-268	56
MISO	METC_9_MSA_Kalamazoo_L	8760	118	1,334	-819	-1,476	36.73	8.36	-263	57
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	8.53	-262	58
MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-884	-1,480	33.75	9.35	-261	59
PJM	VAP_27_MSA_DC_L	8760	-	1,048	-643	-1,075	44.35	10.93	-250	60
SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	-	1,187	-720	-1,220	39.16	9.05	-247	61
NYPP	NYISO_2_NYB	8760	650	1,759	-732	-1,245	38.27	6.46	-246	62
MISO	IPL_5_MSA_Indianapolis_L	8760	306	1,187	-783	-1,258	34.68	8.85	-238	63
PJM	PECO_8_MSA_Philadelphia_L	8760	399	1,064	-598	-1,130	44.54	10.01	-233	64
SOUTHERN	SOCO_17_MSA-Mobile_G	7920	5,205	4,575	-737	-1,736	37.53	7.84	-219	65
SPP	KACP_7_MSA_KansasCity_L	8760	-	1,291	-730	-1,422	32.74	12.61	-209	66
MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	32.79	8.50	-207	67
MISO	FE_5_MSA_Cleveland_L	8355	3,216	4,680	-655	-2,731	37.30	8.34	-204	68
PJM	PEPCO_4_MSA_DC_L	8760	-	825	-511	-895	45.57	11.34	-204	69
VACAR	SCEG_9_MSA_Charleston_G	8736	1,152	1,944	-584	-1,451	39.91	9.57	-204	70
VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	9.64	-202	71
ENTERGY	EES_3_MSA_Beaumont-PortArthur_L	8760	265	1,099	-612	-1,022	37.54	7.77	-201	72
PJM	BGE_8_MSA_Baltimore-Towson_L	8760	-	840	-493	-880	45.51	11.05	-197	73
MISO	FE_7_MSA_Toledo_L	8665	2,586	2,106	-623	-1,227	36.09	8.24	-195	74

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-485	-1,030	45.37	10.83	-193	75
PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	9.42	-188	76
PJM	NI_3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	9.24	-182	77
PJM	PEPCO_5_MSA_DC_L	8760	-	710	-454	-796	45.54	11.13	-181	78
MISO	METC_8_MSA_BayCity_G	8013	3,795	2,562	-588	-1,639	37.13	7.43	-175	79
VACAR	CPL_9_MSA_NewBern_L	8760	53	811	-493	-792	40.29	9.12	-174	80
PJM	AE_7_MSA_OceanCity_G	8760	90	836	-441	-916	44.80	10.75	-173	81
MISO	XEL_3_MSA_Minneapolis_G	5811	7,596	7,622	-900	-2,499	33.04	13.33	-173	82
MISO	FE_10_MSA_Mansfield_L	8760	46	859	-536	-843	36.55	8.29	-171	83
MISO	LGEE_8_L	8760	33	771	-561	-928	33.97	8.77	-167	84
MISO	IPL_8_MSA_Indianapolis_L	8760	547	1,227	-539	-1,094	34.73	8.95	-164	85
MISO	CIN_4_MSA_Cincinnati-Middletown_C	6707	6,026	5,727	-643	-2,119	36.70	8.75	-158	86
PJM	DP&L_6_MSA_Seaford_L	8661	1,438	1,523	-409	-997	44.61	9.83	-158	87
TVAUTHOR	TVA_10_MSA_Grenada_L	8760	-	651	-479	-809	36.24	8.25	-152	88
MAPP	OPPD_5_MSA_Omaha_L	8760	480	1,686	-855	-1,549	19.83	7.65	-148	89
ENTERGY	AECI_3_L	8760	-	915	-503	-932	33.66	9.71	-148	90
ONTARIO	IESO_2_G	6738	2,437	2,116	-584	-1,367	36.70	6.96	-144	91
PJM	PECO_5_MSA_Philadelphia_L	7264	1,656	2,510	-413	-2,388	46.84	8.83	-141	92
NYPP	NYISO_5_NYE	8755	1,098	909	-384	-773	41.18	6.68	-138	93
SOUTHERN	SOCO_22_MSA_Atlanta_L	8760	41	661	-397	-673	39.37	9.40	-137	94
PJM	DLCO_1_MSA_Pittsburgh_L	8760	-	635	-420	-667	36.23	8.54	-133	95
SPP	WFEC_7_MSA_Woodward_G	8760	342	193	-344	-584	43.95	15.80	-132	96
PJM	PEPCO_7_MSA_DC_L	8760	-	655	-326	-570	45.57	11.27	-130	97
SPP	AEPW_1_MSA_Tulsa_G	8145	3,295	2,000	-707	-1,423	22.54	11.68	-130	98
PJM	PSEG_6_MSA_NewYork_L	8760	-	639	-329	-680	44.39	9.89	-128	99
MISO	WEC_7_MSA_Milwaukee_G	8534	3,850	3,052	-584	-1,628	25.37	11.54	-126	100
NEPOOL	NEPOOL_10_RI	6733	2,062	2,203	-422	-1,198	43.22	8.55	-123	101
MISO	LGEE_9_MSA_Louisville_G	8458	1,136	1,763	-409	-1,420	31.80	10.24	-110	102
ENTERGY	AECI_9_L	8760	-	694	-380	-704	31.18	7.74	-104	103
MISO	MP_7_MSA_Duluth_L	8760	514	824	-485	-747	23.68	9.19	-101	104
ENTERGY	EES_7_MSA_Beaumont-PortArthur_C	6086	7,393	4,949	-446	-1,529	36.79	8.87	-100	105
ENTERGY	AECI_7_MSA_KansasCity_L	8760	-	615	-351	-651	31.94	8.92	-98	106
ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	8.22	-96	107
MISO	SIGE_9_MSA_Evansville_L	8760	159	774	-314	-541	34.16	10.49	-94	108
MISO	OTP_1_L	8760	-	640	-433	-692	22.31	8.39	-85	109
SPP	WERE_5_MSA_KansasCity_L	8760	204	915	-300	-897	31.82	12.19	-84	110
PJM	METED_4_MSA_Reading_G	6750	913	854	-280	-570	43.38	10.45	-82	111

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	10.68	-78	112
PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	16.69	-73	113
SOUTHERN	SMEPA_5_MSA_Laurel_G	8760	341	184	-210	-394	38.97	9.17	-72	114
MISO	METC_4_MSA_Holland-GrandHaven	2271	7,365	2,900	-1,053	-2,678	29.92	5.86	-72	115
MAPP	NPPD_1_MSA_GrandIsland_L	8760	376	983	-426	-837	18.89	9.02	-70	116
MAPP	NPPD_7_L	8760	210	975	-369	-751	19.41	7.27	-63	117
PJM	BGE_7_MSA_Baltimore-Towson_G	2487	2,548	1,043	-444	-731	41.86	9.59	-46	118
NEPOOL	NEPOOL_3_ME	4928	3,494	2,522	-245	-1,068	37.93	6.54	-46	119
PJM	PECO_1_MSA_Philadelphia_G	4654	2,323	554	-222	-375	42.18	9.74	-44	120
MISO	SUNC_3_MSA_GardenCity_G	7410	840	18	-149	-231	38.43	15.48	-42	121
ENTERGY	EES_4_GEN_Ouachita_G	2453	6,345	2,417	-524	-1,354	30.96	4.87	-40	122
MISO	AMRN_12_MSA_StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	9.39	-40	123
SPP	EMDE_1_MSA_Joplin_G	7095	1,102	458	-170	-400	30.07	9.32	-36	124
MISO	WPS_4_MSA_Marshfield_L	8760	411	442	-152	-263	26.30	12.30	-35	125
NEPOOL	NEPOOL_1_VT	3999	821	1,115	-166	-694	46.21	6.72	-31	126
NEPOOL	NEPOOL_7_CT	1734	4,447	3,920	-374	-1,741	46.62	8.25	-30	127
MISO	MGE_7_MSA_Madison_L	8698	399	403	-119	-288	27.21	9.96	-28	128
MAPP	WAPA_2_MSA_RapidCity_G	5593	2,405	813	-272	-419	17.76	7.95	-27	129
MISO	CWLP_1_MSA_Springfield_G	8089	310	227	-101	-189	31.21	8.39	-25	130
PJM	RECO_1_MSA_NewYork_L	8760	-	146	-60	-144	44.87	10.04	-24	131
MISO	CIN_3_MSA_TerreHaute_G	2350	3,230	1,015	-330	-620	29.99	6.65	-23	132
VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	7.82	-22	133
MISO	WEPL_7_MSA_DodgeCity_G	8453	137	124	-60	-117	39.28	15.32	-20	134
NEPOOL	NEPOOL_8_SWCT	2451	2,678	1,850	-189	-631	40.65	9.11	-19	135
SPP	OMPA_9_MSA_PoncaCity_G	8224	163	147	-53	-131	41.96	11.81	-18	136
SPP	AEPW_9_MSA_MountPleasant_G	1548	8,168	3,832	-265	-974	39.23	4.88	-16	137
MISO	WEC_3_MSA_Milwaukee_G	3434	1,429	2,423	-148	-918	27.04	10.56	-14	138
SPP	LEPA_5_MSA_Houma-Bayou_G	8760	93	73	-40	-76	39.08	10.78	-14	139
MISO	UPPC_9_MSA_Houghton_L	8753	2	75	-41	-64	35.83	23.55	-13	140
PJM	VAP_26_MSA_DC_G	2106	1,981	631	-148	-436	39.34	9.18	-12	141
NYPP	NYISO_4_NYD	1168	1,206	681	-274	-916	37.69	7.51	-12	142
VACAR	DUK_5_MSA_Seneca_G	1270	1,911	-	-323	-1,100	29.17	4.11	-12	143
SPP	MIDW_7_MSA_Hays_L	8760	19	92	-39	-95	34.65	12.60	-12	144
ENTERGY	DENL_7_MSA_LittleRock_L	8760	-	81	-37	-86	35.10	8.42	-11	145
MISO	LES_5_MSA_Lincoln_G	8760	264	108	-58	-110	21.77	7.77	-11	146
MISO	ALTW_6_MSA_CedarRapids_L	1365	996	1,103	-212	-618	38.10	13.50	-11	147
SPP	AEPW_5_MSA_Tulsa_G	1580	4,226	2,571	-170	-655	35.36	10.33	-10	148

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
TVAUTHOR	TVA_9_MSA_Paducah_G	2175	4,470	2,130	-116	-604	37.16	11.32	-9	149
ENTERGY	DERS_1_MSA_Ruston_G	8303	75	68	-31	-56	36.04	8.19	-9	150
ENTERGY	EES_10_MSA_Vicksburg_G	696	3,544	1,249	-336	-639	39.60	10.93	-9	151
NYPP	NYISO_6_NYF	1000	4,103	1,983	-232	-1,044	37.45	8.57	-9	152
SPP	SPRM_10_MSA_Springfield_L	4476	236	346	-57	-236	33.17	12.07	-8	153
PJM	PEPCO_8_MSA_DC_G	649	3,786	1,108	-312	-692	41.22	8.83	-8	154
SPP	SPS_2_GEN_Tolk1_G	1736	4,480	2,973	-87	-290	53.96	18.33	-8	155
ENTERGY	CWLD_2_MSA_Columbia_L	8760	-	48	-29	-54	31.64	8.90	-8	156
FRCC	RCU_6_MSA_Orlando_L	8760	-	38	-20	-36	42.82	9.97	-8	157
PJM	NI_6_MSA_Chicago_G	772	9,759	7,577	-275	-1,210	31.89	9.71	-7	158
SOUTHERN	SOCO_2_GEN_Hartwll_G	6034	2,186	46	-26	-42	36.73	9.06	-6	159
VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	3.27	-6	160
SPP	GRDA_2_G	1253	849	179	-143	-442	29.68	8.38	-5	161
VACAR	CPLW_3_Ashville_G	2582	764	93	-53	-77	35.99	7.47	-5	162
MISO	IP_8_GEN_Clinton_G	751	2,302	1,195	-194	-619	33.71	6.82	-5	163
MISO	MIPU_7_MSA_KansasCity_G	3031	1,307	437	-66	-380	24.26	7.50	-5	164
NYPP	NYISO_1_NYA	462	4,946	2,500	-307	-1,263	33.50	7.13	-5	165
NEPOOL	NEPOOL_2_NH	460	4,204	2,621	-271	-816	37.60	3.55	-5	166
FRCC	STK_1_L	8760	-	17	-12	-20	43.19	10.01	-5	167
MISO	SIPC_9_MSA_Marion-Herrin_G	4412	432	37	-31	-51	31.83	7.75	-4	168
SPP	CELE_10_MSA_Alexandria_G	416	1,895	742	-223	-450	42.47	13.62	-4	169
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	7759	87	14	-14	-21	32.56	6.73	-4	170
SOUTHERN	SOCO_32_MSA_Pascagoula_G	556	3,574	2,674	-161	-662	35.56	9.05	-3	171
PJM	OVEC_3_G	5438	1,620	10	-17	-34	33.05	7.51	-3	172
MISO	DPC_10_G	1862	615	140	-75	-123	19.99	6.18	-3	173
VACAR	SCEG_1_MSA_Columbia_G	357	4,954	2,752	-248	-1,012	31.39	8.10	-3	174
SPP	WERE_1_MSA_Manhattan_G	615	2,988	409	-175	-254	25.13	8.07	-3	175
MAPP	NPPD_4_GEN_Gentleman_G	525	2,702	148	-185	-270	27.72	9.19	-3	176
PJM	UGI_2_MSA_Scranton_G	8760	48	8	-6	-9	43.81	9.43	-2	177
PJM	PL_8_MSA_Allentown_G	825	2,853	385	-65	-197	42.96	9.15	-2	178
SOUTHERN	SOCO_15_MSA_Birmingham_G	207	12,464	9,217	-281	-945	38.21	6.48	-2	179
FRCC	FPC_10_MSA_Lakeland_G	336	3,561	747	-148	-399	38.00	8.18	-2	180
SPP	SWPA_2_MSA_MountainHome_G	2978	478	70	-25	-41	25.48	6.55	-2	181
PJM	PENELEC_2_MSA_DuBois_G	392	2,724	1,196	-101	-388	42.00	5.47	-2	182
TVAUTHOR	DOE_2_MSA_Paducah_G	8754	520	309	-6	-10	29.84	9.94	-2	183
FRCC	KEY_1_MSA_KeyWest_G	8760	880	138	-3	-6	44.11	11.15	-1	184
PJM	NI_20_MSA_Chicago_G	860	1,632	83	-43	-68	32.16	8.01	-1	185

Task 2: Appendix 3, Simulation Results for Sink Hubs by Scenario

LowCase2011R2

Market Area	Hub Name	Sink Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	CILC_8_MSA_Peoria_G	342	756	349	-104	-180	24.61	5.70	-1	186
MAPP	MEC_3_MSA_DesMoines_G	266	3,307	1,933	-145	-610	18.78	8.25	-1	187
MISO	FE_6_MSA_Pittsburgh_G	168	2,371	213	-116	-133	35.12	7.23	-1	188
MISO	WEC_1_MSA_Chicago_G	168	1,728	303	-105	-132	36.47	10.99	-1	189
SPP	KACY_10_MSA_KansasCity_G	728	316	40	-24	-24	36.22	13.51	-1	190
FRCC	FPL_8_MSA_PortStLucie_G	83	10,364	4,623	-173	-962	35.06	4.24	-1	191
TVAUTHOR	TVA_4_MSA_Clarksville_G	168	2,544	150	-84	-102	32.81	3.87	0	192
MAPP	MPW_1_MSA_Muscatine_G	1793	151	16	-10	-13	23.62	7.98	0	193
FRCC	GVL_3_MSA_Gainesville_G	1176	433	15	-8	-15	42.19	9.28	0	194
MISO	OTP_9_GEN_BigStone_G	120	1,189	136	-85	-128	33.88	9.81	0	195
MISO	EEI_2_MSA_Paducah_G	274	507	36	-38	-121	31.70	8.39	0	196
PJM	DLCO_7_MSA_Pittsburgh_G	528	1,644	25	-16	-23	37.12	8.14	0	197
MISO	SMPA_9_MSA_Rochester_G	8518	128	58	-1	-23	26.33	9.97	0	198
FRCC	OUC_1_MSA_Orlando_G	80	889	73	-48	-62	44.87	10.17	0	199
MISO	HE_9_MSA_TerreHaute_G	72	1,016	27	-41	-58	37.60	6.27	0	200
FRCC	FMP_8_MSA_Sebastian_G	6362	145	20	0	-1	38.87	7.07	0	201
FRCC	LWU_1_MSA_Miami_G	1700	250	82	-2	-3	38.49	10.08	0	202
MISO	NIPS_8_MSA_Chicago_G	68	2,892	1,694	-57	-233	24.56	6.59	0	203
FRCC	NSB_1_MSA_DaytonaBeach_G	1120	514	86	-2	-3	39.28	10.23	0	204
ENTERGY	EES_2_MSA_Batesville_G	17	3,525	1,697	-87	-146	34.28	0.29	0	205
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	4	17,334	9,966	-330	-836	36.55	16.93	0	206
FRCC	LAK_1_MSA_Lakeland_G	105	819	28	-11	-17	33.98	5.33	0	207
MISO	FE_9_MSA>Weirton_G	19	1,860	112	-49	-51	38.72	5.65	0	208
MISO	ITC_3_MSA_Detroit_G	16	3,815	1,600	-37	-91	39.29	5.51	0	209
NEPOOL	NEPOOL_5_SEMA	3	6,454	3,978	-68	-77	47.08	0.02	0	210
SPP	INDN_6_MSA_KansasCity_G	60	143	27	-4	-6	24.63	14.84	0	211
MISO	ALTE_2_MSA_Madison_G	14	1,665	441	-13	-34	16.47	1.16	0	212

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
BaseCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	16.80	2,394	1
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	-	5,109	5,796	50.67	17.43	2,274	2
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	11,765	1,583	3,912	9,527	50.80	17.52	1,744	3
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	19.56	1,736	4
PJM	PJM500_8_MSA_Philadelphia_G	8784	3,914	-	3,134	3,868	61.77	20.82	1,701	5
VACAR	DUK_9_MSA_Charlotte_G	8780	14,681	9,966	3,106	5,530	50.48	20.13	1,377	6
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	17.09	1,374	7
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,494	4,092	39.26	19.12	1,205	8
PJM	PJM500_7_MSA_York-Hanover_G	8784	2,696	-	2,195	2,570	60.81	20.77	1,172	9
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,546	3,985	51.13	17.39	1,144	10
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,952	3,703	63.66	15.71	1,092	11
FRCC	TECO_3_MSA_Tampa_G	8784	3,733	1,026	2,075	3,069	58.32	19.39	1,063	12
FRCC	FPL_8_MSA_PortStLucie_G	8763	10,364	4,623	1,943	5,374	58.77	19.82	1,001	13
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	44.36	17.02	975	14
MISO	CIN_8_MSA_Evansville_G	8784	3,657	260	2,476	3,391	43.10	16.97	937	15
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	13.72	934	16
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	65.27	17.22	906	17
PJM	DPL_8_GEN_Killen_G	8784	2,964	-	2,184	2,940	45.08	16.69	865	18
PJM	PJM500_5_MSA_DC_G	8784	1,730	-	1,516	1,730	61.31	22.59	817	19
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	15.94	800	20
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	19.38	793	21
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	12,464	9,217	1,735	5,010	50.51	17.02	760	22
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	17.40	742	23
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	44.36	17.02	718	24
FRCC	FPC_2_MSA_HomosassaSprings_G	8784	1,584	-	1,421	1,584	57.25	18.85	714	25
PJM	PJM500_4_MSA_Philadelphia_G	8374	2,383	-	1,338	2,295	61.29	20.38	687	26
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	-	1,475	1,700	52.18	18.27	676	27
PJM	NI_7_MSA_Rochelle_G	8784	2,290	-	2,119	2,290	34.96	20.02	651	28
VACAR	SCPSA_10_MSA_Charleston_G	8616	1,680	-	1,474	1,680	51.19	18.30	650	29
PJM	VAP_7_G	6936	4,179	303	1,656	3,629	56.01	17.02	643	30
NYPP	NYISO_1_NYA	8254	4,946	2,500	1,579	2,362	47.51	15.12	619	31
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	-	1,364	1,700	51.51	17.71	617	32
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,369	1,917	50.59	17.06	597	33
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	2,199	163	1,343	1,701	49.16	15.40	580	34
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	-	1,232	1,330	56.40	18.63	567	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)

BaseCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,486	1,894	41.68	18.74	544	36
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	42.60	16.76	535	37
NEPOOL	NEPOOL_2_NH	8426	4,204	2,621	1,020	1,855	61.82	14.78	531	38
FRCC	FPC_10_MSA_Lakeland_G	8021	3,561	747	1,087	2,004	59.53	18.55	519	39
MISO	ITC_7_MSA_Monroe_G	8712	1,500	-	1,307	1,500	45.01	17.46	513	40
PJM	PEPCO_8_MSA_DC_G	8783	3,786	1,108	952	1,918	61.11	22.50	511	41
MISO	ITC_3_MSA_Detroit_G	8784	3,815	1,600	1,266	1,933	45.14	17.53	502	42
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	43.89	17.46	495	43
PJM	NI_15_MSA_Davenport_G	8664	2,479	-	1,717	2,314	33.05	18.79	492	44
MISO	FE_9_MSA>Weirton_G	8571	1,860	112	1,269	1,807	44.07	17.87	480	45
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,345	57.15	19.19	456	46
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	2,315	248	1,156	1,641	44.39	16.30	451	47
ENTERGY	EES_8_MSA_BatonRouge_G	8520	1,060	-	1,059	1,060	49.06	15.49	443	48
MISO	IP_7_GEN_Baldwin_G	8784	1,900	444	1,189	1,478	41.69	17.58	435	49
SPP	WERE_1_MSA_Manhattan_G	8771	2,988	409	1,354	2,277	36.55	20.40	434	50
VACAR	CPLE_1_MSA_Durham_G	7843	10,224	8,563	1,031	2,817	52.97	19.50	428	51
MISO	METC_4_MSA_Holland-GrandHaven	5779	7,365	2,900	1,427	4,534	51.55	15.67	425	52
ONTARIO	IESO_15_G	8382	1,964	3,375	1,098	2,054	44.34	17.28	408	53
VACAR	SCEG_1_MSA_Columbia_G	7968	4,954	2,752	946	2,516	52.49	18.15	396	54
VACAR	DUK_5_MSA_Seneca_G	6789	1,911	-	1,003	1,911	54.60	16.95	372	55
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	45.18	16.72	372	56
ENTERGY	EES_4_GEN_Ouachita_G	5418	6,345	2,417	1,230	3,507	53.53	13.71	357	57
FRCC	OUC_1_MSA_Orlando_G	8616	889	73	724	867	56.87	18.85	355	58
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	16.06	350	59
PJM	PENELEC_2_MSA_DuBois_G	8336	2,724	1,196	764	1,643	52.40	16.47	334	60
NEPOOL	NEPOOL_7_CT	7641	4,447	3,920	689	1,728	63.04	16.48	332	61
PJM	NI_6_MSA_Chicago_G	8111	9,759	7,577	1,023	2,890	39.39	19.67	327	62
MISO	HE_9_MSA_TerreHaute_G	8496	1,016	27	864	999	43.07	16.92	316	63
PJM	BGE_7_MSA_Baltimore-Towson_G	7994	2,548	1,043	621	1,392	61.96	21.90	308	64
MISO	NIPS_8_MSA_Chicago_G	8765	2,892	1,694	940	1,665	37.31	19.25	307	65
MISO	IP_8_GEN_Clinton_G	8016	2,302	1,195	916	1,230	40.02	18.37	294	66
MISO	BREC_3_County_Webster_G	8784	1,355	476	908	1,163	36.10	15.75	288	67
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,140	33.61	18.79	264	68
FRCC	KEY_1_MSA_KeyWest_G	8244	880	138	507	811	61.43	24.23	257	69
PJM	NI_20_MSA_Chicago_G	7214	1,632	83	889	1,504	39.87	19.79	256	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
BaseCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	AEPW_9_MSA_MountPleasant_G	7676	8,168	3,832	715	1,919	46.57	13.68	255	71
NYPP	NYISO_6_NYF	7469	4,103	1,983	522	1,558	61.60	14.32	240	72
MISO	CIN_3_MSA_TerreHaute_G	7034	3,230	1,015	726	2,206	45.20	16.80	231	73
MAPP	MEC_3_MSA_DesMoines_G	7991	3,307	1,933	908	1,431	29.65	19.34	215	74
SOUTHERN	SOCO_2_GEN_Hartwll_G	2829	2,186	46	1,069	1,673	63.70	13.69	193	75
SOUTHERN	AEC_8_G	8782	903	60	431	834	50.71	17.00	192	76
MISO	AMRN_12_MSA_StLouis_L	6699	5,059	6,066	757	1,937	36.76	15.13	186	77
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	604	1,083	35.42	19.34	184	78
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	3,574	2,674	469	1,538	50.84	16.79	179	79
FRCC	NSB_1_MSA_DaytonaBeach_G	7225	514	86	406	513	59.61	17.95	175	80
PJM	PL_8_MSA_Allentown_G	6898	2,853	385	409	2,259	61.07	20.34	173	81
FRCC	LAK_1_MSA_Lakeland_G	8594	819	28	345	536	58.06	18.74	172	82
SPP	CELE_10_MSA_Alexandria_G	8554	1,895	742	341	961	53.12	23.04	155	83
NYPP	NYISO_4_NYD	7581	1,206	681	661	917	30.68	27.59	154	84
SPP	AEPW_5_MSA_Tulsa_G	7426	4,226	2,571	406	1,330	47.19	14.31	142	85
SPP	KACP_4_MSA_KansasCity_G	7656	670	-	617	670	29.85	20.91	141	86
MISO	OTP_9_GEN_BigStone_G	8784	1,189	136	738	1,097	20.83	10.09	135	87
PJM	PECO_1_MSA_Philadelphia_G	2241	2,323	554	690	1,090	73.18	16.14	113	88
SPP	GRDA_2_G	7739	849	179	309	676	46.28	14.91	111	89
MISO	CILC_8_MSA_Peoria_G	8013	756	349	333	594	40.04	19.92	107	90
MISO	EEI_2_MSA_Paducah_G	8784	507	36	279	472	43.56	17.77	107	91
VACAR	CPLW_3_Ashville_G	7812	764	93	245	635	50.89	17.67	97	92
FRCC	GVL_3_MSA_Gainesville_G	7656	433	15	211	300	57.34	19.11	93	93
MISO	DPC_10_G	7770	615	140	322	513	34.51	20.62	86	94
FRCC	LWU_1_MSA_Miami_G	6592	250	82	196	249	65.70	22.76	85	95
FRCC	TAL_3_MSA_Tallahassee_G	8091	336	-	184	262	56.29	18.42	84	96
MAPP	NPPD_4_GEN_Gentleman_G	8760	2,702	148	635	1,479	13.97	12.44	78	97
FRCC	KIS_10_MSA_Orlando_G	5214	410	-	211	290	66.50	15.48	73	98
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	13.41	71	99
MISO	XEL_3_MSA_Minneapolis_G	4112	7,596	7,622	820	2,043	19.05	8.96	64	100
PJM	VAP_26_MSA_DC_G	3928	1,981	631	231	456	69.86	18.63	63	101
SPP	SWPA_2_MSA_MountainHome_G	5411	478	70	343	450	32.57	26.12	60	102
MISO	MIPU_7_MSA_KansasCity_G	3823	1,307	437	291	672	52.50	19.39	58	103
PJM	OVEC_3_G	997	1,620	10	849	1,089	63.98	12.59	54	104
SPP	KACY_10_MSA_KansasCity_G	8784	316	40	148	189	41.72	22.34	54	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
BaseCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	ALTW_6_MSA_CedarRapids_L	8228	996	1,103	197	427	32.29	17.01	52	106
MAPP	WAPA_2_MSA_RapidCity_G	3295	2,405	813	586	822	23.51	11.70	45	107
NEPOOL	NEPOOL_10_RI	2214	2,062	2,203	305	988	66.94	10.45	45	108
SPP	EMDE_1_MSA_Joplin_G	5895	1,102	458	157	590	47.57	15.82	44	109
MISO	SIPC_9_MSA_Marion-Herrin_G	6469	432	37	145	382	45.36	17.85	43	110
NEPOOL	NEPOOL_8_SWCT	2849	2,678	1,850	190	815	70.83	13.94	38	111
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	2045	7,393	4,949	322	1,100	58.00	10.13	38	112
SPP	SPS_2_GEN_Tolk1_G	4377	4,480	2,973	102	517	79.43	12.54	35	113
NEPOOL	NEPOOL_1_VT	5105	821	1,115	110	391	58.95	15.72	33	114
MAPP	MPW_1_MSA_Muscatine_G	7339	151	16	125	143	34.88	18.80	32	115
SPP	WERE_4_GEN_Wolfcreek_G	5131	3,510	2,459	252	755	23.12	24.51	30	116
NYPP	NYISO_7_NYG	805	3,156	2,195	430	1,219	80.74	10.22	28	117
MISO	CIN_4_MSA_Cincinnati-Middletown_G	1819	6,026	5,727	312	1,118	49.17	13.95	28	118
TVAUTHOR	TVA_9_MSA_Paducah_G	3834	4,470	2,130	147	766	48.25	18.36	27	119
SOUTHERN	SOCO_17_MSA_Mobile_G	2075	5,205	4,575	217	995	54.06	17.87	24	120
VACAR	DUK_4_MSA_Greenville_L	1968	3,546	4,489	225	952	50.43	14.65	22	121
SPP	LAFA_7_MSA_Lafayette_G	2840	175	-	92	175	83.27	44.61	22	122
ENTERGY	EES_9_MSA_Russellville_G	2533	6,123	4,517	196	1,152	41.85	17.35	21	123
PJM	AEP_3_MSA_Columbus_L	1012	10,204	8,244	326	1,601	57.45	14.32	19	124
SPP	AEPW_1_MSA_Tulsa_G	1350	3,295	2,000	237	991	55.66	14.55	18	125
MISO	CWLP_1_MSA_Springfield_G	3931	310	227	85	168	53.08	18.48	18	126
MISO	FE_5_MSA_Cleveland_L	2311	3,216	4,680	199	708	36.68	14.05	17	127
SPP	INDN_6_MSA_KansasCity_G	8604	143	27	45	125	40.77	20.99	16	128
MISO	SUNC_3_MSA_GardenCity_G	2161	840	18	113	198	61.55	13.89	15	129
SPP	SPRM_10_MSA_Springfield_L	5854	236	346	55	159	40.92	15.90	13	130
PJM	METED_4_MSA_Reading_G	1213	913	854	117	373	75.62	16.43	11	131
PJM	PECO_5_MSA_Philadelphia_L	2131	1,656	2,510	116	341	38.73	13.38	10	132
FRCC	FMP_8_MSA_Sebastian_G	1819	145	20	37	65	92.64	18.88	6	133
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	1265	3,431	4,125	146	465	30.93	9.97	6	134
MISO	WEC_7_MSA_Milwaukee_G	715	3,850	3,052	164	858	44.56	26.85	5	135
MISO	MGE_7_MSA_Madison_L	1673	399	403	55	163	54.99	14.74	5	136
FRCC	FPL_2_MSA_FortMyers_G	278	5,929	4,563	213	902	69.39	8.54	4	137
MISO	METC_8_MSA_BayCity_G	458	3,795	2,562	136	581	57.30	25.85	4	138
NEPOOL	NEPOOL_6_WCMA	141	4,285	3,417	302	1,015	81.49	6.41	3	139
MISO	WEC_3_MSA_Milwaukee_G	1886	1,429	2,423	70	254	21.23	10.23	3	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
BaseCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	FTP_7_MSA_PortStLucie_G	640	93	-	36	37	115.43	18.91	3	141
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	746	87	14	50	69	69.71	11.62	3	142
MISO	LES_5_MSA_Lincoln_G	321	264	108	88	193	87.39	7.73	2	143
TVAUTHOR	TVA_5_MSA_Nashville_L	243	9,154	8,858	215	863	43.33	11.94	2	144
SPP	OMPA_9_MSA_PoncaCity_G	905	163	147	19	94	102.92	20.64	2	145
ONTARIO	IESO_2_G	73	2,437	2,116	283	995	60.35	5.14	1	146
MISO	SMMPA_9_MSA_Rochester_G	168	128	58	71	83	85.68	9.11	1	147
NEPOOL	NEPOOL_4_NEBOS	93	3,262	5,904	180	769	57.20	3.88	1	148
PJM	DP&L_6_MSA_Seaford_L	377	1,438	1,523	39	186	51.94	15.40	1	149
VACAR	SCEG_9_MSA_Charleston_G	290	1,152	1,944	48	194	45.86	13.76	1	150
ENTERGY	DERS_1_MSA_Ruston_G	277	75	68	21	35	87.02	13.34	1	151
MISO	ITC_2_MSA_Detroit_L	243	4,001	5,247	75	276	24.43	5.02	0	152
SOUTHERN	SOCO_21_MSA_Atlanta_G	19	3,334	2,733	119	630	77.37	12.26	0	153
MISO	FE_7_MSA_Toledo_L	6	2,586	2,106	290	376	88.01	2.02	0	154
NYPP	NYISO_5_NYE	27	1,098	909	52	200	64.45	3.81	0	155
TVAUTHOR	TVA_7_MSA_Memphis_L	11	7,215	5,982	58	159	38.17	19.41	0	156
MISO	WEPL_7_MSA_DodgeCity_G	9	137	124	23	41	82.74	2.40	0	157
MISO	WPS_4_MSA_Marshfield_L	10	411	442	16	38	78.06	3.48	0	158
SPP	OKGE_4_MSA_OklahomaCity_L	1	2,102	2,403	24	24	86.71		0	159
NYPP	NYISO_9_NYI	317	2	1,476	0	2	37.61	10.80	0	160
SPP	WERE_5_MSA_KansasCity_L	1	204	915	12	12	19.10		0	161

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	19.87	2,530	1
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	-	5,109	6,381	54.56	20.57	2,449	2
PJM	PJM500_8_MSA_Philadelphia_G	8784	3,914	-	3,138	3,868	68.73	26.07	1,894	3
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	23.43	1,893	4
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	20.63	1,885	5
VACAR	DUK_9_MSA_Charlotte_G	8780	14,681	9,966	3,113	5,523	54.32	20.97	1,485	6
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	20.21	1,482	7
PJM	PJM500_7_MSA_York-Hanover_G	8784	2,696	-	2,196	2,570	67.12	25.79	1,295	8
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	21.42	1,293	9
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	21.13	1,222	10
FRCC	TECO_3_MSA_Tampa_G	8784	3,733	1,026	2,074	3,032	63.66	22.94	1,160	11
FRCC	FPL_8_MSA_PortStLucie_G	8747	10,364	4,623	1,944	5,374	64.08	23.20	1,089	12
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,703	3,589	72.03	20.20	1,078	13
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	77.04	23.77	1,070	14
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	17.48	1,069	15
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	47.25	20.05	1,039	16
MISO	CIN_8_MSA_Evansville_G	8783	3,657	260	2,479	3,391	46.16	20.09	1,005	17
PJM	DPL_8_GEN_Killen_G	8784	2,964	-	2,193	2,940	48.23	19.78	929	18
PJM	PJM500_5_MSA_DC_G	8784	1,730	-	1,516	1,730	67.14	27.30	894	19
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	18.82	861	20
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	22.70	849	21
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	19.59	783	22
FRCC	FPC_2_MSA_HomosassaSprings_G	8784	1,584	-	1,421	1,584	62.19	21.99	776	23
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	47.25	20.05	765	24
PJM	PJM500_4_MSA_Philadelphia_G	8397	2,383	-	1,320	2,295	68.14	25.50	755	25
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	20.09	755	26
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	-	1,474	1,700	56.21	22.30	728	27
PJM	VAP_7_G	6905	4,179	303	1,668	3,629	61.02	20.45	703	28
PJM	NI_7_MSA_Rochelle_G	8784	2,290	-	2,119	2,290	37.75	22.84	703	29
VACAR	SCPSA_10_MSA_Charleston_G	8616	1,680	-	1,473	1,680	55.09	21.42	699	30
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	18.43	671	31
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	-	1,358	1,700	55.44	21.61	661	32
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	20.19	657	33
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	18.55	637	34
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	2,199	163	1,343	1,701	53.52	18.44	631	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	-	1,231	1,330	61.35	21.92	616	36
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,487	1,898	44.78	21.99	585	37
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	45.61	19.83	573	38
FRCC	FPC_10_MSA_Lakeland_G	8028	3,561	747	1,085	2,055	64.87	21.70	565	39
PJM	PEPCO_8_MSA_DC_G	8783	3,786	1,108	957	1,918	66.87	27.13	562	40
MISO	ITC_7_MSA_Monroe_G	8712	1,500	-	1,307	1,500	48.10	20.59	548	41
MISO	ITC_3_MSA_Detroit_G	8784	3,815	1,600	1,266	1,970	48.24	20.70	536	42
PJM	NI_15_MSA_Davenport_G	8664	2,479	-	1,716	2,314	35.62	21.57	530	43
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	19.61	522	44
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	20.02	506	45
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,349	62.05	22.44	495	46
ENTERGY	AECI_4_GEN_NewMadrid1_G	8781	2,315	248	1,151	1,615	47.88	19.18	484	47
ENTERGY	EES_8_MSA_BatonRouge_G	8520	1,060	-	1,059	1,060	53.42	18.56	482	48
VACAR	CPL_1_MSA_Durham_G	7851	10,224	8,563	1,043	2,644	57.38	21.17	470	49
MISO	IP_7_GEN_Baldwin_G	8784	1,900	444	1,189	1,478	44.83	20.61	468	50
SPP	WERE_1_MSA_Manhattan_G	8753	2,988	409	1,357	2,215	39.31	23.64	467	51
MISO	METC_4_MSA_Holland-GrandHaven	5726	7,365	2,900	1,396	4,534	55.70	18.85	445	52
ONTARIO	IESO_15_G	8385	1,964	3,375	1,097	2,054	47.28	20.34	435	53
VACAR	SCEG_1_MSA_Columbia_G	7951	4,954	2,752	918	2,554	56.51	21.22	413	54
VACAR	DUK_5_MSA_Seneca_G	6783	1,911	-	1,009	1,911	59.37	19.87	406	55
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	21.14	397	56
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	48.33	19.81	397	57
PJM	PENELEC_2_MSA_DuBois_G	8404	2,724	1,196	821	1,658	56.52	19.86	390	58
FRCC	OUC_1_MSA_Orlando_G	8616	889	73	724	867	61.85	22.01	386	59
ENTERGY	EES_4_GEN_Ouachita_G	5475	6,345	2,417	1,195	3,528	58.13	16.21	380	60
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	867	1,221	53.84	18.99	377	61
PJM	BGE_7_MSA_Baltimore-Towson_G	8212	2,548	1,043	623	1,324	67.80	26.54	347	62
MISO	HE_9_MSA_TerreHaute_G	8496	1,016	27	864	999	46.17	20.08	339	63
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	21.69	339	64
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	22.06	331	65
SPP	AEPW_9_MSA_MountPleasant_G	7978	8,168	3,832	800	1,815	50.17	15.47	320	66
MISO	IP_8_GEN_Clinton_G	8015	2,302	1,195	913	1,230	42.92	20.47	314	67
NYPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	17.42	302	68
MISO	BREC_3_County_Webster_G	8784	1,355	476	906	1,164	37.08	17.55	295	69
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	21.58	283	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	KEY_1_MSA_KeyWest_G	8247	880	138	508	811	67.17	28.12	281	71
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	21.71	276	72
MISO	CIN_3_MSA_TerreHaute_G	7044	3,230	1,015	716	2,206	48.62	19.93	245	73
MAPP	MEC_3_MSA_DesMoines_G	7974	3,307	1,933	904	1,380	31.70	22.16	229	74
SOUTHERN	SOCO_2_GEN_Hartwll_G	2829	2,186	46	1,069	1,864	69.69	15.94	211	75
SOUTHERN	AEC_8_G	8781	903	60	430	839	54.91	20.12	207	76
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	606	1,085	38.13	21.62	199	77
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	17.72	198	78
FRCC	NSB_1_MSA_DaytonaBeach_G	7199	514	86	406	513	65.16	20.90	190	79
FRCC	LAK_1_MSA_Lakeland_G	8594	819	28	345	608	63.25	21.98	188	80
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	20.06	184	81
PJM	PL_8_MSA_Allentown_G	6728	2,853	385	390	2,261	67.64	25.41	177	82
NYPP	NYISO_4_NYD	7662	1,206	681	667	908	34.23	31.62	175	83
SPP	CELE_10_MSA_Alexandria_G	8563	1,895	742	344	945	58.01	26.68	171	84
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	16.97	162	85
SPP	KACP_4_MSA_KansasCity_G	7656	670	-	611	670	31.67	24.17	148	86
MISO	OTP_9_GEN_BigStone_G	8784	1,189	136	737	1,094	21.48	11.15	139	87
SPP	GRDA_2_G	7701	849	179	311	676	50.68	17.51	121	88
PJM	PECO_1_MSA_Philadelphia_G	2064	2,323	554	688	1,090	83.33	19.03	118	89
MISO	CILC_8_MSA_Peoria_G	8036	756	349	336	594	42.89	21.02	116	90
MISO	EEL_2_MSA_Paducah_G	8784	507	36	279	472	46.87	20.84	115	91
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	16.34	107	92
VACAR	CPLW_3_Ashville_G	7969	764	93	243	635	54.82	20.70	106	93
FRCC	GVL_3_MSA_Gainesville_G	7656	433	15	212	374	62.35	22.38	101	94
FRCC	LWU_1_MSA_Miami_G	6633	250	82	196	249	72.07	26.40	94	95
MISO	DPC_10_G	7791	615	140	324	513	37.09	23.59	94	96
FRCC	TAL_3_MSA_Tallahassee_G	8084	336	-	184	262	61.14	21.69	91	97
FRCC	KIS_10_MSA_Orlando_G	5256	410	-	211	290	72.87	18.23	81	98
MAPP	NPPD_4_GEN_Gentleman_G	8760	2,702	148	635	1,481	14.17	12.89	79	99
MISO	XEL_3_MSA_Minneapolis_G	4106	7,596	7,622	822	1,981	19.22	9.60	65	100
SPP	SWPA_2_MSA_MountainHome_G	5478	478	70	338	450	35.01	29.11	65	101
PJM	VAP_26_MSA_DC_G	3535	1,981	631	227	456	79.11	21.83	63	102
NEPOOL	NEPOOL_10_RI	2673	2,062	2,203	291	988	76.61	13.88	60	103
MISO	MIPU_7_MSA_KansasCity_G	3685	1,307	437	272	672	58.31	22.58	58	104
SPP	KACY_10_MSA_KansasCity_G	8784	316	40	147	189	45.03	25.89	58	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
HighCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	ALTW_6_MSA_CedarRapids_L	8230	996	1,103	197	422	34.46	19.45	56	106
PJM	OVEC_3_G	786	1,620	10	861	1,336	73.35	15.14	50	107
SPP	EMDE_1_MSA_Joplin_G	6104	1,102	458	157	649	51.84	18.79	50	108
NEPOOL	NEPOOL_8_SWCT	3029	2,678	1,850	199	713	81.84	17.52	49	109
MAPP	WAPA_2_MSA_RapidCity_G	3323	2,405	813	582	823	24.58	12.91	48	110
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	1779	7,393	4,949	321	1,330	64.25	11.66	37	111
NEPOOL	NEPOOL_1_VT	5105	821	1,115	110	391	65.25	19.94	37	112
SPP	SPS_2_GEN_Tolk1_G	4162	4,480	2,973	96	517	88.73	14.83	35	113
MAPP	MPW_1_MSA_Muscatine_G	7329	151	16	126	143	37.88	21.69	35	114
MISO	CIN_4_MSA_Cincinnati-Middletown_G	1910	6,026	5,727	325	1,118	53.47	16.40	33	115
SPP	WERE_4_GEN_Wolfcreek_G	5114	3,510	2,459	252	755	23.44	27.17	30	116
TVAUTHOR	TVA_9_MSA_Paducah_G	3821	4,470	2,130	150	826	52.56	21.88	30	117
VACAR	DUK_4_MSA_Greenville_L	2034	3,546	4,489	230	952	55.07	17.40	26	118
SOUTHERN	SOCO_17_MSA-Mobile_G	2046	5,205	4,575	214	1,180	58.33	21.14	26	119
SPP	LAFA_7_MSA_Lafayette_G	2868	175	-	92	175	91.67	47.63	24	120
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	20.25	23	121
PJM	AEP_3_MSA_Columbus_L	1074	10,204	8,244	322	1,601	62.21	17.10	22	122
MISO	CWLP_1_MSA_Springfield_G	4025	310	227	87	168	57.95	16.57	20	123
SPP	AEPW_1_MSA_Tulsa_G	1344	3,295	2,000	236	996	63.46	15.78	20	124
MISO	FE_5_MSA_Cleveland_L	2526	3,216	4,680	205	734	38.32	16.14	20	125
MISO	SUNC_3_MSA_GardenCity_G	2351	840	18	121	198	63.57	15.18	18	126
SPP	INDN_6_MSA_KansasCity_G	8585	143	27	46	126	44.05	24.38	18	127
NYPP	NYISO_7_NYG	396	3,156	2,195	433	1,063	100.39	12.04	17	128
SPP	SPRM_10_MSA_Springfield_L	5857	236	346	55	159	43.90	18.53	14	129
PJM	PECO_5_MSA_Philadelphia_L	2189	1,656	2,510	115	343	40.34	16.95	10	130
PJM	METED_4_MSA_Reading_G	1034	913	854	109	275	87.15	19.25	10	131
FRCC	FMP_8_MSA_Sebastian_G	1836	145	20	37	85	103.88	21.16	7	132
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	1313	3,431	4,125	146	465	31.83	11.76	6	133
MISO	WEC_7_MSA_Milwaukee_G	687	3,850	3,052	162	685	48.70	31.16	5	134
MISO	MGE_7_MSA_Madison_L	1469	399	403	54	163	61.01	8.36	5	135
FRCC	FPL_2_MSA_FortMyers_G	271	5,929	4,563	214	902	74.33	9.58	4	136
MISO	METC_8_MSA_BayCity_G	427	3,795	2,562	142	719	63.78	30.62	4	137
MISO	LES_5_MSA_Lincoln_G	403	264	108	96	205	99.54	8.53	4	138
FRCC	FTP_7_MSA_PortStLucie_G	819	93	-	36	93	122.07	22.62	4	139
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	763	87	14	50	69	78.37	13.20	3	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	WEC_3_MSA_Milwaukee_G	1903	1,429	2,423	69	260	21.99	11.94	3	141
TVAUTHOR	TVA_5_MSA_Nashville_L	253	9,154	8,858	206	863	47.44	15.05	2	142
SPP	OMPA_9_MSA_PoncaCity_G	835	163	147	20	100	114.82	21.63	2	143
NEPOOL	NEPOOL_4_NEBOS	128	3,262	5,904	173	829	63.75	3.86	1	144
ONTARIO	IESO_2_G	69	2,437	2,116	251	895	66.61	5.26	1	145
ONTARIO	IESO_2_G	69	2,437	2,116	251	895	66.61	5.26	1	146
MISO	SMMPA_9_MSA_Rochester_G	166	128	58	71	83	96.60	10.11	1	147
PJM	DP&L_6_MSA_Seaford_L	404	1,438	1,523	39	186	56.68	18.44	1	148
VACAR	SCEG_9_MSA_Charleston_G	345	1,152	1,944	49	182	48.46	15.29	1	149
ENTERGY	DERS_1_MSA_Ruston_G	285	75	68	22	41	100.36	18.63	1	150
MISO	ITC_2_MSA_Detroit_L	244	4,001	5,247	77	276	24.27	5.08	0	151
NEPOOL	NEPOOL_6_WCMA	22	4,285	3,417	169	556	83.15	14.76	0	152
SOUTHERN	SOCO_21_MSA_Atlanta_G	16	3,334	2,733	154	630	89.65	11.00	0	153
MISO	FE_7_MSA_Toledo_L	5	2,586	2,106	233	320	98.50	2.59	0	154
NYPP	NYISO_5_NYE	27	1,098	909	50	200	71.40	5.06	0	155
TVAUTHOR	TVA_7_MSA_Memphis_L	15	7,215	5,982	76	177	47.86	22.92	0	156
MISO	WPS_4_MSA_Marshfield_L	11	411	442	16	38	87.67	6.75	0	157
NYPP	NYISO_9_NYI	317	2	1,476	0	2	37.47	13.33	0	158
SPP	OKGE_4_MSA_OklahomaCity_L	1	2,102	2,403	3	3	87.18		0	159
MISO	WEPL_7_MSA_DodgeCity_G	1	137	124	3	3	91.53		0	160
SPP	WERE_5_MSA_KansasCity_L	1	204	915	12	12	18.84		0	161

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	10.54	2,167	1
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	-	5,108	6,282	42.24	10.99	1,895	2
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	11.09	1,508	3
PJM	PJM500_8_MSA_Philadelphia_G	8784	3,914	-	3,139	3,868	50.68	13.47	1,398	4
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,288	6,493	47.58	12.25	1,374	5
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	17,334	9,966	3,331	6,553	39.62	10.26	1,159	6
VACAR	DUK_9_MSA_Charlotte_G	8783	14,681	9,966	3,042	5,492	42.51	11.57	1,136	7
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,498	4,181	32.75	12.32	1,006	8
PJM	PJM500_7_MSA_York-Hanover_G	8784	2,696	-	2,198	2,570	50.23	13.43	970	9
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	10.71	926	10
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,957	3,704	50.35	10.70	866	11
FRCC	TECO_3_MSA_Tampa_G	8784	3,733	1,026	2,102	3,143	46.64	12.75	861	12
FRCC	FPL_8_MSA_PortStLucie_G	8751	10,364	4,623	2,026	5,279	46.99	12.82	833	13
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	37.71	10.56	829	14
MISO	CIN_8_MSA_Evansville_G	8783	3,657	260	2,484	3,391	36.95	10.72	806	15
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	10.44	771	16
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,852	3,064	46.81	8.83	762	17
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	53.25	12.28	740	18
PJM	DPL_8_GEN_Killen_G	8759	2,964	-	2,042	2,940	38.65	10.49	691	19
PJM	PJM500_5_MSA_DC_G	8784	1,730	-	1,516	1,730	50.37	14.37	671	20
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	12.24	662	21
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,952	2,769	37.86	9.67	649	22
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	10.80	643	23
PJM	PJM500_4_MSA_Philadelphia_G	8496	2,383	-	1,449	2,346	50.48	13.29	621	24
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	37.71	10.56	611	25
FRCC	FPC_2_MSA_HomosassaSprings_G	8784	1,584	-	1,423	1,584	45.85	11.97	573	26
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	-	1,473	1,700	44.08	11.54	570	27
VACAR	SCPSA_10_MSA_Charleston_G	8616	1,680	-	1,468	1,680	43.42	12.30	549	28
NYPP	NYISO_1_NYA	8323	4,946	2,500	1,595	2,319	40.13	8.85	533	29
PJM	NI_7_MSA_Rochelle_G	8784	2,290	-	2,119	2,290	28.20	14.28	525	30
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	-	1,368	1,700	43.76	11.11	524	31
PJM	VAP_7_G	7413	4,179	303	1,507	3,629	45.32	10.94	506	32
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	10.44	484	33
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,496	1,895	35.70	12.25	469	34
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,435	1,664	36.63	10.57	462	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	2,199	163	1,342	1,697	39.15	9.25	461	36
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	-	1,220	1,330	45.56	11.89	453	37
MISO	ITC_7_MSA_Monroe_G	8712	1,500	-	1,307	1,500	38.03	11.08	433	38
MISO	METC_4_MSA_Holland-GrandHaven_G	6219	7,365	2,900	1,638	4,534	42.31	9.72	431	39
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	38.01	10.77	429	40
FRCC	FPC_10_MSA_Lakeland_G	8093	3,561	747	1,116	2,047	47.21	12.10	426	41
MISO	ITC_3_MSA_Detroit_G	8784	3,815	1,600	1,252	1,948	38.23	11.08	421	42
NEPOOL	NEPOOL_2_NH	8501	4,204	2,621	1,014	1,816	48.52	9.85	418	43
PJM	NI_15_MSA_Davenport_G	8670	2,479	-	1,728	2,314	27.04	13.13	405	44
MISO	FE_9_MSA_Weirton_G	8628	1,860	112	1,220	1,808	38.10	11.01	401	45
PJM	PEPCO_8_MSA_DC_G	8731	3,786	1,108	891	1,926	50.15	14.31	390	46
VACAR	SCEG_1_MSA_Columbia_G	8372	4,954	2,752	1,018	2,380	44.04	12.42	375	47
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	2,315	248	1,168	1,641	36.21	10.09	372	48
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	909	1,349	46.04	12.28	368	49
SPP	WERE_1_MSA_Manhattan_G	8739	2,988	409	1,343	2,277	31.03	13.17	364	50
MISO	IP_7_GEN_Baldwin_G	8784	1,900	444	1,189	1,478	34.72	11.30	363	51
ENTERGY	EES_8_MSA_BatonRouge_G	8520	1,060	-	1,059	1,060	39.11	9.36	353	52
ONTARIO	IESO_15_G	8396	1,964	3,375	1,094	2,054	37.72	10.76	347	53
VACAR	CPLE_1_MSA_Durham_G	7555	10,224	8,563	940	2,730	44.48	11.76	316	54
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	927	1,366	38.73	10.51	315	55
ENTERGY	EES_4_GEN_Ouachita_G	5357	6,345	2,417	1,375	3,621	42.08	8.82	310	56
PJM	NI_6_MSA_Chicago_G	8321	9,759	7,577	1,110	3,034	33.17	12.36	306	57
VACAR	DUK_5_MSA_Seneca_G	7142	1,911	-	954	1,911	44.65	11.48	304	58
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	894	1,236	39.85	9.96	288	59
FRCC	OUC_1_MSA_Orlando_G	8616	889	73	724	867	45.60	12.12	284	60
MISO	HE_9_MSA_TerreHaute_G	8496	1,016	27	865	999	36.95	10.71	271	61
NEPOOL	NEPOOL_7_CT	7667	4,447	3,920	690	1,740	50.04	11.20	265	62
MISO	BREC_3_County_Webster_G	8784	1,355	476	902	1,135	33.08	11.02	262	63
MISO	NIPS_8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	12.96	251	64
MISO	IP_8_GEN_Clinton_G	8011	2,302	1,195	917	1,230	33.74	11.48	248	65
NYPP	NYISO_6_NYF	7778	4,103	1,983	618	1,759	49.25	9.16	237	66
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	12.38	222	67
PJM	NI_20_MSA_Chicago_G	7234	1,632	83	896	1,571	33.43	12.44	217	68
MISO	CIN_3_MSA_TerreHaute_G	6968	3,230	1,015	796	2,234	38.21	10.56	212	69
PJM	PL_8_MSA_Allentown_G	7726	2,853	385	537	2,281	50.69	13.16	210	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
LowCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	KEY_1_MSA_KeyWest_G	8249	880	138	517	811	48.65	16.32	207	71
PJM	BGE_7_MSA_Baltimore-Towson_G	7066	2,548	1,043	549	1,095	51.17	14.13	198	72
PJM	PENELEC_2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	10.51	195	73
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	10.04	193	74
MAPP	MEC_3_MSA_DesMoines_G	8009	3,307	1,933	939	1,547	24.54	12.90	185	75
SOUTHERN	AEC_8_G	8783	903	60	472	858	41.62	10.55	172	76
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	9.32	158	77
SOUTHERN	SOCO_2_GEN_Hartwll_G	2829	2,186	46	1,069	1,639	51.19	9.62	155	78
PJM	PECO_1_MSA_Philadelphia_G	3734	2,323	554	734	1,126	55.03	11.60	151	79
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	590	1,099	29.01	12.69	147	80
FRCC	NSB_1_MSA_DaytonaBeach_G	7323	514	86	417	513	47.19	11.67	144	81
FRCC	LAK_1_MSA_Lakeland_G	8571	819	28	347	527	46.38	12.05	138	82
SPP	AEPW_9_MSA_MountPleasant_G	6984	8,168	3,832	534	1,673	36.63	8.56	137	83
SPP	KACP_4_MSA_KansasCity_G	7656	670	-	639	670	26.16	14.21	128	84
SPP	CELE_10_MSA_Alexandria_G	8586	1,895	742	356	1,228	40.95	14.44	125	85
NYPP	NYISO_4_NYD	7672	1,206	681	662	935	24.58	21.19	125	86
MISO	OTP_9_GEN_BigStone_G	8784	1,189	136	737	1,096	18.91	6.71	122	87
SPP	AEPW_5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	8.81	100	88
PJM	OVEC_3_G	2340	1,620	10	846	1,057	47.07	9.04	93	89
MISO	EEL_2_MSA_Paducah_G	8784	507	36	279	472	36.04	11.26	88	90
SPP	GRDA_2_G	7602	849	179	318	676	36.15	9.32	87	91
MISO	CILC_8_MSA_Peoria_G	8032	756	349	318	594	33.42	11.98	85	92
PJM	VAP_26_MSA_DC_G	5811	1,981	631	252	494	51.80	13.05	76	93
FRCC	GVL_3_MSA_Gainesville_G	7608	433	15	212	299	46.22	12.17	75	94
MISO	DPC_10_G	7833	615	140	317	512	28.41	14.02	71	95
FRCC	TAL_3_MSA_Tallahassee_G	8190	336	-	186	262	45.26	11.72	69	96
MAPP	NPPD_4_GEN_Gentleman_G	8760	2,702	148	626	1,477	12.49	9.31	69	97
FRCC	LWU_1_MSA_Miami_G	6592	250	82	198	249	51.25	15.69	67	98
VACAR	CPLW_3_Asheville_G	6202	764	93	231	642	43.57	11.89	62	99
MISO	XEL_3_MSA_Minneapolis_G	4129	7,596	7,622	812	1,981	17.84	6.21	60	100
MISO	MIPU_7_MSA_KansasCity_G	4891	1,307	437	310	690	38.87	12.76	59	101
FRCC	KIS_10_MSA_Orlando_G	5222	410	-	214	290	51.74	10.77	58	102
SPP	SPS_2_GEN_Tolk1_G	5527	4,480	2,973	152	620	62.94	8.61	53	103
NEPOOL	NEPOOL_3_ME	3752	3,494	2,522	297	1,074	46.10	9.34	51	104
SPP	SWPA_2_MSA_MountainHome_G	5258	478	70	356	450	27.02	18.91	51	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
LowCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	KACY_10_MSA_KansasCity_G	8784	316	40	151	189	34.35	14.21	45	106
MISO	ALTW_6_MSA_CedarRapids_L	8223	996	1,103	194	413	26.92	11.44	43	107
NEPOOL	NEPOOL_10_RI	2541	2,062	2,203	309	988	52.06	8.59	41	108
MAPP	WAPA_2_MSA_RapidCity_G	3256	2,405	813	587	773	20.89	7.90	40	109
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	2642	7,393	4,949	345	1,123	42.89	5.70	39	110
NEPOOL	NEPOOL_8_SWCT	2913	2,678	1,850	202	880	55.91	11.17	33	111
SPP	WERE_4_GEN_Wolfcreek_G	5152	3,510	2,459	254	755	23.89	16.29	31	112
MISO	SIPC_9_MSA_Marion-Herrin_G	5819	432	37	139	327	36.84	11.79	30	113
NEPOOL	NEPOOL_1_VT	5105	821	1,115	110	391	46.82	10.24	26	114
MAPP	MPW_1_MSA_Muscatine_G	7305	151	16	122	143	28.31	13.00	25	115
SPP	EMDE_1_MSA_Joplin_G	4235	1,102	458	152	535	37.58	11.00	24	116
TVAUTHOR	TVA_9_MSA_Paducah_G	3814	4,470	2,130	142	700	38.82	10.79	21	117
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	10.66	17	118
SPP	LAFA_7_MSA_Lafayette_G	2863	175	-	92	175	62.61	34.62	17	119
PJM	METED_4_MSA_Reading_G	2135	913	854	134	392	57.15	11.85	16	120
VACAR	DUK_4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	8.91	16	121
SPP	AEPW_1_MSA_Tulsa_G	1628	3,295	2,000	235	909	41.35	10.59	16	122
MISO	FE_5_MSA_Cleveland_L	2145	3,216	4,680	218	755	32.53	8.49	15	123
SOUTHERN	SOCO_17_MSA_Mobile_G	1104	5,205	4,575	258	1,043	51.88	10.70	15	124
MISO	CWLP_1_MSA_Springfield_G	3272	310	227	83	168	42.03	9.98	11	125
NYPP	NYISO_7_NYG	364	3,156	2,195	450	1,107	68.36	8.63	11	126
SPP	SPRM_10_MSA_Springfield_L	5759	236	346	53	159	33.11	9.01	10	127
MISO	CIN_4_MSA_Cincinnati-Middletown_G	1012	6,026	5,727	240	893	39.57	7.72	10	128
SPP	INDN_6_MSA_KansasCity_G	8574	143	27	30	124	33.62	13.31	9	129
MISO	WEC_7_MSA_Milwaukee_G	1082	3,850	3,052	194	931	37.08	15.98	8	130
MISO	SUNC_3_MSA_GardenCity_G	1262	840	18	96	198	56.39	13.18	7	131
PJM	PECO_5_MSA_Philadelphia_L	1799	1,656	2,510	106	295	35.47	8.73	7	132
PJM	AEP_3_MSA_Columbus_L	428	10,204	8,244	326	1,547	46.22	6.66	6	133
MISO	METC_8_MSA_BayCity_G	665	3,795	2,562	185	674	50.10	15.49	6	134
FRCC	FMP_8_MSA_Sebastian_G	1814	145	20	37	65	70.97	13.95	5	135
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	1106	3,431	4,125	140	401	28.72	5.26	4	136
FRCC	FPL_2_MSA_FortMyers_G	320	5,929	4,563	209	902	49.88	5.93	3	137
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	720	87	14	54	69	54.09	7.58	2	138
MISO	WEC_3_MSA_Milwaukee_G	1576	1,429	2,423	73	258	17.53	3.13	2	139
TVAUTHOR	TVA_5_MSA_Nashville_L	217	9,154	8,858	216	912	37.72	6.32	2	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
LowCase2008R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	FTP_7_MSA_PortStLucie_G	551	93	-	36	37	89.44	14.71	2	141
NEPOOL	NEPOOL_6_WCMA	77	4,285	3,417	343	957	59.72	5.94	2	142
MISO	LES_5_MSA_Lincoln_G	223	264	108	90	183	66.25	5.23	1	143
NEPOOL	NEPOOL_4_NEBOS	153	3,262	5,904	199	829	43.17	1.88	1	144
MISO	MGE_7_MSA_Madison_L	968	399	403	31	132	43.06	4.82	1	145
ONTARIO	IESO_2_G	92	2,437	2,116	295	995	45.52	4.70	1	146
SPP	OMPA_9_MSA_PoncaCity_G	700	163	147	20	100	73.10	13.47	1	147
MISO	SMMPA_9_MSA_Rochester_G	177	128	58	72	83	64.74	7.14	1	148
MISO	ITC_2_MSA_Detroit_L	246	4,001	5,247	81	276	24.81	4.41	0	149
ENTERGY	DERS_1_MSA_Ruston_G	318	75	68	21	37	66.47	12.82	0	150
VACAR	SCEG_9_MSA_Charleston_G	173	1,152	1,944	51	197	38.00	7.81	0	151
PJM	DP&L_6_MSA_Seaford_L	119	1,438	1,523	45	173	45.79	11.51	0	152
MISO	WEPL_7_MSA_DodgeCity_G	128	137	124	29	58	61.96	2.29	0	153
TVAUTHOR	TVA_7_MSA_Memphis_L	59	7,215	5,982	82	281	37.75	10.00	0	154
SOUTHERN	SOCO_21_MSA_Atlanta_G	8	3,334	2,733	152	400	65.23	0.40	0	155
MISO	FE_7_MSA_Toledo_L	16	2,586	2,106	73	320	53.79	10.84	0	156
NYPP	NYISO_5_NYE	20	1,098	909	44	200	46.40	3.94	0	157
SPP	OKGE_4_MSA_OklahomaCity_L	11	2,102	2,403	23	66	57.10	3.26	0	158
PJM	PSEG_8_MSA_NewYork_G	5	3,860	3,654	33	47	58.22	3.41	0	159
MISO	WPS_4_MSA_Marshfield_L	3	411	442	17	21	65.52	1.04	0	160
FRCC	FPL_3_MSA_Miami_L	1	6,944	7,089	28	28	42.27		0	161
NYPP	NYISO_9_NYI	317	2	1,476	0	2	35.43	6.68	0	162
SPP	WERE_5_MSA_KansasCity_L	1	204	915	12	12	19.55		0	163

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	12.12	2,159	1
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	-	5,111	6,381	44.23	11.99	1,980	2
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	12.02	1,639	3
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	12.71	1,518	4
PJM	PJM500_8_MSA_Philadelphia_G	8760	3,914	-	3,130	3,758	52.08	13.12	1,428	5
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,560	4,074	36.67	12.36	1,143	6
VACAR	DUK_9_MSA_Charlotte_G	8544	14,681	9,966	3,002	5,557	43.40	11.61	1,113	7
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	11.46	1,092	8
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	11.42	1,038	9
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	44.11	9.84	968	10
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	44.10	9.83	963	11
PJM	PJM500_7_MSA_York-Hanover_G	8760	2,696	-	2,071	2,570	52.28	13.51	948	12
FRCC	TECO_3_MSA_Tampa_G	8760	3,733	1,026	2,110	3,221	50.28	13.66	929	13
NEPOOL	NEPOOL_5_SEMA	8760	6,454	3,978	1,839	3,523	51.63	10.77	832	14
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,516	3,391	37.24	11.57	821	15
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	9.35	806	16
FRCC	FPL_8_MSA_PortStLucie_G	8660	10,364	4,623	1,803	4,746	50.91	13.58	795	17
PJM	DPL_8_GEN_Killen_G	8760	2,964	-	2,196	2,940	40.15	11.89	772	18
PJM	PJM500_4_MSA_Philadelphia_G	8690	2,383	-	1,675	3,295	52.22	13.45	760	19
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	11.99	745	20
PJM	PJM500_5_MSA_DC_G	8760	1,730	-	1,600	1,730	52.91	14.44	742	21
NYPP	NYISO_8_NYH	8760	2,021	973	1,570	1,958	53.34	12.13	734	22
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	11.56	708	23
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,926	2,737	40.63	11.57	684	24
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	11.29	681	25
PJM	NI_7_MSA_Rochelle_G	8760	2,290	-	2,119	2,290	32.91	12.50	611	26
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	9.00	609	27
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	-	1,492	1,700	44.80	11.75	579	28
FRCC	FPC_2_MSA_HomosassaSprings_G	8544	1,584	-	1,364	1,584	49.56	13.05	577	29
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	11.57	564	30
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	-	1,440	1,700	44.47	11.47	561	31
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	-	1,428	1,680	44.59	11.83	558	32
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	11.50	508	33
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,346	1,750	42.43	10.52	500	34
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	12.12	499	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	-	1,135	1,330	50.10	13.39	498	36
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,388	1,802	40.46	11.33	492	37
FRCC	OUC_1_MSA_Orlando_G	8688	889	73	1,108	1,487	49.40	13.42	475	38
MISO	ITC_7_MSA_Monroe_G	8472	1,500	-	1,344	1,500	41.48	11.72	472	39
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,414	1,664	37.13	11.20	460	40
MISO	ITC_3_MSA_Detroit_G	8745	3,815	1,600	1,235	2,005	41.95	11.73	453	41
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	40.16	11.30	452	42
PJM	NI_15_MSA_Davenport_G	8712	2,479	-	1,684	2,314	30.23	11.99	444	43
MISO	METC_4_MSA_Holland-GrandHaven_G	6132	7,365	2,900	1,463	4,452	45.96	10.25	412	44
PJM	PEPCO_8_MSA_DC_G	8628	3,786	1,108	904	1,788	52.83	14.31	412	45
ENTERGY	EES_4_GEN_Ouachita_G	6486	6,345	2,417	1,390	3,642	44.78	10.06	404	46
NEPOOL	NEPOOL_2_NH	8396	4,204	2,621	933	1,787	49.91	9.91	391	47
VACAR	SCEG_1_MSA_Columbia_G	8179	4,954	2,752	1,057	2,537	45.11	12.31	390	48
FRCC	JEA_6_MSA_Jacksonville_G	8760	1,665	358	873	1,331	50.54	13.86	386	49
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	-	1,059	1,060	42.39	10.55	381	50
SPP	WERE_1_MSA_Manhattan_G	8641	2,988	409	1,327	2,260	31.79	15.27	365	51
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,080	1,590	37.65	10.91	356	52
VACAR	CPLE_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	11.99	336	53
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	10.97	333	54
MISO	IP_7_GEN_Baldwin_G	8760	1,900	444	1,150	1,478	32.77	11.26	330	55
VACAR	DUK_5_MSA_Seneca_G	6597	1,911	-	1,031	1,911	47.89	10.75	326	56
FRCC	FPC_10_MSA_Lakeland_G	8347	3,561	747	734	1,471	50.58	13.52	310	57
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	11.01	302	58
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	837	1,091	39.94	11.86	293	59
MISO	BREC_3_County_Webster_G	8760	1,355	476	879	1,156	35.98	11.47	277	60
MISO	HE_9_MSA_TerreHaute_G	8688	1,016	27	840	997	37.57	11.69	274	61
PJM	NI_6_MSA_Chicago_G	7665	9,759	7,577	946	3,023	37.14	12.44	269	62
MISO	WEC_1_MSA_Chicago_G	8592	1,728	303	911	1,379	34.17	13.71	268	63
MISO	NIPS_8_MSA_Chicago_G	8658	2,892	1,694	844	1,541	36.43	12.52	266	64
MISO	IP_8_GEN_Clinton_G	8002	2,302	1,195	927	1,212	35.59	12.10	264	65
PJM	NI_20_MSA_Chicago_G	7874	1,632	83	888	1,578	36.53	12.37	256	66
PJM	BGE_7_MSA_Baltimore-Towson_G	7816	2,548	1,043	608	1,238	53.27	14.16	253	67
NEPOOL	NEPOOL_7_CT	7199	4,447	3,920	629	1,694	51.70	11.40	234	68
NYPP	NYISO_6_NYF	7576	4,103	1,983	579	1,680	50.77	9.27	223	69
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	11.17	206	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	CIN_3_MSA_TerreHaute_G	6557	3,230	1,015	784	2,188	39.90	11.67	205	71
SPP	AEPW_9_MSA_MountPleasant_G	7520	8,168	3,832	657	1,891	40.94	8.80	202	72
SOUTHERN	AEC_8_G	8760	903	60	456	848	44.23	11.41	177	73
PJM	PL_8_MSA_Allentown_G	7177	2,853	385	451	1,484	51.96	13.37	168	74
FRCC	NSB_1_MSA_DaytonaBeach_G	7636	514	86	423	512	51.19	13.10	165	75
SOUTHERN	SOCO_2_GEN_Hartwll_G	2726	2,186	46	1,106	1,832	53.86	8.88	162	76
FRCC	LAK_1_MSA_Lakeland_G	8646	819	28	364	591	50.09	13.22	158	77
SPP	CELE_10_MSA_Alexandria_G	8325	1,895	742	394	962	44.87	15.44	147	78
SPP	KACP_4_MSA_KansasCity_G	7896	670	-	1,149	1,520	15.76	11.87	143	79
NEPOOL	NEPOOL_8_SWCT	6096	2,678	1,850	412	1,717	55.63	10.38	140	80
MISO	ALTE_2_MSA_Madison_G	8747	1,665	441	494	1,033	30.31	13.22	131	81
NYPP	NYISO_4_NYD	7573	1,206	681	657	959	25.39	22.00	126	82
PJM	PECO_1_MSA_Philadelphia_G	2869	2,323	554	726	1,124	57.60	12.08	120	83
MISO	AMRN_12_MSA_StLouis_L	6277	5,059	6,066	626	1,857	30.41	9.03	119	84
MAPP	MEC_3_MSA_DesMoines_G	8427	3,307	1,933	601	1,391	22.45	10.69	114	85
MAPP	NPPD_4_GEN_Gentleman_G	8240	2,702	148	822	1,475	15.41	14.89	104	86
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	13.25	101	87
MISO	CILC_8_MSA_Peoria_G	8420	756	349	333	610	35.89	12.20	101	88
MISO	OTP_9_GEN_BigStone_G	8640	1,189	136	889	1,593	11.43	12.58	88	89
SPP	GRDA_2_G	7519	849	179	300	652	37.58	13.33	85	90
MISO	EEL_2_MSA_Paducah_G	8486	507	36	284	473	34.94	12.28	84	91
VACAR	CPLW_3_Ashville_G	7832	764	93	236	632	43.78	12.08	81	92
FRCC	GVL_3_MSA_Gainesville_G	7608	433	15	208	292	49.88	13.28	79	93
FRCC	TAL_3_MSA_Tallahassee_G	8131	336	-	191	262	48.61	12.99	75	94
FRCC	LWU_1_MSA_Miami_G	7024	250	82	201	249	53.36	13.77	75	95
FRCC	KIS_10_MSA_Orlando_G	7038	410	-	203	290	52.28	12.73	75	96
PJM	OVEC_3_G	1644	1,620	10	891	1,458	50.99	9.73	75	97
MISO	DPC_10_G	7075	615	140	303	513	33.64	16.60	72	98
SPP	SPS_2_GEN_Tolk1_G	6444	4,480	2,973	167	615	65.97	18.68	71	99
PJM	VAP_26_MSA_DC_G	5459	1,981	631	229	863	54.83	13.14	69	100
MISO	MIPU_7_MSA_KansasCity_G	4381	1,307	437	313	779	44.85	15.87	62	101
TVAUTHOR	TVA_9_MSA_Paducah_G	6786	4,470	2,130	213	1,064	41.70	13.26	60	102
SPP	KACY_10_MSA_KansasCity_G	8032	316	40	168	234	38.71	19.60	52	103
NEPOOL	NEPOOL_3_ME	3621	3,494	2,522	285	1,072	48.84	8.90	50	104
MAPP	WAPA_2_MSA_RapidCity_G	3177	2,405	813	581	920	23.23	9.18	43	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	ALTW_6_MSA_CedarRapids_L	7465	996	1,103	166	386	27.84	10.19	34	106
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	2258	7,393	4,949	309	1,011	48.98	7.53	34	107
SPP	SWPA_2_MSA_MountainHome_G	5835	478	70	316	450	18.27	19.69	34	108
MISO	CIN_4_MSA_Cincinnati-Middletown_G	2760	6,026	5,727	297	980	39.22	10.61	32	109
MISO	SIPC_9_MSA_Marion-Herrin_G	5625	432	37	130	365	43.68	13.01	32	110
MISO	XEL_3_MSA_Minneapolis_G	2885	7,596	7,622	602	1,657	17.87	6.16	31	111
ONTARIO	IESO_2_G	1918	2,437	2,116	284	1,026	51.27	6.17	28	112
SPP	EMDE_1_MSA_Joplin_G	2780	1,102	458	220	661	45.62	12.62	28	113
NEPOOL	NEPOOL_10_RI	1981	2,062	2,203	254	662	53.64	8.27	27	114
MAPP	MPW_1_MSA_Muscatine_G	7129	151	16	124	143	30.41	11.74	27	115
NEPOOL	NEPOOL_1_VT	4760	821	1,115	104	397	47.81	10.51	24	116
MISO	SUNC_3_MSA_GardenCity_G	2901	840	18	120	198	62.03	15.30	22	117
SPP	LAFA_7_MSA_Lafayette_G	3183	175	-	91	175	67.34	31.61	20	118
SPP	WERE_4_GEN_Wolfcreek_G	4275	3,510	2,459	228	674	19.78	17.53	19	119
SOUTHERN	SOCO_17_MSA_Mobile_G	1382	5,205	4,575	254	951	52.83	11.56	19	120
MISO	WEC_3_MSA_Milwaukee_G	5624	1,429	2,423	147	513	22.33	10.46	18	121
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	10.65	18	122
NYPP	NYISO_7_NYG	596	3,156	2,195	430	1,026	66.53	9.03	17	123
PJM	AEP_3_MSA_Columbus_L	964	10,204	8,244	305	1,124	49.28	10.55	15	124
SPP	INDN_6_MSA_KansasCity_G	8734	143	27	45	127	36.60	17.44	14	125
VACAR	DUK_4_MSA_Greenville_L	1450	3,546	4,489	166	889	43.62	8.21	10	126
PJM	METED_4_MSA_Reading_G	1310	913	854	114	303	56.85	7.92	8	127
SPP	SPRM_10_MSA_Springfield_L	4597	236	346	43	116	36.74	11.00	7	128
PJM	PECO_5_MSA_Philadelphia_L	1794	1,656	2,510	107	276	37.38	11.02	7	129
FRCC	FMP_8_MSA_Sebastian_G	2386	145	20	37	43	67.73	5.85	6	130
MISO	METC_8_MSA_BayCity_G	611	3,795	2,562	193	1,120	46.08	17.73	5	131
NEPOOL	NEPOOL_6_WCMA	206	4,285	3,417	275	1,241	60.98	8.56	3	132
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	1058	87	14	55	70	56.71	7.43	3	133
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	804	3,431	4,125	136	449	29.39	6.36	3	134
MISO	FE_5_MSA_Cleveland_L	720	3,216	4,680	122	435	33.79	7.67	3	135
SPP	AEPW_1_MSA_Tulsa_G	503	3,295	2,000	146	497	38.85	14.17	3	136
MISO	CWLP_1_MSA_Springfield_G	1299	310	227	38	77	46.91	5.86	2	137
SOUTHERN	SOCO_21_MSA_Atlanta_G	87	3,334	2,733	306	699	67.68	0.68	2	138
SPP	OMPA_9_MSA_PoncaCity_G	911	163	147	20	77	86.69	20.12	2	139
MISO	SMMPA_9_MSA_Rochester_G	242	128	58	74	89	75.21	13.29	1	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
BaseCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	FE_7_MSA_Toledo_L	59	2,586	2,106	233	493	69.47	8.02	1	141
FRCC	FTP_7_MSA_PortStLucie_G	339	93	-	35	37	76.33	10.80	1	142
MISO	MGE_7_MSA_Madison_L	635	399	403	25	101	47.16	5.41	1	143
PJM	DP&L_6_MSA_Seaford_L	280	1,438	1,523	57	186	43.21	10.50	1	144
MISO	LGEE_9_MSA_Louisville_G	405	1,136	1,763	55	225	24.84	9.21	1	145
ENTERGY	DERS_1_MSA_Ruston_G	381	75	68	20	35	70.08	10.33	1	146
FRCC	FPL_2_MSA_FortMyers_G	59	5,929	4,563	141	623	52.07	6.80	0	147
TVAUTHOR	TVA_5_MSA_Nashville_L	83	9,154	8,858	162	529	30.15	4.55	0	148
MISO	WEPL_7_MSA_DodgeCity_G	191	137	124	30	78	69.73	5.55	0	149
MISO	ITC_2_MSA_Detroit_L	135	4,001	5,247	69	302	26.67	4.40	0	150
NEPOOL	NEPOOL_4_NEBOS	33	3,262	5,904	146	421	44.72	2.30	0	151
MISO	WEC_7_MSA_Milwaukee_G	218	3,850	3,052	65	337	14.36	12.60	0	152
TVAUTHOR	DOE_2_MSA_Paducah_G	6	520	309	409	445	67.63	0.00	0	153
VACAR	SCEG_9_MSA_Charleston_G	91	1,152	1,944	39	125	36.75	5.85	0	154
SPP	OKGE_4_MSA_OklahomaCity_L	18	2,102	2,403	44	136	72.44	12.13	0	155
TVAUTHOR	TVA_7_MSA_Memphis_L	15	7,215	5,982	65	156	34.54	11.19	0	156
NYPP	NYISO_5_NYE	4	1,098	909	115	167	45.39	0.06	0	157
MISO	LES_5_MSA_Lincoln_G	2	264	108	56	77	66.26	0.50	0	158
MISO	UPPC_9_MSA_Houghton_L	5	2	75	2	3	165.32	13.21	0	159
NYPP	NYISO_9_NYI	472	2	1,476	0	2	37.51	9.63	0	160
SPP	LEPA_5_MSA_Houma-Bayou_G	1	93	73	1	1	83.08		0	161

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
HighCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	20.34	2,593	1
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	-	5,110	6,381	55.47	19.59	2,483	2
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	21.85	2,048	3
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	19.58	2,024	4
PJM	PJM500_8_MSA_Philadelphia_G	8760	3,914	-	3,130	3,868	70.63	23.39	1,937	5
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	3,071	5,821	54.45	19.37	1,429	6
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,559	4,074	45.36	20.35	1,414	7
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	19.08	1,366	8
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	20.13	1,324	9
PJM	PJM500_7_MSA_York-Hanover_G	8760	2,696	-	2,070	2,570	70.66	23.89	1,282	10
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	56.39	17.22	1,238	11
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	56.38	17.21	1,231	12
FRCC	TECO_3_MSA_Tampa_G	8760	3,733	1,026	2,088	3,258	65.15	21.29	1,191	13
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,926	2,870	65.56	16.17	1,106	14
NYPP	NYISO_8_NYH	8760	2,021	973	1,570	1,958	75.23	21.65	1,035	15
FRCC	FPL_8_MSA_PortStLucie_G	8628	10,364	4,623	1,804	5,105	66.17	21.40	1,030	16
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,511	3,387	45.87	19.05	1,009	17
PJM	PJM500_5_MSA_DC_G	8760	1,730	-	1,600	1,730	70.80	24.98	992	18
NEPOOL	NEPOOL_5_SEMA	8739	6,454	3,978	1,588	3,670	71.41	18.75	991	19
PJM	DPL_8_GEN_Killen_G	8760	2,964	-	2,218	2,940	49.86	19.97	969	20
PJM	PJM500_4_MSA_Philadelphia_G	8645	2,383	-	1,579	3,295	70.92	23.66	968	21
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	19.68	944	22
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,923	2,737	51.76	18.69	870	23
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	19.14	827	24
NYPP	NYISO_1_NYA	8292	4,946	2,500	1,651	2,452	57.80	16.32	791	25
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	19.13	788	26
FRCC	FPC_2_MSA_HomosassaSprings_G	8544	1,584	-	1,373	1,584	64.20	20.78	753	27
PJM	NI_7_MSA_Rochelle_G	8760	2,290	-	2,119	2,290	40.58	19.78	753	28
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	19.13	752	29
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	-	1,490	1,700	57.05	20.55	736	30
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	-	1,430	1,700	56.53	20.11	708	31
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	-	1,437	1,680	56.12	19.65	706	32
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	19.06	672	33
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,728	55.08	17.66	650	34
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	-	1,135	1,330	64.73	21.21	643	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
HighCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	OUC_1_MSA_Orlando_G	8688	889	73	1,109	1,487	63.86	21.07	615	36
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,410	1,803	49.49	19.24	611	37
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	44.67	19.27	608	38
MISO	ITC_7_MSA_Monroe_G	8472	1,500	-	1,344	1,500	51.90	19.98	591	39
NEPOOL	NEPOOL_2_NH	8425	4,204	2,621	1,000	1,918	68.48	17.25	577	40
MISO	ITC_3_MSA_Detroit_G	8744	3,815	1,600	1,234	1,928	52.63	20.11	568	41
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,411	1,664	45.86	18.64	567	42
PJM	PEPCO_8_MSA_DC_G	8671	3,786	1,108	915	1,843	70.57	24.72	560	43
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	19.12	549	44
PJM	NI_15_MSA_Davenport_G	8712	2,479	-	1,682	2,314	37.11	18.85	544	45
PJM	PENELEC_2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	18.95	519	46
VACAR	CPLE_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	57.05	20.05	509	47
FRCC	JEA_6_MSA_Jacksonville_G	8760	1,665	358	872	1,331	65.21	21.67	498	48
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	-	1,059	1,060	54.99	17.70	495	49
ENTERGY	EES_4_GEN_Ouachita_G	6519	6,345	2,417	1,268	3,688	58.18	15.93	481	50
MISO	METC_4_MSA_Holland-GrandHaven	5811	7,365	2,900	1,373	4,452	59.66	17.76	476	51
SPP	WERE_1_MSA_Manhattan_G	8684	2,988	409	1,338	2,255	39.48	23.74	459	52
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,095	1,597	47.78	18.01	458	53
VACAR	SCEG_1_MSA_Columbia_G	7998	4,954	2,752	999	2,547	56.98	19.84	455	54
VACAR	DUK_5_MSA_Seneca_G	6330	1,911	-	1,074	1,911	62.14	16.93	422	55
MISO	IP_7_GEN_Baldwin_G	8760	1,900	444	1,149	1,478	40.47	17.98	407	56
FRCC	FPC_10_MSA_Lakeland_G	8320	3,561	747	721	1,471	65.71	20.98	394	57
PJM	BGE_7_MSA_Baltimore-Towson_G	8161	2,548	1,043	660	1,099	71.25	24.41	384	58
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	850	1,211	55.21	18.05	378	59
SPP	AEPW_9_MSA_MountPleasant_G	8404	8,168	3,832	852	2,045	52.70	13.73	377	60
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	849	1,088	49.57	19.87	369	61
MISO	HE_9_MSA_TerreHaute_G	8688	1,016	27	840	997	46.26	19.25	338	62
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	20.59	334	63
NEPOOL	NEPOOL_7_CT	7217	4,447	3,920	641	1,828	70.94	19.62	328	64
MISO	BREC_3_County_Webster_G	8760	1,355	476	891	1,191	41.70	16.98	325	65
MISO	IP_8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	19.69	323	66
MISO	WEC_1_MSA_Chicago_G	8592	1,728	303	912	1,394	40.89	21.09	320	67
PJM	NI_20_MSA_Chicago_G	7868	1,632	83	887	1,505	45.22	20.26	315	68
NYPP	NYISO_6_NYF	7512	4,103	1,983	591	1,834	70.70	15.07	314	69
PJM	NI_6_MSA_Chicago_G	7271	9,759	7,577	894	3,023	45.75	20.48	297	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
HighCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	CIN_3_MSA_TerreHaute_G	6611	3,230	1,015	738	2,170	49.93	19.28	244	71
SOUTHERN	AEC_8_G	8760	903	60	460	843	55.91	18.83	225	72
FRCC	NSB_1_MSA_DaytonaBeach_G	7633	514	86	422	513	66.56	20.47	214	73
SOUTHERN	SOCO_2_GEN_Hartwll_G	2726	2,186	46	1,107	1,836	70.67	13.48	213	74
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	18.81	212	75
NEPOOL	NEPOOL_8_SWCT	6228	2,678	1,850	421	1,723	78.27	17.55	205	76
FRCC	LAK_1_MSA_Lakeland_G	8637	819	28	363	601	64.95	20.83	204	77
SPP	CELE_10_MSA_Alexandria_G	8293	1,895	742	372	959	59.85	25.35	185	78
PJM	PL_8_MSA_Allentown_G	6432	2,853	385	400	1,482	69.80	23.99	180	79
NYPP	NYISO_4_NYD	7615	1,206	681	662	908	34.59	31.38	175	80
MISO	ALTE_2_MSA_Madison_G	8749	1,665	441	498	1,033	37.26	19.63	162	81
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	20.01	156	82
SPP	KACP_4_MSA_KansasCity_G	7896	670	-	1,121	1,520	16.87	16.96	149	83
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	15.07	145	84
PJM	PECO_1_MSA_Philadelphia_G	2264	2,323	554	720	1,108	82.50	18.49	134	85
MAPP	MEC_3_MSA_DesMoines_G	8371	3,307	1,933	588	1,348	26.64	16.43	131	86
MISO	CILC_8_MSA_Peoria_G	8393	756	349	339	610	44.27	19.85	126	87
MAPP	NPPD_4_GEN_Gentleman_G	8247	2,702	148	850	1,575	17.45	14.60	122	88
VACAR	CPLW_3_Asheville_G	8418	764	93	253	631	54.54	19.66	116	89
SPP	GRDA_2_G	7622	849	179	295	654	49.48	20.68	111	90
MISO	EEI_2_MSA_Paducah_G	8485	507	36	285	473	44.79	19.67	108	91
MISO	OTP_9_GEN_BigStone_G	8640	1,189	136	897	1,677	13.77	14.01	107	92
FRCC	GVL_3_MSA_Gainesville_G	7632	433	15	208	293	64.30	21.13	102	93
FRCC	LWU_1_MSA_Miami_G	7100	250	82	200	249	70.21	21.49	100	94
FRCC	KIS_10_MSA_Orlando_G	6973	410	-	203	290	68.68	19.50	97	95
FRCC	TAL_3_MSA_Tallahassee_G	8003	336	-	188	262	62.61	21.10	94	96
MISO	DPC_10_G	6991	615	140	308	513	42.72	24.90	92	97
NEPOOL	NEPOOL_3_ME	3787	3,494	2,522	344	1,072	67.04	15.82	87	98
TVAUTHOR	TVA_9_MSA_Paducah_G	6905	4,470	2,130	218	1,038	53.86	22.49	81	99
PJM	OVEC_3_G	1211	1,620	10	870	1,457	71.13	15.63	75	100
PJM	VAP_26_MSA_DC_G	4164	1,981	631	216	433	78.33	20.92	70	101
MISO	MIPU_7_MSA_KansasCity_G	3681	1,307	437	286	741	63.74	23.34	67	102
SPP	SPS_2_GEN_Tolk1_G	5802	4,480	2,973	132	562	86.07	23.94	66	103
SPP	KACY_10_MSA_KansasCity_G	8032	316	40	166	198	49.21	30.28	66	104
MISO	CIN_4_MSA_Cincinnati-Middletown_G	3287	6,026	5,727	326	1,172	49.71	17.94	53	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
HighCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	SIPC_9_MSA_Marion-Herrin_G	6185	432	37	148	394	57.47	21.01	53	106
MAPP	WAPA_2_MSA_RapidCity_G	3222	2,405	813	582	941	27.39	13.87	51	107
SPP	SWPA_2_MSA_MountainHome_G	5837	478	70	314	450	23.79	27.43	44	108
NEPOOL	NEPOOL_10_RI	2333	2,062	2,203	249	759	74.79	13.48	43	109
MISO	ALTW_6_MSA_CedarRapids_L	7509	996	1,103	166	386	33.25	15.93	41	110
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	1755	7,393	4,949	329	1,143	67.63	11.75	39	111
SPP	EMDE_1_MSA_Joplin_G	3860	1,102	458	170	661	58.04	18.71	38	112
MISO	SUNC_3_MSA_GardenCity_G	3914	840	18	139	199	69.82	21.45	38	113
ONTARIO	IESO_2_G	1825	2,437	2,116	286	994	69.40	9.02	36	114
MAPP	MPW_1_MSA_Muscatine_G	7140	151	16	124	143	37.73	18.63	33	115
MISO	XEL_3_MSA_Minneapolis_G	2891	7,596	7,622	612	1,771	18.39	7.81	33	116
NEPOOL	NEPOOL_1_VT	4760	821	1,115	104	397	64.42	18.65	32	117
SPP	LAFA_7_MSA_Lafayette_G	3170	175	-	94	175	92.17	43.56	27	118
MISO	WEC_3_MSA_Milwaukee_G	6113	1,429	2,423	154	494	27.50	14.13	26	119
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	5,205	4,575	224	1,452	60.78	20.20	26	120
VACAR	DUK_4_MSA_Greenville_L	1928	3,546	4,489	223	924	56.82	13.01	24	121
PJM	AEP_3_MSA_Columbus_L	1303	10,204	8,244	293	1,281	60.22	17.60	23	122
SPP	INDN_6_MSA_KansasCity_G	8734	143	27	49	128	46.26	27.17	20	123
ENTERGY	EES_9_MSA_Russellville_G	2493	6,123	4,517	184	831	40.43	17.74	19	124
SPP	WERE_4_GEN_Wolfcreek_G	4254	3,510	2,459	223	668	19.33	25.62	18	125
NYPP	NYISO_7_NYG	356	3,156	2,195	384	963	100.50	13.30	14	126
PJM	PECO_5_MSA_Philadelphia_L	2133	1,656	2,510	115	329	44.74	19.53	11	127
SPP	SPRM_10_MSA_Springfield_L	4749	236	346	45	120	46.41	18.53	10	128
FRCC	FMP_8_MSA_Sebastian_G	2366	145	20	37	90	92.32	10.57	8	129
MISO	FE_5_MSA_Cleveland_L	1190	3,216	4,680	137	564	42.42	15.39	7	130
SPP	AEPW_1_MSA_Tulsa_G	734	3,295	2,000	165	975	55.90	18.84	7	131
MISO	MGE_7_MSA_Madison_L	1645	399	403	66	157	58.79	7.62	6	132
MISO	METC_8_MSA_BayCity_G	587	3,795	2,562	182	1,110	58.63	30.03	6	133
PJM	METED_4_MSA_Reading_G	816	913	854	89	244	82.03	9.87	6	134
MISO	CWLP_1_MSA_Springfield_G	2084	310	227	44	77	59.01	9.28	5	135
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	1074	87	14	52	69	77.23	11.48	4	136
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	913	3,431	4,125	139	449	31.16	10.41	4	137
FRCC	FTP_7_MSA_PortStLucie_G	637	93	-	36	37	102.69	16.23	2	138
NEPOOL	NEPOOL_6_WCMA	116	4,285	3,417	213	881	86.01	17.20	2	139
SPP	OMPA_9_MSA_PoncaCity_G	969	163	147	17	75	116.70	24.38	2	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
MISO	SMMPA_9_MSA_Rochester_G	226	128	58	74	89	102.11	18.27	2	141
MISO	FE_7_MSA_Toledo_L	50	2,586	2,106	224	466	98.59	8.94	1	142
PJM	DP&L_6_MSA_Seaford_L	411	1,438	1,523	48	177	54.21	18.52	1	143
SOUTHERN	SOCO_21_MSA_Atlanta_G	44	3,334	2,733	261	582	90.11	9.86	1	144
MISO	LGEE_9_MSA_Louisville_G	454	1,136	1,763	63	225	28.97	14.89	1	145
ENTERGY	DERS_1_MSA_Ruston_G	337	75	68	20	37	95.42	10.87	1	146
TVAUTHOR	TVA_5_MSA_Nashville_L	114	9,154	8,858	154	573	32.28	8.81	1	147
FRCC	FPL_2_MSA_FortMyers_G	51	5,929	4,563	140	623	68.94	8.20	0	148
NEPOOL	NEPOOL_4_NEBOS	45	3,262	5,904	154	490	62.24	4.67	0	149
VACAR	SCEG_9_MSA_Charleston_G	189	1,152	1,944	40	140	43.28	12.05	0	150
MISO	ITC_2_MSA_Detroit_L	136	4,001	5,247	79	302	27.29	6.75	0	151
TVAUTHOR	DOE_2_MSA_Paducah_G	9	520	309	323	465	94.08	0.16	0	152
MISO	WEC_7_MSA_Milwaukee_G	207	3,850	3,052	63	261	12.94	7.49	0	153
MISO	LES_5_MSA_Lincoln_G	17	264	108	61	86	92.91	2.25	0	154
SPP	OKGE_4_MSA_OklahomaCity_L	23	2,102	2,403	43	125	96.84	12.07	0	155
MISO	WEPL_7_MSA_DodgeCity_G	38	137	124	23	38	93.80	4.18	0	156
NYPP	NYISO_5_NYE	4	1,098	909	115	167	62.16	0.34	0	157
TVAUTHOR	TVA_7_MSA_Memphis_L	7	7,215	5,982	43	86	28.36	13.62	0	158
MISO	UPPC_9_MSA_Houghton_L	3	2	75	1	3	266.21	13.13	0	159
NYPP	NYISO_9_NYI	472	2	1,476	0	2	43.95	17.93	0	160

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
LowCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	8.53	2,024	1
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	-	5,102	6,381	39.15	9.06	1,750	2
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	9.08	1,474	3
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	9.59	1,298	4
PJM	PJM500_8_MSA_Philadelphia_G	8760	3,914	-	3,132	3,868	44.43	9.58	1,219	5
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,562	4,192	32.75	8.93	1,022	6
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	8.20	1,012	7
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	2,865	5,471	38.80	8.90	950	8
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	8.12	889	9
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	38.04	7.04	835	10
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	38.03	7.03	830	11
FRCC	TECO_3_MSA_Tampa_G	8760	3,733	1,026	2,143	3,270	43.28	10.45	812	12
PJM	PJM500_7_MSA_York-Hanover_G	8760	2,696	-	2,072	2,570	44.70	9.97	811	13
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,521	3,388	33.40	8.48	738	14
NEPOOL	NEPOOL_5_SEMA	8757	6,454	3,978	1,898	3,583	43.66	8.15	726	15
FRCC	FPL_8_MSA_PortStLucie_G	8677	10,364	4,623	1,845	4,766	43.86	10.28	702	16
PJM	PJM500_4_MSA_Philadelphia_G	8702	2,383	-	1,806	3,346	44.57	9.92	700	17
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	8.46	693	18
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,909	3,259	41.23	6.68	690	19
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	8.65	649	20
PJM	PJM500_5_MSA_DC_G	8760	1,730	-	1,600	1,730	45.52	11.02	638	21
PJM	DPL_8_GEN_Killen_G	8760	2,964	-	2,028	2,940	35.81	8.45	636	22
NYPP	NYISO_8_NYH	8760	2,021	973	1,570	1,958	45.29	9.15	623	23
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	36.50	8.38	616	24
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,929	2,737	34.97	8.49	590	25
PJM	NI_7_MSA_Rochelle_G	8760	2,290	-	2,119	2,290	29.24	9.29	543	26
NYPP	NYISO_1_NYA	8298	4,946	2,500	1,639	2,336	38.71	6.18	526	27
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	-	1,492	1,700	39.35	8.62	509	28
FRCC	FPC_2_MSA_HomosassaSprings_G	8544	1,584	-	1,359	1,584	42.67	9.73	496	29
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	-	1,438	1,700	39.08	8.30	492	30
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	-	1,413	1,680	39.64	9.08	490	31
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	8.57	460	32
MISO	LGEE_3_GEN_Gehrt2_G	8760	2,000	225	1,554	1,900	33.05	9.20	450	33
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	8.43	444	34
MISO	FE_9_MSA>Weirton_G	8741	1,860	112	1,342	1,795	36.50	8.35	428	35

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	-	1,128	1,330	43.19	10.02	427	36
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,726	36.14	7.95	426	37
MISO	METC_4_MSA_Holland-GrandHaven_G	6489	7,365	2,900	1,642	4,626	39.38	7.41	420	38
MISO	ITC_7_MSA_Monroe_G	8472	1,500	-	1,344	1,500	36.59	8.29	417	39
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,417	1,664	33.29	8.16	413	40
FRCC	OUC_1_MSA_Orlando_G	8680	889	73	1,119	1,487	42.51	10.14	413	41
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	36.42	8.35	410	42
PJM	NI_15_MSA_Davenport_G	8712	2,479	-	1,695	2,361	27.05	8.82	399	43
MISO	ITC_3_MSA_Detroit_G	8744	3,815	1,600	1,221	2,005	36.98	8.19	395	44
VACAR	SCEG_1_MSA_Columbia_G	8403	4,954	2,752	1,121	2,595	40.37	9.97	380	45
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	7.91	351	46
FRCC	JEA_6_MSA_Jacksonville_G	8760	1,665	358	870	1,331	43.60	10.48	332	47
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	-	1,059	1,060	36.11	8.01	325	48
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,108	1,604	32.71	7.78	317	49
PJM	PEPCO_8_MSA_DC_G	8111	3,786	1,108	833	1,790	45.73	11.07	309	50
NEPOOL	NEPOOL_2_NH	8300	4,204	2,621	857	1,787	42.24	7.29	300	51
MISO	IP_7_GEN_Baldwin_G	8760	1,900	444	1,151	1,478	29.17	8.24	294	52
SPP	WERE_1_MSA_Manhattan_G	8145	2,988	409	1,217	2,299	29.25	10.88	290	53
VACAR	DUK_5_MSA_Seneca_G	7069	1,911	-	960	1,911	41.81	9.13	284	54
FRCC	FPC_10_MSA_Lakeland_G	8424	3,561	747	762	1,495	43.42	10.33	279	55
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	8.36	264	56
VACAR	CPL_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	9.22	262	57
PJM	NI_6_MSA_Chicago_G	7988	9,759	7,577	995	2,915	32.98	8.96	262	58
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	810	1,088	35.64	8.47	253	59
MISO	BREC_3_County_Webster_G	8760	1,355	476	855	1,129	32.98	8.94	247	60
MISO	HE_9_MSA_TerreHaute_G	8688	1,016	27	840	997	33.77	8.54	247	61
MISO	WEC_1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	10.45	239	62
MISO	IP_8_GEN_Clinton_G	8009	2,302	1,195	927	1,213	31.99	8.77	238	63
MISO	NIPS_8_MSA_Chicago_G	8692	2,892	1,694	817	1,465	32.55	9.06	231	64
PJM	NI_20_MSA_Chicago_G	7900	1,632	83	892	1,578	32.69	9.00	230	65
PJM	PENELEC_2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	8.03	224	66
NYPP	NYISO_6_NYF	7760	4,103	1,983	619	2,031	42.90	6.74	206	67
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	8.28	194	68
NEPOOL	NEPOOL_7_CT	7026	4,447	3,920	609	1,685	43.97	8.65	188	69
MISO	CIN_3_MSA_TerreHaute_G	6410	3,230	1,015	818	2,188	35.55	8.58	186	70

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
PJM	PL_8_MSA_Allentown_G	7935	2,853	385	514	1,484	44.34	9.78	181	71
SOUTHERN	AEC_8_G	8760	903	60	458	863	38.62	8.53	155	72
PJM	BGE_7_MSA_Baltimore-Towson_G	6273	2,548	1,043	500	1,248	46.86	11.07	147	73
PJM	PECO_1_MSA_Philadelphia_G	4106	2,323	554	754	1,138	47.27	9.67	146	74
SPP	KACP_4_MSA_KansasCity_G	7896	670	-	1,185	1,520	15.55	9.22	146	75
FRCC	NSB_1_MSA_DaytonaBeach_G	7640	514	86	427	513	43.91	9.93	143	76
SOUTHERN	SOCO_2_GEN_Hartwll_G	2726	2,186	46	1,106	1,837	46.85	7.66	141	77
FRCC	LAK_1_MSA_Lakeland_G	8655	819	28	367	628	43.09	9.95	137	78
SPP	AEPW_9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	6.38	136	79
SPP	CELE_10_MSA_Alexandria_G	8344	1,895	742	403	1,246	37.85	12.82	127	80
NEPOOL	NEPOOL_8_SWCT	6309	2,678	1,850	419	1,719	46.36	8.33	123	81
PJM	OVEC_3_G	3322	1,620	10	859	1,458	41.16	7.36	117	82
MISO	ALTE_2_MSA_Madison_G	8746	1,665	441	491	1,061	27.05	10.23	116	83
NYPP	NYISO_4_NYD	7592	1,206	681	664	1,392	22.34	18.21	113	84
MAPP	MEC_3_MSA_DesMoines_G	8494	3,307	1,933	636	1,436	20.61	7.93	111	85
MISO	AMRN_12_MSA_StLouis_L	6285	5,059	6,066	625	1,758	27.33	6.16	107	86
MAPP	NPPD_4_GEN_Gentleman_G	8235	2,702	148	790	1,472	13.70	9.65	89	87
MISO	CILC_8_MSA_Peoria_G	8418	756	349	325	610	32.09	8.82	88	88
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	9.41	87	89
MISO	OTP_9_GEN_BigStone_G	8640	1,189	136	880	1,176	11.27	10.70	86	90
SPP	SPS_2_GEN_Tolk1_G	7024	4,480	2,973	198	696	57.81	18.06	80	91
PJM	VAP_26_MSA_DC_G	6654	1,981	631	240	476	45.75	10.60	73	92
SPP	GRDA_2_G	7507	849	179	303	652	31.85	9.69	72	93
MISO	EEI_2_MSA_Paducah_G	8486	507	36	281	473	30.10	9.28	72	94
FRCC	GVL_3_MSA_Gainesville_G	7584	433	15	208	373	43.09	9.95	68	95
MISO	MIPU_7_MSA_KansasCity_G	5729	1,307	437	329	779	35.90	11.43	68	96
FRCC	TAL_3_MSA_Tallahassee_G	8139	336	-	197	262	42.23	9.62	68	97
FRCC	KIS_10_MSA_Orlando_G	7037	410	-	209	358	44.67	9.78	66	98
FRCC	LWU_1_MSA_Miami_G	7060	250	82	202	249	45.47	10.89	65	99
MISO	DPC_10_G	6898	615	140	292	500	29.54	12.99	59	100
VACAR	CPLW_3_Ashville_G	6178	764	93	220	634	39.81	9.54	54	101
TVAUTHOR	TVA_9_MSA_Paducah_G	6585	4,470	2,130	209	1,104	35.98	9.26	50	102
SPP	KACY_10_MSA_KansasCity_G	8032	316	40	171	234	34.64	14.15	48	103
NEPOOL	NEPOOL_3_ME	3832	3,494	2,522	277	1,070	40.43	6.58	43	104
MAPP	WAPA_2_MSA_RapidCity_G	3167	2,405	813	582	870	20.98	6.27	39	105

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
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Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	2674	7,393	4,949	326	1,504	39.85	6.29	35	106
MISO	ALTW_6_MSA_CedarRapids_L	7395	996	1,103	163	386	25.29	7.43	30	107
MISO	XEL_3_MSA_Minneapolis_G	2949	7,596	7,622	585	1,604	17.49	5.27	30	108
SPP	SWPA_2_MSA_MountainHome_G	5782	478	70	320	450	15.99	16.28	30	109
ONTARIO	IESO_2_G	2022	2,437	2,116	295	1,032	42.49	5.18	25	110
MAPP	MPW_1_MSA_Muscatine_G	6967	151	16	123	142	27.16	8.65	23	111
SPP	WERE_4_GEN_Wolfcreek_G	4315	3,510	2,459	231	872	23.22	13.00	23	112
NEPOOL	NEPOOL_10_RI	2027	2,062	2,203	245	662	45.34	6.56	23	113
MISO	SIPC_9_MSA_Marion-Herrin_G	4348	432	37	127	360	37.57	9.85	21	114
NEPOOL	NEPOOL_1_VT	4760	821	1,115	104	397	40.76	7.65	20	115
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	7.28	20	116
SPP	EMDE_1_MSA_Joplin_G	1665	1,102	458	246	661	41.75	9.78	17	117
SPP	LAFA_7_MSA_Lafayette_G	3186	175	-	92	175	57.40	27.00	17	118
MISO	WEC_3_MSA_Milwaukee_G	5326	1,429	2,423	147	461	20.37	8.20	16	119
MISO	CIN_4_MSA_Cincinnati-Middletown_G	2053	6,026	5,727	203	737	33.21	7.27	14	120
NYPP	NYISO_7_NYG	569	3,156	2,195	430	1,017	56.55	7.74	14	121
PJM	METED_4_MSA_Reading_G	2010	913	854	122	344	47.28	6.50	12	122
SPP	INDN_6_MSA_KansasCity_G	8700	143	27	36	127	32.81	12.39	10	123
SOUTHERN	SOCO_17_MSA_Mobile_G	840	5,205	4,575	243	955	48.88	7.76	10	124
MISO	SUNC_3_MSA_GardenCity_G	1350	840	18	103	198	53.99	15.20	8	125
MISO	METC_8_MSA_BayCity_G	747	3,795	2,562	206	1,115	42.54	11.89	7	126
PJM	AEP_3_MSA_Columbus_L	485	10,204	8,244	274	1,131	44.14	7.53	6	127
VACAR	DUK_4_MSA_Greenville_L	996	3,546	4,489	159	606	36.12	7.31	6	128
SPP	SPRM_10_MSA_Springfield_L	4284	236	346	39	131	31.54	7.10	5	129
PJM	PECO_5_MSA_Philadelphia_L	1496	1,656	2,510	104	276	33.27	7.19	5	130
FRCC	FMP_8_MSA_Sebastian_G	2398	145	20	37	43	57.28	4.84	5	131
SPP	AEPW_1_MSA_Tulsa_G	615	3,295	2,000	166	660	31.38	11.87	3	132
NEPOOL	NEPOOL_6_WCMA	204	4,285	3,417	266	1,256	50.74	7.09	3	133
TVAUTHOR	BCA_1_GEN_NRGBatesville_G	1001	87	14	56	70	47.89	5.67	3	134
SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	638	3,431	4,125	118	327	27.13	3.38	2	135
SOUTHERN	SOCO_21_MSA_Atlanta_G	129	3,334	2,733	240	634	55.32	5.38	2	136
MISO	FE_5_MSA_Cleveland_L	405	3,216	4,680	103	435	30.51	5.36	1	137
MISO	SMMPA_9_MSA_Rochester_G	242	128	58	74	89	63.45	12.49	1	138
MISO	CWLP_1_MSA_Springfield_G	671	310	227	34	69	41.94	4.30	1	139
MISO	FE_7_MSA_Toledo_L	95	2,586	2,106	172	493	52.51	11.14	1	140

Task 2: Appendix 3, Simulation Results for Source Nodes (Hubs)
LowCase2011R2

Market Area	Hub Name	Source Hrs	Gen Weight (MW)	Load Weight (MW)	Avg net injection (MW)	Max Net injection (MW)	Price (\$/MWh)	Price Std.Dev (MWh)	Revenue Surplus (\$million)	Rank based on Revenue Surplus
SPP	OMPA_9_MSA_PoncaCity_G	536	163	147	19	75	73.49	20.03	1	141
MISO	WEPL_7_MSA_DodgeCity_G	307	137	124	39	63	57.85	3.46	1	142
FRCC	FTP_7_MSA_PortStLucie_G	257	93	-	35	37	66.87	9.73	1	143
ENTERGY	DERS_1_MSA_Ruston_G	457	75	68	20	39	58.46	9.07	1	144
FRCC	FPL_2_MSA_FortMyers_G	80	5,929	4,563	142	623	41.97	4.77	0	145
MISO	LGEE_9_MSA_Louisville_G	302	1,136	1,763	54	178	22.57	6.54	0	146
TVAUTHOR	TVA_5_MSA_Nashville_L	71	9,154	8,858	146	529	28.90	3.06	0	147
MISO	ITC_2_MSA_Detroit_L	144	4,001	5,247	71	302	27.26	4.15	0	148
PJM	DP&L_6_MSA_Seaford_L	99	1,438	1,523	68	178	40.97	6.52	0	149
NEPOOL	NEPOOL_4_NEBOS	43	3,262	5,904	154	490	37.23	1.05	0	150
MISO	WEC_7_MSA_Milwaukee_G	226	3,850	3,052	61	261	14.94	12.20	0	151
TVAUTHOR	TVA_7_MSA_Memphis_L	46	7,215	5,982	86	379	33.86	5.70	0	152
SPP	OKGE_4_MSA_OklahomaCity_L	41	2,102	2,403	58	139	56.35	7.36	0	153
TVAUTHOR	DOE_2_MSA_Paducah_G	6	520	309	311	448	56.86	0.00	0	154
MISO	MGE_7_MSA_Madison_L	62	399	403	15	67	43.76	6.77	0	155
VACAR	SCEG_9_MSA_Charleston_G	24	1,152	1,944	36	92	34.67	3.13	0	156
NYPP	NYISO_5_NYE	5	1,098	909	95	167	39.92	6.03	0	157
PJM	PSEG_8_MSA_NewYork_G	2	3,860	3,654	47	72	38.67	10.55	0	158
MISO	UPPC_9_MSA_Houghton_L	7	2	75	2	3	143.71	19.56	0	159
NYPP	NYISO_9_NYI	472	2	1,476	0	2	34.64	6.62	0	160

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
MISO	CIN 3 MSA TerreHaute_G	7034	3,230	1,015	726	2,206	45.20	231	MISO	LGEE 5 MSA Lexington_L	8784	595	2,345	-1,652	-2,690	51.03	-740	5.8	129	1%
TVAUTHOR	TVA 4 MSA Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	TVAUTHOR	TVA 5 MSA Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	5.8	5984	68%
MISO	IP 8_GEN Clinton_G	8016	2,302	1,195	916	1,230	40.02	294	PJM	NI 6 MSA Chicago_G	673	9,759	7,577	-321	-1,221	45.80	-10	5.8	161	2%
TVAUTHOR	TVA 4 MSA Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	SOUTHERN	SOCO 17 MSA Mobile_G	6709	5,205	4,575	-434	-1,703	49.65	-145	5.8	5844	67%
ENTERGY	LAGN 1 MSA BatonRouge_G	8784	2,199	163	1,343	1,701	49.16	580	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	5.7	6322	72%
PJM	NI 2 MSA Chicago_G	8784	5,342	1,283	3,494	4,092	39.26	1,205	PJM	AEP 9 MSA Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	5.7	2535	29%
PJM	AEP 8_GEN Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	MISO	LGEE 5 MSA Lexington_L	8784	595	2,345	-1,652	-2,690	51.03	-740	5.7	18	0%
TVAUTHOR	TVA 4 MSA Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	ENTERGY	EES 9 MSA Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	-137	5.6	5867	67%
PJM	NI 6 MSA Chicago_G	8111	9,759	7,577	1,023	2,890	39.39	327	PJM	AEP 9 MSA Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	5.6	2541	29%
TVAUTHOR	TVA 1 MSA Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO 10 MSA Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	5.6	282	3%
SPP	WERE 1 MSA Manhattan_G	8771	2,988	409	1,354	2,277	36.55	434	SPP	AEPW 1 MSA Tulsa_G	7434	3,295	2,000	-603	-1,182	42.10	-189	5.5	8634	98%
ENTERGY	EES 9 MSA Russellville_G	2533	6,123	4,517	196	1,152	41.85	21	SPP	AEPW 9 MSA MountPleasant_G	1108	8,168	3,832	-303	-1,116	47.31	-16	5.5	3749	43%
NEPOOL	NEPOOL 3_ME	3923	3,494	2,522	293	1,276	61.48	71	NVPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	5.4	8737	99%
ENTERGY	AECI 4_GEN_NewMadrid1_G	8784	2,315	248	1,156	1,641	44.39	451	TVAUTHOR	TVA 5 MSA Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	5.3	4893	56%
NVPP	NYISO 6_NYF	7469	4,103	1,983	522	1,558	61.60	240	NVPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	5.3	8626	98%
PJM	AEP 8_GEN Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	VACAR	DUK 4 MSA Greenville_L	6816	3,546	4,489	-587	-2,021	50.52	-202	5.2	5209	59%
ENTERGY	EES 10 MSA Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	5.2	6331	72%
PJM	PJM500 9 MSA Pittsburgh_G	8784	1,700	0	1,475	1,700	52.18	676	PJM	VAP 15 MSA VB-Norfolk_L	8784	435	1,297	-572	-1,149	57.34	-288	5.2	7922	90%
PJM	AEP 8_GEN Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	VACAR	DUK 8 MSA Charlotte_L	8784	1,407	4,886	-2,115	-3,574	50.47	-937	5.2	3560	41%
NEPOOL	NEPOOL 7_CT	7641	4,447	3,920	689	1,728	63.04	332	NVPP	NYISO 10_NYJ	8784	10,283	11,493	-3,670	-5,413	68.19	-2,198	5.1	8777	100%
ENTERGY	AECI 4_GEN_NewMadrid1_G	8784	2,315	248	1,156	1,641	44.39	451	ENTERGY	EES 9 MSA Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	-137	5.1	4674	53%
PJM	NI 20 MSA Chicago_G	7214	1,632	83	889	1,504	39.87	256	PJM	AEP 9 MSA Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	5.1	2532	29%
PJM	VAP 1 MSA Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	1,736	PJM	VAP 7_G	1848	4,179	303	-1,012	-1,772	63.09	-118	5.1	5456	62%
FRCC	SEC 6 MSA Palatka_G	8160	1,330	0	1,232	1,330	56.40	567	FRCC	FPL 7 MSA Miami_L	8784	570	3,923	-2,488	-4,070	61.50	-1,344	5.1	4748	54%
NEPOOL	NEPOOL 2_NH	8426	4,204	2,621	1,020	1,855	61.82	531	NVPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	5.1	8771	100%
FRCC	SEC 6 MSA Palatka_G	8160	1,330	0	1,232	1,330	56.40	567	FRCC	FPL 3 MSA Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	-1,053	5.0	4762	54%
NVPP	NYISO 3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	NEPOOL	NEPOOL 6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	-739	5.0	8396	96%
NVPP	NYISO 3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	NEPOOL	NEPOOL 4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	-759	5.0	8770	100%
MISO	LGEE 3_GEN_Geht2_G	8784	2,000	225	1,486	1,894	41.68	544	PJM	AEP 2_STA TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	5.0	4295	49%
PJM	DLCO 7 MSA Pittsburgh_G	8616	1,644	25	1,310	1,633	43.89	495	MISO	FE 5 MSA Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	4.8	4458	51%
MISO	FE 6 MSA Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	MISO	FE 5 MSA Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	4.7	4391	50%
PJM	VAP 7_G	6936	4,179	303	1,656	3,629	56.01	643	PJM	AP 8 MSA DC-VA-MD_L	8784	0	1,097	-798	-1,144	60.64	-425	4.6	5365	61%
PJM	NI 7 MSA Rochelle_G	8784	2,290	0	2,119	2,290	34.96	651	PJM	NI 13 MSA Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	-1,865	4.6	4373	50%
MISO	FE 9 MSA Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	MISO	FE 5 MSA Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	4.6	3653	42%
PJM	NI 7 MSA Rochelle_G	8784	2,290	0	2,119	2,290	34.96	651	PJM	NI 3 MSA Chicago_L	8784	26	1,205	-634	-1,254	39.52	-220	4.6	4410	50%
NEPOOL	NEPOOL 5_SEMA	8784	6,454	3,978	1,952	3,703	63.66	1,092	NVPP	NYISO 10_NYJ	8784	10,283	11,493	-3,670	-5,413	68.19	-2,198	4.5	8778	100%
MISO	EKPC 8 MSA Maysville_G	8784	1,396	272	936	1,366	45.18	372	TVAUTHOR	TVA 5 MSA Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	4.5	5678	65%
PJM	NI 15 MSA Davenport_G	8664	2,479	0	1,717	2,314	33.05	492	MISO	WEC 3 MSA Milwaukee_G	6898	1,429	2,423	-264	-1,143	37.53	-68	4.5	4142	47%
NVPP	NYISO 8_NYH	8784	2,021	973	1,581	1,945	65.27	906	NVPP	NYISO 11_NYK	8784	5,681	5,289	-1,802	-2,670	69.74	-1,104	4.5	8784	100%
ENTERGY	EES 10 MSA Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO 10 MSA Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	4.4	1389	16%
SOUTHERN	SOCO 15 MSA Birmingham_G	8671	12,464	9,217	1,735	5,010	50.51	760	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	4.4	6980	79%
PJM	VAP 7_G	6936	4,179	303	1,656	3,629	56.01	643	PJM	VAP 33 MSA DC_L	8784	910	2,983	-1,730	-2,599	60.40	-918	4.4	5395	61%
VACAR	CPL 1 MSA Durham_G	7843	10,224	8,563	1,031	2,817	52.97	428	PJM	VAP 15 MSA VB-Norfolk_L	8784	435	1,297	-572	-1,149	57.34	-288	4.4	6487	74%
PJM	AEP 8_GEN Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	TVAUTHOR	TVA 5 MSA Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	4.4	6030	69%
FRCC	JEA 6 MSA Jacksonville_G	8784	1,665	358	908	1,345	57.15	456	FRCC	FPL 7 MSA Miami_L	8784	570	3,923	-2,488	-4,070	61.50	-1,344	4.4	4272	49%
SOUTHERN	SOCO 28 MSA Birmingham_G	8616	2,535	1,090	1,369	1,917	50.59	597	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	4.3	6936	79%
FRCC	JEA 6 MSA Jacksonville_G	8784	1,665	358	908	1,345	57.15	456	FRCC	FPL 3 MSA Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	-1,053	4.3	4282	49%
FRCC	FPC 2 MSA HomosassaSprings	8784	1,584	0	1,421	1,584	57.25	714	FRCC	FPL 7 MSA Miami_L	8784	570	3,923	-2,488	-4,070	61.50	-1,344	4.3	5129	58%
SOUTHERN	SOCO 26 MSA Macon_G	8784	6,802	0	5,109	5,796	50.67	2,274	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	4.2	7077	81%
PJM	VAP 7_G	6936	4,179	303	1,656	3,629	56.01	643	PJM	VAP 27 MSA DC_L	8784	0	1,048	-641	-1,075	60.24	-339	4.2	5395	61%
FRCC	FPC 2 MSA HomosassaSprings	8784	1,584	0	1,421	1,584	57.25	714	FRCC	FPL 3 MSA Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	-1,053	4.2	5135	58%
MISO	NIPS 8 MSA Chicago_G	8765	2,892	1,694	940	1,665	37.31	307	MISO	CIN 7 MSA Lafayette_L	8784	144	1,712	-851	-1,422	41.48	-310	4.2	1347	15%
NVPP	NYISO 3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	NVPP	NYISO 7_NYF	7979	3,156	2,195	-673	-1,446	62.81	-337	4.2	6185	70%
MISO	ALTE 2 MSA Madison_G	8616	1,665	441	604	1,083	35.42	184	PJM	NI 13 MSA Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	-1,865	4.1	5793	66%

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	11,765	1,583	3,912	9,527	50.80	1,744	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	4.1	7012	80%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	604	1,083	35.42	184	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	39.52	-220	4.1	5794	66%
MISO	AMRN_12_MSA_StLouis_L	6699	5,059	6,066	757	1,937	36.76	186	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	40.84	-257	4.1	3790	43%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	3,574	2,674	469	1,538	50.84	179	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	4.1	6656	76%
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	42.60	535	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	4.1	4345	49%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,209	-2,885	47.93	-509	4.0	5254	60%
SPP	WERE_1_MSA_Manhattan_G	8771	2,988	409	1,354	2,277	36.55	434	SPP	KACP_7_MSA_KansasCity_L	8784	0	1,291	-691	-1,351	40.59	-246	4.0	3255	37%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	7,215	5,982	-1,502	-4,034	47.91	-631	4.0	5323	61%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	NEPOOL	NEPOOL_10_RI	6570	2,062	2,203	-406	-1,222	62.60	-167	4.0	8771	100%
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	42.60	535	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	3.9	3891	44%
PJM	VAP_7_G	6936	4,179	303	1,656	3,629	56.01	643	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	59.93	-348	3.9	5242	60%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,140	33.61	264	MISO	WEC_3_MSA_Milwaukee_G	6898	1,429	2,423	-264	-1,143	37.53	-68	3.9	87	1%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,122	-2,398	62.55	-617	3.9	7219	82%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	SOUTHERN	SOCO_32_MSA_Pascagoula_G	1253	3,574	2,674	-240	-1,091	47.76	-14	3.9	5883	67%
NEPOOL	NEPOOL_7_CT	7641	4,447	3,920	689	1,728	63.04	332	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	3.8	8575	98%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	43.89	495	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,036	-1,695	47.70	-434	3.8	4635	53%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-951	-1,856	62.39	-521	3.7	6771	77%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,036	-1,695	47.70	-434	3.7	4632	53%
MISO	ITC_7_MSA_Monroe_G	8712	1,500	0	1,307	1,500	45.01	513	MISO	FE_5_MSA_Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	3.7	5499	63%
VACAR	DUK_9_MSA_Charlotte_G	8780	14,681	9,966	3,106	5,530	50.48	1,377	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.6	363	4%
MISO	FE_9_MSA_Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,036	-1,695	47.70	-434	3.6	4618	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	12,464	9,217	1,735	5,010	50.51	760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.6	271	3%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,369	1,917	50.59	597	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.5	277	3%
MISO	ITC_3_MSA_Detroit_G	8784	3,815	1,600	1,266	1,933	45.14	502	MISO	FE_5_MSA_Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	3.5	8397	96%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	5,796	50.67	2,274	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.5	438	5%
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	MISO	FE_5_MSA_Cleveland_L	6473	3,216	4,680	-517	-2,089	48.67	-163	3.4	4043	46%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	11,765	1,583	3,912	9,527	50.80	1,744	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.3	275	3%
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	71	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	-392	3.3	8769	100%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	3,574	2,674	469	1,538	50.84	179	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	3.3	1382	16%
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,952	3,703	63.66	1,092	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	3.2	8605	98%
NYPP	NYISO_6_NYF	7469	4,103	1,983	522	1,558	61.60	240	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	-392	3.2	8770	100%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,813	3,003	58.65	934	PJM	PSEG_5_MSA_Philadelphia_L	8784	2,143	2,766	-1,072	-2,213	61.65	-580	3.0	7153	81%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	800	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	3.0	5784	66%
NEPOOL	NEPOOL_2_NH	8426	4,204	2,621	1,020	1,855	61.82	531	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	-392	3.0	8780	100%
SPP	AEPW_9_MSA_MountPleasant_G	7676	8,168	3,832	715	1,919	46.57	255	ENTERGY	EES_9_MSA_Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	-137	3.0	8735	99%
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	65.27	906	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,670	-5,413	68.19	-2,198	2.9	8783	100%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,232	1,330	56.40	567	FRCC	FPL_2_MSA_FortMyers_G	8506	5,929	4,563	-1,034	-2,343	59.29	-521	2.9	4261	49%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	800	ENTERGY	EES_9_MSA_Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	-137	2.8	2323	26%
MISO	AMRN_12_MSA_StLouis_L	6699	5,059	6,066	757	1,937	36.76	186	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	-1,865	2.8	5519	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	2.8	5272	60%
MISO	AMRN_12_MSA_StLouis_L	6699	5,059	6,066	757	1,937	36.76	186	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	39.52	-220	2.8	5341	61%
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	45.31	372	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,209	-2,885	47.93	-509	2.8	5027	57%
FRCC	FPL_8_MSA_PortStLucie_G	8763	10,364	4,623	1,943	5,374	58.77	1,001	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	61.50	-1,344	2.7	3402	39%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	2.7	5322	61%
FRCC	FPL_8_MSA_PortStLucie_G	8763	10,364	4,623	1,943	5,374	58.77	1,001	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	-1,053	2.7	2924	33%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	1,736	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	60.44	-425	2.7	3766	43%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	2.7	5897	67%
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,209	-2,885	47.93	-509	2.6	5862	67%
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	7,215	5,982	-1,502	-4,034	47.91	-631	2.6	5450	62%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	2.6	6207	71%
SPP	AEPW_9_MSA_MountPleasant_G	7676	8,168	3,832	715	1,919	46.57	255	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6739	7,393	4,949	-473	-1,685	49.15	-157	2.6	8728	99%
MISO	FE_9_MSA_Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	2.6	5052	58%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	34.96	651	MISO	WEC_3_MSA_Milwaukee_G	6898	1,429	2,423	-264	-1,143	37.53	-68	2.6	4580	52%
MISO	FE_9_MSA_Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	PJM	AEP_										

Task 2: Appendix 4, Corridors Results by Scenario
BaseCase2008R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,652	-2,690	51.03	-740	2.5	1148	13%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	1,736	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,730	-2,599	60.40	-918	2.4	3941	45%
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	42.60	535	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	2.4	2435	28%
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,036	-1,695	47.70	-434	2.4	6148	70%
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	VACAR	CPL_1_MSA_Durham_G	941	10,224	8,563	-313	-1,346	47.67	-14	2.4	6859	78%
SPP	AEPW_9_MSA_MountPleasant_G	7676	8,168	3,832	715	1,919	46.57	265	ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,227	-1,983	48.92	-527	2.4	8734	99%
SPP	AEPW_5_MSA_Tulsa_G	7426	4,226	2,571	406	1,330	47.19	142	ENTERGY	EES_9_MSA_Russellville_G	6251	6,123	4,517	-444	-1,630	49.53	-137	2.3	5900	67%
PJM	PJM500_7_MSA_York-Hanover_G	8784	2,696	0	2,195	2,570	60.81	1,172	PJM	VAP_7_G	1848	4,179	303	-1,012	-1,772	63.09	-118	2.3	6627	75%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	1,736	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	60.24	-339	2.3	3044	35%
MISO	NIPS_8_MSA_Chicago_G	8765	2,892	1,694	940	1,665	37.31	307	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,366	-9,115	39.56	-1,865	2.3	162	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,302	-2,646	50.79	-581	2.2	155	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	50.79	-475	2.2	225	3%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	50.79	-816	2.2	194	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,807	-2,983	50.78	-806	2.2	104	1%
MISO	NIPS_8_MSA_Chicago_G	8765	2,892	1,694	940	1,665	37.31	307	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	39.52	-220	2.2	5	0%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	12,464	9,217	1,735	5,010	50.51	760	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	2.2	2686	31%
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	71	NEPOOL	NEPOOL_6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	-739	2.2	6854	78%
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	71	NEPOOL	NEPOOL_4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	-759	2.2	6692	76%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	3,334	2,733	-888	-1,940	50.72	-395	2.2	15	0%
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,345	57.15	456	FRCC	FPL_2_MSA_FortMyers_G	8506	5,929	4,563	-1,034	-2,343	59.29	-521	2.1	4246	48%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	50.70	-293	2.1	10	0%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,369	1,917	50.59	597	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	2.1	2728	31%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	604	1,083	35.42	184	MISO	WEC_3_MSA_Milwaukee_G	6898	1,429	2,423	-264	-1,143	37.53	-68	2.1	1867	21%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,232	1,330	56.40	567	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,471	-2,335	58.48	-756	2.1	3971	45%
NYPP	NYISO_6_NYF	7469	4,103	1,983	522	1,558	61.60	240	NEPOOL	NEPOOL_6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	-739	2.1	7183	82%
NYPP	NYISO_6_NYF	7469	4,103	1,983	522	1,558	61.60	240	NEPOOL	NEPOOL_4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	-759	2.0	7210	82%
FRCC	FPC_2_MSA_HomosassaSpring_G	8784	1,584	0	1,421	1,584	57.25	714	FRCC	FPL_2_MSA_FortMyers_G	8506	5,929	4,563	-1,034	-2,343	59.29	-521	2.0	4967	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	5,796	50.67	2,274	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	2.0	1133	13%
FRCC	FPC_10_MSA_Lakeland_G	8021	3,561	747	1,087	2,004	59.53	519	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	61.50	-1,344	2.0	4293	49%
SPP	AEPW_5_MSA_Tulsa_G	7426	4,226	2,571	406	1,330	47.19	142	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6739	7,393	4,949	-473	-1,685	49.15	-157	2.0	6181	70%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,409	6,440	57.98	1,736	PJM	AP_7_MSA_Hagerstown-Marinsburg_L	8784	203	1,153	-661	-1,009	59.93	-348	2.0	4615	53%
FRCC	FPC_10_MSA_Lakeland_G	8021	3,561	747	1,087	2,004	59.53	519	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,951	-4,084	61.44	-1,053	1.9	4292	49%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	11,765	1,583	3,912	9,527	50.80	1,744	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	1.9	2717	31%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	3,574	2,674	469	1,538	50.84	179	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	1.9	4297	49%
NEPOOL	NEPOOL_2_NH	8426	4,204	2,621	1,020	1,855	61.82	531	NEPOOL	NEPOOL_6_WCMA	8643	4,285	3,417	-1,343	-3,453	63.68	-739	1.9	6868	78%
NEPOOL	NEPOOL_2_NH	8426	4,204	2,621	1,020	1,855	61.82	531	NEPOOL	NEPOOL_4_NEBOS	8691	3,262	5,904	-1,372	-3,898	63.65	-759	1.8	6695	76%
ONTARIO	IESO_15_G	8382	1,964	3,375	1,098	2,054	44.34	408	NYPP	NYISO_2_NYB	8784	650	1,759	-710	-1,588	46.16	-288	1.8	8449	96%
PJM	PJM500_4_MSA_Philadelphia_G	8374	2,383	0	1,338	2,295	61.29	687	PJM	VAP_7_G	1848	4,179	303	-1,012	-1,772	63.09	-118	1.8	5933	68%
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	44.36	718	NYPP	NYISO_2_NYB	8784	650	1,759	-710	-1,588	46.16	-288	1.8	8460	96%
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	44.36	975	NYPP	NYISO_2_NYB	8784	650	1,759	-710	-1,588	46.16	-288	1.8	8528	97%
PJM	PJM500_5_MSA_DC_G	8784	1,730	0	1,516	1,730	61.31	817	PJM	VAP_7_G	1848	4,179	303	-1,012	-1,772	63.09	-118	1.8	5260	60%
NEPOOL	NEPOOL_7_CT	7641	4,447	3,920	689	1,728	63.04	332	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	-392	1.7	8754	100%
SPP	AEPW_5_MSA_Tulsa_G	7426	4,226	2,571	406	1,330	47.19	142	ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,227	-1,983	48.92	-527	1.7	5562	63%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	-396	1.7	7045	80%
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,486	1,894	41.68	544	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	43.40	-831	1.7	4263	49%
VACAR	CEEG_1_MSA_Columbia_G	7968	4,954	2,752	946	2,516	52.49	396	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3,431	4,125	-701	-2,899	54.12	-285	1.6	445	5%
MISO	FE_9_MSA>Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	-396	1.6	6876	78%
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	65.27	906	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	66.87	-445	1.6	6506	74%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,494	4,092	39.26	1,205	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	40.84	-257	1.6	4280	49%
PJM	DPL_8_GEN_Killen_G	8784	2,964	0	2,184	2,940	45.08	865	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	1.6	1917	22%
VACAR	SCPSA_10_MSA_Charleston_G	8616	1,680	0	1,474	1,680	51.19	650	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,215	-2,649	52.70	-562	1.5	2236	25%

Task 2: Appendix 4, Corridors Results by Scenario
BaseCase2008R2

Source Hub Information										Sink Hub Information										Congestion Indicators	
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %	
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	57.25	714	FRCC	TECO_7_MSA_Tampa_L	8784	0	1,481	-951	-2,004	58.75	-491	1.5	3645	41%	
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	45.18	372	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	1.5	1411	16%	
PJM	DPL_8_GEN_Killen_G	8784	2,964	0	2,184	2,940	45.08	865	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	1.5	3115	35%	
MISO	CIN_3_MSA_TerreHaute_G	7034	3,230	1,015	726	2,206	45.20	231	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	1.5	3844	44%	
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,717	2,314	33.05	492	MISO	WEC_7_MSA_Milwaukee_G	8069	3,850	3,052	-556	-1,659	34.50	-155	1.4	4719	54%	
PJM	NI_6_MSA_Chicago_G	8111	9,759	7,577	1,023	2,890	39.39	327	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	40.84	-257	1.4	4234	48%	
ENTERGY	EES_4_GEN_Ouachita_G	5418	6,345	2,417	1,230	3,507	53.53	357	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,947	-5,217	54.91	-1,421	1.4	6326	72%	
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,557	-2,640	46.65	-638	1.3	9	0%	
MISO	CIN_3_MSA_TerreHaute_G	7034	3,230	1,015	726	2,206	45.20	231	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	1.3	3172	36%	
ONTARIO	IESO_15_G	8382	1,964	3,375	1,098	2,054	44.34	408	MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	-396	1.3	8708	99%	
PJM	VAP_7_G	6936	4,179	303	1,656	3,629	56.01	643	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-572	-1,149	57.34	-288	1.3	5475	62%	
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	71	NYPP	NYISO_7_NYG	7979	3,156	2,195	-673	-1,446	62.81	-337	1.3	6712	76%	
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	44.36	718	MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	-396	1.3	8718	99%	
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	44.36	975	MISO	ITC_2_MSA_Detroit_L	8541	4,001	5,247	-1,015	-3,744	45.68	-396	1.3	8724	99%	
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	43.89	495	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,227	-1,849	45.16	-487	1.3	1832	21%	
PJM	PJM500_4_MSA_Philadelphia_G	8374	2,383	0	1,338	2,295	61.29	687	PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,122	-2,398	62.55	-617	1.3	7112	81%	
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	800	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,209	-2,885	47.93	-509	1.3	3712	42%	
PJM	PL_8_MSA_Allentown_G	6898	2,853	385	409	2,259	61.07	173	PJM	JCPL_1_MSA_NewYork_L	8784	0	1,792	-862	-1,934	62.32	-472	1.2	7808	89%	
PJM	AEP_8_GEN_Amos01_G	8783	19,694	6,544	6,016	10,177	45.31	2,394	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,537	-2,299	46.54	-628	1.2	3206	36%	
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	12,464	9,217	1,735	5,010	50.51	760	VACAR	SCEG_9_MSA_Charleston_G	8494	1,152	1,944	-360	-1,540	51.74	-158	1.2	2815	32%	
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	57.25	714	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,471	-2,335	58.48	-756	1.2	2706	31%	
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,951	2,769	46.68	800	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	7,215	5,982	-1,502	-4,034	47.91	-631	1.2	3294	38%	
NYPP	NYISO_6_NYF	7469	4,103	1,983	522	1,558	60.60	240	NYPP	NYISO_7_NYG	7979	3,156	2,195	-673	-1,446	62.81	-337	1.2	5038	57%	
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,227	-1,849	45.16	-487	1.2	1792	20%	
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,072	-4,218	45.13	-822	1.2	7682	87%	
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,369	1,917	50.59	597	VACAR	SCEG_9_MSA_Charleston_G	8494	1,152	1,944	-360	-1,540	51.74	-158	1.2	2841	32%	
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,952	3,703	63.66	1,092	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-689	-1,135	64.79	-392	1.1	8755	100%	
NEPOOL	NEPOOL_3_ME	3923	3,494	2,522	293	1,276	61.48	71	NEPOOL	NEPOOL_10_RI	6570	2,062	2,203	-406	-1,222	62.60	-167	1.1	6688	76%	
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	43.88	793	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	1.1	5444	62%	
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	9,154	8,858	-1,543	-4,313	49.67	-655	1.1	120	1%	
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	43.89	495	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,481	-2,058	44.99	-585	1.1	4400	50%	
PJM	PJM500_4_MSA_Philadelphia_G	8374	2,383	0	1,338	2,295	61.29	687	PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-951	-1,856	62.39	-521	1.1	7009	80%	
MISO	FE_9_MSA_Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,227	-1,849	45.16	-487	1.1	3548	40%	
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,302	-2,646	50.79	-581	1.1	1361	15%	
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,221	6,196	48.57	1,374	SOUTHERN	SOCO_17_MSA_Mobile_G	6709	5,205	4,575	-434	-1,703	49.65	-145	1.1	2782	32%	
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	50.79	-475	1.1	1411	16%	
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	50.79	-816	1.1	1407	16%	
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,807	-2,983	50.78	-806	1.1	1327	15%	
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	5,796	50.67	2,274	VACAR	SCEG_9_MSA_Charleston_G	8494	1,152	1,944	-360	-1,540	51.74	-158	1.1	2773	32%	
MISO	FE_9_MSA_Weirton_G	8571	1,860	112	1,269	1,807	44.07	480	MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,072	-4,218	45.13	-822	1.1	7579	86%	
MAPP	MEC_3_MSA_DesMoines_G	7991	3,307	1,933	908	1,431	29.65	215	MAPP	OPPD_5_MSA_Omaha_L	8784	480	1,686	-847	-1,521	30.69	-228	1.0	2138	24%	
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,922	2,287	43.96	742	PJM	AEP_9_MSA_Canton-Massillon	8784	733	2,120	-1,481	-2,058	44.99	-585	1.0	4355	50%	
ENTERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	871	1,221	49.71	350	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	3,334	2,733	-888	-1,940	50.72	-395	1.0	1238	14%	

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2008R2

Source Hub Information							Sink Hub Information							Congestion Indicators						
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	-33	36.6	6671	76%
ONTARIO	IESO 6 G	8784	2,146	147	1,844	2,071	47.25	765	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	35.1	6676	76%
ONTARIO	IESO 7 G	8784	2,953	253	2,502	2,825	47.25	1,039	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	35.1	6676	76%
ONTARIO	IESO 15 G	8385	1,964	3,375	1,097	2,054	47.28	435	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	35.1	6676	76%
ONTARIO	IESO 6 G	8784	2,146	147	1,844	2,071	47.25	765	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	33.6	8784	100%
ONTARIO	IESO 7 G	8784	2,953	253	2,502	2,825	47.25	1,039	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	33.6	8784	100%
ONTARIO	IESO 15 G	8385	1,964	3,375	1,097	2,054	47.28	435	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	33.6	8784	100%
ONTARIO	IESO 6 G	8784	2,146	147	1,844	2,071	47.25	765	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	31.9	6667	76%
ONTARIO	IESO 7 G	8784	2,953	253	2,502	2,825	47.25	1,039	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	31.9	6668	76%
ONTARIO	IESO 15 G	8385	1,964	3,375	1,097	2,054	47.28	435	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	31.9	6666	76%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	31.6	6676	76%
MAPP	MEC 3_MSA_DesMoines_G	7974	3,307	1,933	904	1,380	31.70	229	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	30.6	3889	44%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	30.1	8784	100%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	28.5	6591	75%
ONTARIO	IESO 6 G	8784	2,146	147	1,844	2,071	47.25	765	NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	27.2	6665	76%
ONTARIO	IESO 7 G	8784	2,953	253	2,502	2,825	47.25	1,039	NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	27.2	6666	76%
ONTARIO	IESO 15 G	8385	1,964	3,375	1,097	2,054	47.28	435	NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	27.1	6664	76%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	26.6	5041	57%
MISO	OTP_9_GEN_BigStone_G	8784	1,189	136	737	1,094	21.48	139	MISO	XEL_3_MSA_Minneapolis_G	4678	7,596	7,622	-853	-2,814	48.01	-192	26.5	7790	89%
PJM	PENELEC_2_MSA_DuBois_G	8404	2,724	1,196	821	1,658	56.52	390	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	25.8	6676	76%
SPP	WERE_1_MSA_Manhattan_G	8753	2,988	409	1,357	2,215	39.31	467	SPP	OKGE_4_MSA_OklahomaCity_L	8783	2,102	2,403	-821	-1,550	64.79	-467	25.5	8317	95%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	24.5	5648	64%
PJM	PENELEC_2_MSA_DuBois_G	8404	2,724	1,196	821	1,658	56.52	390	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	24.4	6675	76%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	23.7	6511	74%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	23.5	6681	76%
PJM	PENELEC_2_MSA_DuBois_G	8404	2,724	1,196	821	1,658	56.52	390	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	22.7	6648	76%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	-33	21.9	8771	100%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NEPOOL	NEPOOL_6_WCMA	8762	4,285	3,417	-1,506	-3,982	72.25	-953	21.5	6671	76%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NEPOOL	NEPOOL_4_NEBOS	8656	3,262	5,904	-1,161	-3,970	72.00	-724	21.3	6671	76%
SPP	WERE_1_MSA_Manhattan_G	8753	2,988	409	1,357	2,215	39.31	467	SPP	WERE_4_GEN_Wolfcreek_G	3670	3,510	2,459	-486	-1,564	60.17	-107	20.9	3405	39%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	20.1	3553	40%
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	339	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	20.0	3560	41%
ENTERGY	EES 9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SPP	OKGE_4_MSA_OklahomaCity_L	8783	2,102	2,403	-821	-1,550	64.79	-467	19.9	4293	49%
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	19.8	7979	91%
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	19.7	7968	91%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	PJM	PSEG 8_MSA_NewYork_G	8784	3,860	3,654	-1,121	-2,452	70.38	-693	19.6	8192	93%
MISO	FE 9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	19.6	7943	90%
NYPP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	PJM	PSEG 3_MSA_NewYork_L	8784	1,843	2,275	-946	-1,857	70.18	-583	19.4	8228	94%
NEPOOL	NEPOOL 3_ME	4348	3,494	2,522	361	1,212	67.94	107	NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	-33	19.4	7681	87%
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	276	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	19.4	3541	40%
MISO	IP 8_GEN_Clinton_G	8015	2,302	1,195	913	1,230	42.92	314	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	19.3	1786	20%
MAPP	NPPD 4_GEN_Gentleman_G	8760	2,702	148	635	1,481	14.17	79	MAPP	OPPD 5_MSA_Omaha_L	8784	480	1,686	-847	-1,503	33.20	-247	19.0	8403	96%
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	19.0	7933	90%
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	18.9	7921	90%
MISO	FE 9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	18.8	7901	90%
NEPOOL	NEPOOL 2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	-33	18.4	7696	88%
NYPP	NYISO 1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	PJM	PSEG 5_MSA_Philadelphia_L	8784	2,143	2,766	-959	-1,990	68.62	-578	17.9	8248	94%
PJM	PENELEC 2_MSA_DuBois_G	8404	2,724	1,196	821	1,658	56.52	390	NYPP	NYISO 7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	17.9	6645	76%
PJM	AEP 8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	17.5	8064	92%
MISO	IP 7_GEN_Baldwin_G	8784	1,900	444	1,189	1,478	44.83	468	MISO	AMRN 12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	17.4	994	11%
MISO	BREC 3_County_Webster_G	8784	1,355	476	906	1,164	37.08	295	MISO	LGEE 5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	-789	17.3	7384	84%
PJM	AEP 8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	VAP 33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	17.3	8124	92%
PJM	AEP 8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	VAP 27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	17.1	8045	92%
PJM	AEP 8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	VAP 7_G	1879	4,179	303	-1,021	-1,772	65.53	-126	17.0	6743	77%

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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	14.5	6842	78%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	861	SPP	OKGE_4_MSA_OklahomaCity	8783	2,102	2,403	-821	-1,550	64.79	-467	14.5	6133	70%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	14.5	6081	69%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	14.4	8782	100%
ENTERGY	AECL_4_GEN_NewMadrid1_G	8781	2,315	248	1,151	1,615	47.88	484	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	14.4	2912	33%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	13.8	3444	39%
NYPP	NYISO_3_NYK	8784	6,711	2,657	1,860	2,732	65.41	1,069	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	13.8	8697	99%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	MISO	AMRN_12_MSA_StLouis_L	2086	5,059	6,066	-464	-1,835	62.26	-60	13.7	748	9%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-594	-1,149	62.16	-324	13.6	8015	91%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	13.6	4732	54%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	13.4	8782	100%
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	SPP	OKGE_4_MSA_OklahomaCity	8783	2,102	2,403	-821	-1,550	64.79	-467	13.2	1445	16%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	13.2	4466	51%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	MISO	METC_9_MSA_Kalamazoo_L	8784	118	1,334	-758	-1,367	48.95	-326	13.0	5758	66%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	12.9	8784	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	12.9	5718	65%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	12.8	5354	61%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	12.7	5715	65%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	8,602	0	5,109	6,381	54.56	2,449	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	12.6	5472	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	12.6	5353	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	8,602	0	5,109	6,381	54.56	2,449	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	12.6	5478	62%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	12.5	5712	65%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	12.4	5352	61%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	12.4	6582	75%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	12.3	6030	69%
ENTERGY	AECL_4_GEN_NewMadrid1_G	8781	2,315	248	1,151	1,615	47.88	484	SPP	WERE_4_GEN_Wolfcreek_G	3670	3,510	2,459	-486	-1,564	60.17	-107	12.3	7585	86%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	12.3	5265	60%
MAPP	MEC_3_MSA_DesMoines_G	7974	3,307	1,933	904	1,380	31.70	229	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	43.77	-276	12.1	5616	64%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	12.0	5932	68%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	12.0	5600	64%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	11.9	8784	100%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	BGE_9_MSA_Baltimore-Towson	8784	0	1,186	-681	-1,226	67.28	-403	11.8	7936	90%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	MISO	METC_8_MSA_BayCity_G	8357	3,795	2,562	-547	-1,369	47.82	-219	11.8	5988	68%
NYPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	11.7	8783	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	11.7	5514	63%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	PEPCO_1_MSA_DC_L	8784	0	1,439	-847	-1,492	66.76	-497	11.7	7714	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-643	-1,025	66.98	-378	11.5	8695	99%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-572	-1,323	66.88	-336	11.4	7888	90%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	11.4	4347	49%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	PEPCO_1_MSA_DC_L	8784	0	1,439	-847	-1,492	66.76	-497	11.3	7790	89%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-733	-1,299	66.73	-429	11.3	7874	90%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	11.2	8756	100%
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	397	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	11.1	8782	100%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	0	1,186	-681	-1,226	67.28	-403	11.1	7861	89%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	606	1,085	38.13	199	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	11.0	5715	65%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	11.0	6810	78%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	11.0	7555	86%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	10.9	6601	75%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-643	-1,025	66.98	-378	10.8	8419	96%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	10.8	7645	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-572	-1,323	66.88	-336	10.7	7814	89%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	10.6	7846	89%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	10.6	7518	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM</											

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	77.04	1,070	NEPOOL	NEPOOL_7_CT	1106	4,447	3,920	-339	-1,095	87.32	-33	10.3	8753	100%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	10.3	5045	57%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	10.3	8780	100%
NYPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	10.3	8783	100%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	10.2	5196	59%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	10.2	7518	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	10.2	7686	88%
PJM	PJM500_7_MSA_York-Hanover	8784	2,696	0	2,196	2,570	67.12	1,295	PJM	PECO_5_MSA_Philadelphia_L	6595	1,656	2,510	-403	-2,442	77.26	-206	10.1	3504	40%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	10.1	5526	63%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	10.1	5045	57%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	VAP_7_G	1879	4,179	303	-1,021	-1,772	65.53	-126	10.1	6804	77%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	10.1	4780	54%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	10.0	5498	63%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	10.0	1408	16%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	606	1,085	38.13	199	MISO	XEL_3_MSA_Minneapolis_G	4678	7,596	7,622	-853	-2,814	48.01	-192	9.9	2351	27%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	9.9	7887	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	9.8	7816	89%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,297	-2,646	54.66	-623	9.7	3428	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	54.66	-878	9.7	3452	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	54.65	-511	9.7	3454	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,808	-2,983	54.64	-868	9.7	3387	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	54.61	-315	9.7	2899	33%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_21_MSA_Atlanta_G	8768	3,334	2,733	-858	-1,940	54.60	-411	9.7	3379	38%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	9.6	5320	61%
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,487	1,898	44.78	585	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	-789	9.6	4107	47%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	9.6	8041	92%
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	397	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	9.6	8780	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,644	9,217	1,611	4,984	54.34	755	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	9.5	4856	55%
PJM	BGE_7_MSA_Baltimore-Towson	8212	2,548	1,043	623	1,324	67.80	347	PJM	PECO_5_MSA_Philadelphia_L	6595	1,656	2,510	-403	-2,442	77.26	-206	9.5	4679	53%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	9.4	7633	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	VAP_7_G	1879	4,179	303	-1,021	-1,772	65.53	-126	9.3	7000	80%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	9.3	4859	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	9.3	5011	57%
SPP	AEPW_9_MSA_MountPleasant	7978	8,168	3,832	800	1,815	50.17	320	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	9.2	8744	100%
PJM	PJM500_4_MSA_Philadelphia_C	8397	2,383	0	1,320	2,295	68.14	755	PJM	PECO_5_MSA_Philadelphia_L	6595	1,656	2,510	-403	-2,442	77.26	-206	9.1	5	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	9.1	4860	55%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	9.1	13	0%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,474	1,700	56.21	728	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	9.0	7880	90%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	NYPP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	9.0	5975	68%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_17_MSA_Mobile_G	6738	5,205	4,575	-421	-1,892	53.83	-153	8.9	3389	39%
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,487	1,898	44.78	585	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	8.9	6303	72%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	5,205	4,575	214	1,180	58.33	26	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	8.9	5740	65%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-489	-1,659	53.78	-184	8.9	6572	75%
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,703	3,589	72.03	1,078	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	8.8	8781	100%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	8.8	8771	100%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	5,205	4,575	214	1,180	58.33	26	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	8.8	5381	61%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	8.8	6019	69%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	8.7	5990	68%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	8.7	5162	59%
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	SPP	WERE_4_GEN_Wolfcreek_G	3670	3,510	2,459	-486	-1,564	60.17	-107	8.6	4615	53%
NYPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	8.6	8657	99%
VACAR	CPL_1_MSA_Durham_G	7851	10,224	8,563	1,043	2,644	57.38	470	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	8.4	7483	85%
VACAR	CPL_1_MSA_Durham_G	7851	10,224	8,563	1,043	2,644	57.38	470	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	8.2	7123	81%
MISO	BREC_3_County_Webster_G	8784	1,355	476	906	1,164	37.08	295	MISO	LGEE_9_MSA_Louisville_G										

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2008R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	MISO	AMRN_2_County_Macon_L	8784	1,209	-717	-1,139	43.77	-276	8.2	5642	64%	
VACAR	CPL1_1_MSA_Durham_G	7851	10,224	8,563	1,043	2,644	57.38	470	PJM	VAP_7_G	1879	4,179	303	-1,021	-1,772	65.53	-126	8.2	5425	62%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	8.1	5514	63%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	8.0	2451	28%
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	339	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	8.0	5524	63%
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	397	NYPVP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	7.9	8633	98%
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	339	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	7.9	2458	28%
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	7.9	7692	88%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	7.8	1446	16%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	FRCC	FPC_3_MSA_Oriando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	7.8	4315	49%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,297	-2,646	54.66	-623	7.6	5488	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	54.66	-878	7.6	5495	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	54.65	-511	7.6	5502	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,808	-2,983	54.64	-868	7.6	5423	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	54.61	-315	7.6	5434	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_21_MSA_Atlanta_G	8784	3,334	2,733	-858	-1,940	54.60	-411	7.6	5468	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	FRCC	FPC_3_MSA_Oriando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	7.6	4316	49%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	FRCC	FPC_3_MSA_Oriando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	7.5	4497	51%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	-789	7.4	5249	60%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	FRCC	FPC_3_MSA_Oriando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	7.4	4313	49%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	46.47	-890	7.3	5961	68%
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	276	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	7.3	5407	62%
NYPVP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NEPOOL	NEPOOL_2_NH	265	4,204	2,621	-181	-1,019	57.99	-3	7.3	6795	77%
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	276	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	7.2	4430	50%
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,703	3,589	72.03	1,078	NYPVP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	7.2	8648	98%
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	47.25	765	NYPVP	NYISO_6_NYF	1254	4,103	1,983	-261	-1,145	54.41	-18	7.2	6643	76%
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	47.25	1,039	NYPVP	NYISO_6_NYF	1254	4,103	1,983	-261	-1,145	54.41	-18	7.2	6644	76%
ONTARIO	IESO_15_G	8385	1,964	3,375	1,097	2,054	47.28	435	NYPVP	NYISO_6_NYF	1254	4,103	1,983	-261	-1,145	54.41	-18	7.1	6638	76%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,528	3,886	55.06	1,222	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-594	-1,149	62.16	-324	7.1	7565	86%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	7.1	0	0%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	SOUTHERN	SOCO_32_MSA_Pascagoula	1396	3,574	2,674	-258	-1,156	51.96	-19	7.0	3198	36%
MISO	LGEE_3_GEN_Gehrt2_G	8784	2,000	225	1,487	1,898	44.78	585	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	6.9	4777	57%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	FRCC	FPC_3_MSA_Oriando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	6.9	4761	54%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	6.9	3400	39%
MISO	LGEE_3_GEN_Gehrt2_G	8784	2,000	225	1,487	1,898	44.78	585	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	-692	6.9	5112	58%
NYPVP	NEPOOL_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	NEPOOL	NEPOOL_6_WCMA	8762	4,285	3,417	-1,506	-3,982	72.25	-953	6.8	8320	95%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_17_MSA_Mobile_G	6738	5,205	4,575	-421	-1,892	53.83	-153	6.8	5863	67%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,386	-9,115	42.40	-2,006	6.8	4747	54%
ENTERGY	EES_9_MSA_Russellville_G	2521	6,123	4,517	200	1,152	44.91	23	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	-692	6.8	960	11%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	42.36	-236	6.7	4745	54%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	1,705	0	1,358	1,700	55.44	661	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-594	-1,149	62.16	-324	6.7	7717	88%
SPP	WERE_1_MSA_Manhattan_G	8753	2,988	409	1,357	2,215	39.31	467	SPP	AEPW_1_MSA_Tulsa_G	7440	3,295	2,000	-608	-1,182	45.99	-208	6.7	8644	98%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	6.7	5959	68%
NYPVP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	NEPOOL	NEPOOL_4_NEBOB	8656	3,262	5,904	-1,161	-3,970	72.00	-724	6.6	8770	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	ENTERGY	EES_9_MSA_Russellville_G	6263	6,123	4,517	-444	-1,617	53.58	-149	6.6	5847	67%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	5,205	4,575	214	1,180	58.33	26	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	6.5	5068	58%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NYPVP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	6.5	6499	74%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,386	-9,115	42.40	-2,006	6.4	4466	51%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	42.36	-236	6.4	4466	51%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	46.47	-890	6.4	1302	15%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	6.3	8768	100%
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	276	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	6.3	0	0%
MISO	IP_8_GEN_Clinton_G	8015	2,302	1,195	913	1,230	42.92	314	PJM	NI_6_MSA_Chicago_G	716	9,759	7,577	-320	-1,221	49.17	-11	6.3	175	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_10_MSA_Albanys-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-			

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ENERGY	LAGN_1_MSA_BatonRouge_G	8784	2,199	163	1,343	1,701	53.52	631	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	5.9	6328	72%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	-789	5.9	21	0%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,231	1,330	61.35	616	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	5.9	4875	55%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	VACAR	DUK_8_MSA_Charlotte_L	8784	1,407	4,886	-2,097	-3,574	54.40	-1,002	5.9	3587	41%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	MISO	FE_5_MSA_Cleveland_L	8784	3,216	4,680	-514	-2,089	52.20	-168	5.8	4483	51%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,231	1,330	61.35	616	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	5.8	4890	56%
ENERGY	AECI_4_GEN_NewMadrid1_G	8781	2,315	248	1,151	1,615	47.88	484	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	5.8	4801	55%
MISO	CIN_3_MSA_TerreHaute_G	7044	3,230	1,015	716	2,206	48.62	245	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,651	-2,733	54.41	-789	5.8	154	2%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	MISO	FE_5_MSA_Cleveland_L	8784	3,216	4,680	-514	-2,089	52.20	-168	5.8	3808	43%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	5.8	2484	28%
ENERGY	AECI_4_GEN_NewMadrid1_G	8781	2,315	248	1,151	1,615	47.88	484	ENERGY	EES_9_MSA_Russellville_G	8263	6,123	4,517	-444	-1,617	53.58	-149	5.7	4956	52%
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	339	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	5.6	2490	28%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	VACAR	DUK_4_MSA_Greenville_L	6750	3,546	4,489	-589	-1,925	54.17	-215	5.6	5157	59%
ENERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	867	1,221	53.84	377	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	5.6	6337	72%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	5,205	4,575	214	1,820	58.33	266	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	5.5	4874	55%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NYPP	NYISO_7_NY	8388	3,156	2,195	-698	-1,444	74.41	-436	5.5	7138	81%
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	48.33	397	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	5.3	5659	64%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	5.3	8778	100%
NYPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	77.04	1,070	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,945	-2,703	82.36	-1,407	5.3	8783	100%
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,487	1,898	44.78	585	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	5.3	4150	47%
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,349	62.05	495	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	5.2	4421	50%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	5.1	5937	68%
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,349	62.05	495	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	5.1	4438	51%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	5.1	6967	79%
PJM	VAP_7_G	6905	4,179	303	1,668	3,629	61.02	703	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	5.1	5237	60%
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	62.19	776	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	5.0	5213	59%
PJM	NI_20_MSA_Chicago_G	7224	1,632	83	890	1,513	42.90	276	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	5.0	2485	28%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,121	-2,452	70.38	-693	5.0	7706	88%
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	62.19	776	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	5.0	5214	59%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	SOUTHERN	SOCO_32_MSA_Pascagoula_L	1396	3,574	2,674	-258	-1,156	51.96	-19	4.9	5905	67%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	MISO	WEC_3_MSA_Milwaukee_G	6881	1,429	2,423	-261	-1,101	40.53	-73	4.9	4104	47%
ENERGY	EES_10_MSA_Vicksburg_G	8088	3,544	1,249	867	1,221	53.84	377	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.9	1223	14%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	4.9	6923	79%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	4.9	7057	80%
PJM	VAP_7_G	6905	4,179	303	1,668	3,629	61.02	703	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	4.8	5256	60%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	4.8	5226	59%
VACAR	CPL_1_MSA_Durham_G	7851	10,224	8,563	1,043	2,644	57.38	470	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-594	-1,149	62.16	-324	4.8	6370	73%
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-946	-1,857	70.18	-583	4.8	7319	83%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,008	-1,587	51.03	-452	4.7	4714	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	ENERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,952	-5,281	59.42	-1,541	4.7	6987	80%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,008	-1,587	51.03	-452	4.7	4711	54%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	-692	4.7	5271	60%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,386	-9,115	42.40	-2,006	4.6	4290	49%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	43.77	-276	4.6	3648	42%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	42.36	-236	4.6	4321	49%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,008	-1,587	51.03	-452	4.6	4705	54%
PJM	VAP_7_G	6905	4,179	303	1,668	3,629	61.02	703	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	4.6	5249	60%
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	45.61	573	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	4.6	3748	43%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,134	35.99	283	MISO	WEC_3_MSA_Milwaukee_G	6881	1,429	2,423	-261	-1,101	40.53	-73	4.5	92	1%
MISO	IPL_2_MSA_Jasper_G	8784	1,678	0	1,431	1,664	45.61	573	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	4.5	4239	48%
SPP	WERE_1_MSA_Manhattan_G	8753	2,988	409	1,357	2,215	39.31	467	SPP	KACP_7_MSA_KansasCity_L	8784	0	1,291	-691	-1,351	43.73	-265	4.4	3283	37%
VACAR	DUK_9_MSA_Charlotte_G	8780	14,681	9,966	3,113	5,523	54.32	1,485	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.4	227	3%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	SOUTHERN	Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.4	104	1%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,665	40.11	331	MISO	CIN_7_MSA_Lafayette_L	8784	144								

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.2	109	1%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.2	301	3%
MISO	ITC_7_MSA_Monroe_G	8712	1,500	0	1,307	1,500	48.10	548	MISO	FE_5_MSA_Cleveland_L	6258	3,216	4,680	-514	-2,089	52.20	-168	4.1	5477	62%
NEPOOL	NEPOOL_3_ME	4348	3,494	2,522	361	1,212	67.94	107	NEPOOL	NEPOOL_4_NEBO5	8656	3,262	5,904	-1,161	-3,970	72.00	-724	4.1	7025	80%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	4.0	107	1%
MISO	ITC_3_MSA_Detroit_G	8784	3,815	1,600	1,266	1,970	48.24	536	MISO	FE_5_MSA_Cleveland_L	6258	3,216	4,680	-514	-2,089	52.20	-168	4.0	8350	95%
NYP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	77.04	1,070	NYP	NYISO_10_NYJ	8784	10,283	11,493	-3,846	-5,293	80.87	-2,732	3.8	8784	100%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	3.8	6216	71%
NYP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NYP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	3.8	5105	58%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	5,205	4,575	214	1,180	58.33	26	FRCC	FPC_3_MSA_Orlando_L	8784	1,232	3,649	-1,857	-3,553	62.09	-1,013	3.8	4360	50%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	3.7	6046	69%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	3.7	5389	61%
NYP	NYISO_1_NYA	8272	4,946	2,500	1,598	2,466	50.73	671	NYP	NYISO_6_NYF	1254	4,103	1,983	-261	-1,145	54.41	-18	3.7	6498	74%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	MISO	FE_5_MSA_Cleveland_L	6258	3,216	4,680	-514	-2,089	52.20	-168	3.7	4008	46%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	3.6	5146	59%
NYP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	3.6	8768	100%
SPP	AEPW_9_MSA_MountPleasant	7978	8,168	3,832	800	1,815	50.17	320	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-489	-1,659	53.78	-184	3.6	8732	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3,431	4,125	-662	-2,746	58.74	-290	3.6	1195	14%
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	48.33	397	TAU	IVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	3.5	5029	57%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,231	1,330	61.35	616	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	3.5	4349	50%
SPP	AEPW_9_MSA_MountPleasant	7978	8,168	3,832	800	1,815	50.17	320	ENTERGY	EES_9_MSA_Russellville_G	6263	6,123	4,517	-444	-1,617	53.58	-149	3.4	8738	99%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	861	TAU	IVA_5_MSA_Nashville_L	8531	9,154	8,858	-1,542	-4,313	53.67	-706	3.3	5690	65%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NEPOOL	NEPOOL_6_WCMA	8762	4,285	3,417	-1,506	-3,982	72.25	-953	3.3	7124	81%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	NI_13_MSA_Chicago_L	8784	2,396	10,556	-5,386	-9,115	42.40	-2,006	3.3	5484	62%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	TAU	IVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	3.3	5789	66%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	861	ENTERGY	EES_9_MSA_Russellville_G	6263	6,123	4,517	-444	-1,617	53.58	-149	3.2	2262	26%
MISO	AMRN_12_MSA_StLouis_L	6698	5,059	6,066	757	1,937	39.14	198	PJM	NI_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	42.36	-236	3.2	5318	61%
NYP	NYISO_3_NYC	8784	6,711	2,657	1,860	2,732	65.41	1,069	PJM	PSEG_5_MSA_Philadelphia_L	8784	2,143	2,766	-959	-1,990	68.62	-578	3.2	7610	87%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	1,893	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	66.07	-463	3.2	3656	42%
TAU	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	3.2	5806	66%
FRCC	FPL_8_MSA_PortSilucie_G	8747	10,364	4,623	1,944	5,374	64.08	1,089	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	3.1	3401	39%
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	397	NYP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	3.1	6168	70%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	TAU	IVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	-692	3.1	5373	61%
TAU	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,096	2,473	47.01	849	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	3.1	5246	60%
FRCC	FPL_8_MSA_PortSilucie_G	8747	10,364	4,623	1,944	5,374	64.08	1,089	FRCC	FPL_3_MSA_Miami_L	8784	6,944	7,089	-1,934	-4,084	67.15	-1,141	3.1	2924	33%
NEPOOL	NEPOOL_2_NH	8519	4,204	2,621	1,085	1,925	68.93	637	NEPOOL	NEPOOL_4_NEBO5	8656	3,262	5,904	-1,161	-3,970	72.00	-724	3.1	7017	80%
NEPOOL	NEPOOL_7_CT	7678	4,447	3,920	726	1,796	71.28	397	NEPOOL	NEPOOL_9_NWKST	8784	405	1,524	-696	-1,248	74.26	-454	3.0	8753	100%
SPP	AEPW_9_MSA_MountPleasant	7978	8,168	3,832	800	1,815	50.17	320	ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,220	-1,970	53.10	-569	2.9	8737	99%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	1,893	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,729	-2,537	65.82	-999	2.9	3845	44%
PJM	NI_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	37.75	703	MISO	WEC_3_MSA_Milwaukee_G	6881	1,429	2,423	-261	-1,101	40.53	-73	2.8	4508	51%
FRCC	JEA_6_MSA_Jacksonville_G	8784	1,665	358	908	1,349	62.05	495	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	2.8	4333	49%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	1,893	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	65.61	-369	2.7	2913	33%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	1,893	PJM	VAP_7_G	1879	4,179	303	-1,021	-1,772	65.53	-126	2.6	5448	62%
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	62.19	776	FRCC	FPL_2_MSA_FortMyers_G	8513	5,929	4,563	-1,058	-2,545	64.81	-584	2.6	5026	57%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	-424	2.5	7178	82%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	AP_2_GEN_Albright3_L	8784	603	1,748	-1,008	-1,587	51.03	-452	2.5	6176	70%
FRCC	SEC_6_MSA_Palatka_G	8160	1,330	0	1,231	1,330	61.35	616	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	2.5	4106	47%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	-424	2.4	7054	80%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	606	1,383	59.51	199	MISO	WEC_3_MSA_Milwaukee_G	6881	1,429	2,423	-261	-1,101	40.53	-73	2.4	1753	20%
PJM	PL_8_MSA_Allentown_G	6728	2,853	385	390	2,261	67.64	177	PJM	JCPL_1_MSA_NewYork_G	8784	0	1,792	-862	-1,934	70.02	-530	2.4	7836	89%
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,703	3,589	72.03	1,078	NYP	NYISO_7_NYG	8388	3,156	2,195	-698	-1,444	74.41	-436	2.4	6199	71%
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,427	6,440	62.90	1,893	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-661	-1,009	65.25	-379	2.4	4553	52%
FRCC	FPC_10_MSA_Lakeland_G	8028	3,561	747	1,085	2,055	64.87	565	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,488	-4,070	67.21	-1,469	2.3	4364	50%
MISO	NIPS_8_MSA_Chicago_G	8764	2,892	1,694	943	1,694	40.11	331	PJM	NI_13_MSA_Chicago_L	8784									

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2008R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-489	-1,659	53.78	-184	2.2	6128	70%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,297	-2,646	54.66	-623	2.2	165	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	54.66	-878	2.2	176	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	54.65	-511	2.2	211	2%
NVPP	NYISO_8_NYH	8784	2,021	973	1,581	1,945	77.04	1,070	NVPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	79.19	-527	2.2	6666	76%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,808	-2,983	54.64	-868	2.1	72	1%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	54.61	-315	2.1	6	0%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	SOUTHERN	SOCO_21_MSA_Atlanta_G	8784	3,334	2,733	-858	-1,940	54.60	-411	2.1	6	0%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,398	1,917	54.53	657	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	-598	2.1	2736	31%
PJM	PJM500_4_MSA_Philadelphia_C	8397	2,383	0	1,320	2,295	68.14	755	PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-946	-1,857	70.18	-583	2.0	7430	85%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,109	6,381	54.56	2,449	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	-598	2.0	1069	12%
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	ENTERGY	EES_9_MSA_Russellville_G	6263	6,123	4,517	-444	-1,617	53.58	-149	2.0	5850	67%
PJM	DPL_8_GEN_Killen_G	8784	2,964	0	2,193	2,940	48.23	929	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	1.9	3074	35%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	17,334	9,966	3,215	6,406	52.50	1,482	MISO	LGEE_5_MSA_Lexington_G	8784	595	2,345	-1,651	-2,733	54.41	-789	1.9	1078	12%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	11,765	1,583	3,929	9,802	54.70	1,885	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	-598	1.9	2713	31%
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	62.19	776	FRCC	TECO_7_MSA_Tampa_L	8784	0	1,481	-951	-2,004	64.08	-535	1.9	3806	43%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,073	-4,218	48.23	-878	1.9	7748	88%
PJM	DPL_8_GEN_Killen_G	8784	2,964	0	2,193	2,940	48.23	929	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	1.9	1911	22%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	MISO	ITC_9_MSA_Detroit_L	8784	1,340	4,751	-2,073	-4,218	48.23	-878	1.8	7668	87%
MISO	EKPC_8_MSA_Maysville_G	8784	1,396	272	936	1,366	48.33	397	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	1.8	1479	17%
MISO	LGEE_3_GEN_Gehnt2_G	8784	2,000	225	1,487	1,898	44.78	585	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,181	-3,310	46.47	-890	1.7	4114	47%
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,495	4,144	42.11	1,293	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	43.77	-276	1.7	4060	46%
PJM	PJM500_8_MSA_Philadelphia_C	8784	3,914	0	3,138	3,868	68.73	1,894	PJM	PSEG_8_MSA_NewYork_G	8784	3,860	3,654	-1,121	-2,452	70.38	-693	1.6	7550	86%
FRCC	FPC_2_MSA_HomosassaSpring	8784	1,584	0	1,421	1,584	62.19	776	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,476	-2,354	63.83	-827	1.6	2819	32%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	1.6	3196	36%
NVPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NEPOOL	NEPOOL_6_WCMA	8762	4,285	3,417	-1,506	-3,982	72.25	-953	1.6	7463	85%
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	47.25	765	MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	-424	1.6	8717	99%
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	47.25	1,039	MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	-424	1.6	8725	99%
ONTARIO	IESO_15_G	8385	1,964	3,375	1,097	2,054	47.28	435	MISO	ITC_2_MSA_Detroit_L	8540	4,001	5,247	-1,016	-3,744	48.87	-424	1.6	8703	99%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	1.6	4507	51%
MISO	CIN_3_MSA_TerreHaute_G	7044	3,230	1,015	716	2,206	48.62	245	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,538	-2,299	50.18	-678	1.6	3183	36%
PJM	NI_6_MSA_Chicago_G	8068	9,759	7,577	994	2,629	42.22	339	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-717	-1,139	43.77	-276	1.5	4018	46%
PJM	AEP_8_GEN_Amos01_G	8782	19,694	6,544	5,935	10,177	48.54	2,530	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	1.5	2	0%
SPP	AEPW_5_MSA_Tulsa_G	7478	4,226	2,571	420	1,245	51.57	162	ENTERGY	EES_1_MSA_Jackson_L	8784	3,218	3,066	-1,220	-1,970	53.10	-569	1.5	5552	63%
VACAR	SCPSA_10_MSA_Charleston_G	8616	1,680	0	1,473	1,680	55.09	699	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	-598	1.5	2261	26%
MAPP	MEC_3_MSA_DesMoines_G	7974	3,307	1,933	904	1,380	31.70	229	MAPP	OPPD_5_MSA_Omaha_L	8784	480	1,686	-847	-1,503	33.20	-247	1.5	2205	25%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	1.5	4457	51%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,209	-1,732	47.77	-507	1.5	1894	22%
ONTARIO	IESO_6_G	8784	2,146	147	1,844	2,071	47.25	765	NVPP	NYISO_2_NYB	8784	650	1,759	-706	-1,572	48.73	-302	1.5	8457	96%
ONTARIO	IESO_7_G	8784	2,953	253	2,502	2,825	47.25	1,039	NVPP	NYISO_2_NYB	8784	650	1,759	-706	-1,572	48.73	-302	1.5	8505	97%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	861	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3,684	5,102	-1,206	-2,885	51.80	-549	1.5	3620	41%
MISO	CIN_3_MSA_TerreHaute_G	7044	3,230	1,015	716	2,206	48.62	245	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,555	-2,640	50.08	-684	1.5	3863	44%
ONTARIO	IESO_15_G	8385	1,964	3,375	1,097	2,054	47.28	435	NVPP	NYISO_2_NYB	8784	650	1,759	-706	-1,572	48.73	-302	1.5	8441	96%
PJM	PJM500_8_MSA_Philadelphia_C	8784	3,914	0	3,138	3,868	68.73	1,894	PJM	PSEG_3_MSA_NewYork_L	8784	1,843	2,275	-946	-1,857	70.18	-583	1.5	7423	85%
PJM	NI_15_MSA_Davenport_G	8664	2,479	0	1,716	2,314	35.62	530	MISO	WEC_7_MSA_Milwaukee_G	8097	3,850	3,052	-563	-1,631	37.06	-169	1.4	4640	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	12,464	9,217	1,611	4,984	54.34	755	VACAR	SCEG_9_MSA_Charleston_G	8439	1,152	1,944	-355	-1,540	55.77	-167	1.4	2805	32%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,491	-2,063	47.87	-627	1.4	3963	45%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	3,574	2,674	452	1,568	55.17	184	VACAR	SCPSA_2_MSA_Charleston_L	8784	1,607	3,236	-1,203	-2,678	56.60	-598	1.4	4298	49%
MISO	FE_6_MSA_Pittsburgh_G	8784	2,371	213	1,921	2,287	46.37	783	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,209	-1,732	47.77	-507	1.4	1849	21%
NVPP	NYISO_6_NYF	7530	4,103	1,983	569	1,525	70.62	302	NEPOOL	NEPOOL_4_NEBOB	8656	3,262	5,904	-1,161	-3,970	72.00	-724	1.4	7489	85%
PJM	PJM500_4_MSA_Philadelphia_C	8397	2,383	0	1,320	2,295	68.14	755	PJM	JCPCL_3_MSA_NewYork_L	8784	1,315	2,735	-651	-1,985	69.48	-397	1.3	6116	70%
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,949	2,769	50.33	861	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	7,215	5,982	-1,527	-4,177	51.66	-692	1.3	3146	36%
MISO	FE_9_MSA>Weirton_G	8610	1,860	112	1,265	1,807	46.43	506	MISO	FE_4_MSA_Akron_L	8784	531	2,277	-1,209	-1,732	47.77	-507	1.3	3697	42%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	46.28	522	MISO	FE_7_MSA_Toledo_L	8779	2,586</								

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information										Sink Hub Information										Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %		
MAPP	MEC 3 MSA DesMoines_G	8009	3,307	1,933	939	1,547	24.54	185	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	20.5	4097	47%		
ONTARIO	IESO 6_G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	18.9	6364	72%		
ONTARIO	IESO 7_G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	18.9	6364	72%		
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	18.9	6364	72%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NEPOOL	NEPOOL 7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	18.4	6361	72%		
PJM	NI 15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	18.0	5766	66%		
ONTARIO	IESO 6_G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	17.8	8784	100%		
ONTARIO	IESO 7_G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	17.8	8784	100%		
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	17.8	8784	100%		
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	16.9	6315	72%		
ONTARIO	IESO 6_G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	16.6	6353	72%		
ONTARIO	IESO 7_G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	16.6	6353	72%		
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	16.6	6353	72%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	16.5	6364	72%		
PJM	AEP 8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	16.4	6866	76%		
MISO	OTP 9_GEN_BigStone_G	8784	1,189	136	737	1,096	18.91	122	MISO	XEL 3 MSA Minneapolis_G	4678	7,596	7,622	-853	-2,814	34.89	-139	16.0	8076	92%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	15.4	8784	100%		
SPP	WERE 1_MSA_Manhattan_G	8739	2,988	409	1,343	2,277	31.03	364	SPP	OKGE 4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	-317	15.3	8490	97%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	14.2	6289	72%		
ONTARIO	IESO 6_G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	14.1	6351	72%		
ONTARIO	IESO 7_G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	14.1	6351	72%		
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	14.1	6350	72%		
PJM	NI 15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	12.9	7290	83%		
PJM	NI 15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	12.5	6500	74%		
SPP	WERE 1_MSA_Manhattan_G	8739	2,988	409	1,343	2,277	31.03	364	SPP	WERE 4_GEN_Wolfcreek_G	3632	3,510	2,459	-481	-1,564	43.55	-76	12.5	3238	37%		
MAPP	NPPD 4_GEN_Gentleman_G	8760	2,702	148	626	1,477	12.49	69	MAPP	OPPD 5_MSA_Omaha_L	8784	480	1,686	-848	-1,521	24.99	-186	12.5	8388	95%		
NEPOOL	NEPOOL 3_ME	3752	3,494	2,522	297	1,074	46.10	51	NEPOOL	NEPOOL 7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	12.5	7545	86%		
PJM	NI 2_MSA_Chicago_G	8784	5,342	1,283	3,498	4,181	32.75	1,006	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	12.3	3925	45%		
PJM	PENELEC 2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	195	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	12.3	6364	72%		
PJM	NI 6_MSA_Chicago_G	8321	9,759	7,577	1,110	3,034	33.17	306	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	11.9	3935	45%		
PJM	NI 15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	PJM	AEP 9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	-482	11.8	6037	69%		
NYPP	NYISO 3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NEPOOL	NEPOOL 7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	11.8	8766	100%		
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	11.7	7000	80%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	11.7	6192	70%		
PJM	NI 20_MSA_Chicago_G	7234	1,632	830	896	1,317	33.43	217	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	11.7	3912	45%		
PJM	AP 1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	11.6	5280	60%		
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	38.01	429	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	11.6	8009	91%		
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	643	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	11.5	8003	91%		
MISO	FE 9_MSA>Weirton_G	8628	1,860	112	1,220	1,808	38.10	401	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	11.5	7970	91%		
PJM	PJM500 3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	11.4	6524	74%		
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	11.4	6397	73%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NEPOOL	NEPOOL 9_NWKST	8784	405	1,524	-692	-1,141	51.52	-313	11.4	6370	73%		
MISO	IP 8_GEN_Clinton_G	8011	2,302	1,195	917	1,230	33.74	248	MISO	AMRN 12 MSA StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	11.3	1664	19%		
ENTERGY	EES 9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SPP	OKGE 4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	-317	11.3	3682	42%		
PJM	PENELEC 2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	195	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	11.2	6364	72%		
PJM	PJM500 9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	11.1	6696	76%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	PJM	PSEG 8_MSA_NewYork_G	8779	3,860	3,654	-1,066	-2,403	51.21	-479	11.1	8163	93%		
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	38.01	429	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	11.1	7972	91%		
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	643	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	11.0	7964	91%		
MISO	FE 9_MSA>Weirton_G	8628	1,860	112	1,220	1,808	38.10	401	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	11.0	7935	90%		
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	PJM	PSEG 3_MSA_NewYork_L	8784	1,843	2,275	-879	-1,841	51.11	-395	11.0	8179	93%		
PJM	AEP 8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	10.8	8108	92%		
VACAR	CPL 1_MSA_Durham_G	7555	10,224	8,563	940	2,730	44.48	316	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	10.7	5149	59%		
MISO	WEC 1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	222	MISO	METC 9_MSA_Kalamazoo_L	8784	118	1,334	-760	-1,339	38.86	-260	10.6	5773	66%		
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0																		

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Source Hub Information										Sink Hub Information										Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %		
NEPOOL	NEPOOL_2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NEPOOL	NEPOOL_7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	10.0	7577	86%		
MAPP	MEC_3_MSA_DesMoines_G	8009	3,307	1,933	939	1,547	24.54	185	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	10.0	6315	72%		
PJM	PENELEC_2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	195	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	10.0	6334	72%		
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	9.8	8784	100%		
SPP	AEPW_5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	SPP	OKGE_4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	-317	9.7	1940	22%		
SPP	AEPW_9_MSA_MountPleasant_C	6984	8,168	3,832	534	1,673	36.63	137	SPP	OKGE_4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	-317	9.7	4330	49%		
NYPP	NYISO_1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NEPOOL	NEPOOL_10_RI	8243	2,062	2,203	-366	-1,145	49.72	-114	9.6	6361	72%		
NEPOOL	NEPOOL_3_ME	3792	3,494	2,522	297	1,074	46.10	51	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	9.4	8781	100%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	9.4	6807	77%		
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	222	MISO	METC_8_MSA_BayCity_G	8119	3,795	2,562	-538	-1,369	37.60	-164	9.4	5919	67%		
NYPP	NYISO_6_NYF	7778	4,103	1,983	618	1,759	49.25	237	NEPOOL	NEPOOL_7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	9.3	8747	100%		
MISO	XEL_3_MSA_Minneapolis_G	4129	7,596	7,622	812	1,981	17.84	60	MISO	GRE_4_MSA_Minneapolis_L	8784	331	1,111	-1,008	-1,827	27.10	-240	9.3	0	0%		
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	9.2	5377	61%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_10_MSA_Albanys_Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	9.2	3674	42%		
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	2,315	248	1,168	1,641	36.21	372	MISO	AMRN_12_MSA_StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	8.9	2732	31%		
MISO	NIPS_8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	8.8	4999	56%		
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	8.8	7097	81%		
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	8.7	8782	100%		
ENTERGY	EES_2_MSA_Batesville_G	8784	3,525	1,697	1,952	2,769	37.86	649	SPP	OKGE_4_MSA_OklahomaCity_L	8773	2,102	2,403	-781	-1,550	46.32	-317	8.5	5518	63%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	MISO	AMRN_12_MSA_StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	8.5	5995	68%		
MISO	NIPS_8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	8.5	1654	19%		
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	8.4	6856	78%		
PJM	AEP_8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	PJM	VAP_15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	-205	8.4	8049	92%		
NEPOOL	NEPOOL_3_ME	3752	3,494	2,522	297	1,074	46.10	51	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	8.2	8753	100%		
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,957	3,704	50.35	866	NEPOOL	NEPOOL_7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	8.2	2719	31%		
MISO	CIN_8_MSA_Evansville_G	8783	3,657	260	2,484	3,391	36.95	806	MISO	AMRN_12_MSA_StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	8.1	2938	33%		
NEPOOL	NEPOOL_2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	8.1	8783	100%		
SPP	AEPW_5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	7.8	7708	88%		
SPP	AEPW_9_MSA_MountPleasant_C	6984	8,168	3,832	534	1,673	36.63	137	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	7.8	8748	100%		
MISO	NIPS_8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	-482	7.7	1705	19%		
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	-482	7.6	6336	72%		
PJM	VAP_1_MSA_Richmond_G	8784	10,524	3,579	3,288	6,493	47.58	1,374	PJM	VAP_7_G	1371	4,179	303	-974	-1,741	55.16	-74	7.6	5353	61%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_10_MSA_Albanys_Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	7.6	5424	62%		
MISO	LGEE_3_GEN_Gehrt2_G	8784	2,000	225	1,496	1,895	35.70	469	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	7.5	4914	56%		
PJM	NI_15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	7.5	6627	75%		
PJM	PENELEC_2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	195	NYPP	NYISO_7_NYJ	8420	3,156	2,195	-732	-1,477	51.85	-320	7.5	6333	72%		
NYPP	NYISO_3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	7.5	8692	99%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	7.5	3708	42%		
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	7.5	5710	65%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	42.46	-397	7.4	3787	43%		
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	FRCC	FPL_3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	7.4	5183	59%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	42.45	-682	7.4	3763	43%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,410	-2,740	42.42	-526	7.4	3508	40%		
NYPP	NYISO_6_NYF	7778	4,103	1,983	618	1,759	49.25	237	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	7.4	8784	100%		
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	2,315	248	1,168	1,641	36.21	372	SPP	WERE_4_GEN_Wolfcreek_G	3632	3,510	2,459	-481	-1,564	43.55	-76	7.3	6992	80%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	3,334	2,733	-1,117	-2,055	42.33	-415	7.3	3449	39%		
MISO	BREC_3_County_Webster_G	8784	1,355	476	902	1,135	33.08	262	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	7.3	7663	87%		
ENTERGY	EES_9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	42.27	-244	7.2	3061	35%		
PJM	NI_2_MSA_Chicago_G	8784	5,342	1,283	3,498	4,181	32.75	1,006	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	7.2	5573	63%		
NEPOOL	NEPOOL_2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	7.0	8784	100%		
SPP	AEPW_5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	SPP	WERE_4_GEN_Wolfcreek_G	3632	3,510	2,459	-481	-1,564	43.55	-76	7.0	3839	44%		
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	FRCC	SOCO_7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	6.9	5394	61%		
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	FRCC	FPL_3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	6.9	4788	55%		
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	484	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923</									

Task 2: Appendix 4, Corridors Results by Scenario
LowCase2008R2

Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	PJM500 3 MSA Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	0	1,186	-681	-1,226	50.49	-302	6.7	7768	88%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	PEPCO_1_MSA_DC_L	8784	0	1,439	-847	-1,492	50.14	-373	6.6	7474	85%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	MISO	LGEE_5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	6.6	5187	59%
NEPOOL	NEPOOL_7_CT	7667	4,447	3,920	690	1,740	50.04	265	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	6.6	8783	100%
PJM	Ni_20_MSA_Chicago_G	7234	1,632	83	896	1,571	33.43	217	PJM	AEP_1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	6.5	5619	64%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-578	-1,460	50.26	-255	6.5	7730	88%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	6.4	4901	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-806	-1,325	50.17	-355	6.4	7724	88%
PJM	Ni_6_MSA_Chicago_G	8321	9,759	7,577	1,110	3,034	33.17	306	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	6.4	2758	31%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	0	1,186	-681	-1,226	50.49	-302	6.4	7694	88%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	FRCC	FPL_3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	6.4	4913	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	PEPCO_1_MSA_DC_L	8784	0	1,439	-847	-1,492	50.14	-373	6.4	7445	85%
PJM	Ni_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	MISO	AMRN_2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	6.4	6480	74%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	FRCC	FPL_7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	6.3	5380	61%
PJM	AEP_8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	MISO	AMRN_12_MSA_StLouis_L	2082	5,059	6,066	-463	-1,852	45.08	-44	6.3	1056	12%
NYPP	NYISO_6_NYF	7778	4,103	1,983	618	1,759	49.25	237	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	6.3	8782	100%
NEPOOL	NEPOOL_5_SEMA	8784	6,454	3,978	1,957	3,704	50.35	866	NYPP	NYISO_11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	6.3	8783	100%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	FRCC	FPL_3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	6.3	4782	54%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-654	-1,025	49.98	-287	6.2	8676	99%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	845	1,565	-578	-1,460	50.26	-255	6.2	7642	87%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	FRCC	FPL_2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	6.2	4850	55%
PJM	Ni_20_MSA_Chicago_G	7234	1,632	83	896	1,571	33.43	217	PJM	AEP_2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	6.2	4471	51%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	263	1,462	-806	-1,325	50.17	-355	6.1	7634	87%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	6.1	7636	87%
MISO	NIPS_8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,176	-3,301	37.20	-711	6.1	1903	22%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	PEPCO_11_MSA_DC_L	8784	0	1,439	-847	-1,492	50.14	-373	6.1	7419	84%
PJM	Ni_2_MSA_Chicago_G	8784	5,342	1,283	3,498	4,181	32.75	1,006	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	-482	6.0	2858	33%
MISO	AMRN_12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	159	MISO	CIN_1_MSA_Indianapolis_L	8784	816	4,274	-2,176	-3,301	37.20	-711	6.0	6287	72%
PJM	Ni_15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	PJM	Ni_3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	-184	5.9	5745	85%
PJM	Ni_15_MSA_Davenport_G	8670	2,479	0	1,728	2,314	27.04	405	PJM	Ni_13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	-1,524	5.9	5746	85%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-654	-1,025	49.98	-287	5.9	8369	95%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	5.9	5322	61%
MISO	ALTE_2_MSA_Madison_G	8616	1,665	441	590	1,099	29.01	147	MISO	XEL_3_MSA_Minneapolis_G	4678	7,596	7,622	-853	-2,814	34.89	-139	5.9	2141	24%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	5.8	7723	88%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	42.46	-397	5.8	5434	62%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	42.45	-682	5.8	5382	61%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	694	3,058	-1,410	-2,740	42.42	-526	5.8	5284	60%
NEPOOL	NEPOOL_2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NYPP	NYISO_9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	5.8	8773	100%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	-738	5.8	7654	87%
NEPOOL	NEPOOL_3_ME	3752	3,494	2,522	297	1,074	46.10	51	NYPP	NYISO_7_NYK	8420	3,156	2,195	-732	-1,477	51.85	-320	5.8	6131	70%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	3,334	2,733	-1,117	-2,055	42.33	-415	5.7	5274	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	FRCC	FPC_4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	5.7	4648	53%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	VAP_27_MSA_DC_L	8784	0	1,048	-641	-1,075	49.20	-277	5.7	7581	86%
TXAUTHOR	TVA_4_MSA_Clarksville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	42.27	-244	5.6	5366	61%
PJM	PENELEC_2_MSA_DuBois_G	7753	2,724	1,196	568	1,591	44.34	195	PJM	PL_7_MSA_Allentown_L	8784	245	1,051	-654	-1,025	49.98	-287	5.6	7760	88%
PJM	Ni_7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	PJM	Ni_6_MSA_Chicago_G	463	9,759	7,577	-232	-1,050	33.83	-4	5.6	5133	58%
PJM	Ni_6_MSA_Chicago_G	8321	9,759	7,577	1,110	3,034	33.17	306	PJM	AEP_9_MSA_Canton-Massillon_L	8784	733	2,120	-1,414	-2,058	38.80	-482	5.6	2955	34%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	FRCC	FPL_2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	5.6	4382	50%
MISO	WEC_1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	222	PJM	Ni_6_MSA_Chicago_G	463	9,759	7,577	-232	-1,050	33.83	-4	5.6	4502	51%
PJM	AP_1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	5.6	7603	87%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	2,535	1,020	1,342	1,917	41.83	484	FRCC	FPL_2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	5.6	4380	50%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	VAP_33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	-738	5.5	7762	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	AP_8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	5.5	7719	88%
NEPOOL	NEPOOL_7_CT	7667	4,447	3,920	690	1,740	50.04	265	NYPP	NYISO_10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833			

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ENTERGY	EES 8 MSA BatonRouge_G	8520	1,060	0	1,059	1,060	39.11	353	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	5.3	5064	58%
NYPP	NYISO 8_NYH	8784	2,021	973	1,581	1,945	53.25	740	NEPOOL	NEPOOL 7_CT	1117	4,447	3,920	-320	-1,094	58.57	-21	5.3	8753	100%
ENTERGY	LAGN 1_MSA_BatonRouge_G	8784	2,199	163	1,342	1,697	39.15	461	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	5.3	6329	72%
PJM	PJM500 9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	VAP 33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	-738	5.2	7786	89%
NEPOOL	NEPOOL 5_SEMA	8784	6,454	3,978	1,957	3,704	50.35	866	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	5.2	8774	100%
SOUTHERN	SOCO 15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	FRCC	FPC 4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	5.1	4124	47%
SOUTHERN	SOCO 26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	FRCC	FPL 2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	5.1	4535	52%
PJM	PJM500 9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	VAP 27_MSA_DC_L	8784	0	1,048	-641	-1,075	49.20	-277	5.1	7545	86%
ENTERGY	EES 9 MSA Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SOUTHERN	SOCO 17_MSA_Mobile_G	7680	5,205	4,575	-584	-2,068	40.12	-180	5.1	3393	39%
SOUTHERN	SOCO 28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	484	FRCC	FPC 4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	5.1	4125	47%
NYPP	NYISO 6_NYF	7778	4,103	1,983	618	1,759	49.25	237	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	5.1	8643	98%
NYPP	NYISO 3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	5.0	5594	64%
MISO	CIN 3_MSA_TerreHaute_G	6968	3,230	1,015	796	2,234	38.21	212	MISO	LGEE 5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	5.0	255	3%
SOUTHERN	SOCO 31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	FRCC	FPL 2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	5.0	4375	50%
PJM	PJM500 9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	5.0	7607	87%
PJM	PJM500 7_MSA_York-Hanover	8784	2,696	0	2,198	2,570	50.23	970	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	4.9	6054	69%
ENTERGY	EES 9 MSA Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	SPP	AEPW 9_MSA_MountPleasant_G	1800	8,168	3,832	-294	-1,361	39.92	-21	4.9	2759	31%
VACAR	CPL 1_MSA_Durham_G	7555	10,224	8,563	940	2,730	44.48	316	PJM	VAP 33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	-738	4.8	7593	86%
MISO	ALTE 2_MSA_Madison_G	8616	1,665	441	590	1,099	29.01	147	PJM	NI 6_MSA_Chicago_G	463	9,759	7,977	-232	-1,050	33.83	-4	4.8	6187	70%
PJM	PJM500 5_MSA_DC_G	8784	1,730	0	1,516	1,730	50.37	671	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	4.8	4880	56%
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	PJM	NI 3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	-184	4.8	5105	58%
PJM	NI 7_MSA_Rochelle_G	8784	2,290	0	2,119	2,290	28.20	525	PJM	NI 13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	-1,524	4.8	5083	58%
MISO	WEC 1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	222	PJM	NI 3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	-184	4.8	4503	51%
MISO	WEC 1_MSA_Chicago_G	8784	1,728	303	896	1,138	28.23	222	PJM	NI 13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	-1,524	4.7	4502	51%
VACAR	CPL 1_MSA_Durham_G	7555	10,224	8,563	940	2,730	44.48	316	PJM	VAP 27_MSA_DC_L	8784	0	1,048	-641	-1,075	49.20	-277	4.7	7300	83%
NYPP	NYISO 3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NEPOOL	NEPOOL 9_NWIKST	8784	405	1,524	-692	-1,141	51.52	-313	4.7	8769	100%
PJM	PJM500 4_MSA_Philadelphia_G	8496	2,383	0	1,449	2,346	50.48	621	PJM	VAP 7_G	1371	4,179	303	-974	-1,741	55.16	-74	4.7	5560	63%
SOUTHERN	SOCO 26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	FRCC	FPC 4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	4.7	4283	49%
MISO	LGEE 3_GEN_Gehnt2_G	8784	2,000	225	1,496	1,895	35.70	469	TVAUTHOR	TVA 5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	4.7	6092	69%
ENTERGY	EES 10_MSA_Vicksburg_G	8088	3,544	1,249	894	1,236	39.85	288	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	4.6	6335	72%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	183	FRCC	FPC 3_MSA_Orlando_L	8784	1,232	3,649	-1,853	-3,468	45.78	-745	4.6	4143	47%
TVAUTHOR	TVA 1_MSA_Chatt-Hunts_G	8781	17,334	9,966	3,331	6,553	39.62	1,159	SOUTHERN	SOCO 10_MSA_Albany-Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	4.6	536	6%
SOUTHERN	SOCO 31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	FRCC	FPC 4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	4.5	4123	47%
MISO	EKPC 8_MSA_Maysville_G	8784	1,396	272	927	1,366	38.73	315	MISO	LGEE 5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	4.5	1034	12%
PJM	AEP 8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	VACAR	DUK 4_MSA_Greenville_L	6956	3,546	4,489	-618	-2,091	43.29	-186	4.5	5242	60%
ENTERGY	EES 9 MSA Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	ENTERGY	EES 7_MSA_Beaumont-PortArthur_G	6142	7,393	4,949	-435	-1,610	39.49	-105	4.5	6314	72%
PJM	AEP 8_GEN_Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	MISO	LGEE 5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	4.4	83	1%
NEPOOL	NEPOOL 3_ME	3752	3,494	2,522	297	1,074	46.10	51	NEPOOL	NEPOOL 6_WCMA	8707	4,285	3,417	-1,409	-3,954	50.54	-620	4.4	6948	79%
NYPP	NYISO 3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	PJM	PSEG 8_MSA_NewYork_G	8779	3,860	3,654	-1,066	-2,403	51.21	-479	4.4	7548	86%
NYPP	NYISO 1_NYA	8323	4,946	2,500	1,595	2,319	40.13	533	NEPOOL	NEPOOL 3_ME	5032	3,494	2,522	-208	-1,038	44.51	-47	4.4	6484	74%
ENTERGY	EES 10_MSA_Vicksburg_G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 10_MSA_Albany-Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	4.3	1789	20%
NEPOOL	NEPOOL 3_ME	3752	3,494	2,522	297	1,074	46.10	51	NEPOOL	NEPOOL 4_NEBOB	8631	3,262	5,904	-1,262	-3,970	50.39	-549	4.3	6823	78%
NYPP	NYISO 3_NYC	8784	6,711	2,657	1,852	3,064	46.81	762	PJM	PSEG 3_MSA_NewYork_L	8784	1,843	2,275	-879	-1,841	51.11	-395	4.3	7199	82%
PJM	VAP 7_G	7413	4,179	303	1,507	3,629	45.32	506	PJM	AP 8_MSA_DC-VA-MD_L	8784	0	1,097	-798	-1,144	49.61	-348	4.3	5956	68%
NEPOOL	NEPOOL 7_CT	7667	4,447	3,920	690	1,740	50.04	265	NYPP	NYISO 9_NYI	8467	2	1,476	-786	-1,993	54.32	-362	4.3	8615	98%
ENTERGY	EES 9 MSA Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	ENTERGY	EES 1_MSA_Jackson_L	8784	3,218	3,066	-1,233	-2,026	39.26	-425	4.2	2320	26%
ENTERGY	EES 9 MSA Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	TVAUTHOR	TVA 7_MSA_Memphis_L	8725	7,215	5,982	-1,376	-4,095	39.25	-471	4.2	1050	12%
MISO	NIPS 8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	MISO	CIN 7_MSA_Lafayette_L	8784	144	1,712	-851	-1,422	35.30	-284	4.2	1662	19%
ENTERGY	AECI 4_GEN_NewMadrid1_G	8784	2,315	248	1,168	1,641	36.21	372	TVAUTHOR	TVA 5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	4.1	4764	54%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	VACAR	SCPSA 2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	4.1	2603	30%
ENTERGY	EES 9_MSA_Russellville_G	2477	6,123	4,517	196	1,183	35.02	17	TVAUTHOR	TVA 3_MSA_Knoxville_L	8784	3,684	5,102	-1,211	-2,885	39.10	-416	4.1	3407	39%
PJM	PJM500 7_MSA_York-Hanover	8784	2,696	0	2,198	2,570	50.23	970	PJM	PECO 5_MSA_Philadelphia_L	6985	1,656	2,510	-424	-2,442	54.27	-161	4.0	2626	30%
SOUTHERN	SOCO 15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	FRCC	FPC 3_MSA_Orlando_L	8784	1,232	3,649	-1,853	-3,468	45.78	-745	4.0	3426	39%
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	38.01	429	MISO	FE 5_MSA_Cleveland_L	6639	3,216	4,680	-553	-2,419	42.00	-154</			

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
NYPP	NYISO 3 NYC	8784	6,711	2,657	1,852	3,064	46.81	762	PJM	PSEG 5 MSA Philadelphia_L	8784	2,143	2,766	-1,186	-2,037	50.63	-528	3.8	7605	87%
PJM	AEP 8_GEN Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	VACAR	DUK 8 MSA Charlotte_L	8784	1,407	4,886	-2,232	-3,594	42.59	-835	3.8	3528	40%
PJM	PJM500 4_MSA Philadelphia_G	8496	2,383	0	1,449	2,346	50.48	621	PJM	PECO 5 MSA Philadelphia_L	6985	1,656	2,510	-424	-2,442	54.27	-161	3.8	1	0%
MISO	ITC 3_MSA_Detroit_G	8784	3,815	1,600	1,252	1,948	38.23	421	MISO	FE 5_MSA_Cleveland_L	6639	3,216	4,680	-553	-2,419	42.00	-154	3.8	8361	95%
PJM	VAP 7_G	7413	4,179	303	1,507	3,629	45.32	506	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	3.8	5860	67%
TVAUTHOR	TVA 4_MSA_Clarkeville_G	8616	2,544	150	2,099	2,473	36.62	662	TVAUTHOR	TVA 5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	3.7	5924	67%
NYPP	NYISO 3 NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NEPOOL	NEPOOL 6_WCMA	8707	4,285	3,417	-1,409	-3,954	50.54	-620	3.7	8390	96%
ONTARIO	IESO 6_G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 8_NYF	1006	4,103	1,983	-230	-1,041	41.39	-10	3.7	6319	72%
ONTARIO	IESO 7_G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 8_NYF	1006	4,103	1,983	-230	-1,041	41.39	-10	3.7	6319	72%
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 8_NYF	1006	4,103	1,983	-230	-1,041	41.39	-10	3.7	6315	72%
PJM	AP 1_County_Harrison_G	8784	6,563	2,223	2,424	3,969	43.51	926	PJM	VAP 15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	-205	3.7	7574	86%
MISO	BREC 3_County_Webster_G	8784	1,355	476	902	1,135	33.08	262	MISO	LGEE 9_MSA_Louisville_G	8784	1,136	1,763	-959	-1,773	36.72	-309	3.6	7458	85%
NEPOOL	NEPOOL 3_ME	3752	3,494	2,522	297	1,074	46.10	51	NEPOOL	NEPOOL 10_RI	6243	2,062	2,203	-366	-1,145	49.72	-114	3.6	6823	78%
TVAUTHOR	TVA 1_MSA_Chatt-Hunts_G	8781	17,334	9,966	3,331	6,553	39.62	1,159	MISO	LGEE 5_MSA_Lexington_L	8784	595	2,345	-1,654	-2,693	43.24	-628	3.6	1623	18%
NYPP	NYISO 3 NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NEPOOL	NEPOOL 4_NEBO3	8631	3,262	5,904	-1,262	-3,970	50.39	-549	3.6	8764	100%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 10_MSA_Albanys-Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	3.6	498	6%
MISO	LGEE 3_GEN_Gehnt2_G	8784	2,000	225	1,496	1,895	35.70	469	TVAUTHOR	TVA 7_MSA_Memphis_L	8725	7,215	5,982	-1,376	-4,095	39.25	-471	3.5	5676	65%
SOUTHERN	SOCO 26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	FRCC	FPC 3_MSA_Orlando_L	8784	1,232	3,649	-1,853	-3,468	45.78	-745	3.5	3607	41%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	VACAR	SCPSA 2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	3.5	4042	46%
TVAUTHOR	TVA 4_MSA_Clarkeville_G	8616	2,544	150	2,099	2,473	36.62	662	SOUTHERN	SOCO 17_MSA_Mobile_G	7680	5,205	4,575	-584	-2,068	40.12	-180	3.5	5534	63%
SPP	CELE 10_MSA_Alexandria_G	8586	1,895	742	356	1,228	40.95	125	ENTERGY	EES 5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	3.5	6488	74%
PJM	PJM500 3_MSA_Pittsburgh_G	8758	1,705	0	1,368	1,700	43.76	524	PJM	VAP 15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	-205	3.4	7590	86%
MISO	LGEE 3_GEN_Gehnt2_G	8784	2,000	225	1,496	1,895	35.70	469	TVAUTHOR	TVA 3_MSA_Knoxville_L	8784	3,684	5,102	-1,211	-2,985	39.10	-416	3.4	5624	64%
SOUTHERN	SOCO 31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	FRCC	FPC 3_MSA_Orlando_L	8784	1,232	3,649	-1,853	-3,468	45.78	-745	3.4	3424	39%
MISO	AMRN 12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	MISO	AMRN 2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	3.4	4425	59%
NYPP	NYISO 8_NYH	8784	2,021	973	1,581	1,945	53.25	740	NYPP	NYISO 11_NYK	8784	5,681	5,289	-1,869	-2,703	56.62	-930	3.4	8784	100%
NEPOOL	NEPOOL 2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	3.3	6881	78%
SPP	AEPW 5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	SPP	AEPW 9_MSA_MountPleasant_L	1800	8,168	3,832	-294	-1,361	39.92	-21	3.3	3516	40%
TVAUTHOR	TVA 4_MSA_Clarkeville_G	8616	2,544	150	2,099	2,473	36.62	662	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	3.3	5982	68%
MISO	IPL 2_MSA_Jasper_G	8784	1,678	0	1,435	1,664	36.63	462	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	3.3	4149	47%
ENTERGY	AECI 4_GEN_NewMadrid1_G	8784	2,315	248	1,168	1,641	36.21	372	ENTERGY	EES 9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	-112	3.3	4478	51%
PJM	AEP 8_GEN Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	MISO	FE 5_MSA_Cleveland_L	6639	3,216	4,680	-553	-2,419	42.00	-154	3.2	4962	56%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	ENTERGY	EES 5_MSA_NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	3.2	6629	75%
FRCC	SEC 6_MSA_Palatka_G	8160	1,330	0	1,220	1,330	45.56	453	FRCC	FPL 7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	3.1	4733	54%
PJM	DLCO 7_MSA_Pittsburgh_G	8616	1,644	25	1,310	1,633	38.01	429	PJM	AP 2_GEN_Albright3_L	8784	603	1,748	-1,114	-1,695	41.10	-402	3.1	4812	55%
PJM	BGE 7_MSA_Baltimore-Towson	7066	2,548	1,043	549	1,095	51.17	198	PJM	PECO 5_MSA_Philadelphia_L	6985	1,656	2,510	-424	-2,442	54.27	-161	3.1	3818	43%
PJM	PJM500 9_MSA_Pittsburgh_G	8784	1,700	0	1,473	1,700	44.08	570	PJM	VAP 15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	-205	3.1	7539	86%
FRCC	SEC 6_MSA_Palatka_G	8160	1,330	0	1,220	1,330	45.56	453	FRCC	FPL 3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	3.1	4751	54%
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	643	PJM	AP 2_GEN_Albright3_L	8784	603	1,748	-1,114	-1,695	41.10	-402	3.0	4809	55%
MISO	FE 9_MSA_Weirton_G	8628	1,860	112	1,220	1,808	38.10	401	PJM	AP 2_GEN_Albright3_L	8784	603	1,748	-1,114	-1,695	41.10	-402	3.0	4803	55%
NEPOOL	NEPOOL 2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NEPOOL	NEPOOL 9_NWKST	8784	405	1,524	-692	-1,141	51.52	-313	3.0	8779	100%
SOUTHERN	SOCO 15_MSA_Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	VACAR	SCPSA 2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	3.0	2417	28%
TVAUTHOR	TVA 4_MSA_Clarkeville_G	8616	2,544	150	2,099	2,473	36.62	662	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	3.0	5189	59%
MISO	IPL 2_MSA_Jasper_G	8784	1,678	0	1,435	1,664	36.63	462	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	3.0	4341	49%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	SOUTHERN	SOCO 10_MSA_Albanys-Valdosta_L	7678	3,431	4,125	-720	-2,899	44.18	-244	3.0	1758	20%
SOUTHERN	SOCO 28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	484	VACAR	SCPSA 2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	2.9	2457	28%
NYPP	NYISO 3 NYC	8784	6,711	2,657	1,852	3,064	46.81	762	NEPOOL	NEPOOL 10_RI	6243	2,062	2,203	-366	-1,145	49.72	-114	2.9	8764	100%
SPP	AEPW 5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	ENTERGY	EES 7_MSA_Beaumont-PortArthur_G	6142	7,393	4,949	-435	-1,610	39.49	-105	2.9	6069	69%
TVAUTHOR	TVA 1_MSA_Chatt-Hunts_G	8781	17,334	9,966	3,331	6,553	39.62	1,159	SOUTHERN	SOCO 5_GEN_GEPCHY_L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	2.9	652	7%
SPP	AEPW 5_MSA_Tulsa_G	7062	4,226	2,571	388	1,209	36.60	100	ENTERGY	EES 9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	-112	2.9	5952	68%
SPP	AEPW 9_MSA_MountPleasant_G	6984	8,168	3,832	534	1,673	36.63	137	ENTERGY	EES 7_MSA_Beaumont-PortArthur_G	6142	7,393	4,949	-435	-1,610	39.49	-105	2.9	8737	99%
TVAUTHOR	TVA 4_MSA_Clarkeville_G	8616	2,544	150	2,099	2,473	36.62	662	ENTERGY	EES 9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	-112	2.9	5492	63%
SPP	AEPW 9_MSA_MountPleasant_G	6984	8,168	3,832	534	1,673	36.63	137	ENTERGY	EES 9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	-112	2.9	8747	100%
TVAUTHOR	TVA 1_MSA_Chatt-Hunts_G	8781	17,334	9,966	3,331	6,553	39.62	1,159	SOUTHERN	SOCO 8_MSA										

Task 2: Appendix 4, Corridors Results by Scenario
LowCase2008R2

Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
FRCC	FPC 2 MSA HomosassaSprings	8784	1,584	0	1,423	1,584	45.85	573	FRCC	FPL 3 MSA Miami L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	2.8	5048	57%
PJM	NI 7 MSA Rochelle G	8784	2,290	0	2,119	2,290	28.20	525	MISO	WEC 3 MSA Milwaukee G	7208	1,429	2,423	-320	-1,202	30.99	-72	2.8	5230	60%
MISO	WEC 1 MSA Chicago G	8784	1,728	303	896	1,138	28.23	222	MISO	WEC 3 MSA Milwaukee G	7208	1,429	2,423	-320	-1,202	30.99	-72	2.8	147	2%
TVAUTHOR	TVA 1 MSA Chatt-Hunts G	8781	17,334	9,966	3,331	6,553	39.62	1,159	SOUTHERN	SOCO 21 MSA Atlanta G	8776	3,334	2,733	-1,117	-2,055	42.33	-415	2.7	145	2%
MISO	NIPS 8 MSA Chicago G	8760	2,892	1,694	920	1,665	31.13	251	PJM	NI 6 MSA Chicago G	463	9,759	7,577	-232	-1,050	33.83	-4	2.7	6	0%
VACAR	CPL 1 MSA Durham G	7555	10,224	8,563	940	2,730	44.48	316	PJM	VAP 15 MSA VB-Norfolk L	8784	435	1,297	-494	-1,149	47.17	-205	2.7	6298	72%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 5 GEN_GEPCHY L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	2.7	1944	22%
SPP	AEPW 5 MSA Tulsa G	7062	4,226	2,571	388	1,209	36.60	100	ENTERGY	EES 1 MSA Jackson L	8784	3,218	3,066	-1,233	-2,026	39.26	-425	2.7	5184	59%
SOUTHERN	SOCO 15 MSA Birmingham G	8695	12,464	9,217	2,123	5,257	41.76	771	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	2.7	6871	78%
MISO	AMRN 12 MSA StLouis L	6702	5,059	6,066	757	1,937	31.17	158	PJM	NI 6 MSA Chicago G	463	9,759	7,577	-232	-1,050	33.83	-4	2.7	5902	67%
TVAUTHOR	TVA 1 MSA Chatt-Hunts G	8781	17,334	9,966	3,331	6,553	39.62	1,159	SOUTHERN	SOCO 6 MSA Augusta-Richmond L	8784	0	1,187	-657	-1,116	42.27	-244	2.6	349	4%
FRCC	JE 6 MSA Jacksonville G	8784	1,665	358	909	1,349	46.04	368	FRCC	FPL 7 MSA Miami L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	2.6	4045	46%
SPP	AEPW 9 MSA MountPleasant G	6984	8,168	3,832	534	1,673	36.63	137	ENTERGY	EES 1 MSA Jackson L	8784	3,218	3,066	-1,233	-2,026	39.26	-425	2.6	8745	100%
TVAUTHOR	TVA 4 MSA Clarksville G	8616	2,544	150	2,099	2,473	36.62	662	TVAUTHOR	TVA 7 MSA Memphis L	8725	7,215	5,982	-1,376	-4,095	39.25	-471	2.6	5089	58%
FRCC	JE 6 MSA Jacksonville G	8784	1,665	358	909	1,349	46.04	368	FRCC	FPL 3 MSA Miami L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	2.6	4067	46%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 8 MSA Atlanta L	8784	0	1,925	-1,065	-1,811	42.46	-397	2.6	2040	23%
NYPP	NYISO 6 NYF	7778	4,103	1,983	618	1,759	49.25	237	NYPP	NYISO 7_NYG	8420	3,156	2,195	-732	-1,477	51.85	-320	2.6	4735	54%
SPP	WERE 1 MSA Manhattan_G	8739	2,988	409	1,343	2,277	31.03	364	SPP	KACP 7 MSA KansasCity_L	8784	0	1,291	-691	-1,351	33.63	-204	2.6	3172	36%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 33 MSA Atlanta L	8784	3	3,305	-1,828	-3,110	42.45	-682	2.6	2028	23%
SOUTHERN	SOCO 28 MSA Birmingham G	8616	2,535	1,090	1,342	1,917	41.83	484	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	2.6	6837	78%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 16 MSA Atlanta L	8784	694	3,058	-1,410	-2,740	42.42	-526	2.6	1698	19%
ENTERGY	EES 2 MSA Batesville G	8784	3,525	1,697	1,952	2,769	37.86	649	TVAUTHOR	TVA 5 MSA Nashville L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	2.5	5565	63%
SOUTHERN	SOCO 26 MSA Macon G	8784	6,802	0	5,108	6,282	42.24	1,895	VACAR	SCPSA 2 MSA Charleston L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	2.5	1459	17%
TVAUTHOR	TVA 4 MSA Clarksville G	8616	2,544	150	2,099	2,473	36.62	662	TVAUTHOR	TVA 3 MSA Knoxville L	8784	3,684	5,102	-1,211	-2,885	39.10	-416	2.5	5137	58%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 21 MSA Atlanta G	8776	3,334	2,733	-1,117	-2,055	42.33	-415	2.5	1545	18%
ENTERGY	EES 10 MSA Vicksburg G	8088	3,544	1,249	894	1,236	39.85	288	SOUTHERN	SOCO 6 MSA Augusta-Richmond L	8784	0	1,187	-657	-1,116	42.27	-244	2.4	1491	17%
SOUTHERN	SOCO 15 MSA Birmingham G	8695	12,464	9,217	2,123	5,257	41.76	771	SOUTHERN	SOCO 10 MSA Albany-Valdosta L	7678	3,431	4,125	-720	-2,899	44.18	-244	2.4	536	6%
SOUTHERN	SOCO 32 MSA Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	VACAR	SCEG 9 MSA Charleston_G	8611	1,152	1,944	-401	-1,540	43.63	-151	2.4	3439	39%
SOUTHERN	SOCO 31 MSA Atlanta G	8772	11,765	1,583	4,057	8,815	42.38	1,508	VACAR	SCPSA 2 MSA Charleston L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	2.4	2615	30%
SOUTHERN	SOCO 28 MSA Birmingham G	8616	2,535	1,090	1,342	1,917	41.83	484	SOUTHERN	SOCO 10 MSA Albany-Valdosta L	7678	3,431	4,125	-720	-2,899	44.18	-244	2.3	544	6%
ENTERGY	EES 4 GEN Ouachita G	5357	6,345	2,417	1,375	3,621	42.08	310	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	2.3	6332	72%
PJM	AEP 8 GEN Amos01_G	8784	19,694	6,544	6,359	10,066	38.79	2,167	PJM	AP 2 GEN Albright3 L	8784	603	1,748	-1,114	-1,695	41.10	-402	2.3	6110	70%
NYPP	NYISO 8 NYH	8784	2,021	973	1,581	1,945	53.25	740	NYPP	NYISO 10_NYJ	8784	10,283	11,493	-3,758	-5,317	55.54	-1,833	2.3	8783	100%
NYPP	NYISO 6 NYF	7778	4,103	1,983	618	1,759	49.25	237	NEPOOL	NEPOOL 9_NWKST	8784	405	1,524	-692	-1,141	51.52	-313	2.3	8767	100%
SOUTHERN	SOCO 26 MSA Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	2.2	6959	79%
TVAUTHOR	TVA 4 MSA Clarksville G	8616	2,544	150	2,099	2,473	36.62	662	PJM	AEP 9 MSA Canton-Massillon L	8784	733	2,120	-1,414	-2,058	38.80	-482	2.2	5321	61%
MISO	IPL 2 MSA Jasper G	8784	1,678	0	1,435	1,664	36.63	462	PJM	AEP 9 MSA Canton-Massillon L	8784	733	2,120	-1,414	-2,058	38.80	-482	2.2	2600	30%
ENTERGY	EES 4 GEN Ouachita G	5357	6,345	2,417	1,375	3,621	42.08	310	SOUTHERN	SOCO 10 MSA Albany-Valdosta L	7678	3,431	4,125	-720	-2,899	44.18	-244	2.1	1893	22%
SOUTHERN	SOCO 32 MSA Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	VACAR	DUK 4 MSA Greenville L	6956	3,546	4,489	-618	-2,091	43.29	-186	2.1	3343	38%
SOUTHERN	SOCO 31 MSA Atlanta G	8772	11,765	1,583	4,057	8,815	42.38	1,508	ENTERGY	EES 5 MSA NewOrleans_G	8784	9,735	9,294	-2,890	-5,151	44.43	-1,128	2.0	6886	78%
MISO	WEC 1 MSA Chicago G	8784	1,728	303	896	1,138	28.23	222	MISO	METC 4 MSA Holland-GrandHaven G	2565	7,365	2,900	-1,026	-2,869	30.27	-80	2.0	5769	86%
PJM	VAP 1 MSA Richmond_G	8784	10,524	3,579	3,288	6,493	47.58	1,374	PJM	AP 8 MSA DC-VA-MD L	8784	0	1,097	-798	-1,144	49.61	-348	2.0	4191	48%
NEPOOL	NEPOOL 2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NEPOOL	NEPOOL 6 WCMA	8707	4,285	3,417	-1,409	-3,954	50.54	-620	2.0	6955	79%
MISO	ALTE 2 MSA Madison_G	8616	1,665	441	590	1,099	29.01	147	MISO	WEC 3 MSA Milwaukee G	7208	1,429	2,423	-320	-1,202	30.99	-72	2.0	2479	28%
VACAR	DUK 4 MSA Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	VACAR	DUK 8 MSA Charlotte L	8784	1,407	4,886	-2,232	-3,594	42.59	-835	2.0	0	0%
NYPP	NYISO 6 NYF	7778	4,103	1,983	618	1,759	49.25	237	PJM	PSEG 8 MSA NewYork_G	8779	3,860	3,654	-1,066	-2,403	51.21	-479	2.0	7735	88%
SOUTHERN	SOCO 26 MSA Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	SOUTHERN	SOCO 10 MSA Albany-Valdosta L	7678	3,431	4,125	-720	-2,899	44.18	-244	1.9	675	8%
VACAR	DUK 4 MSA Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 5 GEN_GEPCHY L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	1.9	35	0%
ONTARIO	IESO 6 G	8784	2,146	147	1,844	2,071	37.71	611	NYPP	NYISO 2_NYB	8784	650	1,759	-706	-1,571	39.58	-245	1.9	8313	95%
ONTARIO	IESO 7 G	8784	2,953	253	2,502	2,825	37.71	829	NYPP	NYISO 2_NYB	8784	650	1,759	-706	-1,571	39.58	-245	1.9	8429	96%
NEPOOL	NEPOOL 2_NH	8501	4,204	2,621	1,014	1,816	48.52	418	NEPOOL	NEPOOL 4_NEBOS	8631	3,262	5,904	-1,262	-3,970	50.39	-549	1.9	6823	78%
SOUTHERN	SOCO 15 MSA Birmingham_G	8695	12,464	9,217	2,123	5,257	41.76	771	VACAR	SCEG 9 MSA Charleston_G	8611	1,152	1,944	-401	-1,540	43.63	-151	1.9	2548	29%

Task 2: Appendix 4, Corridors Results by Scenario
LowCase2008R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ONTARIO	IESO 15_G	8396	1,964	3,375	1,094	2,054	37.72	347	NYPP	NYISO 2_NYB	8784	650	1,759	-706	-1,571	39.58	-245	1.9	8294	94%
NYPP	NYISO 6_NYF	7778	4,103	1,983	618	1,759	49.25	237	PJM	PSEG 3_MSA_NewYork_L	8784	1,843	2,275	-879	-1,841	51.11	-395	1.9	7732	88%
MISO	NIPS 8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	PJM	NI 3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	-184	1.8	6	0%
PJM	VAP 7_G	7413	4,179	303	1,507	3,629	45.32	506	PJM	VAP 15_MSA_VB-Norfolk_L	8784	435	1,297	-494	-1,149	47.17	-205	1.8	5970	68%
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	643	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	1.8	6538	74%
MISO	FE 9_MSA>Weirton_G	8628	1,860	112	1,220	1,808	38.10	401	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	1.8	6422	73%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 9_MSA_Atlanta_L	8784	0	1,925	-1,065	-1,811	42.46	-397	1.8	252	2%
MISO	NIPS 8_MSA_Chicago_G	8760	2,892	1,694	920	1,665	31.13	251	PJM	NI 13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	-1,524	1.8	206	2%
FRCC	SEC 6_MSA_Palatka_G	8160	1,330	0	1,220	1,330	45.56	453	FRCC	FPL 2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	1.8	3796	43%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 33_MSA_Atlanta_L	8784	3	3,305	-1,828	-3,110	42.45	-682	1.8	182	2%
NEPOOL	NEPOOL 7_CT	7667	4,447	3,920	690	1,740	50.04	265	NEPOOL	NYISO 7_NYG	8420	3,166	2,195	-732	-1,477	51.85	-320	1.8	5793	66%
MISO	AMRN 12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	PJM	NI 3_MSA_Chicago_L	8784	26	1,205	-634	-1,254	32.98	-184	1.8	5767	66%
SOUTHERN	SOCO 28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	484	VACAR	SCEG 3_MSA_Charleston_G	8611	1,152	1,944	-401	-1,540	43.63	-151	1.8	2553	29%
PJM	NI 2_MSA_Chicago_G	8784	5,342	1,283	3,498	4,181	32.75	1,006	MISO	AMRN 2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	1.8	4908	56%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 16_MSA_Atlanta_L	8784	694	3,058	-1,410	-2,740	42.42	-526	1.8	253	3%
SOUTHERN	SOCO 31_MSA_Atlanta_G	8772	11,765	1,583	4,057	8,815	42.38	1,508	SOUTHERN	SOCO 10_MSA_Albany-Valdosta_L	8784	3,431	4,125	-720	-2,899	44.18	-244	1.8	480	5%
MISO	AMRN 12_MSA_StLouis_L	6702	5,059	6,066	757	1,937	31.17	158	PJM	NI 13_MSA_Chicago_L	8784	2,396	10,556	-5,262	-9,151	32.96	-1,524	1.8	5890	67%
MISO	CIN 3_MSA_TerreHaut_G	6968	3,230	1,015	796	2,234	38.21	212	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	1.7	3302	38%
PJM	VAP 1_MSA_Richmond_G	8784	8,124	3,579	3,288	6,493	1,374	1,374	PJM	VAP 33_MSA_DC_L	8784	910	2,983	-1,704	-2,478	49.31	-738	1.7	4626	53%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 21_MSA_Atlanta_G	8776	3,334	2,733	-1,117	-2,055	42.33	-415	1.7	103	1%
FRCC	FPL 8_MSA_PortStLucie_G	8751	10,364	4,623	2,026	5,279	46.99	833	FRCC	FPL 7_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	1.7	3103	35%
VACAR	DUK 9_MSA_Charlotte_G	8783	14,681	9,966	3,042	5,492	42.51	1,136	SOUTHERN	SOCO 10_MSA_Albany-Valdosta_L	8778	3,431	4,125	-720	-2,899	44.18	-244	1.7	538	6%
FRCC	FPL 8_MSA_PortStLucie_G	8751	10,364	4,623	2,026	5,279	46.99	833	FRCC	FPL 3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	1.7	2469	28%
VACAR	DUK 4_MSA_Greenville_L	1828	3,546	4,489	215	1,012	40.62	16	SOUTHERN	SOCO 6_MSA_Augusta-Richmond_L	8784	0	1,187	-657	-1,116	42.27	-244	1.6	349	4%
MISO	EKPC 8_MSA_Maysville_G	8784	1,396	272	927	1,366	38.73	315	VAUTHOR	TVA 5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	1.6	5380	61%
ENTERGY	EES 2_MSA_Batesville_G	8784	3,525	1,697	1,952	2,769	37.86	649	ENTERGY	EES 9_MSA_Russellville_G	6307	6,123	4,517	-450	-1,630	39.49	-112	1.6	2090	24%
PJM	VAP 1_MSA_Richmond_G	8784	10,524	3,579	3,288	6,493	47.58	1,374	PJM	VAP 27_MSA_DC_L	8784	0	1,048	-641	-1,075	49.20	-277	1.6	3453	39%
MISO	AEP 8_GEN_Amos01_G	8784	19,634	6,544	6,359	10,066	38.79	2,167	VAUTHOR	TVA 5_MSA_Nashville_L	8567	9,154	8,858	-1,556	-4,023	40.36	-538	1.6	5813	68%
FRCC	FPC 2_MSA_HomosassaSprings_G	8784	1,584	0	1,423	1,584	45.85	573	FRCC	FPL 2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	1.5	4827	56%
ENTERGY	EES 7_MSA_Beaumont-PortArth_G	2642	7,393	4,949	345	1,123	42.89	39	ENTERGY	EES 5_MSA_NewOrleans_G	8784	9,725	9,294	-2,890	-5,151	44.43	-1,128	1.5	6328	72%
SOUTHERN	SOCO 15_MSA_Birmingham_G	8695	12,646	9,217	2,123	5,257	41.76	771	VACAR	DUK 4_MSA_Greenville_L	6956	3,546	4,489	-618	-2,091	43.29	-186	1.5	2501	28%
PJM	VAP 1_MSA_Richmond_G	8784	10,524	3,579	3,288	6,493	47.58	1,374	PJM	AP 7_MSA_Hagerstown-Martinsburg_L	8784	203	1,153	-662	-1,009	49.08	-285	1.5	4933	56%
MISO	LGEE 3_GEN_Gehrt2_G	8784	2,000	225	1,496	1,895	35.70	469	MISO	CIN 1_MSA_Indianapolis_L	8784	816	4,274	-2,176	-3,301	37.20	-711	1.5	4943	56%
NEPOOL	NEPOOL 5_SEMA	8784	6,454	3,978	1,957	3,704	50.35	866	NYPP	NYISO 7_NYG	8420	3,166	2,195	-732	-1,477	51.85	-320	1.5	5835	66%
MISO	FE 6_MSA_Pittsburgh_G	8784	2,371	213	1,923	2,287	38.10	643	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	1.5	5313	60%
MISO	FE 9_MSA>Weirton_G	8628	1,860	112	1,220	1,808	38.10	401	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	1.5	5114	58%
NEPOOL	NEPOOL 7_CT	7667	4,447	3,920	690	1,740	50.04	265	NEPOOL	NEPOOL 9_NWKST	8784	405	1,524	-692	-1,141	51.52	-313	1.5	8753	100%
FRCC	FPC 10_MSA_Lakeland_G	8093	3,561	747	1,116	2,047	47.21	426	FRCC	FPL 1_MSA_Miami_L	8784	570	3,923	-2,490	-4,080	48.68	-1,065	1.5	4378	50%
SOUTHERN	SOCO 28_MSA_Birmingham_G	8616	2,535	1,090	1,342	1,917	41.83	484	VACAR	DUK 4_MSA_Greenville_L	6956	3,546	4,489	-618	-2,091	43.29	-186	1.5	2469	28%
SPP	WERE 1_MSA_Manhattan_G	8739	2,988	409	1,343	2,277	31.03	364	SPP	AEPW 1_MSA_Tulsa_G	7156	3,295	2,000	-556	-1,182	32.47	-129	1.4	8679	99%
FRCC	FPC 10_MSA_Lakeland_G	8093	3,561	747	1,116	2,047	47.21	426	FRCC	FPL 3_MSA_Miami_L	8783	6,944	7,089	-1,913	-4,084	48.65	-817	1.4	4383	50%
ENTERGY	EES 2_MSA_Batesville_G	8784	3,525	1,697	1,952	2,769	37.86	649	VAUTHOR	TVA 7_MSA_Memphis_L	8725	7,215	5,982	-1,376	-4,095	39.25	-471	1.4	3147	36%
SOUTHERN	SOCO 26_MSA_Macon_G	8784	6,802	0	5,108	6,282	42.24	1,895	VACAR	SCEG 9_MSA_Charleston_G	8611	1,152	1,944	-401	-1,540	43.63	-151	1.4	2536	29%
PJM	NI 6_MSA_Chicago_G	8321	9,759	7,577	1,110	3,034	33.17	306	MISO	AMRN 2_County_Macon_L	8784	174	1,209	-716	-1,132	34.55	-217	1.4	4866	55%
NYPP	NYISO 6_NYF	7778	4,103	1,983	618	1,759	49.25	237	PJM	PSEG 5_MSA_Philadelphia_L	8784	2,143	2,766	-1,186	-2,037	50.63	-528	1.4	7985	91%
MISO	CIN 3_MSA_TerreHaut_G	6968	3,230	1,015	796	2,234	38.21	212	PJM	AEP 2_STA_TN-WV_L	8784	1,284	2,977	-1,591	-2,640	39.59	-553	1.4	3626	41%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	VACAR	DUK 8_MSA_Charlotte_L	8784	1,407	4,886	-2,232	-3,594	42.59	-835	1.4	3436	39%
FRCC	SEC 6_MSA_Palatka_G	8160	1,330	0	1,220	1,330	45.56	453	FRCC	FPC 4_MSA_Tampa_L	8784	2,239	2,873	-1,477	-2,349	46.91	-609	1.4	3500	40%
FRCC	JEA 6_MSA_Jacksonville_G	8784	1,665	358	909	1,349	46.04	368	FRCC	FPL 2_MSA_FortMyers_G	8464	5,929	4,563	-1,018	-2,545	47.39	-408	1.4	3781	43%
VACAR	SCPSA 10_MSA_Charleston_G	8616	1,680	0	1,468	1,680	43.42	549	VACAR	SCPSA 2_MSA_Charleston_L	8784	1,607	3,236	-1,307	-2,681	44.75	-514	1.3	1545	18%
SOUTHERN	SOCO 32_MSA_Pascagoula_G	8110	3,574	2,674	578	1,690	41.22	193	SOUTHERN	SOCO 5_GEN_GEPCHY_L	8784	2,098	3,403	-1,790	-2,847	42.52	-668	1.3	1914	22%
NYPP	NYISO 6_NYF	7778	4,103	1,983	618	1,759	49.25	237	NEPOOL	NEPOOL 6_WCMA	8707	4,285	3,417	-1,409	-3,954	50.54	-620	1.3	7472	85%
PJM	DPL 8_GEN_Killen_G	8759	2,964	0	2,042	2,940	38.65	691	PJM	AEP 1_MSA_Lynchburg_G	8784	843	2,162	-1,529	-2,299	39.95	-537	1.3	3219	37%
ENTERGY	EES 7_MSA_Beaumont-PortArth_G	2642	7,393	4,949	345	1,123	42.89	39	SOUTHERN	SOCO 10_MSA_Albany-Valdosta_L	767									

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,560	4,074	36.67	1,143	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	3.6	4427	50%
PJM	NI 6 MSA Chicago_G	7665	9,759	7,577	946	3,023	37.14	269	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	3.2	4450	51%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	7.4	5550	63%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	10.1	5076	58%
PJM	NI 20 MSA Chicago_G	7874	1,632	83	888	1,578	36.53	256	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	3.8	4319	49%
MISO	NIPS 8 MSA Chicago_G	8658	2,892	1,694	844	1,541	36.43	266	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	3.9	4169	47%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	3.2	6959	79%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,606	-2,415	40.29	-567	9.3	7273	83%
PJM	NI 20 MSA Chicago_G	7874	1,632	83	888	1,578	36.53	256	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.8	1264	14%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,560	4,074	36.67	1,143	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.7	1358	15%
PJM	NI 6 MSA Chicago_G	7665	9,759	7,577	946	3,023	37.14	269	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.2	1370	16%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	7.5	3718	42%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	10.1	3128	36%
MISO	NIPS 8 MSA Chicago_G	8658	2,892	1,694	844	1,541	36.43	266	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.9	1054	12%
MISO	LGEE 3_GEN Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	499	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.7	5035	57%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	3.2	6276	71%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,691	-2,729	40.37	-598	10.0	6397	73%
MISO	NIPS 8 MSA Chicago_G	8658	2,892	1,694	844	1,541	36.43	266	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	4.4	1096	12%
PJM	NI 20 MSA Chicago_G	7874	1,632	83	888	1,578	36.53	256	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	4.3	1689	19%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	10.6	3668	42%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	7.9	4027	46%
PJM	NI 6 MSA Chicago_G	7665	9,759	7,577	946	3,023	37.14	269	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	3.6	1696	19%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,560	4,074	36.67	1,143	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	4.1	1689	19%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	10.4	6611	75%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,552	-2,252	40.79	-554	3.7	6429	73%
PJM	NI 6 MSA Chicago_G	7665	9,759	7,577	946	3,023	37.14	269	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	5.0	1447	16%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,516	3,391	37.24	821	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	4.9	6246	71%
MISO	IP 7_GEN Baldwin_G	8760	1,900	444	1,150	1,478	32.77	330	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	9.3	1	0%
MISO	IP 8_GEN Clinton_G	8002	2,302	1,195	927	1,212	35.59	264	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	6.5	447	5%
MAPP	MEC 3 MSA DesMoines_G	8427	3,307	1,933	601	1,391	22.45	114	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	19.7	2611	30%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,560	4,074	36.67	1,143	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	5.4	1432	16%
TVAUTHOR	TVA 4 MSA Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	1.2	1194	14%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	11.9	2907	33%
PJM	AEP 8_GEN Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	1.6	110	1%
PJM	NI 20 MSA Chicago_G	7874	1,632	83	888	1,578	36.53	256	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	5.6	1085	12%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	9.2	3849	44%
ENTERGY	AECI 4_GEN NewMadrid1_G	8760	2,315	248	1,080	1,590	37.65	356	MISO	AMRN 12 MSA StLouis_L	2483	5,059	6,066	-436	-1,841	42.11	-46	4.5	2590	29%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	36.57	-231	6.2	4271	49%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	36.57	-231	3.7	5041	57%
MAPP	MEC 3 MSA DesMoines_G	8427	3,307	1,933	601	1,391	22.45	114	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	36.57	-231	14.1	4735	54%
MISO	IP 7_GEN Baldwin_G	8760	1,900	444	1,150	1,478	32.77	330	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	36.57	-231	3.8	4635	53%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	36.57	-231	6.3	4521	51%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	PJM	AP 2_GEN Albright3_L	8760	603	1,748	-1,115	-1,684	42.35	-414	1.9	4667	53%
PJM	DLC0 7 MSA Pittsburgh_G	8232	1,644	25	1,367	1,632	40.16	452	PJM	AP 2_GEN Albright3_L	8760	603	1,748	-1,115	-1,684	42.35	-414	2.2	4653	53%
PJM	AEP 8_GEN Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	AP 2_GEN Albright3_L	8760	603	1,748	-1,115	-1,684	42.35	-414	1.8	6100	69%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	PJM	AP 2_GEN Albright3_L	8760	603	1,748	-1,115	-1,684	42.35	-414	2.0	4518	51%
PJM	PJM500 9 MSA Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	6.7	7650	87%
PJM	VAP 1 MSA Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	1,518	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	1.2	4641	53%
PJM	PJM500 3 MSA Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	7.0	7651	87%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	11.0	8187	93%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	11.2	8182	93%
PJM	AEP 8_GEN Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	11.0	8299	94%

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	7.2	7598	86%
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	2.8	5267	60%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	40.16	452	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	51.50	-309	11.3	8186	93%
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	11.9	8233	94%
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	3.2	5528	63%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	1,518	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	1.6	3942	45%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	7.1	7744	88%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	7.7	7687	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	7.4	7730	88%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	11.4	8079	92%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	11.6	8220	94%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	40.16	452	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	51.92	-331	11.8	8230	94%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-478	-1,030	52.69	-220	7.9	7722	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-478	-1,030	52.69	-220	8.2	7761	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-774	-1,495	52.56	-356	7.8	7723	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-774	-1,495	52.56	-356	8.1	7763	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	53.00	-320	8.2	7742	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	53.00	-320	8.5	7770	88%
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	-765	1.3	2867	33%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	499	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	-765	1.8	4938	56%
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,516	3,391	37.24	821	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	-765	1.2	2960	34%
MISO	NIPS_8_MSA_Chicago_G	8658	2,892	1,694	844	1,541	36.43	266	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	-765	2.0	691	8%
MISO	AMRN_12_MSA_StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,748	38.45	-765	8.0	3753	43%
MISO	NIPS_8_MSA_Chicago_G	8658	2,892	1,694	844	1,541	36.43	266	MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-884	-1,480	37.57	-291	1.1	634	7%
VACAR	DUK_9_MSA_Charlotte_G	8544	14,681	9,966	3,002	5,557	43.40	1,113	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	6.6	622	7%
VACAR	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	1.3	5106	58%
VACAR	SCEG_1_MSA_Columbia_G	8179	4,954	2,752	1,057	2,537	45.11	390	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	4.9	2366	27%
VACAR	DUK_5_MSA_Seneca_G	6597	1,911	0	1,031	1,911	47.89	326	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	2.1	4662	53%
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,428	1,680	44.59	558	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	5.4	1701	19%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	VACAR	CPLE_1_MSA_Durham_G	1153	10,224	8,563	-441	-1,529	50.02	-25	9.5	6794	77%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	VACAR	DUK_4_MSA_Greenville_L	7310	3,546	4,489	-613	-2,063	44.21	-198	3.7	4415	50%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,888	-2,234	-3,877	44.01	-861	3.5	3790	43%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	22.3	2647	30%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	22.4	2587	29%
VACAR	SCEG_1_MSA_Columbia_G	8179	4,954	2,752	1,057	2,537	45.11	390	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	21.0	249	3%
VACAR	DUK_5_MSA_Seneca_G	6597	1,911	0	1,031	1,911	47.89	326	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	18.2	27	0%
VACAR	CPLE_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	336	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	21.2	342	4%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	21.9	558	6%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	25.5	3985	45%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	21.9	890	10%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	VACAR	DUK_9_MSA_Charlotte_G	216	14,681	9,966	-493	-2,175	66.08	-7	21.5	2437	28%
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	101	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,410	-2,066	42.17	-521	5.6	2899	33%
SPP	AEPW_9_MSA_MountPleasant	7520	8,168	3,832	657	1,891	40.94	202	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,410	-2,066	42.17	-521	1.2	8715	99%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,410	-2,066	42.17	-521	7.8	2745	31%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	4.2	7018	80%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	4.3	7010	80%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	3.9	6752	77%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	4.7	6965	79%
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	0	1,059	1,060	42.39	381	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	6.0	5394	61%
ENTERGY	EES_4_GEN_Ouachita_G	6486	6,345	2,417	1,390	3,642	44.78	404	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	3.6	6488	74%

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	4.7	6986	80%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	14.1	6873	78%
SPP	AEPW_9_MSA_MountPleasant	7520	8,168	3,832	657	1,891	40.94	202	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	7.5	8714	99%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,346	1,750	42.43	500	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	6.0	6486	74%
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	101	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	11.9	6939	79%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,914	-5,532	48.42	-1,236	5.4	6529	74%
SPP	AEPW_9_MSA_MountPleasant	7520	8,168	3,832	657	1,891	40.94	202	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	7,393	4,949	-497	-1,630	42.86	-138	1.9	8715	99%
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	101	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	7,393	4,949	-497	-1,630	42.86	-138	6.3	4247	48%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	7,393	4,949	-497	-1,630	42.86	-138	8.5	7219	82%
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,926	2,737	40.63	684	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	3.7	1843	21%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,346	1,750	42.43	500	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	1.9	0	0%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	1.3	0	0%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,080	1,590	37.65	356	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	6.6	3522	40%
SPP	AEPW_9_MSA_MountPleasant	7520	8,168	3,832	657	1,891	40.94	202	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	3.4	8716	99%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	3.4	3043	35%
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	101	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	7.8	265	3%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	ENTERGY	EES_9_MSA_Russellville_G	6000	6,123	4,517	-452	-2,066	44.29	-120	3.1	1658	19%
MISO	FE_9_MSA>Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	MISO	FE_5_MSA_Cleveland_L	8040	3,216	4,680	-570	-2,443	41.75	-191	1.3	2229	25%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	MISO	FE_5_MSA_Cleveland_L	8040	3,216	4,680	-570	-2,443	41.75	-191	1.4	4061	46%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	MISO	FE_5_MSA_Cleveland_L	8040	3,216	4,680	-570	-2,443	41.75	-191	1.2	4297	49%
PJM	DLC0_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	40.16	452	MISO	FE_5_MSA_Cleveland_L	8040	3,216	4,680	-570	-2,443	41.75	-191	1.6	4200	48%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	-877	5.2	4736	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	-877	5.6	4648	53%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	-877	6.0	4644	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	-877	6.0	4646	53%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,012	-3,788	49.76	-877	5.5	4639	53%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	-680	5.8	5076	58%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	-680	6.1	5017	57%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	-680	6.2	5020	57%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	-680	6.6	5020	57%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,542	-2,658	50.34	-680	6.6	5020	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	6.8	5335	61%
FRCC	FPC_2_MSA_HomosassaSpring	8544	1,584	0	1,364	1,584	49.56	577	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	1.5	5142	59%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	6.5	5400	61%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	6.9	5338	61%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	7.3	5344	61%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	FRCC	FPL_2_MSA_FortMyers_G	8701	5,929	4,563	-1,280	-2,761	51.01	-568	7.2	5341	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	7.3	5241	60%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	7.8	5246	60%
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	0	1,135	1,330	50.10	498	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	1.4	4906	56%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	7.3	5242	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	6.9	5294	60%
FRCC	FPC_2_MSA_HomosassaSpring	8544	1,584	0	1,364	1,584	49.56	577	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	1.9	5236	60%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,197	-4,333	51.48	-991	7.7	5244	60%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	7.3	5277	60%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	7.7	5277	60%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	7.2	5273	60%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	7.7	5279	60%
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	0	1,135	1,330	50.10	498	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	1.4	4971	57%
FRCC	FPC_2_MSA_HomosassaSpring	8544	1,584	0	1,364	1,584	49.56	577	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	1.9	5289	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,634	-4,256	51.45	-1,187	6.9	5323	61%
MISO	XEL_3_MSA_Minneapolis_G	2885	7,596	7,622	602	1,657	17.87	31	MISO	GRE_4_MSA_Minneapolis_L	8760	331	1,111	-1,099	-2,103	31.83	-307	14.0	6	0%
MISO	ITC_3_MSA_Detroit_G	8745	3,815	1,600	1,235	2,005	41.95	453	ONTARIO	IESO_11_G	8760	9,529	12,779	-3,043	-7,371	44.44	-1,184	2.5		

Task 2: Appendix 4, Corridors Results by Scenario
BaseCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	41.48	472	ONTARIO	IESO 3 L	8760	39	1,696	-1,181	-1,636	43.42	-449	1.9	7882	90%
MISO	ITC 3 MSA Detroit_G	8745	3,815	1,600	1,235	2,005	41.95	453	ONTARIO	IESO 3 L	8760	39	1,696	-1,181	-1,636	43.42	-449	1.5	7408	84%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	MISO	IPL 5 MSA Indianapolis_L	8760	306	1,187	-784	-1,258	38.66	-266	1.5	2582	29%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,516	3,391	37.24	821	MISO	IPL 5 MSA Indianapolis_L	8760	306	1,187	-784	-1,258	38.66	-266	1.4	6131	70%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,516	3,391	37.24	821	MISO	IPL 8 MSA Indianapolis_L	8760	547	1,227	-531	-1,094	38.73	-180	1.5	6188	70%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,414	1,664	37.13	460	MISO	IPL 8 MSA Indianapolis_L	8760	547	1,227	-531	-1,094	38.73	-180	1.6	2640	30%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	MISO	ITC 2 MSA Detroit_L	8625	4,001	5,247	-1,114	-3,583	41.97	-403	1.5	6416	73%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	MISO	ITC 2 MSA Detroit_L	8625	4,001	5,247	-1,114	-3,583	41.97	-403	1.6	6980	79%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	40.34	681	MISO	ITC 9 MSA Detroit_L	8760	1,340	4,751	-2,179	-4,538	41.85	-799	1.5	7682	87%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,388	1,802	40.46	492	MISO	ITC 9 MSA Detroit_L	8760	1,340	4,751	-2,179	-4,538	41.85	-799	1.4	7322	83%
SPP	WREC 1 MSA Manhattan_G	8641	2,988	409	1,327	2,260	31.79	365	SPP	KACP 7 MSA KansasCity_L	8760	0	1,291	-730	-1,422	36.39	-233	4.6	771	9%
MISO	BREC 3 County Webster_G	8760	1,355	476	879	1,156	35.98	277	MISO	LGEE 5 MSA Lexington_L	8760	595	2,345	-1,786	-2,997	37.32	-584	1.3	2763	31%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	911	1,379	34.17	268	MISO	METC 8 MSA BayCity_G	8149	3,795	2,562	-600	-1,641	42.36	-207	8.2	5208	59%
PJM	AEP 8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	MISO	METC 8 MSA BayCity_G	8149	3,795	2,562	-600	-1,641	42.36	-207	1.8	3176	36%
PJM	AEP 8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	MISO	METC 9 MSA Kalamazoo_L	8760	118	1,334	-812	-1,476	41.72	-297	1.2	1194	14%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	911	1,379	34.17	268	MISO	METC 9 MSA Kalamazoo_L	8760	118	1,334	-812	-1,476	41.72	-297	7.6	4687	53%
NYPP	NYISO 1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NEPOOL	NEPOOL 10_RI	6779	2,062	2,203	-410	-1,213	51.13	-142	6.3	6123	70%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NEPOOL	NEPOOL 10_RI	6779	2,062	2,203	-410	-1,213	51.13	-142	2.7	8760	100%
NEPOOL	NEPOOL 2_NH	8396	4,204	2,621	933	1,787	49.91	391	NEPOOL	NEPOOL 10_RI	6779	2,062	2,203	-410	-1,213	51.13	-142	1.2	6923	79%
NEPOOL	NEPOOL 3_ME	3621	3,494	2,522	285	1,072	48.84	50	NEPOOL	NEPOOL 10_RI	6779	2,062	2,203	-410	-1,213	51.13	-142	2.3	6904	79%
NEPOOL	NEPOOL 2_NH	8396	4,204	2,621	933	1,787	49.91	391	NEPOOL	NEPOOL 4_NEBOS	8727	3,262	5,904	-1,533	-3,500	51.56	-690	1.7	6923	79%
NEPOOL	NEPOOL 3_ME	3621	3,494	2,522	285	1,072	48.84	50	NEPOOL	NEPOOL 4_NEBOS	8727	3,262	5,904	-1,533	-3,500	51.56	-690	2.7	6920	79%
NYPP	NYISO 1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NEPOOL	NEPOOL 4_NEBOS	8727	3,262	5,904	-1,533	-3,500	51.56	-690	6.7	6123	70%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NEPOOL	NEPOOL 4_NEBOS	8727	3,262	5,904	-1,533	-3,500	51.56	-690	3.1	8760	100%
NEPOOL	NEPOOL 3_ME	3621	3,494	2,522	285	1,072	48.84	50	NEPOOL	NEPOOL 6_WCMA	8554	4,285	3,417	-1,028	-3,107	51.63	-454	2.8	7027	80%
NEPOOL	NEPOOL 2_NH	8396	4,204	2,621	933	1,787	49.91	391	NEPOOL	NEPOOL 6_WCMA	8554	4,285	3,417	-1,028	-3,107	51.63	-454	1.7	7045	80%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NEPOOL	NEPOOL 6_WCMA	8554	4,285	3,417	-1,028	-3,107	51.63	-454	3.2	8570	98%
NYPP	NYISO 1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NEPOOL	NEPOOL 6_WCMA	8554	4,285	3,417	-1,028	-3,107	51.63	-454	6.8	6125	70%
NEPOOL	NEPOOL 2_NH	8396	4,204	2,621	933	1,787	49.91	391	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	6.9	7640	87%
NEPOOL	NEPOOL 3_ME	3621	3,494	2,522	285	1,072	48.84	50	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	7.9	7617	87%
NYPP	NYISO 1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	11.9	6127	70%
NEPOOL	NEPOOL 5_SEMA	8760	6,454	3,978	1,839	3,523	51.63	832	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	5.1	2659	30%
NYPP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	53.34	734	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	3.4	8752	100%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	8.3	8760	100%
NEPOOL	NEPOOL 8_SWCT	6096	2,678	1,850	412	1,717	55.63	140	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	1.1	7361	84%
NYPP	NYISO 6_NYF	7576	4,103	1,983	579	1,680	50.77	223	NEPOOL	NEPOOL 7_CT	1561	4,447	3,920	-397	-1,722	56.77	-35	6.0	8749	100%
NEPOOL	NEPOOL 2_NH	8396	4,204	2,621	933	1,787	49.91	391	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	3.2	8758	100%
NYPP	NYISO 6_NYF	7576	4,103	1,983	579	1,680	50.77	223	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	2.3	8759	100%
NYPP	NYISO 1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	8.2	6133	70%
NEPOOL	NEPOOL 7_CT	7199	4,447	3,920	629	1,694	51.70	234	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	1.4	8757	100%
NEPOOL	NEPOOL 5_SEMA	8760	6,454	3,978	1,839	3,523	51.63	832	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	1.4	8756	100%
NEPOOL	NEPOOL 3_ME	3621	3,494	2,522	285	1,072	48.84	50	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	4.2	8757	100%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-731	-1,289	53.08	-340	4.6	8760	100%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	6.4	2910	33%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	911	1,379	34.17	268	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	2.4	3987	45%
MISO	IP 8_GEN_Clinton_G	8002	2,302	1,195	927	1,212	35.59	264	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	1.0	1287	15%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	6.2	6423	73%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	3.7	3161	36%
MISO	ALTE 2 MSA Madison_G	8747	1,665	441	494	1,033	30.31	131	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,558	-9,590	36.59	-1,782	6.3	4833	55%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	911	1,379	34.17	268	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	36.47	-204	2.3	3712	42%
MISO	AMRN 12 MSA StLouis_L	6277	5,059	6,066	626	1,857	30.41	119	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	36.47	-204	6.1	6374	73%
MISO	ALTE 2 MSA Madison_G	8747	1,665	441	494	1,033	30.31	131	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	36.47	-204	6.2	4843	55%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	32.91	611	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	36.47	-204	3.6	3198	36%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,684	2,314	30.23	444	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	36.47	-204	6.2	2944	34%
MISO	ALTE 2 MSA Madison_G	8747	1,665	441	494	1,033	30.31	131	PJM	NI 6 MSA Chicago_G	1095	9,759	7,577	-312	-1,427	35.18	-12			

Task 2: Appendix 4, Corridors Results by Scenario
BaseCase2011R2

Source Hub Information										Sink Hub Information										Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %		
NEPOOL	NEPOOL_7_CT	7199	4,447	3,920	629	1,694	51.70	234	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	3.2	8758	100%		
NEPOOL	NEPOOL_3_ME	3621	3,494	2,522	285	1,072	48.84	50	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	6.1	8760	100%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	333	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	9.1	6126	70%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	10.0	8759	100%		
ONTARIO	IESO_2_G	1918	2,437	2,116	284	1,026	51.27	28	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	3.6	8760	100%		
NYPP	NYISO_8_NYH	8760	2,021	973	1,570	1,958	53.34	734	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	1.6	8759	100%		
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	44.10	963	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	10.8	8760	100%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	6.4	8758	100%		
NEPOOL	NEPOOL_2_NH	8396	4,204	2,621	933	1,787	49.91	391	NYPP	NYISO_10_NYJ	8760	10,283	11,493	-3,436	-5,455	54.91	-1,653	5.0	8760	100%		
NEPOOL	NEPOOL_7_CT	7199	4,447	3,920	629	1,694	51.70	234	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	3.7	8760	100%		
NYPP	NYISO_8_NYH	8760	2,021	973	1,570	1,958	53.34	734	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	2.1	8754	100%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	10.5	6130	70%		
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	44.11	968	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	11.3	6130	70%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	6.9	8760	100%		
NEPOOL	NEPOOL_2_NH	8396	4,204	2,621	933	1,787	49.91	391	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	5.5	8760	100%		
NEPOOL	NEPOOL_5_SEMA	8760	6,454	3,978	1,839	3,523	51.63	832	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	3.8	8760	100%		
NYPP	NYISO_6_NYH	7576	4,103	1,983	579	1,680	50.77	223	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	4.6	8760	100%		
NEPOOL	NEPOOL_3_ME	3621	3,494	2,522	285	1,072	48.84	50	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	6.6	8760	100%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	333	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	9.6	6130	70%		
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	44.10	963	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	11.3	6130	70%		
ONTARIO	IESO_2_G	1918	2,437	2,116	284	1,026	51.27	28	NYPP	NYISO_11_NYK	8760	5,681	5,289	-1,912	-2,882	55.40	-928	4.1	6130	70%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	6.7	6035	69%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	333	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	5.8	6074	69%		
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	44.10	963	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	7.5	6109	70%		
NEPOOL	NEPOOL_2_NH	8396	4,204	2,621	933	1,787	49.91	391	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	1.6	6526	74%		
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	44.11	968	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	7.4	6114	70%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	3.1	5609	64%		
NEPOOL	NEPOOL_3_ME	3621	3,494	2,522	285	1,072	48.84	50	NYPP	NYISO_7_NYG	8164	3,156	2,195	-771	-1,760	51.55	-324	2.7	5962	68%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	333	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	8.5	6081	69%		
NEPOOL	NEPOOL_2_NH	8396	4,204	2,621	933	1,787	49.91	391	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	4.4	8743	100%		
ONTARIO	IESO_2_G	1918	2,437	2,116	284	1,026	51.27	28	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	3.0	6119	70%		
NYPP	NYISO_6_NYF	7576	4,103	1,983	579	1,680	50.77	223	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	3.5	8615	98%		
ONTARIO	IESO_6_G	8760	2,146	147	2,493	2,787	44.10	963	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	10.2	6121	70%		
NEPOOL	NEPOOL_3_ME	3621	3,494	2,522	285	1,072	48.84	50	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	5.4	8741	100%		
NEPOOL	NEPOOL_7_CT	7199	4,447	3,920	629	1,694	51.70	234	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	2.6	8538	97%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	5.8	8686	99%		
NEPOOL	NEPOOL_5_SEMA	8760	6,454	3,978	1,839	3,523	51.63	832	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	2.6	8630	98%		
ONTARIO	IESO_7_G	8760	2,953	253	2,506	2,829	44.11	968	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	10.2	6123	70%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	NYPP	NYISO_9_NYI	8288	2	1,476	-845	-2,165	54.27	-380	9.4	6092	69%		
SPP	AEPW_5_MSA_Tulsa_G	7078	4,226	2,571	392	1,198	36.54	101	SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	-389	19.3	6394	73%		
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,926	2,737	40.63	684	SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	-389	15.2	7720	88%		
SPP	WERE_1_MSA_Manhattan_G	8641	2,988	409	1,327	2,260	31.79	365	SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	-389	24.0	8218	94%		
SPP	AEPW_9_MSA_MountPleasant	7520	8,168	3,832	657	1,891	40.94	202	SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	-389	14.9	6720	77%		
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SPP	OKGE_4_MSA_OklahomaCity_L	8742	2,102	2,403	-796	-1,677	55.82	-389	21.5	7335	84%		
MAPP	NPPD_4_GEN_Gentleman_G	8240	2,702	148	822	1,475	15.41	104	MAPP	OPPD_5_MSA_Omaha_L	8760	480	1,686	-854	-1,534	21.57	-161	6.2	7560	86%		
PJM	BGE_7_MSA_Baltimore-Towson	7816	2,548	1,043	608	1,238	53.27	253	PJM	PECO_5_MSA_Philadelphia_L	6966	1,656	2,510	-394	-2,388	55.94	-153	2.7	3910	45%		
PJM	PJM500_4_MSA_Philadelphia_C	8690	2,383	0	1,675	3,295	52.22	760	PJM	PECO_5_MSA_Philadelphia_L	6966	1,656	2,510	-394	-2,388	55.94	-153	3.7	0	0%		
PJM	PJM500_7_MSA_York-Hanover	8760	2,696	0	2,071	2,570	52.28	948	PJM	PECO_5_MSA_Philadelphia_L	6966	1,656	2,510	-394	-2,388	55.94	-153	3.7	1444	16%		
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	52.59	-407	8.1	7624	87%		
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	52.59	-407	7.8	7616	87%		
PJM	AP_1 County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.28	1,038	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	52.59	-407	8.3	7622	87%		
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	51.75	-327	6.9	5782	66%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846	1,678	45.79	333	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	51.75	-327	6.0	7664	87%		
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	51.75	-327	7.3	7234	82%		
PJM	PENELEC_2_MSA_DuBois_G	8601	2,724	1,196	846																	

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information										Sink Hub Information										Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-969	-2,093	51.97	-441	7.1	8154	93%		
NYPP	NYISO_6_NYF	7576	4,103	1,983	579	1,680	50.77	223	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-969	-2,093	51.97	-441	1.2	8146	93%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,225	-2,112	52.37	-562	3.9	7743	88%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,225	-2,112	52.37	-562	7.5	8156	93%		
NYPP	NYISO_6_NYF	7576	4,103	1,983	579	1,680	50.77	223	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,225	-2,112	52.37	-562	1.6	8181	93%		
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,899	3,352	48.46	806	PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,182	-2,500	51.96	-538	3.5	8005	91%		
NYPP	NYISO_1_NYA	8310	4,946	2,500	1,634	2,263	44.86	609	PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,182	-2,500	51.96	-538	7.1	8043	92%		
NYPP	NYISO_6_NYF	7576	4,103	1,983	579	1,680	50.77	223	PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,182	-2,500	51.96	-538	1.2	7974	91%		
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	VACAR	SCEG_9_MSA_Charleston_G	8669	1,152	1,944	-460	-1,230	44.76	-179	1.0	2133	24%		
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	VACAR	SCEG_9_MSA_Charleston_G	8669	1,152	1,944	-460	-1,230	44.76	-179	1.1	2120	24%		
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,428	1,680	44.59	558	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	1.5	1653	19%		
VACAR	CPL_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	336	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	1.2	2121	24%		
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	2.4	4349	50%		
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	2.3	4349	50%		
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	1.9	4350	50%		
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	1.6	4791	55%		
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,520	-3,042	46.09	-614	1.9	983	11%		
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	12,464	9,217	1,920	5,437	43.71	708	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	2.1	479	5%		
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	3,574	2,674	582	1,585	44.54	206	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	1.2	720	8%		
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	2.8	764	9%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	4.9	2390	27%		
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,111	6,381	44.23	1,980	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	1.5	428	5%		
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,237	9,393	44.15	1,639	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	1.6	443	5%		
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	4.6	491	6%		
VACAR	DUK_9_MSA_Charlotte_G	8544	14,681	9,966	3,002	5,557	43.40	1,113	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	2.4	629	7%		
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	11.4	3124	36%		
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,325	1,876	43.76	508	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	3,431	4,125	-781	-3,110	45.77	-284	2.0	489	6%		
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,372	-2,611	44.19	-531	3.0	91	1%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,372	-2,611	44.19	-531	3.3	1580	18%		
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,372	-2,611	44.19	-531	9.9	2924	33%		
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,372	-2,611	44.19	-531	1.2	387	4%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_17_MSA_Mobile_G	7378	5,205	4,575	-559	-1,701	42.60	-176	1.7	3196	36%		
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_17_MSA_Mobile_G	7378	5,205	4,575	-559	-1,701	42.60	-176	1.4	2947	34%		
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_17_MSA_Mobile_G	7378	5,205	4,575	-559	-1,701	42.60	-176	8.3	2961	34%		
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	3,334	2,733	-780	-1,570	43.92	-297	2.7	86	1%		
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	3,334	2,733	-780	-1,570	43.92	-297	3.0	1959	22%		

Task 2: Appendix 4, Corridors Results by Scenario
BaseCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	3,334	2,733	-780	-1,570	43.92	-297	9.6	2918	33%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	44.21	-756	1.2	547	6%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	44.21	-756	3.0	244	3%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	44.21	-756	9.9	3007	34%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	44.21	-756	3.3	1733	20%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,960	-3,169	44.31	-761	10.0	3058	35%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,960	-3,169	44.31	-761	1.3	626	7%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,960	-3,169	44.31	-761	3.1	372	4%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,960	-3,169	44.31	-761	3.4	1787	20%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	44.25	-279	3.0	63	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	44.25	-279	3.4	1400	16%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	44.25	-279	9.9	2743	31%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	44.25	-279	1.3	337	4%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	17,334	9,966	3,029	7,429	41.20	1,092	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	44.21	-441	3.0	241	3%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	44.21	-441	9.9	3006	34%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,120	2,481	40.90	745	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	44.21	-441	3.3	1717	20%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	872	1,212	42.99	302	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	44.21	-441	1.2	547	6%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,315	-2,941	39.50	-455	5.2	2879	33%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	499	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,315	-2,941	39.50	-455	2.9	4983	57%
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	837	1,091	39.94	293	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	-587	1.4	1244	14%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	-587	7.0	2797	32%
MISO	BREC_3_COUNTY_Webster_G	8760	1,355	476	879	1,156	35.98	277	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	-587	5.3	6736	77%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	499	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	-587	4.7	6183	70%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,080	1,590	37.65	356	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	9,154	8,858	-1,638	-5,752	41.29	-587	3.6	2591	29%
ENTERGY	EES_9_MSA_Russellville_G	2760	6,123	4,517	188	1,044	34.33	18	TVAUTHOR	TVA_7_MSA_Memphis_L	8745	7,215	5,982	-1,707	-4,409	41.06	-613	6.7	790	9%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	36.63	499	TVAUTHOR	TVA_7_MSA_Memphis_L	8745	7,215	5,982	-1,707	-4,409	41.06	-613	4.4	5269	60%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	5.3	7756	88%
VACAR	CPL_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	336	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	4.9	6570	75%
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	1.0	5582	64%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	5.0	7745	88%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	5.5	7684	87%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-540	-1,124	49.78	-236	9.2	8020	91%
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	3.0	5537	63%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	1,518	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	1.4	3050	35%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	11.2	8018	91%
VACAR	CPL_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	336	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	6.9	7534	86%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	7.5	7671	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	7.3	7696	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	51.74	-291	6.9	7616	87%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	7.5	7707	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	44.80	579	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	7.0	7772	88%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,079	10,227	40.55	2,159	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	11.2	8151	93%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	7.3	7772	88%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	1,518	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	1.5	3756	56%
VACAR	CPL_1_MSA_Durham_G	7607	10,224	8,563	986	2,572	44.85	336	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	6.9	7702	88%
PJM	VAP_7_G	6808	4,179	303	1,699	3,608	48.73	564	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,877	-2,931	51.79	-852	3.1	5547	63%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,440	1,700	44.47	561	PJM	VAP_7_G	1952	4,179	303	-1,013	-2,512	60.98	-121	16.5	7222	88%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,676	3,904	44.26	1,038	PJM	VAP_7_G	1952	4,179	303	-1,013	-2,512	60.98	-121	16.7	5725	88%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,443	6,047	50.33	1,518	PJM	VAP_7_G	1952	4,179	303	-1,013	-2,512	60.98	-121	10.7	5484	88%
PJM	PJM500_7_MSA_York-Hanover	8760	2,696	0	2,071	2,570	52.28	948	PJM	VAP_7_G	1952	4,179	303	-1,013	-2,512	60.98	-121	8.7	6107	88%

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2011R2

Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	1.2	6619	75%
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	334	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	5.1	4070	46%
PJM	NI_20_MSA_Chicago_G	7868	1,632	83	887	1,505	45.22	315	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	5.0	4098	47%
PJM	NI_15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	13.1	4729	54%
PJM	NI_7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	9.6	5243	60%
PJM	NI_6_MSA_Chicago_G	7271	9,759	7,577	894	3,023	45.75	297	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	4.4	4299	49%
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,559	4,074	45.36	1,414	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	4.8	4280	49%
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	13.2	7137	81%
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	PJM	AEP_1_MSA_Lynchburg_G	8760	843	2,162	-1,611	-2,415	50.19	-708	4.3	6892	78%
PJM	NI_6_MSA_Chicago_G	7271	9,759	7,577	894	3,023	45.75	297	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	4.6	1401	16%
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	334	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	5.3	1166	13%
PJM	NI_20_MSA_Chicago_G	7868	1,632	83	887	1,505	45.22	315	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	5.2	1242	14%
PJM	NI_7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	9.8	3386	39%
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,559	4,074	45.36	1,414	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	5.0	1386	16%
MISO	LCEE_3_GEN_Gehrt2_G	8760	2,000	225	1,554	1,900	44.67	608	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	5.7	5053	58%
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	13.4	6244	71%
PJM	NI_15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	13.3	2778	32%
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	4.5	6210	71%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AEP_2_STA_TN-WV_L	8760	1,284	2,977	-1,671	-2,729	50.37	-737	1.4	5365	61%
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,559	4,074	45.36	1,414	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	5.0	1559	18%
PJM	NI_6_MSA_Chicago_G	7271	9,759	7,577	894	3,023	45.75	297	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	4.6	1558	18%
PJM	NI_7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	9.8	3806	43%
PJM	NI_15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	13.3	3381	38%
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	334	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	5.3	1172	13%
PJM	NI_20_MSA_Chicago_G	7868	1,632	83	887	1,505	45.22	315	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	5.1	1557	18%
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	4.5	6405	73%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	1.4	4647	53%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	1.5	4750	54%
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	AEP_9_MSA_Canton-Massillon_L	8760	733	2,120	-1,573	-2,255	50.37	-694	13.4	6519	74%
PJM	NI_20_MSA_Chicago_G	7868	1,632	83	887	1,505	45.22	315	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	9.5	951	11%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	3.0	1276	15%
PJM	NI_2_MSA_Chicago_G	8760	5,342	1,283	3,559	4,074	45.36	1,414	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	9.4	1265	14%
MAPP	MEC_3_MSA_DesMoines_G	8371	3,307	1,933	588	1,348	26.64	131	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	28.1	2364	27%
PJM	NI_15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	17.6	2572	29%
PJM	NI_7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	14.2	3556	40%
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,511	3,387	45.87	1,009	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	8.9	6183	70%
MISO	IP_7_GEN_Baldwin_G	8760	1,900	444	1,149	1,478	40.47	407	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	14.3	0	0%
MISO	IP_8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	323	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	11.1	446	5%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	4.3	64	1%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,095	1,597	47.78	458	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	6.9	2961	34%
PJM	NI_6_MSA_Chicago_G	7271	9,759	7,577	894	3,023	45.75	297	MISO	AMRN_12_MSA_StLouis_L	2474	5,059	6,066	-438	-1,792	54.73	-59	9.0	1277	15%
PJM	NI_15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	8.0	4183	48%
PJM	NI_7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	4.5	4638	53%
MISO	IP_7_GEN_Baldwin_G	8760	1,900	444	1,149	1,478	40.47	407	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	4.6	4366	50%
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	8.1	4142	47%
MISO	IP_8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	323	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	1.4	222	3%
MAPP	MEC_3_MSA_DesMoines_G	8371	3,307	1,933	588	1,348	26.64	131	MISO	AMRN_2_County_Macon_L	8760	174	1,209	-720	-1,156	45.09	-284	18.4	4402	50%
MISO	FE_9_MSA>Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,039	-1,618	52.94	-482	3.4	5077	58%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,039	-1,618	52.94	-482	3.9	4980	57%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,039	-1,618	52.94	-482	2.5	6277	71%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	PJM	AP_2_GEN_Albright3_L	8760	603	1,748	-1,039	-1,618	52.94	-482	4.1	5086	58%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	11.8	7629	87%
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	752	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	3.9	5104	58%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	2.3	4599	52%
PJM	PJM500_9_MSA_Pittsburgh_G																			

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	19.3	8182	93%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	19.5	8199	93%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	11.8	7553	86%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	17.9	8324	95%
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	203	1,153	-686	-1,101	68.30	-411	18.8	8196	93%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	3.1	3836	44%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	12.0	7699	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	12.5	7675	87%
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	19.6	8216	94%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	20.2	8216	94%
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	752	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	4.7	5382	61%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	18.6	8020	91%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	12.5	7599	87%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	69.06	-441	20.0	8198	93%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-475	-1,030	70.57	-294	13.5	7641	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-475	-1,030	70.57	-294	14.0	7700	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-718	-1,436	70.39	-443	13.9	7696	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-718	-1,436	70.39	-443	13.3	7634	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	71.02	-429	14.5	7711	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	71.02	-429	14.0	7670	87%
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	334	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	-943	2.3	524	6%
MISO	LGEE_3_GEN_Gehntz_G	8760	2,000	225	1,554	1,900	44.67	608	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	-943	2.7	4959	56%
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,511	3,387	45.87	1,009	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	-943	1.5	2912	33%
MISO	AMRN_12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	-943	10.4	3394	39%
MISO	IFL_2_MSA_Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,273	-3,693	47.39	-943	1.5	2711	31%
MISO	NIPS_8_MSA_Chicago_G	8643	2,892	1,694	859	1,599	45.04	334	MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-883	-1,480	46.48	-360	1.4	502	6%
MISO	LGEE_3_GEN_Gehntz_G	8760	2,000	225	1,554	1,900	44.67	608	MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-883	-1,480	46.48	-360	1.8	5772	66%
VACAR	SCEG_1_MSA_Columbia_G	7998	4,954	2,752	999	2,547	56.98	455	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	10.1	2292	26%
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	752	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	2.7	4936	56%
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,437	1,680	56.12	706	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	10.9	1324	15%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	3,071	5,821	54.45	1,429	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	12.6	555	6%
VACAR	DUK_5_MSA_Seneca_G	6330	1,911	0	1,074	1,911	62.14	422	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	4.9	4626	53%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	1.0	563	6%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	VACAR	CPL_1_MSA_Durham_G	830	10,224	8,563	-383	-1,448	67.04	-21	16.6	6778	77%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	VACAR	DUK_4_MSA_Greenville_L	6832	3,546	4,489	-609	-2,063	54.71	-228	4.3	4035	46%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,886	-2,150	-3,877	55.28	-1,041	4.8	3772	43%
VACAR	SCEG_1_MSA_Columbia_G	7998	4,954	2,752	999	2,547	56.98	455	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	33.9	181	2%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	34.1	2560	29%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	35.5	802	9%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	35.8	2756	31%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	35.4	527	6%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	30.1	2781	32%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	35.8	2712	31%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	40.4	3971	45%
VACAR	CPL_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	50.45	509	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	33.8	290	3%
VACAR	DUK_5_MSA_Seneca_G	6330	1,911	0	1,074	1,911	62.14	422	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-503	-2,175	90.83	-10	28.7	34	0%
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	156	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,418	-2,066	54.26	-674	5.8	3124	36%
SPP	AEPW_9_MSA_MountPleasant	8404	8,168	3,832	852	2,045	52.70	377	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,418	-2,066	54.26	-674	1.6	8741	100%
ENTERGY	EES_4_GEN_Ouachita_G	6519	6,345	2,417	1,268	3,688	58.18	481	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	3.5	6455	73%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,728	55.08	650	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.6	6450	73%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	850	1,211	55.21	378	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.4	6495	74%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.4	7072	81%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.6	7017	80%

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	0	1,059	1,060	54.99	495	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.7	5423	62%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.6	7041	80%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	6.2	7101	81%
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	156	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	13.2	6883	78%
SPP	AEPW_9_MSA_MountPleasant	8404	8,168	3,832	852	2,045	52.70	377	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	8.9	8733	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,966	-5,564	61.64	-1,601	5.0	6704	76%
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	156	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-545	-1,645	55.69	-213	7.2	4350	50%
SPP	AEPW_9_MSA_MountPleasant	8404	8,168	3,832	852	2,045	52.70	377	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7,393	4,949	-545	-1,645	55.69	-213	3.0	8735	99%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,728	55.08	650	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	2.3	2	0%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	5.6	3657	42%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	5.0	2108	24%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	850	1,211	55.21	378	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	2.2	0	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	2.1	1536	17%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	1.9	2012	23%
SPP	AEPW_9_MSA_MountPleasant	8404	8,168	3,832	852	2,045	52.70	377	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	4.7	8740	99%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	2.4	1582	18%
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,923	2,737	51.76	870	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	5.6	1825	21%
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	156	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	8.9	260	3%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,095	1,597	47.78	458	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	9.6	3914	45%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	ENTERGY	EES_9_MSA_Russellville_G	6267	6,123	4,517	-451	-2,048	57.38	-162	2.4	2119	24%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	MISO	FE_4_MSA_Akron_L	8760	531	2,277	-1,214	-1,778	50.24	-534	1.4	4202	48%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	MISO	FE_4_MSA_Akron_L	8760	531	2,277	-1,214	-1,778	50.24	-534	1.2	4085	47%
MISO	FE_9_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	MISO	FE_5_MSA_Cleveland_L	7570	3,216	4,680	-537	-2,443	51.93	-211	2.9	4694	53%
MISO	FE_9_MSA_Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	MISO	FE_5_MSA_Cleveland_L	7570	3,216	4,680	-537	-2,443	51.93	-211	2.4	2462	28%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,533	MISO	FE_5_MSA_Cleveland_L	7570	3,216	4,680	-537	-2,443	51.93	-211	1.5	4094	47%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	MISO	FE_5_MSA_Cleveland_L	7570	3,216	4,680	-537	-2,443	51.93	-211	3.1	4795	55%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	MISO	FE_7_MSA_Toledo_L	8710	2,586	2,106	-717	-1,342	51.37	-321	2.3	6392	73%
MISO	FE_9_MSA>Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	MISO	FE_7_MSA_Toledo_L	8710	2,586	2,106	-717	-1,342	51.37	-321	1.9	5376	61%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	MISO	FE_7_MSA_Toledo_L	8710	2,586	2,106	-717	-1,342	51.37	-321	2.5	6449	73%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	48.83	549	MISO	FE_8_MSA_Youngstown_L	8760	939	2,217	-904	-1,569	49.85	-395	1.0	107	1%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	7.7	5088	58%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	9.0	4973	57%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	9.3	4975	57%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	3.6	5043	57%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	9.3	4976	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,013	-3,788	64.34	-1,134	8.9	4964	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	9.7	5363	61%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	8.4	5439	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	10.1	5368	61%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	4.3	5405	62%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	10.1	5368	61%
FRCC	OUC_1_MSA_Orlando_G	8688	889	73	1,109	1,487	63.86	615	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	1.3	4809	55%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,543	-2,611	65.12	-880	9.8	5369	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	10.9	5615	64%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	5.6	5660	64%
FRCC	FPC_2_MSA_HomosassaSpring	8544	1,584	0	1,373	1,584	64.20	753	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	2.2	5162	59%
FRCC	FPC_6_MSA_Jacksonville_G	8760	1,665	358	872	1,331	65.21	498	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	1.1	4109	47%
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	0	1,135	1,330	64.73	643	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	1.6	4137	47%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	11.4	5616	64%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	11.1	5615	64%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	9.7	5680	65%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	FRCC	FPL_2_MSA_FortMyers_G	8709	5,929	4,563	-1,306	-2,761	66.36	-755	11.3	5618	64%
FRCC	SEC_6_MSA_Palatka_G	8760	1,330	0	1,135	1,330	64.73	643	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,193	-4,333	67.19	-1,291	2.5	4877	56%

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
FRCC	FPL 8 MSA PortStLucie_G	8628	10,364	4,623	1,804	5,105	66.17	1,030	FRCC	FPL 3 MSA Miami_L	8760	6,944	7,089	-2,193	-4,333	67.19	-1,291	1.0	3155	36%
SOUTHERN	SOCO 17 MSA Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	FRCC	FPL 3 MSA Miami_L	8760	6,944	7,089	-2,193	-4,333	67.19	-1,291	6.4	5597	64%
FRCC	FPC 2 MSA HomosassaSpring	8544	1,584	0	1,373	1,584	64.20	753	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	3.0	5309	60%
SOUTHERN	SOCO 15 MSA Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	12.2	5578	64%
FRCC	FPL 8 MSA PortStLucie_G	8628	10,364	4,623	1,804	5,105	66.17	1,030	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	1.0	3169	36%
FRCC	FPC 10 MSA Lakeland_G	8320	3,581	747	721	1,471	65.71	394	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	1.5	4371	50%
FRCC	JEA 6 MSA Jacksonville_G	8760	1,665	358	872	1,331	65.21	498	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	2.0	3779	43%
FRCC	SEC 6 MSA Palatka_G	8760	1,330	0	1,135	1,330	64.73	643	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	2.4	4980	57%
SOUTHERN	SOCO 17 MSA Mobile_G	1894	5,205	4,575	224	1,452	60.78	26	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	6.4	5621	64%
SOUTHERN	SOCO 25 MSA Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	11.7	5576	63%
SOUTHERN	SOCO 28 MSA Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	12.2	5575	63%
SOUTHERN	SOCO 31 MSA Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	11.9	5575	63%
SOUTHERN	SOCO 32 MSA Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	FRCC	FPL 7 MSA Miami_L	8760	570	3,923	-2,632	-4,256	67.17	-1,549	10.5	5635	64%
MISO	XEL 3 MSA Minneapolis_L	2891	7,596	7,622	612	1,771	18.39	33	MISO	GRE 4 MSA Minneapolis_L	8760	331	1,111	-1,099	-2,124	39.95	-385	21.6	4	0%
MISO	ITC 3 MSA Detroit_G	8744	3,815	1,600	1,234	1,928	52.63	568	ONTARIO	IESO 11_G	8760	9,529	12,779	-3,043	-7,371	56.86	-1,515	4.2	7837	89%
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	51.90	591	ONTARIO	IESO 11_G	8760	9,529	12,779	-3,043	-7,371	56.86	-1,515	5.0	5778	66%
MISO	ITC 3 MSA Detroit_G	8744	3,815	1,600	1,234	1,928	52.63	568	ONTARIO	IESO 15_G	8760	1,964	3,375	-2,360	-3,239	56.62	-1,171	4.0	7395	84%
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	51.90	591	ONTARIO	IESO 15_G	8760	1,964	3,375	-2,360	-3,239	56.62	-1,171	4.7	5707	65%
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	51.90	591	ONTARIO	IESO 2_G	6935	2,437	2,116	-635	-1,375	52.91	-233	1.0	7620	87%
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	51.90	591	ONTARIO	IESO 2_L	239	39	1,696	-1,181	-1,636	55.43	-574	3.5	8038	92%
MISO	ITC 3 MSA Detroit_G	8744	3,815	1,600	1,234	1,928	52.63	568	ONTARIO	IESO 3_L	8760	39	1,696	-1,181	-1,636	55.43	-574	2.8	7520	86%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	MISO	IPL 5 MSA Indianapolis_L	8760	306	1,187	-784	-1,258	47.74	-328	1.9	2435	28%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,511	3,387	45.87	1,009	MISO	IPL 5 MSA Indianapolis_L	8760	306	1,187	-784	-1,258	47.74	-328	1.9	6102	69%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,511	3,387	45.87	1,009	MISO	IPL 8 MSA Indianapolis_L	8760	547	1,227	-528	-1,094	47.81	-221	1.9	6136	70%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,411	1,664	45.86	567	MISO	IPL 8 MSA Indianapolis_L	8760	547	1,227	-528	-1,094	47.81	-221	2.0	2471	28%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	MISO	ITC 2 MSA Detroit_L	8624	4,001	5,247	-1,113	-3,583	52.70	-506	3.2	6691	76%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	MISO	ITC 2 MSA Detroit_L	8624	4,001	5,247	-1,113	-3,583	52.70	-506	3.7	7278	83%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	49.02	827	MISO	ITC 9 MSA Detroit_L	8760	1,340	4,751	-2,178	-4,518	52.48	-1,001	3.5	7896	90%
MISO	FE 9 MSA Weirton_G	8760	1,860	112	1,410	1,803	49.49	611	MISO	ITC 9 MSA Detroit_L	8760	1,340	4,751	-2,178	-4,518	52.48	-1,001	3.0	7535	86%
SPP	WERE 1 MSA Manhattan_G	8684	2,988	409	1,338	2,255	39.48	459	SPP	KACP 7 MSA KansasCity_L	8760	0	1,291	-730	-1,422	45.88	-293	6.4	757	9%
MISO	BREC 3 County Webster_G	8760	1,355	476	891	1,191	41.70	325	MISO	LGEE 5 MSA Lexington_L	8760	595	2,345	-1,778	-2,923	45.68	-712	4.0	3283	37%
MISO	LGEE 3 GEN Cehrnt2_G	8760	2,000	225	1,554	1,900	44.67	608	MISO	LGEE 5 MSA Lexington_L	8760	595	2,345	-1,778	-2,923	45.68	-712	1.0	4322	49%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	912	1,394	40.89	320	MISO	METC 8 MSA BayCity_G	8173	3,795	2,562	-603	-1,641	53.22	-262	12.3	5315	61%
MISO	ITC 7 MSA Monroe_G	8472	1,500	0	1,344	1,500	51.90	591	MISO	METC 8 MSA BayCity_G	8173	3,795	2,562	-603	-1,641	53.22	-262	1.3	3286	37%
PJM	AEP 8 GEN Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	MISO	METC 8 MSA BayCity_G	8173	3,795	2,562	-603	-1,641	53.22	-262	2.8	3405	39%
PJM	AEP 8 GEN Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	MISO	METC 9 MSA Kalamazoo_L	8760	118	1,334	-808	-1,473	52.62	-372	2.2	1541	18%
MISO	WEC 1 MSA Chicago_G	8592	1,728	303	912	1,394	40.89	320	MISO	METC 9 MSA Kalamazoo_L	8760	118	1,334	-808	-1,473	52.62	-372	11.7	4823	55%
NEPOOL	NEPOOL 3 ME	3787	3,494	2,522	344	1,072	67.04	87	NEPOOL	NEPOOL 10 RI	6427	2,062	2,203	-313	-1,073	70.36	-142	3.3	7160	82%
NYPP	NYISO 3 NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NEPOOL	NEPOOL 10 RI	6427	2,062	2,203	-313	-1,073	70.36	-142	4.8	8760	100%
NYPP	NYISO 1 NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NEPOOL	NEPOOL 10 RI	6427	2,062	2,203	-313	-1,073	70.36	-142	12.6	5832	66%
NEPOOL	NEPOOL 2 NH	8425	4,204	2,621	1,000	1,918	68.48	577	NEPOOL	NEPOOL 10 RI	6427	2,062	2,203	-313	-1,073	70.36	-142	1.9	7181	82%
NYPP	NYISO 1 NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NEPOOL	NEPOOL 3 ME	4973	3,494	2,522	-232	-1,137	62.13	-72	4.3	5832	66%
NYPP	NYISO 3 NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NEPOOL	NEPOOL 4 NEBOS	8715	3,262	5,904	-1,340	-3,500	71.29	-833	5.7	8760	100%
NYPP	NYISO 1 NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NEPOOL	NEPOOL 4 NEBOS	8715	3,262	5,904	-1,340	-3,500	71.29	-833	13.5	5832	66%
NEPOOL	NEPOOL 3 ME	3787	3,494	2,522	344	1,072	67.04	87	NEPOOL	NEPOOL 4 NEBOS	8715	3,262	5,904	-1,340	-3,500	71.29	-833	4.2	7176	82%
NEPOOL	NEPOOL 2 NH	8425	4,204	2,621	1,000	1,918	68.48	577	NEPOOL	NEPOOL 4 NEBOS	8715	3,262	5,904	-1,340	-3,500	71.29	-833	2.8	7182	82%
NYPP	NYISO 3 NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NEPOOL	NEPOOL 6 WCMA	8644	4,285	3,417	-1,170	-3,529	71.38	-722	5.8	8612	98%
NYPP	NYISO 1 NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NEPOOL	NEPOOL 6 WCMA	8644	4,285	3,417	-1,170	-3,529	71.38	-722	13.6	5836	66%
NEPOOL	NEPOOL 3 ME	3787	3,494	2,522	344	1,072	67.04	87	NEPOOL	NEPOOL 6 WCMA	8644	4,285	3,417	-1,170	-3,529	71.38	-722	4.3	7245	82%
NEPOOL	NEPOOL 2 NH	8425	4,204	2,621	1,000	1,918	68.48	577	NEPOOL	NEPOOL 6 WCMA	8644	4,285	3,417	-1,170	-3,529	71.38	-722	2.9	7267	83%
NEPOOL	NEPOOL 5 SEMA	8739	6,454	3,978	1,588	3,670	71.41	991	NEPOOL	NEPOOL 7 CT	1543	4,447	3,920	-416	-1,722	82.40	-53	11.0	2199	25%
NEPOOL	NEPOOL 2 NH	8425	4,204	2,621	1,000	1,918	68.48	577	NEPOOL	NEPOOL 7 CT	1543	4,447	3,920	-416	-1,722	82.40	-53	13.9	7798	89%
NEPOOL	NEPOOL 8 SWCT	6228	2,678	1,850	421	1,723	78.27	205	NEPOOL	NEPOOL 7 CT	1543	4,447	3,920	-416	-1,722	82.40	-53	4.1	7476	85%
NYPP	NYISO 1 NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NEPOOL	NEPOOL 7 CT	1543	4,447	3,920	-416	-1,722	82.40	-53	24.6	5836	66%
NYPP	NYISO 3 NYC	8760	6,711	2,657	1,926	2,8														

Task 2: Appendix 4, Corridors Results by Scenario
HighCase2011R2

Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,616	-9,590	45.30	-2,229	4.7	2893	33%
MISO	AMRN 12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,616	-9,590	45.30	-2,229	8.4	6268	71%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,616	-9,590	45.30	-2,229	8.2	2519	29%
MISO	IP 8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	323	PJM	NI 13 MSA Chicago_L	8760	2,396	10,556	-5,616	-9,590	45.30	-2,229	1.6	1092	12%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	912	1,394	40.89	320	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	4.2	3788	43%
MISO	IP 8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	323	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	1.4	1025	12%
MISO	AMRN 12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	8.2	6210	71%
PJM	NI 15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	8.0	2558	29%
MISO	ALTE 2_MSA_Madison_G	8749	1,665	441	498	1,033	37.26	162	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	7.9	4795	55%
PJM	NI 7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	NI 3 MSA Chicago_L	8760	26	1,205	-638	-1,267	45.12	-252	4.5	2941	33%
MISO	AMRN 12_MSA_StLouis_L	6286	5,059	6,066	623	1,639	36.94	145	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	9.0	6277	71%
MISO	IP 8_GEN_Clinton_G	7994	2,302	1,195	924	1,212	43.68	323	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	2.3	462	5%
MISO	ALTE 2_MSA_Madison_G	8749	1,665	441	498	1,033	37.26	162	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	8.7	4518	51%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	912	1,394	40.89	320	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	5.1	4033	46%
PJM	NI 15_MSA_Davenport_G	8712	2,479	0	1,682	2,314	37.11	544	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	8.9	2536	29%
PJM	NI 7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	40.58	753	PJM	NI 6 MSA Chicago_G	1489	9,759	7,577	-356	-1,470	45.98	-24	5.4	2964	34%
NYPP	NYISO 6_NYF	7512	4,103	1,983	591	1,834	70.70	314	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	7.5	8759	100%
NEPOOL	NEPOOL 2_NH	8425	4,204	2,621	1,000	1,918	68.48	577	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	9.8	8760	100%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	56.39	1,238	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	21.8	8760	100%
NYPP	NYISO 1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	20.4	8759	100%
PJM	PENELEC 2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	519	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	19.2	5837	66%
NYPP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	75.23	1,035	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	3.0	8757	100%
NEPOOL	NEPOOL 3_ME	3787	3,494	2,522	344	1,072	67.04	87	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	11.2	8760	100%
NEPOOL	NEPOOL 5_SEMA	8739	6,454	3,978	1,588	3,670	71.41	991	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	6.8	8760	100%
NEPOOL	NEPOOL 7_CT	7217	4,447	3,920	641	1,828	70.94	328	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	7.3	8759	100%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	12.7	8759	100%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	56.38	1,231	NYPP	NYISO 10_NYJ	8760	10,283	11,493	-3,562	-5,473	78.24	-2,441	21.9	8760	100%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	56.38	1,231	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	21.5	5838	66%
PJM	PENELEC 2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	519	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	18.8	5838	66%
NYPP	NYISO 6_NYF	7512	4,103	1,983	591	1,834	70.70	314	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	7.2	8760	100%
NEPOOL	NEPOOL 3_ME	3787	3,494	2,522	344	1,072	67.04	87	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	10.8	8760	100%
NYPP	NYISO 1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	20.1	5838	66%
NEPOOL	NEPOOL 5_SEMA	8739	6,454	3,978	1,588	3,670	71.41	991	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	6.5	8760	100%
NEPOOL	NEPOOL 2_NH	8425	4,204	2,621	1,000	1,918	68.48	577	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	9.4	8760	100%
NEPOOL	NEPOOL 7_CT	7217	4,447	3,920	641	1,828	70.94	328	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	6.9	8760	100%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	12.3	8760	100%
NYPP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	75.23	1,035	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	2.6	8749	100%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	56.39	1,238	NYPP	NYISO 11_NYK	8760	5,681	5,289	-1,977	-2,892	77.87	-1,349	21.5	5838	66%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	56.38	1,231	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	16.2	5801	66%
NYPP	NYISO 1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	14.7	5700	65%
NEPOOL	NEPOOL 2_NH	8425	4,204	2,621	1,000	1,918	68.48	577	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	4.1	6318	72%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	56.39	1,238	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	16.2	5802	66%
NEPOOL	NEPOOL 7_CT	7217	4,447	3,920	641	1,828	70.94	328	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	1.6	5257	60%
PJM	PENELEC 2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	519	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	13.5	5769	66%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	7.0	5475	62%
NEPOOL	NEPOOL 3_ME	3787	3,494	2,522	344	1,072	67.04	87	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	5.5	5699	65%
NYPP	NYISO 6_NYF	7512	4,103	1,983	591	1,834	70.70	314	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	1.8	4398	50%
NEPOOL	NEPOOL 5_SEMA	8739	6,454	3,978	1,588	3,670	71.41	991	NYPP	NYISO 7_NYG	8404	3,156	2,195	-826	-1,818	72.54	-503	1.1	5429	62%
NEPOOL	NEPOOL 5_SEMA	8739	6,454	3,978	1,588	3,670	71.41	991	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	5.6	8670	99%
NEPOOL	NEPOOL 7_CT	7217	4,447	3,920	641	1,828	70.94	328	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	6.1	8599	98%
NEPOOL	NEPOOL 3_ME	3787	3,494	2,522	344	1,072	67.04	87	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	10.0	8751	100%
NYPP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	75.23	1,035	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	1.8	7125	81%
NEPOOL	NEPOOL 2_NH	8425	4,204	2,621	1,000	1,918	68.48	577	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	8.5	8751	100%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	56.39	1,238	NYPP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	77.00	-539	20.6	5821	66%
NYPP	NYISO 3_NYC																			

Task 2: Appendix 4, Corridors Results by Scenario
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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	BGE_7_MSA_Baltimore-Towson	8161	2,548	1,043	660	1,099	71.25	384	PJM	PECO_5_MSA_Philadelphia_L	6627	1,656	2,510	-372	-2,388	78.95	-195	7.7	4391	50%
PJM	PJM500_7_MSA_York-Hanover	8760	2,696	0	2,070	2,570	70.66	1,282	PJM	PECO_5_MSA_Philadelphia_L	6627	1,656	2,510	-372	-2,388	78.95	-195	8.3	1968	22%
PJM	PJM500_4_MSA_Philadelphia_C	8645	2,383	0	1,579	3,295	70.92	968	PJM	PECO_5_MSA_Philadelphia_L	6627	1,656	2,510	-372	-2,388	78.95	-195	8.0	0	0%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	70.14	-543	13.6	7630	87%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	70.14	-543	13.6	7610	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	PEPCO_1_MSA_DC_L	8760	0	1,439	-883	-1,547	70.14	-543	13.1	7593	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	69.59	-439	12.5	5869	67%
PJM	PENELEC_2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	519	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	69.59	-439	13.1	7248	83%
PJM	PENELEC_2_MSA_DuBois_G	8745	2,724	1,196	1,004	1,719	59.08	519	PJM	PL_5_MSA_Lancaster_L	8760	0	897	-721	-1,027	69.59	-439	10.5	7727	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-695	-1,038	69.49	-423	10.4	7432	85%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-695	-1,038	69.49	-423	12.4	7292	83%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	PL_7_MSA_Allentown_L	8760	245	1,051	-695	-1,038	69.49	-423	13.0	8255	94%
NYPP	NYISO_1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-1,004	-2,093	70.31	-618	12.5	8353	95%
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-1,004	-2,093	70.31	-618	4.8	8262	94%
NYPP	NYISO_1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-961	-2,077	70.95	-597	13.2	8348	95%
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-961	-2,077	70.95	-597	5.4	7883	90%
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,926	2,870	65.56	1,106	PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,202	-2,535	70.29	-740	4.7	8181	93%
NYPP	NYISO_1_NYA	8292	4,946	2,500	1,651	2,452	57.80	791	PJM	PSEG_8_MSA_NewYork_G	8760	3,860	3,654	-1,202	-2,535	70.29	-740	12.5	8148	93%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	VACAR	SCEG_9_MSA_Charleston_G	8571	1,152	1,944	-410	-1,082	56.48	-199	1.2	1866	21%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	VACAR	SCEG_9_MSA_Charleston_G	8571	1,152	1,944	-410	-1,082	56.48	-199	1.5	1866	21%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	VACAR	SCEG_9_MSA_Charleston_G	8571	1,152	1,944	-410	-1,082	56.48	-199	1.0	1587	18%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	VACAR	SCEG_9_MSA_Charleston_G	8571	1,152	1,944	-410	-1,082	56.48	-199	1.5	1853	21%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	-716	2.1	853	10%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	-716	2.6	4119	47%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	-716	2.3	4116	47%
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,437	1,680	56.12	706	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	-716	1.5	1282	15%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,418	-3,042	57.60	-716	2.6	4118	47%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	3,071	5,821	54.45	1,429	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	4.0	472	5%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	850	1,211	55.21	378	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	3.2	474	5%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,110	6,381	55.47	2,483	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	3.0	143	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	6.7	2147	24%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	6.1	228	3%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	3,574	2,674	499	1,541	56.69	212	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	1.8	525	6%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,179	9,751	55.29	2,024	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	3.2	146	2%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,394	1,959	55.00	672	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	3.5	224	3%
VACAR	SCEG_1_MSA_Columbia_G	7998	4,954	2,752	999	2,547	56.98	455	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	1.5	354	4%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	12,464	9,217	1,684	5,534	55.02	788	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3,431	4,125	-722	-2,957	58.46	-331	3.4	215	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,369	-2,611	55.30	-663	2.9	103	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,369	-2,611	55.30	-663	3.5	1555	18%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_17_MSA_Mobile_G	6866	5,205	4,575	-445	-1,762	54.55	-167	2.8	3405	39%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_17_MSA_Mobile_G	6866	5,205	4,575	-445	-1,762	54.55	-167	2.2	3024	34%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_21_MSA_Atlanta_G	8716	3,334	2,733	-721	-1,542	55.12	-346	2.7	94	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_21_MSA_Atlanta_G	8716	3,334	2,733	-721	-1,542	55.12	-346	3.3	1947	22%

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	55.32	-946	3.5	1670	19%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	55.32	-946	2.9	219	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,970	-3,246	55.44	-957	3.0	389	4%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,970	-3,246	55.44	-957	3.7	1764	20%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	3,071	5,821	54.45	1,429	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	55.53	-350	1.1	314	4%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	55.53	-350	3.1	83	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	55.53	-350	3.7	1393	16%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	55.32	-552	3.5	1651	19%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	17,334	9,966	2,978	7,160	52.39	1,366	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	55.32	-552	2.9	219	2%
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	849	1,088	49.57	369	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,298	-2,941	50.62	-575	1.1	2173	25%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	44.67	608	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,298	-2,941	50.62	-575	6.0	5050	57%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	44.67	608	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	8.2	6728	77%
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	849	1,088	49.57	369	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	3.3	1444	16%
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,923	2,737	51.76	870	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	1.1	2464	28%
MISO	BREC_3_County_Webster_G	8760	1,355	476	891	1,191	41.70	325	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	11.2	7262	83%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,095	1,597	47.78	458	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	5.1	2808	32%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	2.4	2876	33%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,121	2,481	51.78	944	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	9,154	8,858	-1,614	-5,752	52.89	-738	1.1	0	0%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	44.67	608	TVAUTHOR	TVA_7_MSA_Memphis_L	8753	7,215	5,982	-1,824	-4,409	51.92	-829	7.2	5507	63%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	TVAUTHOR	TVA_7_MSA_Memphis_L	8753	7,215	5,982	-1,824	-4,409	51.92	-829	1.5	864	10%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	-336	14.6	7929	90%
VACAR	CPLE_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	57.05	509	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	-336	8.0	6562	75%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	-336	8.5	7645	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	-336	8.0	7675	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-590	-1,124	65.06	-336	8.5	7705	88%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	18.2	7965	91%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	2.6	2897	33%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	11.6	7547	86%
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	752	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	4.2	5383	61%
VACAR	CPLE_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	57.05	509	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	11.6	7450	85%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	12.1	7573	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	68.61	-386	12.1	7601	87%
PJM	VAP_7_G	6600	4,179	303	1,771	3,623	64.38	752	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	4.4	5401	61%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	2.7	3574	41%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	12.2	7624	87%
VACAR	CPLE_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	57.05	509	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	11.7	7618	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	12.2	7707	88%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	18.3	8060	92%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,875	-2,931	68.74	-1,129	11.7	7705	88%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,674	3,962	56.52	1,324	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	19.6	5807	66%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	5,868	10,212	50.44	2,593	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	25.7	6065	69%
PJM	PJM500_5_MSA_DC_G	8760	1,730	0	1,600	1,730	70.80	992	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	5.3	5141	59%
PJM	PJM500_4_MSA_Philadelphia_G	8645	2,383	0	1,579	3,295	70.92	968	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	5.2	5728	65%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,543	6,081	66.00	2,048	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	10.1	5479	62%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,490	1,700	57.05	736	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	19.1	7205	82%
VACAR	CPLE_1_MSA_Durham_G	7930	10,224	8,563	1,125	2,523	57.05	509	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	19.1	5410	62%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,430	1,700	56.53	708	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	19.6	7148	81%
PJM	PJM500_7_MSA_York-Hanover	8760	2,696	0	2,070	2,570	70.66	1,282	PJM	VAP_7_G	2160	4,179	303	-1,029	-2,509	76.12	-169	5.5	6187	70%
SPP	KACP_4_MSA_KansasCity_G	7896	670	0	1,121	1,520	16.87	149	SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	-120	41.9	7403	84%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,095	1,597	47.78	458	SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	-120	11.0	7927	90%
SPP	WERE_1_MSA_Manhattan_G	8684	2,988	409	1,338	2,255	39.48	459	SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	-120	19.3	1483	17%
SPP	AEPW_5_MSA_Tulsa_G	7582	4,226	2,571	425	1,275	48.49	156	SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	-120	10.3	4447	51%
MAPP	NPPD_4_GEN_Gentleman_G	8247	2,702	148	850	1,575	17.45	122	SPP	WERE_4_GEN_Wolfcreek_G	4506	3,510	2,459	-454	-1,676	58.79	-120	41.3	8717	99%
MISO	OTP_9_GEN_BigStone_G	8640	1,189	136	897	1,677	13.77	107	MISO	XEL_3_MSA_Minneapolis_G	5869	7,596								

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,562	4,192	32.75	1,022	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	3.8	4673	53%
PJM	NI 6 MSA Chicago_G	7988	9,759	7,577	995	2,915	32.98	262	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	3.6	4687	53%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	7.3	5854	67%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	9.5	5687	65%
PJM	NI 20 MSA Chicago_G	7900	1,632	83	892	1,578	32.69	230	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	3.9	4663	53%
MISO	NIPS 8 MSA Chicago_G	8692	2,892	1,694	817	1,465	32.55	231	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	4.0	4403	50%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	3.3	6977	79%
MISO	AMRN 12 MSA StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	AEP 1 MSA Lynchburg_G	8760	843	2,162	-1,598	-2,230	36.54	-511	9.2	7617	87%
PJM	NI 20 MSA Chicago_G	7900	1,632	83	892	1,578	32.69	230	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	3.3	1433	16%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,562	4,192	32.75	1,022	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	3.3	1350	15%
PJM	NI 6 MSA Chicago_G	7988	9,759	7,577	995	2,915	32.98	262	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	3.0	1364	16%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	6.8	4048	46%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	9.0	3712	42%
MISO	NIPS 8 MSA Chicago_G	8692	2,892	1,694	817	1,465	32.55	231	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	3.5	1022	12%
MISO	AMRN 12 MSA StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	8.7	6695	76%
MISO	LGEE 3 GEN Gehnt2_G	8760	2,000	225	1,554	1,900	33.05	450	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	3.0	4876	56%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	PJM	AEP 2 STA TN-WV_L	8760	1,284	2,977	-1,727	-2,729	36.02	-545	2.7	6236	71%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,562	4,192	32.75	1,022	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	3.8	1955	22%
MISO	AMRN 12 MSA StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	9.2	6851	78%
MISO	IPL 2 MSA Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	3.2	6369	73%
PJM	NI 6 MSA Chicago_G	7988	9,759	7,577	995	2,915	32.98	262	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	3.5	1961	22%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	7.3	4305	49%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	9.5	4503	51%
PJM	NI 20 MSA Chicago_G	7900	1,632	83	892	1,578	32.69	230	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	3.8	2086	24%
MISO	NIPS 8 MSA Chicago_G	8692	2,892	1,694	817	1,465	32.55	231	PJM	AEP 9 MSA Canton-Massillon_L	8760	733	2,120	-1,461	-2,211	36.51	-467	4.0	1193	14%
PJM	NI 20 MSA Chicago_G	7900	1,632	83	892	1,578	32.69	230	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	3.8	1398	16%
MAPP	MEC 3 MSA DesMoines_G	8494	3,307	1,933	636	1,436	20.61	111	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	15.9	2977	34%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	9.4	3311	38%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	7.2	4187	48%
ENTERGY	AECI 4 GEN NewMadrid1_G	8760	2,315	248	1,108	1,604	32.71	317	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	3.8	2207	25%
PJM	NI 6 MSA Chicago_G	7988	9,759	7,577	995	2,915	32.98	262	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	3.5	1856	21%
PJM	NI 2 MSA Chicago_G	8760	5,342	1,283	3,562	4,192	32.75	1,022	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	3.7	1832	21%
MISO	CIN 8 MSA Evansville_G	8760	3,657	260	2,521	3,388	33.40	738	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	3.1	6136	70%
MISO	IP 7 GEN Baldwin_G	8760	1,900	444	1,151	1,478	29.17	294	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	7.3	0	0%
MISO	IP 8 GEN Clinton_G	8009	2,302	1,195	927	1,213	31.99	238	MISO	AMRN 12 MSA StLouis_L	2475	5,059	6,066	-438	-1,792	36.48	-40	4.5	492	6%
PJM	NI 7 MSA Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	32.79	-207	3.5	5351	61%
MISO	AMRN 12 MSA StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	32.79	-207	5.5	4660	53%
PJM	NI 15 MSA Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	32.79	-207	5.7	4808	55%
MISO	IP 7 GEN Baldwin_G	8760	1,900	444	1,151	1,478	29.17	294	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	32.79	-207	3.6	5263	60%
MAPP	MEC 3 MSA DesMoines_G	8494	3,307	1,933	636	1,436	20.61	111	MISO	AMRN 2 County Macon_L	8760	174	1,209	-720	-1,156	32.79	-207	12.2	5064	58%
PJM	DLCO 7 MSA Pittsburgh_G	8232	1,644	25	1,367	1,632	36.42	410	PJM	AP 2 GEN Albrght3_L	8760	603	1,748	-1,213	-1,748	37.49	-398	1.1	4094	47%
PJM	AEP 8 GEN Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	AP 2 GEN Albrght3_L	8760	603	1,748	-1,213	-1,748	37.49	-398	1.3	5794	66%
PJM	PJM500 3 MSA Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	5.3	7460	85%
MISO	FE 9 MSA Weirton_G	8741	1,860	112	1,342	1,795	36.50	428	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	7.9	7753	88%
MISO	FE 6 MSA Pittsburgh_G	8592	2,371	213	1,964	2,290	36.50	616	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	7.9	7758	88%
PJM	PJM500 9 MSA Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	5.0	7447	85%
PJM	VAP 1 MSA Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	1,298	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	1.1	4972	57%
PJM	VAP 7_G	7408	4,179	303	1,507	3,608	41.18	460	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	3.2	5773	66%
PJM	AP 1 County Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	889	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	5.6	7492	85%
PJM	AEP 8 GEN Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	AP 7 MSA Hagerstown-Martinsburg_L	8760	203	1,153	-688	-1,101	44.37	-268	8.2	7947	90%

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	36.42	410	PJM	AP_7_MSA_Hagerstown-Marinburg_L	8760	203	1,153	-688	-1,101	44.37	-268	8.0	7778	89%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	1,644	25	1,367	1,632	36.42	410	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	8.4	7938	90%
MISO	FE_6_MSA_Pittsburgh_G	8592	2,371	213	1,964	2,290	36.50	616	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	8.3	7908	90%
MISO	FE_9_MSA_Weirton_G	8741	1,860	112	1,342	1,795	36.50	428	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	8.3	7897	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	5.7	7701	88%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	889	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	6.0	7665	87%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	8.6	7989	91%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	5.5	7695	88%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	1,298	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	1.5	4368	50%
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	460	PJM	AP_8_MSA_DC-VA-MD_L	8760	0	1,097	-728	-1,048	44.81	-286	3.6	5923	67%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-485	-1,030	45.37	-193	6.0	7692	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	845	1,565	-485	-1,030	45.37	-193	6.3	7733	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-821	-1,495	45.25	-325	5.9	7691	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	263	1,462	-821	-1,495	45.25	-325	6.2	7736	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	45.61	-276	6.5	7747	88%
PJM	PJM500_4_MSA_Philadelphia_G	8702	2,383	0	1,806	3,346	44.57	700	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	45.61	-276	1.0	7309	83%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	0	1,186	-690	-1,231	45.61	-276	6.3	7715	88%
MISO	CIN_8_MSA_Evansville_G	8760	3,657	260	2,521	3,388	33.40	738	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	-686	1.1	3051	35%
MISO	NIPS_8_MSA_Chicago_G	8692	2,892	1,694	817	1,465	32.55	231	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	-686	2.0	1224	14%
MISO	IPL_2_MSA_Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	-686	1.2	3135	36%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	33.05	450	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	-686	1.5	4711	54%
MISO	AMRN_12_MSA_StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	MISO	CIN_1_MSA_Indianapolis_L	8760	816	4,274	-2,268	-3,748	34.52	-686	7.2	4567	52%
MISO	EKPC_8_MSA_Maysville_G	8760	1,396	272	810	1,088	35.64	253	MISO	CIN_4_MSA_Cincinnati-Middletown_G	6707	6,026	5,727	-643	-2,119	36.70	-158	1.1	498	6%
MISO	NIPS_8_MSA_Chicago_G	8692	2,892	1,694	817	1,465	32.55	231	MISO	CIN_7_MSA_Lafayette_L	8760	144	1,712	-884	-1,480	33.75	-261	1.2	960	11%
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	460	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	2.2	5404	62%
VACAR	DUK_5_MSA_Seneca_G	7069	1,911	0	960	1,911	41.81	284	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	1.6	4432	50%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	2,865	5,471	38.80	950	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	4.6	600	7%
VACAR	SCFG_1_MSA_Columbia_G	8403	4,954	2,752	1,121	2,595	40.37	380	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	3.0	2127	24%
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,413	1,680	39.64	490	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	3.8	1892	22%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	VACAR	CPLE_1_MSA_Durham_G	1223	10,224	8,563	-421	-1,661	43.41	-22	7.2	6719	76%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	2,865	5,471	38.80	950	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	1.3	25	0%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	1.6	4035	46%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	1.7	4013	46%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	1.0	1051	12%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	1.5	4119	47%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	VACAR	DUK_4_MSA_Greenville_L	7764	3,546	4,489	-649	-1,947	40.12	-202	3.9	5013	57%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	VACAR	DUK_8_MSA_Charlotte_L	8760	1,407	4,886	-2,387	-4,010	39.32	-822	3.1	3953	45%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	VACAR	DUK_9_MSA_Charlotte_L	211	14,681	9,966	-483	-2,130	56.08	-6	19.9	4230	48%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	17.5	2412	27%
VACAR	CPLE_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	16.5	230	3%
VACAR	DUK_5_MSA_Seneca_G	7069	1,911	0	960	1,911	41.81	284	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	14.3	16	0%
VACAR	SCFG_1_MSA_Columbia_G	8403	4,954	2,752	1,121	2,595	40.37	380	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	15.7	226	3%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	17.6	2472	28%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	16.9	752	9%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	17.6	2546	29%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	VACAR	DUK_9_MSA_Charlotte_G	211	14,681	9,966	-483	-2,130	56.08	-6	17.0	1243	14%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,414	-2,144	36.19	-448	5.2	2669	30%
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,414	-2,144	36.19	-448	5.4	2806	32%
SPP	AEPW_9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	137	ENTERGY	EES_1_MSA_Jackson_L	8760	3,218	3,066	-1,414	-2,144	36.19	-448	2.2	8706	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	3.3	6911	79%
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	11.1	7060	80%
ENTERGY	EES_7_MSA_Beaumont-PortArtr	2674	7,393	4,949	326	1,504	39.85	35	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	2.0	6655	76%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	2.8	7109	81%

Task 2: Appendix 4, Corridors Results by Scenario
LowCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
SPP	CELE_10_MSA_Alexandria_G	8344	1,895	742	403	1,246	37.85	127	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	4.0	6855	78%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	2.7	7124	81%
ENTERGY	EES_8_MSA_BatonRouge_G	8496	1,060	0	1,059	1,060	36.11	325	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	5.8	5468	62%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	3.9	6656	76%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	10.9	7036	80%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	5.1	6691	76%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,726	36.14	426	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	5.7	6651	76%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	3.4	7091	81%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	3.5	7085	81%
SPP	AEPW_9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	136	ENTERGY	EES_5_MSA_NewOrleans_G	8760	9,735	9,294	-2,859	-5,453	41.89	-1,049	7.9	8709	99%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6086	7,393	4,949	-446	-1,529	36.79	-100	5.8	6993	80%
SPP	AEPW_9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	136	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6086	7,393	4,949	-446	-1,529	36.79	-100	2.8	8707	99%
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6086	7,393	4,949	-446	-1,529	36.79	-100	6.0	4079	46%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	2.2	2181	25%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	2.1	1112	13%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	1.0	0	0%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	2,199	163	1,347	1,726	36.14	426	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	1.7	0	0%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,108	1,604	32.71	317	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	5.1	2816	32%
ENTERGY	EES_2_MSA_Batesville_G	8743	3,525	1,697	1,929	2,737	34.97	590	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	2.8	1775	20%
SPP	AEPW_9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	136	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	3.8	8707	99%
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	ENTERGY	EES_9_MSA_Russellville_G	5611	6,123	4,517	-452	-2,048	37.81	-96	7.0	280	3%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	MISO	FE_5_MSA_Cleveland_L	8355	3,216	4,680	-655	-2,731	37.30	-204	1.1	4706	54%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	-754	3.7	4002	46%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	-754	4.3	4006	46%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	-754	4.2	4183	48%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	-754	3.8	4017	46%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	FRCC	FPC_3_MSA_Orlando_L	8760	1,232	3,649	-2,010	-3,708	42.85	-754	4.4	4010	46%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	-586	4.8	4487	51%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	-586	4.2	4350	50%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	-586	4.9	4354	50%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	-586	4.9	4353	50%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	FRCC	FPC_4_MSA_Tampa_L	8760	2,239	2,873	-1,541	-2,620	43.37	-586	4.3	4352	50%
FRCC	FPC_2_MSA_HomosassaSprings	8544	1,584	0	1,359	1,584	42.67	496	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	1.2	5035	57%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	5.4	4773	54%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	4.8	4764	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	4.8	4769	54%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	5.5	4774	54%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	FRCC	FPL_2_MSA_FortMyers_G	8680	5,929	4,563	-1,236	-2,761	43.91	-471	5.3	4890	56%
FRCC	FPC_2_MSA_HomosassaSprings	8544	1,584	0	1,359	1,584	42.67	496	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	1.5	5120	58%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	5.8	4680	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	5.7	4680	53%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	5.1	4671	53%
FRCC	SEC_6_MSA_Palarka_G	8760	1,330	0	1,128	1,330	43.19	427	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	1.0	4854	55%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	5.6	4791	55%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	FRCC	FPL_3_MSA_Miami_L	8760	6,944	7,089	-2,181	-4,279	44.20	-845	5.1	4673	53%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	5.6	4820	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	5.0	4707	54%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	5.7	4716	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	5.1	4710	54%
FRCC	FPC_2_MSA_HomosassaSprings	8544	1,584	0	1,359	1,584	42.67	496	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	1.5	5182	59%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	FRCC	FPL_7_MSA_Miami_L	8760	570	3,923	-2,635	-4,256	44.17	-1,019	5.7	4714	54%
MISO	XEL_3_MSA_Minneapolis_G	2949	7,596	7,622	585	1,604	17.49	30	MISO	GRE_4_MSA_Minneapolis_L	8760	331	1,111	-1,099	-2,103	27.93	-269	10.4	6	0%
MISO	ITC_7_MSA_Monroe_G	8472	1,500	0	1,344	1,500	36.59	417	ONTARIO	IESO_11_G	8760	9,529	12,779	-3,037	-7,371	38.29				

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
MISO	ITC 3 MSA Detroit_G	8744	3,815	1,600	1,221	2,005	36.98	395	ONTARIO	IESO 15_G	8760	1,964	3,375	-2,360	-3,239	38.16	-789	1.2	7005	80%
MISO	ITC 7_MSA_Monroe_G	8472	1,500	0	1,344	1,500	36.59	417	ONTARIO	IESO 15_G	8760	1,964	3,375	-2,360	-3,239	38.16	-789	1.6	5771	66%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	ONTARIO	IESO 2_G	6738	2,437	2,116	-584	-1,367	36.70	-144	14.4	8222	94%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	ONTARIO	IESO 3_L	8760	39	1,696	-1,181	-1,636	37.51	-388	15.2	8090	92%
MISO	IPL 2_MSA_Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	MISO	IPL 5_MSA_Indianapolis_L	8760	306	1,187	-783	-1,258	34.68	-238	1.4	2888	33%
MISO	CIN 8_MSA_Evansville_G	8760	3,657	260	2,521	3,388	33.40	738	MISO	IPL 5_MSA_Indianapolis_L	8760	306	1,187	-783	-1,258	34.68	-238	1.3	6004	68%
MISO	IPL 2_MSA_Jasper_G	8760	1,678	0	1,417	1,664	33.29	413	MISO	IPL 8_MSA_Indianapolis_L	8760	547	1,227	-539	-1,094	34.73	-164	1.4	2944	34%
MISO	CIN 8_MSA_Evansville_G	8760	3,657	260	2,521	3,388	33.40	738	MISO	IPL 8_MSA_Indianapolis_L	8760	547	1,227	-539	-1,094	34.73	-164	1.3	6099	69%
SPP	WERE 1_MSA_Manhattan_G	8145	2,988	409	1,217	2,299	29.25	290	SPP	KACP 7_MSA_KansasCity_L	8760	0	1,291	-730	-1,422	32.74	-209	3.5	893	10%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	239	MISO	METC 8_MSA_BayCity_G	8013	3,795	2,562	-588	-1,639	37.13	-175	6.5	5238	60%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	239	MISO	METC 9_MSA_Kalamazoo_L	8760	118	1,334	-819	-1,476	36.73	-263	6.1	4717	54%
NYPP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NEPOOL	NEPOOL 10_RI	6733	2,062	2,203	-422	-1,198	43.22	-123	4.5	6038	69%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NEPOOL	NEPOOL 10_RI	6733	2,062	2,203	-422	-1,198	43.22	-123	2.0	8758	100%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NEPOOL	NEPOOL 10_RI	6733	2,062	2,203	-422	-1,198	43.22	-123	2.8	6752	77%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 10_RI	6733	2,062	2,203	-422	-1,198	43.22	-123	20.9	8757	100%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 3_ME	4928	3,494	2,522	-245	-1,068	37.93	-46	15.6	8605	98%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NEPOOL	NEPOOL 4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	-565	1.4	6761	77%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	-565	21.3	8611	98%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NEPOOL	NEPOOL 4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	-565	2.4	8758	100%
NYPP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NEPOOL	NEPOOL 4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	-565	4.9	6038	69%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NEPOOL	NEPOOL 4_NEBOS	8717	3,262	5,904	-1,487	-3,459	43.61	-565	3.2	6769	77%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NEPOOL	NEPOOL 6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	-378	1.5	6912	79%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NEPOOL	NEPOOL 6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	-378	3.3	6900	79%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	-378	21.4	8611	98%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NEPOOL	NEPOOL 6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	-378	2.5	8578	98%
NYPP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NEPOOL	NEPOOL 6_WCMA	8556	4,285	3,417	-1,011	-3,114	43.71	-378	5.0	6043	69%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	4.4	7608	87%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	24.3	8759	100%
NYPP	NYISO 6_NYF	7760	4,103	1,983	619	2,031	42.90	206	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	3.7	8756	100%
NYPP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	7.9	6043	69%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	5.4	8758	100%
NEPOOL	NEPOOL 5_SEMA	8757	6,454	3,978	1,898	3,583	43.66	726	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	3.0	2790	32%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	6.2	7583	86%
NYPP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	45.29	623	NEPOOL	NEPOOL 7_CT	1734	4,447	3,920	-374	-1,741	46.62	-30	1.3	8754	100%
NYPP	NYISO 6_NYF	7760	4,103	1,983	619	2,031	42.90	206	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	2.0	8760	100%
NEPOOL	NEPOOL 5_SEMA	8757	6,454	3,978	1,898	3,583	43.66	726	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	1.2	8759	100%
NYPP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	22.5	8760	100%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	4.4	8758	100%
NYPP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	6.1	6047	69%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	2.6	8759	100%
NYPP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NEPOOL	NEPOOL 9_NWKST	8760	405	1,524	-729	-1,217	44.85	-287	3.6	8760	100%
PJM	NI 15_MSA_Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	NI 13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	-1,550	5.6	3352	38%
PJM	NI 7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	NI 13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	-1,550	3.4	3339	38%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	239	PJM	NI 13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	-1,550	2.0	4176	48%
MISO	ALTE 2_MSA_Madison_G	8746	1,665	441	491	1,061	27.05	116	PJM	NI 13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	-1,550	5.6	5204	59%
MISO	AMRN 12_MSA_StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	NI 13_MSA_Chicago_L	8760	2,396	10,556	-5,418	-9,590	32.65	-1,550	5.3	6674	76%
MISO	ALTE 2_MSA_Madison_G	8746	1,665	441	491	1,061	27.05	116	PJM	NI 3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	-182	5.5	5204	59%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	239	PJM	NI 3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	-182	1.9	3825	44%
PJM	NI 15_MSA_Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	NI 3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	-182	5.5	3369	38%
PJM	NI 7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	NI 3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	-182	3.3	3369	38%
MISO	AMRN 12_MSA_StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	NI 3_MSA_Chicago_L	8760	26	1,205	-638	-1,267	32.55	-182	5.2	6630	75%
PJM	NI 15_MSA_Davenport_G	8712	2,479	0	1,695	2,361	27.05	399	PJM	NI 6_MSA_Chicago_G	772	9,759	7,577	-275	-1,210	31.89	-7	4.8	3363	38%
PJM	NI 7_MSA_Rochelle_G	8760	2,290	0	2,119	2,290	29.24	543	PJM	NI 6_MSA_Chicago_G	772	9,759	7,577	-275	-1,210	31.89	-7	2.7	3402	39%
MISO	AMRN 12_MSA_StLouis_L	6285	5,059	6,066	625	1,758	27.33	107	PJM	NI 6_MSA_Chicago_G	772	9,759	7,577	-275	-1,210	31.89	-7	4.6	6668	76%
MISO	WEC 1_MSA_Chicago_G	8592	1,728	303	909	1,388	30.66	239	PJM	NI 6_MSA_Chicago_G	772	9,759	7,577	-275	-1,210	31.89				

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Source Hub Information								Sink Hub Information								Congestion Indicators				
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	38.04	835	NYP	NYISO 10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	-1,401	8.4	8759	100%
NYP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NYP	NYISO 10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	-1,401	5.2	8760	100%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	NYP	NYISO 10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	-1,401	6.5	6039	69%
ONTARIO	IESO 2_G	2022	2,437	2,116	295	1,032	42.49	25	NYP	NYISO 10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	-1,401	4.0	8760	100%
NYP	NYISO 6_NYF	7760	4,103	1,983	619	2,031	42.90	206	NYP	NYISO 10_NYJ	8760	10,283	11,493	-3,442	-5,433	46.46	-1,401	3.6	8760	100%
NEPOOL	NEPOOL 5_SEMA	8757	6,454	3,978	1,898	3,583	43.66	726	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	3.4	8760	100%
NYP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	5.8	8760	100%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	6.6	8760	100%
ONTARIO	IESO 2_G	2022	2,437	2,116	295	1,032	42.49	25	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	4.5	6040	69%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	24.7	8760	100%
NEPOOL	NEPOOL 7_CT	7026	4,447	3,920	609	1,685	43.97	188	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	3.1	8760	100%
NYP	NYISO 8_NYH	8760	2,021	973	1,570	1,958	45.29	623	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	1.7	8756	100%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	4.8	8760	100%
NYP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	8.3	6040	69%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	7.0	6040	69%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	38.04	835	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	9.0	6040	69%
NYP	NYISO 6_NYF	7760	4,103	1,983	619	2,031	42.90	206	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	4.1	8760	100%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	38.03	830	NYP	NYISO 11_NYK	8760	5,681	5,289	-1,920	-2,796	47.02	-791	9.0	6040	69%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NYP	NYISO 2_NYB	8760	650	1,759	-732	-1,245	38.27	-246	15.9	7958	91%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NYP	NYISO 6_NYF	1000	4,103	1,983	-232	-1,044	37.45	-9	15.1	8632	98%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	3.4	5819	66%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	3.8	5983	68%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	1.6	6368	72%
NYP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	2.6	5530	63%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	21.5	5757	66%
NYP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	5.1	5925	67%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	38.04	835	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	5.8	6005	68%
ONTARIO	IESO 2_G	2022	2,437	2,116	295	1,032	42.49	25	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	1.3	6017	68%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	38.03	830	NYP	NYISO 7_NYG	8191	3,156	2,195	-811	-1,818	43.82	-291	5.8	6005	68%
NYP	NYISO 1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	7.2	5996	68%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	23.6	8733	99%
NYP	NYISO 6_NYF	7760	4,103	1,983	619	2,031	42.90	206	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	3.0	8596	98%
NEPOOL	NEPOOL 2_NH	8300	4,204	2,621	857	1,787	42.24	300	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	3.7	8731	99%
NYP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	4.7	8671	99%
NEPOOL	NEPOOL 5_SEMA	8757	6,454	3,978	1,898	3,583	43.66	726	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	2.3	8602	98%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	5.9	5987	68%
NEPOOL	NEPOOL 7_CT	7026	4,447	3,920	609	1,685	43.97	188	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	2.0	8512	97%
NEPOOL	NEPOOL 3_ME	3832	3,494	2,522	277	1,070	40.43	43	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	5.5	8730	99%
ONTARIO	IESO 7_G	8760	2,953	253	2,506	2,829	38.04	835	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	7.9	6021	69%
ONTARIO	IESO 6_G	8760	2,146	147	2,493	2,787	38.03	830	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	7.9	6021	69%
ONTARIO	IESO 2_G	2022	2,437	2,116	295	1,032	42.49	25	NYP	NYISO 9_NYI	8288	2	1,476	-845	-2,165	45.93	-322	3.4	6022	69%
ENTERGY	EES 9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SPP	OKGE 4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	-309	14.9	7130	81%
ENTERGY	EES 2_MSA_Batesville_G	8743	3,525	1,697	1,929	2,737	34.97	590	SPP	OKGE 4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	-309	10.8	7579	86%
SPP	AEPW 5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	SPP	OKGE 4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	-309	15.0	6322	72%
SPP	WERE 1_MSA_Manhattan_G	8145	2,988	409	1,217	2,299	29.25	290	SPP	OKGE 4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	-309	16.5	8397	96%
SPP	AEPW 9_MSA_MountPleasant_G	7212	8,168	3,832	554	1,937	34.00	136	SPP	OKGE 4_MSA_OklahomaCity_L	8719	2,102	2,403	-773	-1,677	45.80	-309	11.8	6538	74%
MAPP	NPPD 4_GEN_Gentleman_G	8235	2,702	148	790	1,472	13.70	89	MAPP	OPPD 5_MSA_Omaha_L	8760	480	1,686	-855	-1,549	19.83	-148	6.1	7769	88%
PJM	PJM500 7_MSA_York-Hanover	8760	2,696	0	2,072	2,570	44.70	811	PJM	PECO 5_MSA_Philadelphia_L	7264	1,656	2,510	-413	-2,388	46.84	-141	2.1	977	11%
PJM	PJM500 4_MSA_Philadelphia_G	8702	2,383	0	1,806	3,346	44.57	700	PJM	PECO 5_MSA_Philadelphia_L	7264	1,656	2,510	-413	-2,388	46.84	-141	2.3	0	0%
PJM	AP 1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	889	PJM	PEPCO 1_MSA_DC_L	8760	0	1,439	-883	-1,547	45.47	-352	6.7	7511	86%
PJM	PJM500 3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	PEPCO 1_MSA_DC_L	8760	0	1,439	-883	-1,547	45.47	-352	6.4	7514	86%
PJM	PJM500 9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	PEPCO 1_MSA_DC_L	8760	0	1,439	-883	-1,547	45.47	-352	6.1	7503	85%
PJM	PJM500 3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	PL 5_MSA_Lancaster_L	8760	0	897	-721	-1,027	44.34	-280	5.3	7044	80%
PJM	PJM500 9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	PL 5_MSA_Lancaster_L	8760	0	897	-721	-1,027	44.34	-280	5.0	5819	66%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	PJM	PL 5_MSA_Lancaster_L	8760	0	897	-721	-1,027	44.34	-280	4.3	7397	84%
PJM	PJM500 3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	PL 7_MSA_Allentown_L	8760	245	1,051	-697	-1,038	44.15	-269	5.1	8234	94%
PJM	PENELEC 2_MSA_DuBois_G	8368	2,724	1,196	670	1,568	40.01	224	PJM	PL 7_MSA_Allentown_L	8760	245	1,051	-697	-1,038	44.15	-269	4.1	7335	84%
PJM	PJM500 9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	PL 7_MSA_Allentown_L	8760	245	1,051	-697	-1,038	44.15	-269	4.8	7379	84%
NYP	NYISO 3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	PJM	PSEG 3_MSA_NewYork_L	8760	1,843	2,275	-908	-2,093	44.40	-353	3.2	8194	93%
NYP	NYISO 4_NYD	7592	1,206	681	664	1,392	22.34	113	PJM	PSEG 3_MSA_NewYork_L	8760	1,843	2,275	-908	-2,093	44.40	-353	22.1	8338	95%

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-908	-2,093	44.40	-353	5.7	8174	93%
NYPP	NYISO_6_NYF	7760	4,103	1,983	619	2,031	42.90	206	PJM	PSEG_3_MSA_NewYork_L	8760	1,843	2,275	-908	-2,093	44.40	-353	1.5	8206	93%
NYPP	NYISO_4_NYD	7592	1,206	681	664	1,392	22.34	113	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,281	-2,060	44.73	-502	22.4	8330	95%
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,281	-2,060	44.73	-502	3.5	7891	90%
NYPP	NYISO_1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,281	-2,060	44.73	-502	6.0	8152	93%
NYPP	NYISO_6_NYF	7760	4,103	1,983	619	2,031	42.90	206	PJM	PSEG_5_MSA_Philadelphia_L	8760	2,143	2,766	-1,281	-2,060	44.73	-502	1.8	8260	94%
NYPP	NYISO_6_NYF	7760	4,103	1,983	619	2,031	42.90	206	PJM	PSEG_8_MSA_NewYork_G	8758	3,860	3,654	-1,146	-2,500	44.40	-446	1.5	8051	92%
NYPP	NYISO_4_NYD	7592	1,206	681	664	1,392	22.34	113	PJM	PSEG_8_MSA_NewYork_G	8758	3,860	3,654	-1,146	-2,500	44.40	-446	22.1	8372	95%
NYPP	NYISO_3_NYC	8760	6,711	2,657	1,909	3,259	41.23	690	PJM	PSEG_8_MSA_NewYork_G	8758	3,860	3,654	-1,146	-2,500	44.40	-446	3.2	8087	92%
NYPP	NYISO_1_NYA	8298	4,946	2,500	1,639	2,336	38.71	526	PJM	PSEG_8_MSA_NewYork_G	8758	3,860	3,654	-1,146	-2,500	44.40	-446	5.7	8110	92%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	VACAR	SCEG_9_MSA_Charleston_G	8736	1,152	1,944	-584	-1,451	39.91	-204	1.4	2293	26%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	VACAR	SCEG_9_MSA_Charleston_G	8736	1,152	1,944	-584	-1,451	39.91	-204	1.3	2502	28%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	VACAR	SCEG_9_MSA_Charleston_G	8736	1,152	1,944	-584	-1,451	39.91	-204	1.5	2313	26%
VACAR	SCPSA_10_MSA_Charleston_G	8760	1,680	0	1,413	1,680	39.64	490	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	1.5	1827	21%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	2.6	4390	50%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	6,802	0	5,102	6,381	39.15	1,750	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	2.0	1156	13%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	2.7	4387	50%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	11,765	1,583	4,305	9,149	39.09	1,474	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	2.1	4423	50%
VACAR	CPL1_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	1.5	2299	26%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	VACAR	SCPSA_2_MSA_Charleston_L	8760	1,607	3,236	-1,637	-3,138	41.14	-590	2.5	4755	54%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	4.4	2388	27%
VACAR	DUK_9_MSA_Charlotte_G	8549	14,681	9,966	2,865	5,471	38.80	950	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	1.2	596	7%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	9.1	3200	36%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	2,535	1,090	1,319	1,836	38.44	444	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	1.6	526	6%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	2.0	1249	14%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	3.2	947	11%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	12,464	9,217	2,104	5,025	38.50	693	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	1.5	511	6%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	3,574	2,674	612	1,568	38.60	194	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	1.4	827	9%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3,431	4,125	-807	-3,054	40.02	-262	4.3	530	6%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	-480	1.2	1039	12%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	-480	8.2	3082	35%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	-480	2.4	605	7%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	-480	3.5	1564	18%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	694	3,058	-1,400	-2,611	39.17	-480	3.4	197	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_17_MSA_Mobile_G	7920	5,205	4,575	-737	-1,736	37.53	-219	1.9	3018	34%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_17_MSA_Mobile_G	7920	5,205	4,575	-737	-1,736	37.53	-219	1.8	2890	33%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_17_MSA_Mobile_G	7920	5,205	4,575	-737	-1,736	37.53	-219	6.6	3141	36%

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Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3,334	2,733	-892	-1,981	38.85	-299	3.1	207	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3,334	2,733	-892	-1,981	38.85	-299	3.2	1961	22%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3,334	2,733	-892	-1,981	38.85	-299	2.1	595	7%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3,334	2,733	-892	-1,981	38.85	-299	7.9	3045	35%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	-671	8.3	3305	38%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	-671	3.5	613	7%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	-671	3.6	1976	22%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	-671	2.4	1061	12%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3	3,305	-1,952	-3,314	39.20	-671	1.2	1365	16%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	-669	2.6	987	11%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	-669	3.7	1853	21%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	-669	3.6	593	7%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	-669	8.4	3233	37%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2,098	3,403	-1,941	-3,087	39.37	-669	1.4	1890	22%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	39.16	-247	3.4	134	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	39.16	-247	3.5	1297	15%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	39.16	-247	2.4	529	6%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	39.16	-247	1.2	1632	19%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	0	1,187	-720	-1,220	39.16	-247	8.2	2847	32%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	39.21	-391	8.3	3298	38%
ENTERGY	EES_4_GEN_Ouachita_G	6307	6,345	2,417	1,467	3,701	37.99	351	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	39.21	-391	1.2	1377	16%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	2,544	150	2,119	2,480	35.64	649	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	39.21	-391	3.6	1934	22%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	17,334	9,966	3,234	7,588	35.75	1,012	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	39.21	-391	3.5	603	7%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	3,544	1,249	889	1,232	36.77	264	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	0	1,925	-1,139	-1,932	39.21	-391	2.4	1062	12%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	3,684	5,102	-1,372	-2,941	33.65	-405	2.7	2967	34%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	33.05	450	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	9,154	8,858	-1,676	-5,752	35.84	-522	2.8	5473	62%
MISO	BREC_3_County_Webster_G	8760	1,355	476	855	1,129	32.98	247	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	9,154	8,858	-1,676	-5,752	35.84	-522	2.9	6069	69%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,108	1,604	32.71	317	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	9,154	8,858	-1,676	-5,752	35.84	-522	3.1	2455	28%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	9,154	8,858	-1,676	-5,752	35.84	-522	4.9	2889	33%
ENTERGY	EES_9_MSA_Russellville_G	3149	6,123	4,517	202	1,008	30.95	20	TVAUTHOR	TVA_7_MSA_Memphis_L	8714	7,215	5,982	-1,577	-4,469	35.75	-491	4.8	1044	12%
MISO	LGEE_3_GEN_Gehnt2_G	8760	2,000	225	1,554	1,900	33.05	450	TVAUTHOR	TVA_7_MSA_Memphis_L	8714	7,215	5,982	-1,577	-4,469	35.75	-491	2.7	4945	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	3.9	7585	86%
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	460	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	1.8	5870	67%
VACAR	CPLE_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	3.3	6460	74%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	3.6	7557	86%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	6.7	7842	89%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	899	PJM	VAP_15_MSA_VB-Norfolk_L	8760	435	1,297	-499	-1,124	42.94	-188	4.1	7391	84%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	5.3	7569	86%
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	460	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	3.2	5847	67%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	1,298	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	1.1	3375	38%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	8.1	7841	89%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	899	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	5.5	7564	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	5.0	7472	85%
VACAR	CPLE_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	PJM	VAP_27_MSA_DC_L	8760	0	1,048	-643	-1,075	44.35	-250	4.7	7349	84%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	5.3	7646	87%

Task 2: Appendix 4, Corridors Results by Scenario
 LowCase2011R2

Source Hub Information									Sink Hub Information									Congestion Indicators		
Market Area	Hub Name	Source Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Market Area	Hub Name	Sink Hours	Gen Weight	Load Weight	Average net injection (MW)	Max net injection (MW)	Average Price (\$/MWh)	Revenue surplus (\$MM)	Price Differential	U90 Hours	U90 %
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	1,298	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	1.1	4125	47%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	5.0	7643	87%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	8.1	8041	92%
VACAR	CPL_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	4.7	7567	86%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	889	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	5.5	7609	87%
PJM	VAP_7_G	7408	4,179	303	1,507	3,608	41.18	460	PJM	VAP_33_MSA_DC_L	8760	910	2,983	-1,858	-2,931	44.34	-722	3.2	5853	67%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	1,705	0	1,438	1,700	39.08	492	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	15.4	7063	80%
PJM	PJM500_4_MSA_Philadelphia_G	8702	2,383	0	1,806	3,346	44.57	700	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	9.9	5628	64%
VACAR	CPL_1_MSA_Durham_G	7537	10,224	8,563	879	2,332	39.61	262	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	14.9	5361	61%
PJM	AP_1_County_Harrison_G	8760	6,563	2,223	2,615	3,904	38.81	889	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	15.7	5584	64%
PJM	AEP_8_GEN_Amos01_G	8760	19,694	6,544	6,383	10,230	36.20	2,024	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	18.3	6164	70%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	1,700	0	1,492	1,700	39.35	509	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	15.1	7062	80%
PJM	PJM500_7_MSA_York-Hanover	8760	2,696	0	2,072	2,570	44.70	811	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	9.8	5770	66%
PJM	PJM500_5_MSA_DC_G	8760	1,730	0	1,600	1,730	45.52	638	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	9.0	4867	55%
PJM	VAP_1_MSA_Richmond_G	8760	10,524	3,579	3,424	6,047	43.27	1,298	PJM	VAP_7_G	1352	4,179	303	-990	-2,512	54.49	-73	11.2	5715	65%
MAPP	NPPD_4_GEN_Gentleman_G	8235	2,702	148	790	1,472	13.70	89	SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	-78	25.4	8757	100%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	2,315	248	1,108	1,604	32.71	317	SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	-78	6.4	7749	88%
SPP	AEPW_5_MSA_Tulsa_G	7180	4,226	2,571	394	1,371	30.78	87	SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	-78	8.4	3204	36%
SPP	WERE_1_MSA_Manhattan_G	8145	2,988	409	1,217	2,299	29.25	290	SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	-78	9.9	807	9%
SPP	KACP_4_MSA_KansasCity_G	7896	670	0	1,185	1,520	15.55	146	SPP	WERE_4_GEN_Wolfcreek_G	4445	3,510	2,459	-449	-1,676	39.14	-78	23.6	7380	84%
MISO	OTP_9_GEN_BigStone_G	8640	1,189	136	880	1,176	11.27	86	MISO	XEL_3_MSA_Minneapolis_G	5811	7,596	7,622	-900	-2,499	33.04	-173	21.8	8645	98%
MISO	ALTE_2_MSA_Madison_G	8746	1,665	441	491	1,061	27.05	116	MISO	XEL_3_MSA_Minneapolis_G	5811	7,596	7,622	-900	-2,499	33.04	-173	6.0	2393	27%

Task 2: Appendix 5, Corridor Congestion by Scenario
BaseCase2008R2

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MAPP	MEC_3_MSA_DesMoines_G	7991	MISO	AMRN_12_MSA_StLouis_L	2085	26.9	3893	44%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_7_CT	1143	26.4	6958	79%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_11_NYK	8784	25.4	6963	79%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_11_NYK	8784	25.4	6963	79%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_11_NYK	8784	25.4	6963	79%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_10_NYJ	8784	23.9	8784	100%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_10_NYJ	8784	23.8	8784	100%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_10_NYJ	8784	23.8	8784	100%
PJM	NI_15_MSA_Davenport_G	8664	MISO	AMRN_12_MSA_StLouis_L	2085	23.5	5202	59%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	OKGE_4_MSA_OklahomaCity_L	8783	23.3	8329	95%
MISO	OTP_9_GEN_BigStone_G	8784	MISO	XEL_3_MSA_Minneapolis_G	4672	23.0	7840	89%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_9_NYI	8467	22.5	6955	79%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_9_NYI	8467	22.5	6956	79%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_9_NYI	8467	22.5	6956	79%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_11_NYK	8784	22.2	6963	79%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_12_MSA_StLouis_L	2085	21.6	5759	66%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_10_NYJ	8784	20.7	8784	100%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_9_NYI	8467	19.4	6868	78%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_7_NYG	7979	18.5	6952	79%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	WERE_4_GEN_Wolfcreek_G	3653	18.5	3355	38%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_7_NYG	7979	18.4	6952	79%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_7_NYG	7979	18.4	6953	79%
ENTERGY	EES_9_MSA_Russellville_G	2533	SPP	OKGE_4_MSA_OklahomaCity_L	8783	18.0	3996	45%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	VAP_7_G	1848	17.8	6655	76%
PJM	PENELEC_2_MSA_DuBois_G	8336	NYPP	NYISO_11_NYK	8784	17.3	6963	79%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_12_MSA_StLouis_L	2085	17.3	3670	42%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_9_NWKST	8784	17.3	6972	79%
PJM	NI_6_MSA_Chicago_G	8111	MISO	AMRN_12_MSA_StLouis_L	2085	17.2	3677	42%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_8_MSA_DC-VA-MD_L	8784	16.7	8036	91%
PJM	NI_20_MSA_Chicago_G	7214	MISO	AMRN_12_MSA_StLouis_L	2085	16.7	3664	42%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	16.7	8367	95%

Task 2: Appendix 5, Corridor Congestion by Scenario
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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	16.7	8019	91%
MISO	IP_8_GEN_Clinton_G	8016	MISO	AMRN_12_MSA_StLouis_L	2085	16.6	1758	20%
MISO	FE_9_MSA>Weirton_G	8571	PJM	AP_8_MSA_DC-VA-MD_L	8784	16.6	7993	91%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_6_WCMA	8643	16.2	6958	79%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_4_NEBOS	8691	16.1	6958	79%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	16.0	8003	91%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	16.0	7988	91%
MISO	FE_9_MSA>Weirton_G	8571	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	15.9	7957	91%
PJM	PENELEC_2_MSA_DuBois_G	8336	NYPP	NYISO_10_NYJ	8784	15.8	6961	79%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	AP_8_MSA_DC-VA-MD_L	8784	15.3	8060	92%
NYPP	NYISO_1_NYA	8254	NYPP	NYISO_7_NYG	7979	15.3	6792	77%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_7_CT	1143	15.2	8772	100%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	VAP_33_MSA_DC_L	8784	15.1	8132	93%
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_10_RI	6570	15.1	6958	79%
NYPP	NYISO_1_NYA	8254	PJM	PSEG_8_MSA_NewYork_G	8784	15.0	7874	90%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	14.9	7398	84%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	VAP_27_MSA_DC_L	8784	14.9	8033	91%
MISO	IP_7_GEN_Baldwin_G	8784	MISO	AMRN_12_MSA_StLouis_L	2085	14.9	1093	12%
NYPP	NYISO_1_NYA	8254	PJM	PSEG_3_MSA_NewYork_L	8784	14.9	7901	90%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	14.6	8032	91%
PJM	PENELEC_2_MSA_DuBois_G	8336	NYPP	NYISO_9_NYI	8467	14.5	6925	79%
NYPP	NYISO_1_NYA	8254	PJM	PSEG_5_MSA_Philadelphia_L	8784	14.1	7916	90%
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_2_STA_TN-WV_L	8784	13.6	6137	70%
MISO	XEL_3_MSA_Minneapolis_G	4112	MISO	GRE_4_MSA_Minneapolis_L	8784	13.6	0	0%
MISO	BREC_3_County_Webster_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	13.6	7759	88%
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_1_MSA_Lynchburg_G	8784	13.5	6898	79%
MISO	CIN_8_MSA_Evansville_G	8784	MISO	AMRN_12_MSA_StLouis_L	2085	13.5	2429	28%
SPP	AEPW_9_MSA_MountPleasant_	7676	SPP	OKGE_4_MSA_OklahomaCity_L	8783	13.3	4668	53%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_2_MSA_Batesville_G	8784	SPP	OKGE_4_MSA_OklahomaCity_L	8783	13.2	5940	68%
ENTERGY	EES_9_MSA_Russellville_G	2533	ENTERGY	EES_5_MSA_NewOrleans_G	8784	13.1	6875	78%
MISO	AMRN_12_MSA_StLouis_L	6699	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	12.9	5412	62%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_6_MSA_Chicago_G	673	12.8	4800	55%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	AMRN_12_MSA_StLouis_L	2085	12.7	6024	69%
SPP	AEPW_5_MSA_Tulsa_G	7426	SPP	OKGE_4_MSA_OklahomaCity_L	8783	12.7	1435	16%
NEPOOL	NEPOOL_3_ME	3923	NEPOOL	NEPOOL_7_CT	1143	12.4	7452	85%
NYPP	NYISO_6_NYF	7469	NEPOOL	NEPOOL_7_CT	1143	12.3	8753	100%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	12.3	3642	41%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	MISO	AMRN_12_MSA_StLouis_L	2085	12.2	2888	33%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	673	12.2	4476	51%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_9_MSA_Kalamazoo_L	8784	12.1	5709	65%
NEPOOL	NEPOOL_2_NH	8426	NEPOOL	NEPOOL_7_CT	1143	12.1	7477	85%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	VAP_15_MSA_VB-Norfolk_L	8784	12.0	8024	91%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_7_G	1848	12.0	5642	64%
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_9_MSA_Canton-Massillon_L	8784	11.9	5384	61%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	11.7	6067	69%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	11.6	6603	75%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_7_G	1848	11.6	6872	78%
PJM	AEP_8_GEN_Amos01_G	8783	MISO	AMRN_12_MSA_StLouis_L	2085	11.3	817	9%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_8_MSA_BayCity_G	8326	11.2	5867	67%
MAPP	MEC_3_MSA_DesMoines_G	7991	MISO	AMRN_2_County_Macon_L	8784	11.2	5724	65%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_11_NYK	8784	11.1	8784	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPL_7_MSA_Miami_L	8784	11.0	5655	64%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPL_3_MSA_Miami_L	8784	10.9	5258	60%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_7_G	1848	10.9	7094	81%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_7_MSA_Miami_L	8784	10.9	5651	64%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_3_MSA_Miami_L	8784	10.9	5257	60%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_6_MSA_Chicago_G	673	10.8	4438	51%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	10.8	5349	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_3_MSA_Miami_L	8784	10.8	5361	61%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	FRCC	FPL_7_MSA_Miami_L	8784	10.7	5644	64%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPL_7_MSA_Miami_L	8784	10.7	5894	67%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	FRCC	FPL_3_MSA_Miami_L	8784	10.6	5253	60%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	SPP	WERE_4_GEN_Wolfcreek_G	3653	10.6	7437	85%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPL_3_MSA_Miami_L	8784	10.6	5533	63%
PJM	PENELEC_2_MSA_DuBois_G	8336	NYPP	NYISO_7_NYG	7979	10.4	6924	79%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_6_MSA_Chicago_G	673	10.4	5812	66%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	10.2	5564	63%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_7_CT	1143	10.2	2246	26%
VACAR	CPL_1_MSA_Durham_G	7843	PJM	VAP_7_G	1848	10.1	5436	62%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	10.0	5576	63%
PJM	AP_1_County_Harrison_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	10.0	7772	88%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	AEP_2_STA_TN-WV_L	8784	9.9	6680	76%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	9.9	8004	91%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	AEP_1_MSA_Lynchburg_G	8784	9.8	6903	79%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	9.6	7861	89%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_10_NYJ	8784	9.5	8784	100%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	9.5	7638	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	9.5	7970	91%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	9.4	4258	48%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	AEP_2_STA_TN-WV_L	8784	9.3	1455	17%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	9.3	7958	91%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_33_MSA_DC_L	8784	9.3	7752	88%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	AEP_1_MSA_Lynchburg_G	8784	9.2	4786	54%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	9.2	7942	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	9.1	7904	90%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_27_MSA_DC_L	8784	9.1	7607	87%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	NI_6_MSA_Chicago_G	673	9.0	5534	63%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	8.9	8698	99%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	8.9	3558	41%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	8.9	3589	41%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	8.9	3589	41%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	8.9	3522	40%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	8.9	7842	89%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_33_MSA_DC_L	8784	8.9	8003	91%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	8.9	3499	40%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	8.8	2986	34%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	8.8	7615	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	8.8	7898	90%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPL_2_MSA_FortMyers_G	8506	8.8	4980	57%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_27_MSA_DC_L	8784	8.7	7774	89%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_2_MSA_FortMyers_G	8506	8.7	4976	57%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	8.6	7887	90%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8506	8.6	5113	58%
NYPP	NYISO_8_NYH	8784	NEPOOL	NEPOOL_7_CT	1143	8.6	8751	100%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	NI_6_MSA_Chicago_G	673	8.5	17	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	FRCC	FPL_2_MSA_FortMyers_G	8506	8.5	4975	57%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	8.5	7965	91%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPL_2_MSA_FortMyers_G	8506	8.4	5282	60%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	8.4	7890	90%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	XEL_3_MSA_Minneapolis_G	4672	8.4	2320	26%
SPP	AEPW_9_MSA_MountPleasant	7676	ENTERGY	EES_5_MSA_NewOrleans_G	8784	8.3	8744	100%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	8.3	8453	96%
NEPOOL	NEPOOL_3_ME	3923	NYPP	NYISO_11_NYK	8784	8.3	8784	100%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	AEP_9_MSA_Canton-Massillon_L	8784	8.2	6085	69%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_9_NYI	8467	8.2	8687	99%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_33_MSA_DC_L	8784	8.2	8090	92%
NYPP	NYISO_6_NYF	7469	NYPP	NYISO_11_NYK	8784	8.1	8784	100%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_27_MSA_DC_L	8784	8.1	7782	89%
PJM	PENELEC_2_MSA_DuBois_G	8336	PJM	PL_7_MSA_Allentown_L	8784	8.1	7495	85%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	8.0	6261	71%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPC_4_MSA_Tampa_L	8784	8.0	4752	54%
NEPOOL	NEPOOL_2_NH	8426	NYPP	NYISO_11_NYK	8784	7.9	8784	100%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_4_MSA_Tampa_L	8784	7.9	4753	54%
SPP	AEPW_5_MSA_Tulsa_G	7426	SPP	WERE_4_GEN_Wolfcreek_G	3653	7.8	4472	51%
ENTERGY	EES_9_MSA_Russellville_G	2533	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	7.8	6094	69%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_4_MSA_Tampa_L	8784	7.8	4895	56%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_17_MSA_Mobile_G	6709	7.8	3475	40%
PJM	NI_15_MSA_Davenport_G	8664	MISO	AMRN_2_County_Macon_L	8784	7.8	5804	66%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	7.8	7949	90%
PJM	PJM500_7_MSA_York-Hanover	8784	PJM	PECO_5_MSA_Philadelphia_L	6653	7.7	3177	36%
SPP	AEPW_5_MSA_Tulsa_G	7426	ENTERGY	EES_5_MSA_NewOrleans_G	8784	7.7	7726	88%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	AEP_9_MSA_Canton-Massillon_L	8784	7.7	1501	17%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8254	NEPOOL	NEPOOL_3_ME	4861	7.7	7038	80%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	FRCC	FPC_4_MSA_Tampa_L	8784	7.7	4754	54%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPC_4_MSA_Tampa_L	8784	7.6	5102	58%
VACAR	CPLE_1_MSA_Durham_G	7843	PJM	VAP_33_MSA_DC_L	8784	7.4	7574	86%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	7.4	2494	28%
ENTERGY	EES_9_MSA_Russellville_G	2533	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6739	7.3	6610	75%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	7.3	5502	63%
VACAR	CPLE_1_MSA_Durham_G	7843	PJM	VAP_27_MSA_DC_L	8784	7.3	7253	83%
PJM	NI_6_MSA_Chicago_G	8111	PJM	AEP_2_STA_TN-WV_L	8784	7.3	2497	28%
PJM	PJM500_4_MSA_Philadelphia_G	8374	PJM	PECO_5_MSA_Philadelphia_L	6653	7.3	0	0%
PJM	NI_6_MSA_Chicago_G	8111	PJM	AEP_1_MSA_Lynchburg_G	8784	7.2	5513	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	LGEE_5_MSA_Lexington_L	8784	7.1	5276	60%
ENTERGY	EES_9_MSA_Russellville_G	2533	ENTERGY	EES_1_MSA_Jackson_L	8784	7.1	2779	32%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	6.9	5481	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	6.9	5494	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	6.9	5486	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	6.9	5425	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	6.8	5467	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	6.8	5433	62%
PJM	NI_20_MSA_Chicago_G	7214	PJM	AEP_2_STA_TN-WV_L	8784	6.8	4506	51%
NEPOOL	NEPOOL_3_ME	3923	NYPP	NYISO_10_NYJ	8784	6.7	8784	100%
NEPOOL	NEPOOL_7_CT	7641	NYPP	NYISO_11_NYK	8784	6.7	8784	100%
PJM	NI_20_MSA_Chicago_G	7214	PJM	AEP_1_MSA_Lynchburg_G	8784	6.7	5421	62%
MISO	AMRN_12_MSA_StLouis_L	6699	MISO	CIN_1_MSA_Indianapolis_L	8784	6.6	6063	69%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	FRCC	FPC_3_MSA_Orlando_L	8784	6.6	4237	48%
NYPP	NYISO_6_NYF	7469	NYPP	NYISO_10_NYJ	8784	6.6	8784	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	BGE_7_MSA_Baltimore-Towson	7994	PJM	PECO_5_MSA_Philadelphia_L	6653	6.6	4408	50%
PJM	NI_2_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	673	6.5	0	0%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_3_MSA_Orlando_L	8784	6.5	4237	48%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_13_MSA_Chicago_L	8784	6.5	4821	55%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_3_MSA_Chicago_L	8784	6.5	4816	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_3_MSA_Orlando_L	8784	6.4	4390	50%
NEPOOL	NEPOOL_2_NH	8426	NYPP	NYISO_10_NYJ	8784	6.4	8784	100%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	FRCC	FPC_3_MSA_Orlando_L	8784	6.3	4234	48%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	FRCC	FPC_3_MSA_Orlando_L	8784	6.3	4736	54%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	6.2	5104	58%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	6.2	5249	60%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_9_MSA_Louisville_G	8784	6.2	7329	83%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	6.2	7695	88%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_9_NWKST	8784	6.1	8774	100%
MISO	NIPS_8_MSA_Chicago_G	8765	MISO	CIN_1_MSA_Indianapolis_L	8784	6.1	1355	15%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_11_NYK	8784	6.1	8784	100%
ENTERGY	EES_9_MSA_Russellville_G	2533	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	6.1	3521	40%
ENTERGY	EES_9_MSA_Russellville_G	2533	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	6.1	1009	11%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_13_MSA_Chicago_L	8784	6.0	4476	51%
PJM	NI_20_MSA_Chicago_G	7214	PJM	NI_6_MSA_Chicago_G	673	5.9	0	0%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_3_MSA_Chicago_L	8784	5.9	4476	51%
ENTERGY	EES_9_MSA_Russellville_G	2533	SOUTHERN	SOCO_32_MSA_Pascagoula_G	1253	5.9	3262	37%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_2_County_Macon_L	8784	5.9	5721	65%
MISO	EKPC_8_MSA_Maysville_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	5.9	1237	14%
ENTERGY	EES_8_MSA_BatonRouge_G	8520	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.8	5099	58%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	5.8	7850	89%
MISO	CIN_3_MSA_TerreHaute_G	7034	MISO	LGEE_5_MSA_Lexington_L	8784	5.8	129	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	5.8	5984	68%
MISO	IP_8_GEN_Clinton_G	8016	PJM	NI_6_MSA_Chicago_G	673	5.8	161	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_17_MSA_Mobile_G	6709	5.8	5844	67%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.7	6322	72%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.7	2535	29%
PJM	AEP_8_GEN_Amos01_G	8783	MISO	LGEE_5_MSA_Lexington_L	8784	5.7	18	0%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	ENTERGY	EES_9_MSA_Russellville_G	6251	5.6	5867	67%
PJM	NI_6_MSA_Chicago_G	8111	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.6	2541	29%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	5.6	282	3%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	AEPW_1_MSA_Tulsa_G	7434	5.5	8634	98%
ENTERGY	EES_9_MSA_Russellville_G	2533	SPP	AEPW_9_MSA_MountPleasant_G	1108	5.5	3749	43%
NEPOOL	NEPOOL_3_ME	3923	NYPP	NYISO_9_NYI	8467	5.4	8737	99%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	5.3	4893	56%
NYPP	NYISO_6_NYF	7469	NYPP	NYISO_9_NYI	8467	5.3	8626	98%
PJM	AEP_8_GEN_Amos01_G	8783	VACAR	DUK_4_MSA_Greenville_L	6816	5.2	5209	59%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.2	6331	72%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	5.2	7922	90%
PJM	AEP_8_GEN_Amos01_G	8783	VACAR	DUK_8_MSA_Charlotte_L	8784	5.2	3560	41%
NEPOOL	NEPOOL_7_CT	7641	NYPP	NYISO_10_NYJ	8784	5.1	8777	100%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	ENTERGY	EES_9_MSA_Russellville_G	6251	5.1	4674	53%
PJM	NI_20_MSA_Chicago_G	7214	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.1	2532	29%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_7_G	1848	5.1	5456	62%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_7_MSA_Miami_L	8784	5.1	4748	54%
NEPOOL	NEPOOL_2_NH	8426	NYPP	NYISO_9_NYI	8467	5.1	8771	100%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_3_MSA_Miami_L	8784	5.0	4762	54%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_6_WCMA	8643	5.0	8396	96%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_4_NEBOS	8691	5.0	8770	100%
MISO	LGEE_3_GEN_Gehnt2_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	5.0	4295	49%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_5_MSA_Cleveland_L	6473	4.8	4458	51%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_5_MSA_Cleveland_L	6473	4.7	4391	50%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	VAP_7_G	6936	PJM	AP_8_MSA_DC-VA-MD_L	8784	4.6	5365	61%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_13_MSA_Chicago_L	8784	4.6	4373	50%
MISO	FE_9_MSA_Weirton_G	8571	MISO	FE_5_MSA_Cleveland_L	6473	4.6	3653	42%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_3_MSA_Chicago_L	8784	4.6	4410	50%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_10_NYJ	8784	4.5	8778	100%
MISO	EKPC_8_MSA_Maysville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	4.5	5678	65%
PJM	NI_15_MSA_Davenport_G	8664	MISO	WEC_3_MSA_Milwaukee_G	6898	4.5	4142	47%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_11_NYK	8784	4.5	8784	100%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	4.4	1389	16%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.4	6980	79%
PJM	VAP_7_G	6936	PJM	VAP_33_MSA_DC_L	8784	4.4	5395	61%
VACAR	CPL_1_MSA_Durham_G	7843	PJM	VAP_15_MSA_VB-Norfolk_L	8784	4.4	6487	74%
PJM	AEP_8_GEN_Amos01_G	8783	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	4.4	6030	69%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	4.4	4272	49%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.3	6936	79%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_3_MSA_Miami_L	8784	4.3	4282	49%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_7_MSA_Miami_L	8784	4.3	5129	58%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.2	7077	81%
PJM	VAP_7_G	6936	PJM	VAP_27_MSA_DC_L	8784	4.2	5395	61%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_3_MSA_Miami_L	8784	4.2	5135	58%
MISO	NIPS_8_MSA_Chicago_G	8765	MISO	CIN_7_MSA_Lafayette_L	8784	4.2	1347	15%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_7_NYG	7979	4.2	6185	70%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_13_MSA_Chicago_L	8784	4.1	5793	66%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.1	7012	80%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_3_MSA_Chicago_L	8784	4.1	5794	66%
MISO	AMRN_12_MSA_StLouis_L	6699	MISO	AMRN_2_County_Macon_L	8784	4.1	3790	43%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.1	6656	76%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	4.1	4345	49%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	4.0	5254	60%
SPP	WERE_1_MSA_Manhattan_G	8771	SPP	KACP_7_MSA_KansasCity_L	8784	4.0	3255	37%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	4.0	5323	61%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_10_RI	6570	4.0	8771	100%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	3.9	3891	44%
PJM	VAP_7_G	6936	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	3.9	5242	60%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	WEC_3_MSA_Milwaukee_G	6898	3.9	87	1%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_8_MSA_NewYork_G	8784	3.9	7219	82%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_32_MSA_Pascagoula_G	1253	3.9	5883	67%
NEPOOL	NEPOOL_7_CT	7641	NYPP	NYISO_9_NYI	8467	3.8	8575	98%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_2_GEN_Albright3_L	8784	3.8	4635	53%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_3_MSA_NewYork_L	8784	3.7	6771	77%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_2_GEN_Albright3_L	8784	3.7	4632	53%
MISO	ITC_7_MSA_Monroe_G	8712	MISO	FE_5_MSA_Cleveland_L	6473	3.7	5499	63%
VACAR	DUK_9_MSA_Charlotte_G	8780	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.6	363	4%
MISO	FE_9_MSA>Weirton_G	8571	PJM	AP_2_GEN_Albright3_L	8784	3.6	4618	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.6	271	3%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.5	277	3%
MISO	ITC_3_MSA_Detroit_G	8784	MISO	FE_5_MSA_Cleveland_L	6473	3.5	8397	96%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.5	438	5%
PJM	AEP_8_GEN_Amos01_G	8783	MISO	FE_5_MSA_Cleveland_L	6473	3.4	4043	46%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.3	275	3%
NEPOOL	NEPOOL_3_ME	3923	NEPOOL	NEPOOL_9_NWKST	8784	3.3	8769	100%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	3.3	1382	16%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_9_NYI	8467	3.2	8605	98%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_6_NYF	7469	NEPOOL	NEPOOL_9_NWKST	8784	3.2	8770	100%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_5_MSA_Philadelphia_L	8784	3.0	7153	81%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	3.0	5784	66%
NEPOOL	NEPOOL_2_NH	8426	NEPOOL	NEPOOL_9_NWKST	8784	3.0	8780	100%
SPP	AEPW_9_MSA_MountPleasant	7676	ENTERGY	EES_9_MSA_Russellville_G	6251	3.0	8735	99%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_10_NYJ	8784	2.9	8783	100%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_2_MSA_FortMyers_G	8506	2.9	4261	49%
ENTERGY	EES_2_MSA_Batesville_G	8784	ENTERGY	EES_9_MSA_Russellville_G	6251	2.8	2323	26%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	NI_13_MSA_Chicago_L	8784	2.8	5519	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_2_STA_TN-WV_L	8784	2.8	5272	60%
MISO	AMRN_12_MSA_StLouis_L	6699	PJM	NI_3_MSA_Chicago_L	8784	2.8	5341	61%
MISO	EKPC_8_MSA_Maysville_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	2.8	5027	57%
FRCC	FPL_8_MSA_PortStLucie_G	8763	FRCC	FPL_7_MSA_Miami_L	8784	2.7	3402	39%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	2.7	5322	61%
FRCC	FPL_8_MSA_PortStLucie_G	8763	FRCC	FPL_3_MSA_Miami_L	8784	2.7	2924	33%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	2.7	3766	43%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_1_MSA_Lynchburg_G	8784	2.7	5897	67%
PJM	AEP_8_GEN_Amos01_G	8783	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	2.6	5862	67%
PJM	AEP_8_GEN_Amos01_G	8783	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	2.6	5450	62%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	2.6	6207	71%
SPP	AEPW_9_MSA_MountPleasant	7676	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6739	2.6	8728	99%
MISO	FE_9_MSA>Weirton_G	8571	PJM	AEP_2_STA_TN-WV_L	8784	2.6	5052	58%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	WEC_3_MSA_Milwaukee_G	6898	2.6	4580	52%
MISO	FE_9_MSA>Weirton_G	8571	PJM	AEP_1_MSA_Lynchburg_G	8784	2.5	6050	69%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	MISO	LGEE_5_MSA_Lexington_L	8784	2.5	1148	13%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_33_MSA_DC_L	8784	2.4	3941	45%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	2.4	2435	28%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	AP_2_GEN_Albright3_L	8784	2.4	6148	70%
PJM	AEP_8_GEN_Amos01_G	8783	VACAR	CPL_1_MSA_Durham_G	941	2.4	6859	78%
SPP	AEPW_9_MSA_MountPleasant	7676	ENTERGY	EES_1_MSA_Jackson_L	8784	2.4	8734	99%
SPP	AEPW_5_MSA_Tulsa_G	7426	ENTERGY	EES_9_MSA_Russellville_G	6251	2.3	5900	67%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	PJM500_7_MSA_York-Hanover_G	8784	PJM	VAP_7_G	1848	2.3	6627	75%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_27_MSA_DC_L	8784	2.3	3044	35%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	NI_13_MSA_Chicago_L	8784	2.3	162	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	2.2	155	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	2.2	225	3%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	2.2	194	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2.2	104	1%
MISO	NIPS_8_MSA_Chicago_G	8765	PJM	NI_3_MSA_Chicago_L	8784	2.2	5	0%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.2	2686	31%
NEPOOL	NEPOOL_3_ME	3923	NEPOOL	NEPOOL_6_WCMA	8643	2.2	6854	78%
NEPOOL	NEPOOL_3_ME	3923	NEPOOL	NEPOOL_4_NEBOS	8691	2.2	6692	76%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	2.2	15	0%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8506	2.1	4246	48%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	2.1	10	0%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.1	2728	31%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	WEC_3_MSA_Milwaukee_G	6898	2.1	1867	21%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPC_4_MSA_Tampa_L	8784	2.1	3971	45%
NYPP	NYISO_6_NYF	7469	NEPOOL	NEPOOL_6_WCMA	8643	2.1	7183	82%
NYPP	NYISO_6_NYF	7469	NEPOOL	NEPOOL_4_NEBOS	8691	2.0	7210	82%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_2_MSA_FortMyers_G	8506	2.0	4967	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.0	1133	13%
FRCC	FPC_10_MSA_Lakeland_G	8021	FRCC	FPL_7_MSA_Miami_L	8784	2.0	4293	49%
SPP	AEPW_5_MSA_Tulsa_G	7426	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6739	2.0	6181	70%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	2.0	4615	53%
FRCC	FPC_10_MSA_Lakeland_G	8021	FRCC	FPL_3_MSA_Miami_L	8784	1.9	4292	49%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8775	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.9	2717	31%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7531	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.9	4297	49%
NEPOOL	NEPOOL_2_NH	8426	NEPOOL	NEPOOL_6_WCMA	8643	1.9	6868	78%
NEPOOL	NEPOOL_2_NH	8426	NEPOOL	NEPOOL_4_NEBOS	8691	1.8	6695	76%
ONTARIO	IESO_15_G	8382	NYPP	NYISO_2_NYB	8784	1.8	8449	96%
PJM	PJM500_4_MSA_Philadelphia_G	8374	PJM	VAP_7_G	1848	1.8	5933	68%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_2_NYB	8784	1.8	8460	96%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_2_NYB	8784	1.8	8528	97%
PJM	PJM500_5_MSA_DC_G	8784	PJM	VAP_7_G	1848	1.8	5260	60%
NEPOOL	NEPOOL_7_CT	7641	NEPOOL	NEPOOL_9_NWKST	8784	1.7	8754	100%
SPP	AEPW_5_MSA_Tulsa_G	7426	ENTERGY	EES_1_MSA_Jackson_L	8784	1.7	5562	63%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	ITC_2_MSA_Detroit_L	8541	1.7	7045	80%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	CIN_1_MSA_Indianapolis_L	8784	1.7	4263	49%
VACAR	SCEG_1_MSA_Columbia_G	7968	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7519	1.6	445	5%
MISO	FE_9_MSA>Weirton_G	8571	MISO	ITC_2_MSA_Detroit_L	8541	1.6	6876	78%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_9_NYI	8467	1.6	6506	74%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_2_County_Macon_L	8784	1.6	4280	49%
PJM	DPL_8_GEN_Killen_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	1.6	1917	22%
VACAR	SCPSA_10_MSA_Charleston_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.5	2236	25%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	TECO_7_MSA_Tampa_L	8784	1.5	3645	41%
MISO	EKPC_8_MSA_Maysville_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	1.5	1411	16%
PJM	DPL_8_GEN_Killen_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	1.5	3115	35%
MISO	CIN_3_MSA_TerreHaute_G	7034	PJM	AEP_2_STA_TN-WV_L	8784	1.5	3844	44%
PJM	NI_15_MSA_Davenport_G	8664	MISO	WEC_7_MSA_Milwaukee_G	8069	1.4	4719	54%
PJM	NI_6_MSA_Chicago_G	8111	MISO	AMRN_2_County_Macon_L	8784	1.4	4234	48%
ENTERGY	EES_4_GEN_Ouachita_G	5418	ENTERGY	EES_5_MSA_NewOrleans_G	8784	1.4	6326	72%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AEP_8_GEN_Amos01_G	8783	PJM	AEP_2_STA_TN-WV_L	8784	1.3	9	0%
MISO	CIN_3_MSA_TerreHaute_G	7034	PJM	AEP_1_MSA_Lynchburg_G	8784	1.3	3172	36%
ONTARIO	IESO_15_G	8382	MISO	ITC_2_MSA_Detroit_L	8541	1.3	8708	99%
PJM	VAP_7_G	6936	PJM	VAP_15_MSA_VB-Norfolk_L	8784	1.3	5475	62%
NEPOOL	NEPOOL_3_ME	3923	NYPP	NYISO_7_NYG	7979	1.3	6712	76%
ONTARIO	IESO_6_G	8784	MISO	ITC_2_MSA_Detroit_L	8541	1.3	8718	99%
ONTARIO	IESO_7_G	8784	MISO	ITC_2_MSA_Detroit_L	8541	1.3	8724	99%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_4_MSA_Akron_L	8784	1.3	1832	21%
PJM	PJM500_4_MSA_Philadelphia_G	8374	PJM	PSEG_8_MSA_NewYork_G	8784	1.3	7112	81%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	1.3	3712	42%
PJM	PL_8_MSA_Allentown_G	6898	PJM	JCPL_1_MSA_NewYork_L	8784	1.2	7808	89%
PJM	AEP_8_GEN_Amos01_G	8783	PJM	AEP_1_MSA_Lynchburg_G	8784	1.2	3206	36%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8671	VACAR	SCEG_9_MSA_Charleston_G	8494	1.2	2815	32%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPC_4_MSA_Tampa_L	8784	1.2	2706	31%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8773	1.2	3294	38%
NYPP	NYISO_6_NYF	7469	NYPP	NYISO_7_NYG	7979	1.2	5038	57%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_4_MSA_Akron_L	8784	1.2	1792	20%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	ITC_9_MSA_Detroit_L	8784	1.2	7682	87%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCEG_9_MSA_Charleston_G	8494	1.2	2841	32%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_9_NWKST	8784	1.1	8755	100%
NEPOOL	NEPOOL_3_ME	3923	NEPOOL	NEPOOL_10_RI	6570	1.1	6688	76%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_9_MSA_Canton-Massillon_L	8784	1.1	5444	62%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	TVAUTHOR	TVA_5_MSA_Nashville_L	8541	1.1	120	1%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AEP_9_MSA_Canton-Massillon_L	8784	1.1	4400	50%
PJM	PJM500_4_MSA_Philadelphia_G	8374	PJM	PSEG_3_MSA_NewYork_L	8784	1.1	7009	80%
MISO	FE_9_MSA>Weirton_G	8571	MISO	FE_4_MSA_Akron_L	8784	1.1	3548	40%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	1.1	1361	15%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_17_MSA_Mobile_G	6709	1.1	2782	32%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	1.1	1411	16%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	1.1	1407	16%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	1.1	1327	15%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCEG_9_MSA_Charleston_G	8494	1.1	2773	32%
MISO	FE_9_MSA_Weirton_G	8571	MISO	ITC_9_MSA_Detroit_L	8784	1.1	7579	86%
MAPP	MEC_3_MSA_DesMoines_G	7991	MAPP	OPPD_5_MSA_Omaha_L	8784	1.0	2138	24%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_9_MSA_Canton-Massillor	8784	1.0	4355	50%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_21_MSA_Atlanta_G	8765	1.0	1238	14%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_7_CT	1106	36.6	6671	76%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_11_NYK	8784	35.1	6676	76%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_11_NYK	8784	35.1	6676	76%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_11_NYK	8784	35.1	6676	76%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_10_NYJ	8784	33.6	8784	100%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_10_NYJ	8784	33.6	8784	100%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_10_NYJ	8784	33.6	8784	100%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_9_NYI	8467	31.9	6667	76%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_9_NYI	8467	31.9	6668	76%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_9_NYI	8467	31.9	6666	76%
NYPP	NYISO_1_NYA	8272	NYPP	NYISO_11_NYK	8784	31.6	6676	76%
MAPP	MEC_3_MSA_DesMoines_G	7974	MISO	AMRN_12_MSA_StLouis_L	2086	30.6	3889	44%
NYPP	NYISO_1_NYA	8272	NYPP	NYISO_10_NYJ	8784	30.1	8784	100%
NYPP	NYISO_1_NYA	8272	NYPP	NYISO_9_NYI	8467	28.5	6591	75%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_7_NYG	8388	27.2	6665	76%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_7_NYG	8388	27.2	6666	76%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_7_NYG	8388	27.1	6664	76%
PJM	NI_15_MSA_Davenport_G	8664	MISO	AMRN_12_MSA_StLouis_L	2086	26.6	5041	57%
MISO	OTP_9_GEN_BigStone_G	8784	MISO	XEL_3_MSA_Minneapolis_G	4678	26.5	7790	89%
PJM	PENELEC_2_MSA_DuBois_G	8404	NYPP	NYISO_11_NYK	8784	25.8	6676	76%
SPP	WERE_1_MSA_Manhattan_G	8753	SPP	OKGE_4_MSA_OklahomaCity_L	8783	25.5	8317	95%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_12_MSA_StLouis_L	2086	24.5	5648	64%
PJM	PENELEC_2_MSA_DuBois_G	8404	NYPP	NYISO_10_NYJ	8784	24.4	6675	76%
NYPP	NYISO_1_NYA	8272	NYPP	NYISO_7_NYG	8388	23.7	6511	74%
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_9_NWKST	8784	23.5	6681	76%
PJM	PENELEC_2_MSA_DuBois_G	8404	NYPP	NYISO_9_NYI	8467	22.7	6648	76%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_7_CT	1106	21.9	8771	100%
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_6_WCMA	8762	21.5	6671	76%
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_4_NEBOS	8656	21.3	6671	76%
SPP	WERE_1_MSA_Manhattan_G	8753	SPP	WERE_4_GEN_Wolfcreek_G	3670	20.9	3405	39%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_12_MSA_StLouis_L	2086	20.1	3553	40%
PJM	NI_6_MSA_Chicago_G	8068	MISO	AMRN_12_MSA_StLouis_L	2086	20.0	3560	41%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2521	SPP	GRE_4_MSA_OklahomaCity_L	8783	19.9	4293	49%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_8_MSA_DC-VA-MD_L	8784	19.8	7979	91%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	19.7	7968	91%
NYPP	NYISO_1_NYA	8272	PJM	PSEG_8_MSA_NewYork_G	8784	19.6	8192	93%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AP_8_MSA_DC-VA-MD_L	8784	19.6	7943	90%
NYPP	NYISO_1_NYA	8272	PJM	PSEG_3_MSA_NewYork_L	8784	19.4	8228	94%
NEPOOL	NEPOOL_3_ME	4348	NEPOOL	NEPOOL_7_CT	1106	19.4	7681	87%
PJM	NI_20_MSA_Chicago_G	7224	MISO	AMRN_12_MSA_StLouis_L	2086	19.4	3541	40%
MISO	IP_8_GEN_Clinton_G	8015	MISO	AMRN_12_MSA_StLouis_L	2086	19.3	1786	20%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	19.0	8403	96%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	19.0	7933	90%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	18.9	7921	90%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	18.8	7901	90%
NEPOOL	NEPOOL_2_NH	8519	NEPOOL	NEPOOL_7_CT	1106	18.4	7696	88%
NYPP	NYISO_1_NYA	8272	PJM	PSEG_5_MSA_Philadelphia_L	8784	17.9	8248	94%
PJM	PENELEC_2_MSA_DuBois_G	8404	NYPP	NYISO_7_NYG	8388	17.9	6645	76%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	AP_8_MSA_DC-VA-MD_L	8784	17.5	8064	92%
MISO	IP_7_GEN_Baldwin_G	8784	MISO	AMRN_12_MSA_StLouis_L	2086	17.4	994	11%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	17.3	7384	84%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	VAP_33_MSA_DC_L	8784	17.3	8124	92%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	VAP_27_MSA_DC_L	8784	17.1	8045	92%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	VAP_7_G	1879	17.0	6743	77%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_11_NYK	8784	16.9	8784	100%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	16.7	8038	92%
NYPP	NYISO_6_NYF	7530	NEPOOL	NEPOOL_7_CT	1106	16.7	8750	100%
MISO	BREC_3_County_Webster_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	16.6	7778	89%
MISO	CIN_8_MSA_Evansville_G	8783	MISO	AMRN_12_MSA_StLouis_L	2086	16.1	2278	26%
MISO	XEL_3_MSA_Minneapolis_G	4106	MISO	GRE_4_MSA_Minneapolis_L	8784	15.8	0	0%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_10_NYJ	8784	15.5	8783	100%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_7_CT	1106	15.3	2253	26%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	AMRN_12_MSA_StLouis_L	2086	15.2	5952	68%
SPP	AEPW_9_MSA_MountPleasant_	7978	SPP	OKGE_4_MSA_OklahomaCity_	8783	14.6	4889	56%
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_1_MSA_Lynchburg_G	8784	14.6	6943	79%
MISO	AMRN_12_MSA_StLouis_L	6698	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	14.5	5379	61%
ENTERGY	EES_9_MSA_Russellville_G	2521	ENTERGY	EES_5_MSA_NewOrleans_G	8784	14.5	6842	78%
ENTERGY	EES_2_MSA_Batesville_G	8784	SPP	OKGE_4_MSA_OklahomaCity_	8783	14.5	6133	70%
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_2_STA_TN-WV_L	8784	14.5	6081	69%
NEPOOL	NEPOOL_3_ME	4348	NYPP	NYISO_11_NYK	8784	14.4	8782	100%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8781	MISO	AMRN_12_MSA_StLouis_L	2086	14.4	2912	33%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	13.8	3444	39%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_9_NYI	8467	13.8	8697	99%
PJM	AEP_8_GEN_Amos01_G	8782	MISO	AMRN_12_MSA_StLouis_L	2086	13.7	748	9%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	VAP_15_MSA_VB-Norfolk_L	8784	13.6	8015	91%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_6_MSA_Chicago_G	716	13.6	4732	54%
NEPOOL	NEPOOL_2_NH	8519	NYPP	NYISO_11_NYK	8784	13.4	8782	100%
SPP	AEPW_5_MSA_Tulsa_G	7478	SPP	OKGE_4_MSA_OklahomaCity_	8783	13.2	1445	16%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	716	13.2	4466	51%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_9_MSA_Kalamazoo_L	8784	13.0	5758	66%
NEPOOL	NEPOOL_3_ME	4348	NYPP	NYISO_10_NYJ	8784	12.9	8784	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	FRCC	FPL_7_MSA_Miami_L	8784	12.9	5718	65%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	FRCC	FPL_3_MSA_Miami_L	8784	12.8	5354	61%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_7_MSA_Miami_L	8784	12.7	5715	65%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	12.6	5472	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_3_MSA_Miami_L	8784	12.6	5353	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_3_MSA_Miami_L	8784	12.6	5478	62%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	FRCC	FPL_7_MSA_Miami_L	8784	12.5	5712	65%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	FRCC	FPL_3_MSA_Miami_L	8784	12.4	5352	61%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	12.4	6582	75%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	12.3	6030	69%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8781	SPP	WERE_4_GEN_Wolfcreek_G	3670	12.3	7585	86%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	NI_15_MSA_Davenport_G	8664	PJM	AEP_9_MSA_Canton-Massillon_L	8784	12.3	5265	60%
MAPP	MEC_3_MSA_DesMoines_G	7974	MISO	AMRN_2_County_Macon_L	8784	12.1	5616	64%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	FRCC	FPL_7_MSA_Miami_L	8784	12.0	5932	68%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	FRCC	FPL_3_MSA_Miami_L	8784	12.0	5600	64%
NEPOOL	NEPOOL_2_NH	8519	NYPP	NYISO_10_NYJ	8784	11.9	8784	100%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	11.8	7936	90%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_8_MSA_BayCity_G	8357	11.8	5988	68%
NYPP	NYISO_6_NYF	7530	NYPP	NYISO_11_NYK	8784	11.7	8783	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	11.7	5514	63%
PJM	AP_1_County_Harrison_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	11.7	7714	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	11.5	8695	99%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	11.4	7888	90%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_6_MSA_Chicago_G	716	11.4	4347	49%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	11.3	7790	89%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	11.3	7874	90%
NEPOOL	NEPOOL_3_ME	4348	NYPP	NYISO_9_NYI	8467	11.2	8756	100%
NEPOOL	NEPOOL_7_CT	7678	NYPP	NYISO_11_NYK	8784	11.1	8782	100%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	11.1	7861	89%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_6_MSA_Chicago_G	716	11.0	5715	65%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	AEP_1_MSA_Lynchburg_G	8784	11.0	6810	78%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	11.0	7555	86%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	AEP_2_STA_TN-WV_L	8784	10.9	6601	75%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	10.8	8419	96%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_33_MSA_DC_L	8784	10.8	7645	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	10.7	7814	89%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	10.6	7846	89%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_27_MSA_DC_L	8784	10.6	7518	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	10.5	7794	89%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_3_ME	4436	10.5	6795	77%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	10.5	7802	89%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_7_G	1879	10.5	5619	64%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	FRCC	FPL_2_MSA_FortMyers_G	8513	10.5	5046	57%
PJM	PENELEC_2_MSA_DuBois_G	8404	PJM	PL_7_MSA_Allentown_L	8784	10.5	7873	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_33_MSA_DC_L	8784	10.4	7940	90%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_11_NYK	8784	10.3	8782	100%
NYPP	NYISO_8_NYH	8784	NEPOOL	NEPOOL_7_CT	1106	10.3	8753	100%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_2_MSA_FortMyers_G	8513	10.3	5045	57%
NEPOOL	NEPOOL_2_NH	8519	NYPP	NYISO_9_NYI	8467	10.3	8780	100%
NYPP	NYISO_6_NYF	7530	NYPP	NYISO_10_NYJ	8784	10.3	8783	100%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8513	10.2	5196	59%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	10.2	7518	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_27_MSA_DC_L	8784	10.2	7686	88%
PJM	PJM500_7_MSA_York-Hanover	8784	PJM	PECO_5_MSA_Philadelphia_L	6595	10.1	3504	40%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	10.1	5526	63%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	FRCC	FPL_2_MSA_FortMyers_G	8513	10.1	5045	57%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_7_G	1879	10.1	6804	77%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	AEP_1_MSA_Lynchburg_G	8784	10.1	4780	54%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	NI_6_MSA_Chicago_G	716	10.0	5498	63%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	AEP_2_STA_TN-WV_L	8784	10.0	1408	16%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	XEL_3_MSA_Minneapolis_G	4678	9.9	2351	27%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	9.9	7887	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	9.8	7816	89%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	9.7	3428	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	9.7	3452	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	9.7	3454	39%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	9.7	3387	39%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	9.7	2899	33%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_21_MSA_Atlanta_G	8768	9.7	3379	38%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	FRCC	FPL_2_MSA_FortMyers_G	8513	9.6	5320	61%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	9.6	4107	47%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_33_MSA_DC_L	8784	9.6	8041	92%
NEPOOL	NEPOOL_7_CT	7678	NYPP	NYISO_10_NYJ	8784	9.6	8780	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	FRCC	FPC_4_MSA_Tampa_L	8784	9.5	4856	55%
PJM	BGE_7_MSA_Baltimore-Towson	8212	PJM	PECO_5_MSA_Philadelphia_L	6595	9.5	4679	53%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_27_MSA_DC_L	8784	9.4	7633	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_7_G	1879	9.3	7000	80%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_4_MSA_Tampa_L	8784	9.3	4859	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_4_MSA_Tampa_L	8784	9.3	5011	57%
SPP	AEPW_9_MSA_MountPleasant_	7978	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9.2	8744	100%
PJM	PJM500_4_MSA_Philadelphia_G	8397	PJM	PECO_5_MSA_Philadelphia_L	6595	9.1	5	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	FRCC	FPC_4_MSA_Tampa_L	8784	9.1	4860	55%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	NI_6_MSA_Chicago_G	716	9.1	13	0%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	9.0	7880	90%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_7_NYG	8388	9.0	5975	68%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_17_MSA_Mobile_G	6738	8.9	3389	39%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	8.9	6303	72%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	FRCC	FPL_7_MSA_Miami_L	8784	8.9	5740	65%
ENTERGY	EES_9_MSA_Russellville_G	2521	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	8.9	6572	75%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_10_NYJ	8784	8.8	8781	100%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_9_NWKST	8784	8.8	8771	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	FRCC	FPL_3_MSA_Miami_L	8784	8.8	5381	61%
ENTERGY	EES_9_MSA_Russellville_G	2521	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	8.8	6019	69%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	AEP_9_MSA_Canton-Massillon_L	8784	8.7	5990	68%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	FRCC	FPC_4_MSA_Tampa_L	8784	8.7	5162	59%
SPP	AEPW_5_MSA_Tulsa_G	7478	SPP	WERE_4_GEN_Wolfcreek_G	3670	8.6	4615	53%
NYPP	NYISO_6_NYF	7530	NYPP	NYISO_9_NYI	8467	8.6	8657	99%
VACAR	CPLE_1_MSA_Durham_G	7851	PJM	VAP_33_MSA_DC_L	8784	8.4	7483	85%
VACAR	CPLE_1_MSA_Durham_G	7851	PJM	VAP_27_MSA_DC_L	8784	8.2	7123	81%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_9_MSA_Louisville_G	8784	8.2	7320	83%
ENTERGY	EES_9_MSA_Russellville_G	2521	ENTERGY	EES_1_MSA_Jackson_L	8784	8.2	2739	31%
PJM	NI_15_MSA_Davenport_G	8664	MISO	AMRN_2_County_Macon_L	8784	8.2	5642	64%
VACAR	CPLE_1_MSA_Durham_G	7851	PJM	VAP_7_G	1879	8.2	5425	62%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	8.1	5514	63%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	8.0	2451	28%
PJM	NI_6_MSA_Chicago_G	8068	PJM	AEP_1_MSA_Lynchburg_G	8784	8.0	5524	63%
NEPOOL	NEPOOL_7_CT	7678	NYPP	NYISO_9_NYI	8467	7.9	8633	98%
PJM	NI_6_MSA_Chicago_G	8068	PJM	AEP_2_STA_TN-WV_L	8784	7.9	2458	28%
SPP	AEPW_5_MSA_Tulsa_G	7478	ENTERGY	EES_5_MSA_NewOrleans_G	8784	7.9	7692	88%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	AEP_9_MSA_Canton-Massillon_L	8784	7.8	1446	16%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	FRCC	FPC_3_MSA_Orlando_L	8784	7.8	4315	49%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	7.6	5488	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	7.6	5495	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	7.6	5502	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	7.6	5423	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	7.6	5434	62%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_21_MSA_Atlanta_G	8768	7.6	5468	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_3_MSA_Orlando_L	8784	7.6	4316	49%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_3_MSA_Orlando_L	8784	7.5	4497	51%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	LGEE_5_MSA_Lexington_L	8784	7.4	5249	60%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	FRCC	FPC_3_MSA_Orlando_L	8784	7.4	4313	49%
MISO	AMRN_12_MSA_StLouis_L	6698	MISO	CIN_1_MSA_Indianapolis_L	8784	7.3	5961	68%
PJM	NI_20_MSA_Chicago_G	7224	PJM	AEP_1_MSA_Lynchburg_G	8784	7.3	5407	62%
NYPP	NYISO_1_NYA	8272	NEPOOL	NEPOOL_2_NH	265	7.3	6795	77%
PJM	NI_20_MSA_Chicago_G	7224	PJM	AEP_2_STA_TN-WV_L	8784	7.2	4430	50%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_9_NYI	8467	7.2	8648	98%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_6_NYF	1254	7.2	6643	76%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_6_NYF	1254	7.2	6644	76%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_6_NYF	1254	7.1	6638	76%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	7.1	7565	86%
PJM	NI_2_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	716	7.1	0	0%
ENTERGY	EES_9_MSA_Russellville_G	2521	SOUTHERN	SOCO_32_MSA_Pascagoula_G	1396	7.0	3198	36%
MISO	LGEE_3_GEN_Gehrt2_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	7.0	4977	57%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	FRCC	FPC_3_MSA_Orlando_L	8784	6.9	4761	54%
ENTERGY	EES_9_MSA_Russellville_G	2521	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	6.9	3400	39%
MISO	LGEE_3_GEN_Gehrt2_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	6.9	5112	58%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_6_WCMA	8762	6.8	8320	95%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_17_MSA_Mobile_G	6738	6.8	5863	67%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_13_MSA_Chicago_L	8784	6.8	4747	54%
ENTERGY	EES_9_MSA_Russellville_G	2521	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	6.8	960	11%
PJM	NI_15_MSA_Davenport_G	8664	PJM	NI_3_MSA_Chicago_L	8784	6.7	4745	54%
PJM	PJM500_3_MSA_Pittsburgh_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	6.7	7717	88%
SPP	WERE_1_MSA_Manhattan_G	8753	SPP	AEPW_1_MSA_Tulsa_G	7440	6.7	8644	98%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	6.7	5959	68%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_4_NEBOS	8656	6.6	8770	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	ENTERGY	EES_9_MSA_Russellville_G	6263	6.6	5847	67%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	FRCC	FPL_2_MSA_FortMyers_G	8513	6.5	5068	58%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NEPOOL	NEPOOL_3_ME	4348	NYPP	NYISO_7_NYG	8388	6.5	6499	74%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_13_MSA_Chicago_L	8784	6.4	4466	51%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_3_MSA_Chicago_L	8784	6.4	4466	51%
MISO	NIPS_8_MSA_Chicago_G	8764	MISO	CIN_1_MSA_Indianapolis_L	8784	6.4	1302	15%
NEPOOL	NEPOOL_3_ME	4348	NEPOOL	NEPOOL_9_NWKST	8784	6.3	8768	100%
PJM	NI_20_MSA_Chicago_G	7224	PJM	NI_6_MSA_Chicago_G	716	6.3	0	0%
MISO	IP_8_GEN_Clinton_G	8015	PJM	NI_6_MSA_Chicago_G	716	6.3	175	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	6.2	112	1%
MISO	EKPC_8_MSA_Maysville_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	6.1	1318	15%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_2_County_Macon_L	8784	6.0	5606	64%
ENTERGY	EES_8_MSA_BatonRouge_G	8520	ENTERGY	EES_5_MSA_NewOrleans_G	8784	6.0	5115	58%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	5.9	7791	89%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_5_MSA_Cleveland_L	6258	5.9	4548	52%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.9	6328	72%
PJM	AEP_8_GEN_Amos01_G	8782	MISO	LGEE_5_MSA_Lexington_L	8784	5.9	21	0%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_7_MSA_Miami_L	8784	5.9	4875	55%
PJM	AEP_8_GEN_Amos01_G	8782	VACAR	DUK_8_MSA_Charlotte_L	8784	5.9	3587	41%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_5_MSA_Cleveland_L	6258	5.8	4483	51%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_3_MSA_Miami_L	8784	5.8	4890	56%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8781	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	5.8	4801	55%
MISO	CIN_3_MSA_TerreHaute_G	7044	MISO	LGEE_5_MSA_Lexington_L	8784	5.8	154	2%
MISO	FE_9_MSA>Weirton_G	8610	MISO	FE_5_MSA_Cleveland_L	6258	5.8	3808	43%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.8	2484	28%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8781	ENTERGY	EES_9_MSA_Russellville_G	6263	5.7	4595	52%
PJM	NI_6_MSA_Chicago_G	8068	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.6	2490	28%
PJM	AEP_8_GEN_Amos01_G	8782	VACAR	DUK_4_MSA_Greenville_L	6750	5.6	5157	59%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.6	6337	72%
SOUTHERN	SOCO_17_MSA-Mobile_G	2046	FRCC	FPC_4_MSA_Tampa_L	8784	5.5	4874	55%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NEPOOL	NEPOOL_2_NH	8519	NYPP	NYISO_7_NYG	8388	5.5	7138	81%
MISO	EKPC_8_MSA_Maysville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	5.3	5659	64%
NEPOOL	NEPOOL_2_NH	8519	NEPOOL	NEPOOL_9_NWKST	8784	5.3	8778	100%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_11_NYK	8784	5.3	8783	100%
MISO	LGEE_3_GEN_Gehrt2_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	5.3	4150	47%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	5.2	4421	50%
PJM	AEP_8_GEN_Amos01_G	8782	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	5.1	5937	68%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_3_MSA_Miami_L	8784	5.1	4438	51%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.1	6967	79%
PJM	VAP_7_G	6905	PJM	AP_8_MSA_DC-VA-MD_L	8784	5.1	5237	60%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_7_MSA_Miami_L	8784	5.0	5213	59%
PJM	NI_20_MSA_Chicago_G	7224	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.0	2485	28%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_8_MSA_NewYork_G	8784	5.0	7706	88%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_3_MSA_Miami_L	8784	5.0	5214	59%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_32_MSA_Pascagoula_G	1396	4.9	5905	67%
PJM	NI_15_MSA_Davenport_G	8664	MISO	WEC_3_MSA_Milwaukee_G	6881	4.9	4104	47%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.9	1223	14%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.9	6923	79%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.9	7057	80%
PJM	VAP_7_G	6905	PJM	VAP_33_MSA_DC_L	8784	4.8	5256	60%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	4.8	5226	59%
VACAR	CPL_1_MSA_Durham_G	7851	PJM	VAP_15_MSA_VB-Norfolk_L	8784	4.8	6370	73%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_3_MSA_NewYork_L	8784	4.8	7319	83%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_2_GEN_Albright3_L	8784	4.7	4714	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.7	6987	80%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_2_GEN_Albright3_L	8784	4.7	4711	54%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	4.7	5271	60%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_13_MSA_Chicago_L	8784	4.6	4290	49%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	AMRN_12_MSA_StLouis_L	6698	MISO	AMRN_2_County_Macon_L	8784	4.6	3648	42%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_3_MSA_Chicago_L	8784	4.6	4321	49%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AP_2_GEN_Albright3_L	8784	4.6	4705	54%
PJM	VAP_7_G	6905	PJM	VAP_27_MSA_DC_L	8784	4.6	5249	60%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	4.6	3748	43%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	WEC_3_MSA_Milwaukee_G	6881	4.5	92	1%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	4.5	4239	48%
SPP	WERE_1_MSA_Manhattan_G	8753	SPP	KACP_7_MSA_KansasCity_L	8784	4.4	3283	37%
VACAR	DUK_9_MSA_Charlotte_G	8780	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.4	227	3%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.4	104	1%
MISO	NIPS_8_MSA_Chicago_G	8764	MISO	CIN_7_MSA_Lafayette_L	8784	4.4	1315	15%
NEPOOL	NEPOOL_3_ME	4348	NEPOOL	NEPOOL_6_WCMA	8762	4.3	7127	81%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_13_MSA_Chicago_L	8784	4.3	5692	65%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.3	6642	76%
PJM	VAP_7_G	6905	PJM	AP_7_MSA_Hagerstown-Martir	8784	4.2	5115	58%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_3_MSA_Chicago_L	8784	4.2	5691	65%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.2	109	1%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.2	301	3%
MISO	ITC_7_MSA_Monroe_G	8712	MISO	FE_5_MSA_Cleveland_L	6258	4.1	5477	62%
NEPOOL	NEPOOL_3_ME	4348	NEPOOL	NEPOOL_4_NEBOS	8656	4.1	7025	80%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	4.0	107	1%
MISO	ITC_3_MSA_Detroit_G	8784	MISO	FE_5_MSA_Cleveland_L	6258	4.0	8350	95%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_10_NYJ	8784	3.8	8784	100%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	3.8	6216	71%
NYPP	NYISO_6_NYF	7530	NYPP	NYISO_7_NYG	8388	3.8	5105	58%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	FRCC	FPC_3_MSA_Orlando_L	8784	3.8	4360	50%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AEP_1_MSA_Lynchburg_G	8784	3.7	6046	69%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	3.7	5389	61%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8272	NYPP	NYISO_6_NYF	1254	3.7	6498	74%
PJM	AEP_8_GEN_Amos01_G	8782	MISO	FE_5_MSA_Cleveland_L	6258	3.7	4008	46%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AEP_2_STA_TN-WV_L	8784	3.6	5146	59%
NYPP	NYISO_6_NYF	7530	NEPOOL	NEPOOL_9_NWKST	8784	3.6	8768	100%
SPP	AEPW_9_MSA_MountPleasant	7978	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	3.6	8732	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	3.6	1195	14%
MISO	EKPC_8_MSA_Maysville_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3.5	5029	57%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_2_MSA_FortMyers_G	8513	3.5	4349	50%
SPP	AEPW_9_MSA_MountPleasant	7978	ENTERGY	EES_9_MSA_Russellville_G	6263	3.4	8738	99%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	3.3	5690	65%
NEPOOL	NEPOOL_2_NH	8519	NEPOOL	NEPOOL_6_WCMA	8762	3.3	7124	81%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	NI_13_MSA_Chicago_L	8784	3.3	5484	62%
PJM	AEP_8_GEN_Amos01_G	8782	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3.3	5789	66%
ENTERGY	EES_2_MSA_Batesville_G	8784	ENTERGY	EES_9_MSA_Russellville_G	6263	3.2	2262	26%
MISO	AMRN_12_MSA_StLouis_L	6698	PJM	NI_3_MSA_Chicago_L	8784	3.2	5318	61%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_5_MSA_Philadelphia_L	8784	3.2	7610	87%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	3.2	3656	42%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_1_MSA_Lynchburg_G	8784	3.2	5806	66%
FRCC	FPL_8_MSA_PortStLucie_G	8747	FRCC	FPL_7_MSA_Miami_L	8784	3.1	3401	39%
NEPOOL	NEPOOL_7_CT	7678	NYPP	NYISO_7_NYG	8388	3.1	6168	70%
PJM	AEP_8_GEN_Amos01_G	8782	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	3.1	5373	61%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_2_STA_TN-WV_L	8784	3.1	5246	60%
FRCC	FPL_8_MSA_PortStLucie_G	8747	FRCC	FPL_3_MSA_Miami_L	8784	3.1	2924	33%
NEPOOL	NEPOOL_2_NH	8519	NEPOOL	NEPOOL_4_NEBOS	8656	3.1	7017	80%
NEPOOL	NEPOOL_7_CT	7678	NEPOOL	NEPOOL_9_NWKST	8784	3.0	8753	100%
SPP	AEPW_9_MSA_MountPleasant	7978	ENTERGY	EES_1_MSA_Jackson_L	8784	2.9	8737	99%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_33_MSA_DC_L	8784	2.9	3845	44%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	WEC_3_MSA_Milwaukee_G	6881	2.8	4508	51%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8513	2.8	4333	49%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_27_MSA_DC_L	8784	2.7	2913	33%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_7_G	1879	2.6	5448	62%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_2_MSA_FortMyers_G	8513	2.6	5026	57%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	ITC_2_MSA_Detroit_L	8540	2.5	7178	82%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	AP_2_GEN_Albright3_L	8784	2.5	6176	70%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPC_4_MSA_Tampa_L	8784	2.5	4106	47%
MISO	FE_9_MSA>Weirton_G	8610	MISO	ITC_2_MSA_Detroit_L	8540	2.4	7054	80%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	WEC_3_MSA_Milwaukee_G	6881	2.4	1753	20%
PJM	PL_8_MSA_Allentown_G	6728	PJM	JCPL_1_MSA_NewYork_L	8784	2.4	7836	89%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_7_NYG	8388	2.4	6199	71%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	2.4	4553	52%
FRCC	FPC_10_MSA_Lakeland_G	8028	FRCC	FPL_7_MSA_Miami_L	8784	2.3	4364	50%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	NI_13_MSA_Chicago_L	8784	2.3	161	2%
FRCC	FPC_10_MSA_Lakeland_G	8028	FRCC	FPL_3_MSA_Miami_L	8784	2.3	4364	50%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.3	2692	31%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	2.3	2329	27%
MISO	NIPS_8_MSA_Chicago_G	8764	PJM	NI_3_MSA_Chicago_L	8784	2.2	2	0%
PJM	PJM500_4_MSA_Philadelphia_G	8397	PJM	PSEG_8_MSA_NewYork_G	8784	2.2	7557	86%
VACAR	SCEG_1_MSA_Columbia_G	7951	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7471	2.2	308	4%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_9_NWKST	8784	2.2	8753	100%
SPP	AEPW_5_MSA_Tulsa_G	7478	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	2.2	6128	70%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	2.2	165	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	2.2	176	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	2.2	211	2%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_9_NYI	8467	2.2	6666	76%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2.1	72	1%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	2.1	6	0%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_21_MSA_Atlanta_G	8768	2.1	6	0%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.1	2736	31%
PJM	PJM500_4_MSA_Philadelphia_G	8397	PJM	PSEG_3_MSA_NewYork_L	8784	2.0	7430	85%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.0	1069	12%
SPP	AEPW_5_MSA_Tulsa_G	7478	ENTERGY	EES_9_MSA_Russellville_G	6263	2.0	5850	67%
PJM	DPL_8_GEN_Killen_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	1.9	3074	35%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	MISO	LGEE_5_MSA_Lexington_L	8784	1.9	1078	12%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.9	2713	31%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	TECO_7_MSA_Tampa_L	8784	1.9	3806	43%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	ITC_9_MSA_Detroit_L	8784	1.9	7748	88%
PJM	DPL_8_GEN_Killen_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	1.9	1911	22%
MISO	FE_9_MSA>Weirton_G	8610	MISO	ITC_9_MSA_Detroit_L	8784	1.8	7668	87%
MISO	EKPC_8_MSA_Maysville_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	1.8	1479	17%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	CIN_1_MSA_Indianapolis_L	8784	1.7	4114	47%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_2_County_Macon_L	8784	1.7	4060	46%
PJM	PJM500_8_MSA_Philadelphia_G	8784	PJM	PSEG_8_MSA_NewYork_G	8784	1.6	7550	86%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPC_4_MSA_Tampa_L	8784	1.6	2819	32%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	AEP_1_MSA_Lynchburg_G	8784	1.6	3196	36%
NYPP	NYISO_6_NYF	7530	NEPOOL	NEPOOL_6_WCMA	8762	1.6	7463	85%
ONTARIO	IESO_6_G	8784	MISO	ITC_2_MSA_Detroit_L	8540	1.6	8717	99%
ONTARIO	IESO_7_G	8784	MISO	ITC_2_MSA_Detroit_L	8540	1.6	8725	99%
ONTARIO	IESO_15_G	8385	MISO	ITC_2_MSA_Detroit_L	8540	1.6	8703	99%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AEP_9_MSA_Canton-Massillon_L	8784	1.6	4507	51%
MISO	CIN_3_MSA_TerreHaute_G	7044	PJM	AEP_1_MSA_Lynchburg_G	8784	1.6	3183	36%
PJM	NI_6_MSA_Chicago_G	8068	MISO	AMRN_2_County_Macon_L	8784	1.5	4018	46%
PJM	AEP_8_GEN_Amos01_G	8782	PJM	AEP_2_STA_TN-WV_L	8784	1.5	2	0%
SPP	AEPW_5_MSA_Tulsa_G	7478	ENTERGY	EES_1_MSA_Jackson_L	8784	1.5	5552	63%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
VACAR	SCPSA_10_MSA_Charleston_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.5	2261	26%
MAPP	MEC_3_MSA_DesMoines_G	7974	MAPP	OPPD_5_MSA_Omaha_L	8784	1.5	2205	25%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	1.5	4457	51%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_4_MSA_Akron_L	8784	1.5	1894	22%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_2_NYB	8784	1.5	8457	96%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_2_NYB	8784	1.5	8505	97%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	1.5	3620	41%
MISO	CIN_3_MSA_TerreHaute_G	7044	PJM	AEP_2_STA_TN-WV_L	8784	1.5	3863	44%
ONTARIO	IESO_15_G	8385	NYPP	NYISO_2_NYB	8784	1.5	8441	96%
PJM	PJM500_8_MSA_Philadelphia_G	8784	PJM	PSEG_3_MSA_NewYork_L	8784	1.5	7423	85%
PJM	NI_15_MSA_Davenport_G	8664	MISO	WEC_7_MSA_Milwaukee_G	8097	1.4	4640	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8623	VACAR	SCEG_9_MSA_Charleston_G	8439	1.4	2805	32%
MISO	FE_9_MSA>Weirton_G	8610	PJM	AEP_9_MSA_Canton-Massillon_L	8784	1.4	3963	45%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7388	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.4	4298	49%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_4_MSA_Akron_L	8784	1.4	1849	21%
NYPP	NYISO_6_NYF	7530	NEPOOL	NEPOOL_4_NEBOS	8656	1.4	7489	85%
PJM	PJM500_4_MSA_Philadelphia_G	8397	PJM	JCPL_3_MSA_NewYork_L	8784	1.3	6116	70%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8769	1.3	3146	36%
MISO	FE_9_MSA>Weirton_G	8610	MISO	FE_4_MSA_Akron_L	8784	1.3	3697	42%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_7_MSA_Toledo_L	8779	1.3	6268	71%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	SOUTHERN	SOCO_17_MSA_Mobile_G	6738	1.3	2772	32%
ENTERGY	EES_4_GEN_Ouachita_G	5475	ENTERGY	EES_5_MSA_NewOrleans_G	8784	1.3	6334	72%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_7_MSA_Toledo_L	8779	1.2	6211	71%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCEG_9_MSA_Charleston_G	8439	1.2	2820	32%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCEG_9_MSA_Charleston_G	8439	1.2	2778	32%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	FE_9_MSA_Weirton_G	8610	MISO	FE_7_MSA_Toledo_L	8779	1.2	5824	66%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	TVAUTHOR	TVA_5_MSA_Nashville_L	8531	1.2	124	1%
PJM	VAP_7_G	6905	PJM	VAP_15_MSA_VB-Norfolk_L	8784	1.1	5313	60%
ONTARIO	IESO_6_G	8784	ONTARIO	IESO_2_G	8715	1.1	4622	53%
ONTARIO	IESO_7_G	8784	ONTARIO	IESO_2_G	8715	1.1	5244	60%
ONTARIO	IESO_15_G	8385	ONTARIO	IESO_2_G	8715	1.1	8089	92%
SOUTHERN	SOCO_17_MSA_Mobile_G	2046	ENTERGY	EES_5_MSA_NewOrleans_G	8784	1.1	6819	78%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8782	ENTERGY	EES_9_MSA_Russellville_G	6263	1.1	1202	14%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	WEC_7_MSA_Milwaukee_G	8097	1.1	9	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8771	VACAR	SCEG_9_MSA_Charleston_G	8439	1.1	2819	32%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MAPP	MEC_3_MSA_DesMoines_G	8009	MISO	AMRN_12_MSA_StLouis_L	2082	20.5	4097	47%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_11_NYK	8784	18.9	6364	72%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_11_NYK	8784	18.9	6364	72%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_11_NYK	8784	18.9	6364	72%
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_7_CT	1117	18.4	6361	72%
PJM	NI_15_MSA_Davenport_G	8670	MISO	AMRN_12_MSA_StLouis_L	2082	18.0	5766	66%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_10_NYJ	8784	17.8	8784	100%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_10_NYJ	8784	17.8	8784	100%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_10_NYJ	8784	17.8	8784	100%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_12_MSA_StLouis_L	2082	16.9	6315	72%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_9_NYI	8467	16.6	6353	72%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_9_NYI	8467	16.6	6353	72%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_9_NYI	8467	16.6	6353	72%
NYPP	NYISO_1_NYA	8323	NYPP	NYISO_11_NYK	8784	16.5	6364	72%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	VAP_7_G	1371	16.4	6666	76%
MISO	OTP_9_GEN_BigStone_G	8784	MISO	XEL_3_MSA_Minneapolis_G	4678	16.0	8076	92%
NYPP	NYISO_1_NYA	8323	NYPP	NYISO_10_NYJ	8784	15.4	8784	100%
SPP	WERE_1_MSA_Manhattan_G	8739	SPP	OKGE_4_MSA_OklahomaCity_L	8773	15.3	8490	97%
NYPP	NYISO_1_NYA	8323	NYPP	NYISO_9_NYI	8467	14.2	6289	72%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_7_NYG	8420	14.1	6351	72%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_7_NYG	8420	14.1	6351	72%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_7_NYG	8420	14.1	6350	72%
PJM	NI_15_MSA_Davenport_G	8670	PJM	AEP_1_MSA_Lynchburg_G	8784	12.9	7290	83%
PJM	NI_15_MSA_Davenport_G	8670	PJM	AEP_2_STA_TN-WV_L	8784	12.5	6500	74%
SPP	WERE_1_MSA_Manhattan_G	8739	SPP	WERE_4_GEN_Wolfcreek_G	3632	12.5	3238	37%
MAPP	NPPD_4_GEN_Gentleman_G	8760	MAPP	OPPD_5_MSA_Omaha_L	8784	12.5	8388	95%
NEPOOL	NEPOOL_3_ME	3752	NEPOOL	NEPOOL_7_CT	1117	12.5	7545	86%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_12_MSA_StLouis_L	2082	12.3	3925	45%
PJM	PENELEC_2_MSA_DuBois_G	7753	NYPP	NYISO_11_NYK	8784	12.3	6364	72%
PJM	NI_6_MSA_Chicago_G	8321	MISO	AMRN_12_MSA_StLouis_L	2082	11.9	3935	45%
PJM	NI_15_MSA_Davenport_G	8670	PJM	AEP_9_MSA_Canton-Massillon_L	8784	11.8	6037	69%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_7_CT	1117	11.8	8766	100%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	11.7	7000	80%
NYPP	NYISO_1_NYA	8323	NYPP	NYISO_7_NYG	8420	11.7	6192	70%
PJM	NI_20_MSA_Chicago_G	7234	MISO	AMRN_12_MSA_StLouis_L	2082	11.7	3912	45%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_7_G	1371	11.6	5280	60%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_8_MSA_DC-VA-MD_L	8784	11.6	8009	91%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	11.5	8003	91%
MISO	FE_9_MSA>Weirton_G	8628	PJM	AP_8_MSA_DC-VA-MD_L	8784	11.5	7970	91%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	VAP_7_G	1371	11.4	6524	74%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	11.4	6397	73%
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_9_NWKST	8784	11.4	6370	73%
MISO	IP_8_GEN_Clinton_G	8011	MISO	AMRN_12_MSA_StLouis_L	2082	11.3	1664	19%
ENTERGY	EES_9_MSA_Russellville_G	2477	SPP	OKGE_4_MSA_OklahomaCity_L	8773	11.3	3682	42%
PJM	PENELEC_2_MSA_DuBois_G	7753	NYPP	NYISO_10_NYJ	8784	11.2	6364	72%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_7_G	1371	11.1	6696	76%
NYPP	NYISO_1_NYA	8323	PJM	PSEG_8_MSA_NewYork_G	8779	11.1	8163	93%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	11.1	7972	91%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	11.0	7964	91%
MISO	FE_9_MSA>Weirton_G	8628	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	11.0	7935	90%
NYPP	NYISO_1_NYA	8323	PJM	PSEG_3_MSA_NewYork_L	8784	11.0	8179	93%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	10.8	8108	92%
VACAR	CPL_1_MSA_Durham_G	7555	PJM	VAP_7_G	1371	10.7	5149	59%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_9_MSA_Kalamazoo_L	8784	10.6	5773	66%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	10.6	6053	69%
NEPOOL	NEPOOL_3_ME	3752	NYPP	NYISO_11_NYK	8784	10.5	8783	100%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	VAP_33_MSA_DC_L	8784	10.5	8129	93%
NYPP	NYISO_1_NYA	8323	PJM	PSEG_5_MSA_Philadelphia_L	8784	10.5	8198	93%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_6_WCMA	8707	10.4	6361	72%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	VAP_27_MSA_DC_L	8784	10.4	8079	92%
MISO	IP_7_GEN_Baldwin_G	8784	MISO	AMRN_12_MSA_StLouis_L	2082	10.4	1559	18%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	10.3	8048	92%
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_4_NEBOS	8631	10.3	6361	72%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	10.2	7505	85%
NEPOOL	NEPOOL_2_NH	8501	NEPOOL	NEPOOL_7_CT	1117	10.0	7577	86%
MAPP	MEC_3_MSA_DesMoines_G	8009	MISO	AMRN_2_County_Macon_L	8784	10.0	6315	72%
PJM	PENELEC_2_MSA_DuBois_G	7753	NYPP	NYISO_9_NYI	8467	10.0	6334	72%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_11_NYK	8784	9.8	8784	100%
SPP	AEPW_5_MSA_Tulsa_G	7062	SPP	OKGE_4_MSA_OklahomaCity_L	8773	9.7	1940	22%
SPP	AEPW_9_MSA_MountPleasant_L	6984	SPP	OKGE_4_MSA_OklahomaCity_L	8773	9.7	4330	49%
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_10_RI	6243	9.6	6361	72%
NEPOOL	NEPOOL_3_ME	3752	NYPP	NYISO_10_NYJ	8784	9.4	8781	100%
ENTERGY	EES_9_MSA_Russellville_G	2477	ENTERGY	EES_5_MSA_NewOrleans_G	8784	9.4	6807	77%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_8_MSA_BayCity_G	8119	9.4	5919	67%
NYPP	NYISO_6_NYF	7778	NEPOOL	NEPOOL_7_CT	1117	9.3	8747	100%
MISO	XEL_3_MSA_Minneapolis_G	4129	MISO	GRE_4_MSA_Minneapolis_L	8784	9.3	0	0%
MISO	AMRN_12_MSA_StLouis_L	6702	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	9.2	5377	61%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	9.2	3674	42%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	MISO	AMRN_12_MSA_StLouis_L	2082	8.9	2732	31%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8784	8.8	4899	56%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	AEP_1_MSA_Lynchburg_G	8784	8.8	7097	81%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_10_NYJ	8784	8.7	8782	100%
ENTERGY	EES_2_MSA_Batesville_G	8784	SPP	OKGE_4_MSA_OklahomaCity_L	8773	8.5	5518	63%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	AMRN_12_MSA_StLouis_L	2082	8.5	5995	68%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	AEP_2_STA_TN-WV_L	8784	8.5	1654	19%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	AEP_2_STA_TN-WV_L	8784	8.4	6856	78%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AEP_8_GEN_Amos01_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	8.4	8049	92%
NEPOOL	NEPOOL_3_ME	3752	NYPP	NYISO_9_NYI	8467	8.2	8753	100%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_7_CT	1117	8.2	2719	31%
MISO	CIN_8_MSA_Evansville_G	8783	MISO	AMRN_12_MSA_StLouis_L	2082	8.1	2938	33%
NEPOOL	NEPOOL_2_NH	8501	NYPP	NYISO_11_NYK	8784	8.1	8783	100%
SPP	AEPW_5_MSA_Tulsa_G	7062	ENTERGY	EES_5_MSA_NewOrleans_G	8784	7.8	7708	88%
SPP	AEPW_9_MSA_MountPleasant	6984	ENTERGY	EES_5_MSA_NewOrleans_G	8784	7.8	8748	100%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8784	7.7	1705	19%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	AEP_9_MSA_Canton-Massillon_L	8784	7.6	6336	72%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_7_G	1371	7.6	5353	61%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_10_MSA_Alban-Valdosta_L	7678	7.6	5424	62%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	7.5	4914	56%
PJM	NI_15_MSA_Davenport_G	8670	MISO	AMRN_2_County_Macon_L	8784	7.5	6627	75%
PJM	PENELEC_2_MSA_DuBois_G	7753	NYPP	NYISO_7_NYG	8420	7.5	6333	72%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_9_NYI	8467	7.5	8692	99%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	7.5	3708	42%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	FRCC	FPL_7_MSA_Miami_L	8784	7.5	5710	65%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	7.4	3787	43%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	FRCC	FPL_3_MSA_Miami_L	8783	7.4	5183	59%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	7.4	3763	43%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	7.4	3508	40%
NYPP	NYISO_6_NYF	7778	NYPP	NYISO_11_NYK	8784	7.4	8784	100%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	SPP	WERE_4_GEN_Wolfcreek_G	3632	7.3	6992	80%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	7.3	3449	39%
MISO	BREC_3_County_Webster_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	7.3	7663	87%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	7.2	3061	35%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	7.2	5573	63%
NEPOOL	NEPOOL_2_NH	8501	NYPP	NYISO_10_NYJ	8784	7.0	8784	100%
SPP	AEPW_5_MSA_Tulsa_G	7062	SPP	WERE_4_GEN_Wolfcreek_G	3632	7.0	3839	44%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	FRCC	FPL_7_MSA_Miami_L	8784	6.9	5394	61%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	FRCC	FPL_3_MSA_Miami_L	8783	6.9	4788	55%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_7_MSA_Miami_L	8784	6.8	5384	61%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	6.8	2757	31%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_3_MSA_Miami_L	8783	6.8	4786	54%
PJM	NI_15_MSA_Davenport_G	8670	PJM	NI_6_MSA_Chicago_G	463	6.8	5713	65%
PJM	NI_6_MSA_Chicago_G	8321	PJM	AEP_1_MSA_Lynchburg_G	8784	6.8	5586	64%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	6.7	7768	88%
PJM	AP_1_County_Harrison_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	6.6	7474	85%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	MISO	LGEE_5_MSA_Lexington_L	8784	6.6	5187	59%
NEPOOL	NEPOOL_7_CT	7667	NYPP	NYISO_11_NYK	8784	6.6	8783	100%
PJM	NI_20_MSA_Chicago_G	7234	PJM	AEP_1_MSA_Lynchburg_G	8784	6.5	5619	64%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	6.5	7730	88%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	6.4	4901	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	6.4	7724	88%
PJM	NI_6_MSA_Chicago_G	8321	PJM	AEP_2_STA_TN-WV_L	8784	6.4	2758	31%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_9_MSA_Baltimore-Towson_L	8784	6.4	7694	88%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_3_MSA_Miami_L	8783	6.4	4913	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	PEPCO_1_MSA_DC_L	8784	6.4	7445	85%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	AMRN_2_County_Macon_L	8784	6.4	6480	74%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	FRCC	FPL_7_MSA_Miami_L	8784	6.3	5380	61%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AEP_8_GEN_Amos01_G	8784	MISO	AMRN_12_MSA_StLouis_L	2082	6.3	1056	12%
NYPP	NYISO_6_NYF	7778	NYPP	NYISO_10_NYJ	8784	6.3	8782	100%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_11_NYK	8784	6.3	8783	100%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	FRCC	FPL_3_MSA_Miami_L	8783	6.3	4782	54%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	PL_7_MSA_Allentown_L	8784	6.2	8676	99%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_10_MSA_Baltimore-Towson_L	8784	6.2	7642	87%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	FRCC	FPL_2_MSA_FortMyers_G	8464	6.2	4850	55%
PJM	NI_20_MSA_Chicago_G	7234	PJM	AEP_2_STA_TN-WV_L	8784	6.2	4471	51%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	BGE_5_MSA_Baltimore-Towson_L	8784	6.1	7634	87%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	6.1	7636	87%
MISO	NIPS_8_MSA_Chicago_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8784	6.1	1903	22%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PEPCO_1_MSA_DC_L	8784	6.1	7419	84%
PJM	NI_2_MSA_Chicago_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	6.0	2858	33%
MISO	AMRN_12_MSA_StLouis_L	6702	MISO	CIN_1_MSA_Indianapolis_L	8784	6.0	6287	72%
PJM	NI_15_MSA_Davenport_G	8670	PJM	NI_3_MSA_Chicago_L	8784	5.9	5745	65%
PJM	NI_15_MSA_Davenport_G	8670	PJM	NI_13_MSA_Chicago_L	8784	5.9	5746	65%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	PL_7_MSA_Allentown_L	8784	5.9	8369	95%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	5.9	5322	61%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	XEL_3_MSA_Minneapolis_G	4678	5.9	2141	24%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	AP_8_MSA_DC-VA-MD_L	8784	5.8	7723	88%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	5.8	5434	62%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	5.8	5382	61%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	5.8	5284	60%
NEPOOL	NEPOOL_2_NH	8501	NYPP	NYISO_9_NYI	8467	5.8	8773	100%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_33_MSA_DC_L	8784	5.8	7654	87%
NEPOOL	NEPOOL_3_ME	3752	NYPP	NYISO_7_NYG	8420	5.8	6131	70%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	5.7	5274	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	FRCC	FPC_4_MSA_Tampa_L	8784	5.7	4648	53%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_27_MSA_DC_L	8784	5.7	7581	86%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	5.6	5366	61%
PJM	PENELEC_2_MSA_DuBois_G	7753	PJM	PL_7_MSA_Allentown_L	8784	5.6	7760	88%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_6_MSA_Chicago_G	463	5.6	5133	58%
PJM	NI_6_MSA_Chicago_G	8321	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.6	2955	34%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	FRCC	FPL_2_MSA_FortMyers_G	8464	5.6	4382	50%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	463	5.6	4502	51%
PJM	AP_1_County_Harrison_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	5.6	7603	87%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPL_2_MSA_FortMyers_G	8464	5.6	4380	50%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	VAP_33_MSA_DC_L	8784	5.5	7762	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	5.5	7719	88%
NEPOOL	NEPOOL_7_CT	7667	NYPP	NYISO_10_NYJ	8784	5.5	8775	100%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	VAP_27_MSA_DC_L	8784	5.4	7587	86%
NEPOOL	NEPOOL_3_ME	3752	NEPOOL	NEPOOL_9_NWKST	8784	5.4	8767	100%
PJM	NI_20_MSA_Chicago_G	7234	PJM	AEP_9_MSA_Canton-Massillon_L	8784	5.4	2963	34%
ENTERGY	EES_9_MSA_Russellville_G	2477	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	5.3	5901	67%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	5.3	7617	87%
ENTERGY	EES_8_MSA_BatonRouge_G	8520	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.3	5064	58%
NYPP	NYISO_8_NYH	8784	NEPOOL	NEPOOL_7_CT	1117	5.3	8753	100%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	5.3	6329	72%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_33_MSA_DC_L	8784	5.2	7786	89%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_10_NYJ	8784	5.2	8774	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	FRCC	FPC_4_MSA_Tampa_L	8784	5.1	4124	47%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8464	5.1	4535	52%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_27_MSA_DC_L	8784	5.1	7545	86%
ENTERGY	EES_9_MSA_Russellville_G	2477	SOUTHERN	SOCO_17_MSA_Mobile_G	7680	5.1	3393	39%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_4_MSA_Tampa_L	8784	5.1	4125	47%
NYPP	NYISO_6_NYF	7778	NYPP	NYISO_9_NYI	8467	5.1	8643	98%
NYPP	NYISO_3_NYC	8784	NYPP	NYISO_7_NYG	8420	5.0	5594	64%
MISO	CIN_3_MSA_TerreHaute_G	6968	MISO	LGEE_5_MSA_Lexington_L	8784	5.0	255	3%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	FRCC	FPL_2_MSA_FortMyers_G	8464	5.0	4375	50%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	5.0	7607	87%
PJM	PJM500_7_MSA_York-Hanover	8784	PJM	VAP_7_G	1371	4.9	6054	69%
ENTERGY	EES_9_MSA_Russellville_G	2477	SPP	AEPW_9_MSA_MountPleasant_G	1800	4.9	2759	31%
VACAR	CPLE_1_MSA_Durham_G	7555	PJM	VAP_33_MSA_DC_L	8784	4.8	7593	86%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_6_MSA_Chicago_G	463	4.8	6187	70%
PJM	PJM500_5_MSA_DC_G	8784	PJM	VAP_7_G	1371	4.8	4880	56%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_3_MSA_Chicago_L	8784	4.8	5105	58%
PJM	NI_7_MSA_Rochelle_G	8784	PJM	NI_13_MSA_Chicago_L	8784	4.8	5083	58%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_3_MSA_Chicago_L	8784	4.8	4503	51%
MISO	WEC_1_MSA_Chicago_G	8784	PJM	NI_13_MSA_Chicago_L	8784	4.7	4502	51%
VACAR	CPLE_1_MSA_Durham_G	7555	PJM	VAP_27_MSA_DC_L	8784	4.7	7300	83%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_9_NWKST	8784	4.7	8769	100%
PJM	PJM500_4_MSA_Philadelphia_G	8496	PJM	VAP_7_G	1371	4.7	5560	63%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_4_MSA_Tampa_L	8784	4.7	4283	49%
MISO	LGEE_3_GEN_Gehrt2_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	4.7	6092	69%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	ENTERGY	EES_5_MSA_NewOrleans_G	8784	4.6	6335	72%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	FRCC	FPC_3_MSA_Orlando_L	8784	4.6	4143	47%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_10_MSA_Albanyst-Valdosta_L	7678	4.6	536	6%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	FRCC	FPC_4_MSA_Tampa_L	8784	4.5	4123	47%
MISO	EKPC_8_MSA_Maysville_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	4.5	1034	12%
PJM	AEP_8_GEN_Amos01_G	8784	VACAR	DUK_4_MSA_Greenville_L	6956	4.5	5242	60%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_9_MSA_Russellville_G	2477	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6142	4.5	6314	72%
PJM	AEP_8_GEN_Amos01_G	8784	MISO	LGEE_5_MSA_Lexington_L	8784	4.4	83	1%
NEPOOL	NEPOOL_3_ME	3752	NEPOOL	NEPOOL_6_WCMA	8707	4.4	6948	79%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_8_MSA_NewYork_G	8779	4.4	7548	86%
NYPP	NYISO_1_NYA	8323	NEPOOL	NEPOOL_3_ME	5032	4.4	6484	74%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	4.3	1789	20%
NEPOOL	NEPOOL_3_ME	3752	NEPOOL	NEPOOL_4_NEBOS	8631	4.3	6823	78%
NYPP	NYISO_3_NYC	8784	PJM	PSEG_3_MSA_NewYork_L	8784	4.3	7199	82%
PJM	VAP_7_G	7413	PJM	AP_8_MSA_DC-VA-MD_L	8784	4.3	5956	68%
NEPOOL	NEPOOL_7_CT	7667	NYPP	NYISO_9_NYI	8467	4.3	8615	98%
ENTERGY	EES_9_MSA_Russellville_G	2477	ENTERGY	EES_1_MSA_Jackson_L	8784	4.2	2320	26%
ENTERGY	EES_9_MSA_Russellville_G	2477	TVAUTHOR	TVA_7_MSA_Memphis_L	8725	4.2	1050	12%
MISO	NIPS_8_MSA_Chicago_G	8760	MISO	CIN_7_MSA_Lafayette_L	8784	4.2	1662	19%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	4.1	4764	54%
VACAR	DUK_4_MSA_Greenville_L	1828	VACAR	SCPSA_2_MSA_Charleston_L	8784	4.1	2603	30%
ENTERGY	EES_9_MSA_Russellville_G	2477	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	4.1	3407	39%
PJM	PJM500_7_MSA_York-Hanover	8784	PJM	PECO_5_MSA_Philadelphia_L	6985	4.0	2626	30%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	FRCC	FPC_3_MSA_Orlando_L	8784	4.0	3426	39%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_5_MSA_Cleveland_L	6639	4.0	4675	53%
PJM	VAP_7_G	7413	PJM	VAP_33_MSA_DC_L	8784	4.0	5947	68%
MISO	ITC_7_MSA_Monroe_G	8712	MISO	FE_5_MSA_Cleveland_L	6639	4.0	6366	72%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_3_MSA_Chicago_L	8784	4.0	6159	70%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_9_NYI	8467	4.0	8635	98%
PJM	NI_15_MSA_Davenport_G	8670	MISO	WEC_3_MSA_Milwaukee_G	7208	4.0	4858	55%
MISO	ALTE_2_MSA_Madison_G	8616	PJM	NI_13_MSA_Chicago_L	8784	4.0	6158	70%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	FRCC	FPC_3_MSA_Orlando_L	8784	4.0	3428	39%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_5_MSA_Cleveland_L	6639	3.9	4613	53%
MISO	FE_9_MSA>Weirton_G	8628	MISO	FE_5_MSA_Cleveland_L	6639	3.9	4056	46%
MISO	LGEE_3_GEN_Gehnt2_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	3.9	4978	57%
PJM	VAP_7_G	7413	PJM	VAP_27_MSA_DC_L	8784	3.9	5951	68%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_3_NYC	8784	PJM	PSEG_5_MSA_Philadelphia_L	8784	3.8	7605	87%
PJM	AEP_8_GEN_Amos01_G	8784	VACAR	DUK_8_MSA_Charlotte_L	8784	3.8	3528	40%
PJM	PJM500_4_MSA_Philadelphia_G	8496	PJM	PECO_5_MSA_Philadelphia_L	6985	3.8	1	0%
MISO	ITC_3_MSA_Detroit_G	8784	MISO	FE_5_MSA_Cleveland_L	6639	3.8	8361	95%
PJM	VAP_7_G	7413	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	3.8	5860	67%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	3.7	5924	67%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_6_WCMA	8707	3.7	8390	96%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_6_NYF	1006	3.7	6319	72%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_6_NYF	1006	3.7	6319	72%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_6_NYF	1006	3.7	6315	72%
PJM	AP_1_County_Harrison_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	3.7	7574	86%
MISO	BREC_3_County_Webster_G	8784	MISO	LGEE_9_MSA_Louisville_G	8784	3.6	7458	85%
NEPOOL	NEPOOL_3_ME	3752	NEPOOL	NEPOOL_10_RI	6243	3.6	6823	78%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	MISO	LGEE_5_MSA_Lexington_L	8784	3.6	1623	18%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_4_NEBOS	8631	3.6	8764	100%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	3.6	498	6%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8725	3.5	5676	65%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	FRCC	FPC_3_MSA_Orlando_L	8784	3.5	3607	41%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	VACAR	SCPSA_2_MSA_Charleston_L	8784	3.5	4042	46%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	SOUTHERN	SOCO_17_MSA_Mobile_G	7680	3.5	5534	63%
SPP	CELE_10_MSA_Alexandria_G	8586	ENTERGY	EES_5_MSA_NewOrleans_G	8784	3.5	6488	74%
PJM	PJM500_3_MSA_Pittsburgh_G	8758	PJM	VAP_15_MSA_VB-Norfolk_L	8784	3.4	7590	86%
MISO	LGEE_3_GEN_Gehnt2_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	3.4	5624	64%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	FRCC	FPC_3_MSA_Orlando_L	8784	3.4	3424	39%
MISO	AMRN_12_MSA_StLouis_L	6702	MISO	AMRN_2_County_Macon_L	8784	3.4	4425	50%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_11_NYK	8784	3.4	8784	100%
NEPOOL	NEPOOL_2_NH	8501	NYPP	NYISO_7_NYG	8420	3.3	6881	78%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_5_MSA_Tulsa_G	7062	SPP	AEPW_9_MSA_MountPleasant_G	1800	3.3	3516	40%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_1_MSA_Lynchburg_G	8784	3.3	5982	68%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	3.3	4149	47%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8784	ENTERGY	EES_9_MSA_Russellville_G	6307	3.3	4478	51%
PJM	AEP_8_GEN_Amos01_G	8784	MISO	FE_5_MSA_Cleveland_L	6639	3.2	4962	56%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	ENTERGY	EES_5_MSA_NewOrleans_G	8784	3.2	6629	75%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_7_MSA_Miami_L	8784	3.1	4733	54%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	PJM	AP_2_GEN_Albright3_L	8784	3.1	4812	55%
PJM	BGE_7_MSA_Baltimore-Towson	7066	PJM	PECO_5_MSA_Philadelphia_L	6985	3.1	3818	43%
PJM	PJM500_9_MSA_Pittsburgh_G	8784	PJM	VAP_15_MSA_VB-Norfolk_L	8784	3.1	7539	86%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_3_MSA_Miami_L	8783	3.1	4751	54%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AP_2_GEN_Albright3_L	8784	3.0	4809	55%
MISO	FE_9_MSA>Weirton_G	8628	PJM	AP_2_GEN_Albright3_L	8784	3.0	4803	55%
NEPOOL	NEPOOL_2_NH	8501	NEPOOL	NEPOOL_9_NWKST	8784	3.0	8779	100%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	VACAR	SCPSA_2_MSA_Charleston_L	8784	3.0	2417	28%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_2_STA_TN-WV_L	8784	3.0	5189	59%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	3.0	4341	49%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	3.0	1758	20%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.9	2457	28%
NYPP	NYISO_3_NYC	8784	NEPOOL	NEPOOL_10_RI	6243	2.9	8764	100%
SPP	AEPW_5_MSA_Tulsa_G	7062	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6142	2.9	6069	69%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2.9	652	7%
SPP	AEPW_5_MSA_Tulsa_G	7062	ENTERGY	EES_9_MSA_Russellville_G	6307	2.9	5952	68%
SPP	AEPW_9_MSA_MountPleasant_G	6984	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6142	2.9	8737	99%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	ENTERGY	EES_9_MSA_Russellville_G	6307	2.9	5492	63%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_9_MSA_MountPleasant_	6984	ENTERGY	EES_9_MSA_Russellville_G	6307	2.9	8747	100%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	2.8	793	9%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_7_MSA_Miami_L	8784	2.8	5038	57%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	2.8	754	9%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	2.8	259	3%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_3_MSA_Miami_L	8783	2.8	5048	57%
PJM	NI_7_MSA_Rochelle_G	8784	MISO	WEC_3_MSA_Milwaukee_G	7208	2.8	5230	60%
MISO	WEC_1_MSA_Chicago_G	8784	MISO	WEC_3_MSA_Milwaukee_G	7208	2.8	147	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	2.7	145	2%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	NI_6_MSA_Chicago_G	463	2.7	6	0%
VACAR	CPL_1_MSA_Durham_G	7555	PJM	VAP_15_MSA_VB-Norfolk_L	8784	2.7	6298	72%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	2.7	1944	22%
SPP	AEPW_5_MSA_Tulsa_G	7062	ENTERGY	EES_1_MSA_Jackson_L	8784	2.7	5184	59%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	ENTERGY	EES_5_MSA_NewOrleans_G	8784	2.7	6871	78%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	NI_6_MSA_Chicago_G	463	2.7	5902	67%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8781	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	2.6	349	4%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_7_MSA_Miami_L	8784	2.6	4045	46%
SPP	AEPW_9_MSA_MountPleasant_	6984	ENTERGY	EES_1_MSA_Jackson_L	8784	2.6	8745	100%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_7_MSA_Memphis_L	8725	2.6	5089	58%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_3_MSA_Miami_L	8783	2.6	4067	46%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	2.6	2040	23%
NYPP	NYISO_6_NYF	7778	NYPP	NYISO_7_NYG	8420	2.6	4735	54%
SPP	WERE_1_MSA_Manhattan_G	8739	SPP	KACP_7_MSA_KansasCity_L	8784	2.6	3172	36%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	2.6	2028	23%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	ENTERGY	EES_5_MSA_NewOrleans_G	8784	2.6	6837	78%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	2.6	1698	19%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	2.5	5565	63%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.5	1459	17%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	2.5	5137	58%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	2.5	1545	18%
ENTERGY	EES_10_MSA_Vicksburg_G	8088	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	2.4	1491	17%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	2.4	536	6%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	VACAR	SCEG_9_MSA_Charleston_G	8611	2.4	3439	39%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	VACAR	SCPSA_2_MSA_Charleston_L	8784	2.4	2615	30%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	2.3	544	6%
ENTERGY	EES_4_GEN_Ouachita_G	5357	ENTERGY	EES_5_MSA_NewOrleans_G	8784	2.3	6332	72%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	AP_2_GEN_Albright3_L	8784	2.3	6110	70%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_10_NYJ	8784	2.3	8783	100%
NYPP	NYISO_6_NYF	7778	NEPOOL	NEPOOL_9_NWKST	8784	2.3	8767	100%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	ENTERGY	EES_5_MSA_NewOrleans_G	8784	2.2	6959	79%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8616	PJM	AEP_9_MSA_Canton-Massillon_L	8784	2.2	5321	61%
MISO	IPL_2_MSA_Jasper_G	8784	PJM	AEP_9_MSA_Canton-Massillon_L	8784	2.2	2600	30%
ENTERGY	EES_4_GEN_Ouachita_G	5357	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	2.1	1893	22%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	VACAR	DUK_4_MSA_Greenville_L	6956	2.1	3343	38%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	ENTERGY	EES_5_MSA_NewOrleans_G	8784	2.0	6886	78%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	WEC_1_MSA_Chicago_G	8784	MISO	METC_4_MSA_Holland-GrandHaven_G	2565	2.0	5769	66%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_8_MSA_DC-VA-MD_L	8784	2.0	4191	48%
NEPOOL	NEPOOL_2_NH	8501	NEPOOL	NEPOOL_6_WCMA	8707	2.0	6955	79%
MISO	ALTE_2_MSA_Madison_G	8616	MISO	WEC_3_MSA_Milwaukee_G	7208	2.0	2479	28%
VACAR	DUK_4_MSA_Greenville_L	1828	VACAR	DUK_8_MSA_Charlotte_L	8784	2.0	0	0%
NYPP	NYISO_6_NYF	7778	PJM	PSEG_8_MSA_NewYork_G	8779	2.0	7735	88%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	1.9	675	8%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	1.9	35	0%
ONTARIO	IESO_6_G	8784	NYPP	NYISO_2_NYB	8784	1.9	8313	95%
ONTARIO	IESO_7_G	8784	NYPP	NYISO_2_NYB	8784	1.9	8429	96%
NEPOOL	NEPOOL_2_NH	8501	NEPOOL	NEPOOL_4_NEBOS	8631	1.9	6823	78%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	VACAR	SCEG_9_MSA_Charleston_G	8611	1.9	2548	29%
ONTARIO	IESO_15_G	8396	NYPP	NYISO_2_NYB	8784	1.9	8294	94%
NYPP	NYISO_6_NYF	7778	PJM	PSEG_3_MSA_NewYork_L	8784	1.9	7732	88%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	NI_3_MSA_Chicago_L	8784	1.8	6	0%
PJM	VAP_7_G	7413	PJM	VAP_15_MSA_VB-Norfolk_L	8784	1.8	5970	68%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	1.8	6538	74%
MISO	FE_9_MSA>Weirton_G	8628	PJM	AEP_1_MSA_Lynchburg_G	8784	1.8	6422	73%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	1.8	252	3%
MISO	NIPS_8_MSA_Chicago_G	8760	PJM	NI_13_MSA_Chicago_L	8784	1.8	206	2%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPL_2_MSA_FortMyers_G	8464	1.8	3796	43%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	1.8	182	2%
NEPOOL	NEPOOL_7_CT	7667	NYPP	NYISO_7_NYG	8420	1.8	5793	66%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	NI_3_MSA_Chicago_L	8784	1.8	5767	66%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	SCEG_9_MSA_Charleston_G	8611	1.8	2553	29%
PJM	NI_2_MSA_Chicago_G	8784	MISO	AMRN_2_County_Macon_L	8784	1.8	4908	56%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	1.8	253	3%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7678	1.8	480	5%
MISO	AMRN_12_MSA_StLouis_L	6702	PJM	NI_13_MSA_Chicago_L	8784	1.8	5890	67%
MISO	CIN_3_MSA_TerreHaute_G	6968	PJM	AEP_1_MSA_Lynchburg_G	8784	1.7	3302	38%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_33_MSA_DC_L	8784	1.7	4626	53%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	1.7	103	1%
FRCC	FPL_8_MSA_PortStLucie_G	8751	FRCC	FPL_7_MSA_Miami_L	8784	1.7	3103	35%
VACAR	DUK_9_MSA_Charlotte_G	8783	SOUTHERN	SOCO_10_MSA_Albany-Valdo	7678	1.7	538	6%
FRCC	FPL_8_MSA_PortStLucie_G	8751	FRCC	FPL_3_MSA_Miami_L	8783	1.7	2469	28%
VACAR	DUK_4_MSA_Greenville_L	1828	SOUTHERN	SOCO_6_MSA_Augusta-Richm	8784	1.6	349	4%
MISO	EKPC_8_MSA_Maysville_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	1.6	5380	61%
ENTERGY	EES_2_MSA_Batesville_G	8784	ENTERGY	EES_9_MSA_Russellville_G	6307	1.6	2090	24%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	VAP_27_MSA_DC_L	8784	1.6	3453	39%
PJM	AEP_8_GEN_Amos01_G	8784	TVAUTHOR	TVA_5_MSA_Nashville_L	8567	1.6	5813	66%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPL_2_MSA_FortMyers_G	8464	1.5	4827	55%
ENTERGY	EES_7_MSA_Beaumont-PortArt	2642	ENTERGY	EES_5_MSA_NewOrleans_G	8784	1.5	6328	72%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8695	VACAR	DUK_4_MSA_Greenville_L	6956	1.5	2501	28%
PJM	VAP_1_MSA_Richmond_G	8784	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8784	1.5	4933	56%
MISO	LGEE_3_GEN_Gehrt2_G	8784	MISO	CIN_1_MSA_Indianapolis_L	8784	1.5	4943	56%
NEPOOL	NEPOOL_5_SEMA	8784	NYPP	NYISO_7_NYG	8420	1.5	5835	66%
MISO	FE_6_MSA_Pittsburgh_G	8784	PJM	AEP_2_STA_TN-WV_L	8784	1.5	5313	60%
MISO	FE_9_MSA>Weirton_G	8628	PJM	AEP_2_STA_TN-WV_L	8784	1.5	5114	58%
NEPOOL	NEPOOL_7_CT	7667	NEPOOL	NEPOOL_9_NWKST	8784	1.5	8753	100%
FRCC	FPC_10_MSA_Lakeland_G	8093	FRCC	FPL_7_MSA_Miami_L	8784	1.5	4378	50%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8616	VACAR	DUK_4_MSA_Greenville_L	6956	1.5	2469	28%
SPP	WERE_1_MSA_Manhattan_G	8739	SPP	AEPW_1_MSA_Tulsa_G	7156	1.4	8679	99%
FRCC	FPC_10_MSA_Lakeland_G	8093	FRCC	FPL_3_MSA_Miami_L	8783	1.4	4383	50%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_7_MSA_Memphis_L	8725	1.4	3147	36%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	SCEG_9_MSA_Charleston_G	8611	1.4	2536	29%
PJM	NI_6_MSA_Chicago_G	8321	MISO	AMRN_2_County_Macon_L	8784	1.4	4866	55%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_6_NYF	7778	PJM	PSEG_5_MSA_Philadelphia_L	8784	1.4	7985	91%
MISO	CIN_3_MSA_TerreHaute_G	6968	PJM	AEP_2_STA_TN-WV_L	8784	1.4	3626	41%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	VACAR	DUK_8_MSA_Charlotte_L	8784	1.4	3436	39%
FRCC	SEC_6_MSA_Palatka_G	8160	FRCC	FPC_4_MSA_Tampa_L	8784	1.4	3500	40%
FRCC	JEA_6_MSA_Jacksonville_G	8784	FRCC	FPL_2_MSA_FortMyers_G	8464	1.4	3781	43%
VACAR	SCPSA_10_MSA_Charleston_G	8616	VACAR	SCPSA_2_MSA_Charleston_L	8784	1.3	1545	18%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8784	1.3	1914	22%
NYPP	NYISO_6_NYF	7778	NEPOOL	NEPOOL_6_WCMA	8707	1.3	7472	85%
PJM	DPL_8_GEN_Killen_G	8759	PJM	AEP_1_MSA_Lynchburg_G	8784	1.3	3219	37%
ENTERGY	EES_7_MSA_Beaumont-PortArtf	2642	SOUTHERN	SOCO_10_MSA_Albany-Valdo	7678	1.3	3667	42%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	TECO_7_MSA_Tampa_L	8784	1.3	3198	36%
NYPP	NYISO_1_NYA	8323	NYPP	NYISO_6_NYF	1006	1.3	6167	70%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8772	VACAR	SCEG_9_MSA_Charleston_G	8611	1.3	2679	30%
ENTERGY	EES_2_MSA_Batesville_G	8784	TVAUTHOR	TVA_3_MSA_Knoxville_L	8784	1.2	3711	42%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_8_MSA_Atlanta_L	8784	1.2	2002	23%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_33_MSA_Atlanta_L	8784	1.2	1961	22%
PJM	NI_15_MSA_Davenport_G	8670	MISO	WEC_7_MSA_Milwaukee_G	7702	1.2	5487	62%
PJM	DLCO_7_MSA_Pittsburgh_G	8616	MISO	FE_4_MSA_Akron_L	8784	1.2	1333	15%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_16_MSA_Atlanta_L	8784	1.2	1643	19%
NEPOOL	NEPOOL_2_NH	8501	NEPOOL	NEPOOL_10_RI	6243	1.2	6823	78%
MISO	ITC_7_MSA_Monroe_G	8712	MISO	FE_4_MSA_Akron_L	8784	1.2	4706	54%
NEPOOL	NEPOOL_5_SEMA	8784	NEPOOL	NEPOOL_9_NWKST	8784	1.2	8754	100%
PJM	AEP_8_GEN_Amos01_G	8784	PJM	AEP_1_MSA_Lynchburg_G	8784	1.2	3212	37%
NYPP	NYISO_6_NYF	7778	NEPOOL	NEPOOL_4_NEBOS	8631	1.1	7494	85%
PJM	NI_20_MSA_Chicago_G	7234	MISO	AMRN_2_County_Macon_L	8784	1.1	4804	55%
MISO	FE_6_MSA_Pittsburgh_G	8784	MISO	FE_4_MSA_Akron_L	8784	1.1	1289	15%
MISO	FE_9_MSA>Weirton_G	8628	MISO	FE_4_MSA_Akron_L	8784	1.1	3864	44%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_21_MSA_Atlanta_G	8776	1.1	1500	17%
PJM	NI_2_MSA_Chicago_G	8784	PJM	NI_6_MSA_Chicago_G	463	1.1	0	0%
NYPP	NYISO_8_NYH	8784	NYPP	NYISO_9_NYI	8467	1.1	6780	77%
FRCC	FPC_2_MSA_HomosassaSpring	8784	FRCC	FPC_4_MSA_Tampa_L	8784	1.1	2416	28%
SOUTHERN	SOCO_26_MSA_Macon_G	8784	VACAR	DUK_4_MSA_Greenville_L	6956	1.0	1291	15%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8110	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8784	1.0	1464	17%
MISO	LGEE_3_GEN_Gehnt2_G	8784	MISO	LGEE_9_MSA_Louisville_G	8784	1.0	4975	57%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	3.6	4427	50%
PJM	NI_6_MSA_Chicago_G	7665	PJM	AEP_1_MSA_Lynchburg_G	8760	3.2	4450	51%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	7.4	5550	63%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_1_MSA_Lynchburg_G	8760	10.1	5076	58%
PJM	NI_20_MSA_Chicago_G	7874	PJM	AEP_1_MSA_Lynchburg_G	8760	3.8	4319	49%
MISO	NIPS_8_MSA_Chicago_G	8658	PJM	AEP_1_MSA_Lynchburg_G	8760	3.9	4169	47%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	3.2	6959	79%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	AEP_1_MSA_Lynchburg_G	8760	9.9	7273	83%
PJM	NI_20_MSA_Chicago_G	7874	PJM	AEP_2_STA_TN-WV_L	8760	3.8	1264	14%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	3.7	1358	15%
PJM	NI_6_MSA_Chicago_G	7665	PJM	AEP_2_STA_TN-WV_L	8760	3.2	1370	16%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	7.5	3718	42%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_2_STA_TN-WV_L	8760	10.1	3128	36%
MISO	NIPS_8_MSA_Chicago_G	8658	PJM	AEP_2_STA_TN-WV_L	8760	3.9	1054	12%
MISO	LGEE_3_GEN_Gehnt2_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	3.7	5035	57%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	3.2	6276	71%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	AEP_2_STA_TN-WV_L	8760	10.0	6397	73%
MISO	NIPS_8_MSA_Chicago_G	8658	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.4	1096	12%
PJM	NI_20_MSA_Chicago_G	7874	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.3	1689	19%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_9_MSA_Canton-Massillon_L	8760	10.6	3668	42%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	7.9	4027	46%
PJM	NI_6_MSA_Chicago_G	7665	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.6	1696	19%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.1	1689	19%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	AEP_9_MSA_Canton-Massillon_L	8760	10.4	6611	75%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.7	6429	73%
PJM	NI_6_MSA_Chicago_G	7665	MISO	AMRN_12_MSA_StLouis_L	2483	5.0	1447	16%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	CIN_8_MSA_Evansville_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	4.9	6246	71%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	9.3	1	0%
MISO	IP_8_GEN_Clinton_G	8002	MISO	AMRN_12_MSA_StLouis_L	2483	6.5	447	5%
MAPP	MEC_3_MSA_DesMoines_G	8427	MISO	AMRN_12_MSA_StLouis_L	2483	19.7	2611	30%
PJM	NI_2_MSA_Chicago_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	5.4	1432	16%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	MISO	AMRN_12_MSA_StLouis_L	2483	1.2	1194	14%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_12_MSA_StLouis_L	2483	11.9	2907	33%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	1.6	110	1%
PJM	NI_20_MSA_Chicago_G	7874	MISO	AMRN_12_MSA_StLouis_L	2483	5.6	1085	12%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	9.2	3849	44%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	MISO	AMRN_12_MSA_StLouis_L	2483	4.5	2590	29%
MISO	AMRN_12_MSA_StLouis_L	6277	MISO	AMRN_2_County_Macon_L	8760	6.2	4271	49%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_2_County_Macon_L	8760	3.7	5041	57%
MAPP	MEC_3_MSA_DesMoines_G	8427	MISO	AMRN_2_County_Macon_L	8760	14.1	4735	54%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_2_County_Macon_L	8760	3.8	4635	53%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_2_County_Macon_L	8760	6.3	4521	51%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_2_GEN_Albright3_L	8760	1.9	4667	53%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_2_GEN_Albright3_L	8760	2.2	4653	53%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_2_GEN_Albright3_L	8760	1.8	6100	69%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_2_GEN_Albright3_L	8760	2.0	4518	51%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	6.7	7650	87%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_7_MSA_Hagerstown-Martir	8760	1.2	4641	53%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	7.0	7651	87%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.0	8187	93%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.2	8182	93%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.0	8299	94%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	7.2	7598	86%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	VAP_7_G	6808	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	2.8	5267	60%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.3	8186	93%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	11.5	8233	94%
PJM	VAP_7_G	6808	PJM	AP_8_MSA_DC-VA-MD_L	8760	3.2	5528	63%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	1.6	3942	45%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_8_MSA_DC-VA-MD_L	8760	7.1	7744	88%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	7.7	7687	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	7.4	7730	88%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	11.4	8079	92%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_8_MSA_DC-VA-MD_L	8760	11.6	8220	94%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_8_MSA_DC-VA-MD_L	8760	11.8	8230	94%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	7.9	7722	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	8.2	7761	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	7.8	7723	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	8.1	7763	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	8.2	7742	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	8.5	7770	88%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.3	2867	33%
MISO	LGEE_3_GEN_Gehnt2_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.8	4938	56%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.2	2960	34%
MISO	NIPS_8_MSA_Chicago_G	8658	MISO	CIN_1_MSA_Indianapolis_L	8760	2.0	691	8%
MISO	AMRN_12_MSA_StLouis_L	6277	MISO	CIN_1_MSA_Indianapolis_L	8760	8.0	3753	43%
MISO	NIPS_8_MSA_Chicago_G	8658	MISO	CIN_7_MSA_Lafayette_L	8760	1.1	634	7%
VACAR	DUK_9_MSA_Charlotte_G	8544	VACAR	CPLE_1_MSA_Durham_G	1153	6.6	622	7%
PJM	VAP_7_G	6808	VACAR	CPLE_1_MSA_Durham_G	1153	1.3	5106	58%
VACAR	SCEG_1_MSA_Columbia_G	8179	VACAR	CPLE_1_MSA_Durham_G	1153	4.9	2366	27%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
VACAR	DUK_5_MSA_Seneca_G	6597	VACAR	CPLE_1_MSA_Durham_G	1153	2.1	4662	53%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	CPLE_1_MSA_Durham_G	1153	5.4	1701	19%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	CPLE_1_MSA_Durham_G	1153	9.5	6794	77%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_4_MSA_Greenville_L	7310	3.7	4415	50%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_8_MSA_Charlotte_L	8760	3.5	3790	43%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	DUK_9_MSA_Charlotte_G	216	22.3	2647	30%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	VACAR	DUK_9_MSA_Charlotte_G	216	22.4	2587	29%
VACAR	SCEG_1_MSA_Columbia_G	8179	VACAR	DUK_9_MSA_Charlotte_G	216	21.0	249	3%
VACAR	DUK_5_MSA_Seneca_G	6597	VACAR	DUK_9_MSA_Charlotte_G	216	18.2	27	0%
VACAR	CPLE_1_MSA_Durham_G	7607	VACAR	DUK_9_MSA_Charlotte_G	216	21.2	342	4%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	DUK_9_MSA_Charlotte_G	216	21.9	558	6%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_9_MSA_Charlotte_G	216	25.5	3985	45%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	DUK_9_MSA_Charlotte_G	216	21.9	890	10%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	VACAR	DUK_9_MSA_Charlotte_G	216	21.5	2437	28%
SPP	AEPW_5_MSA_Tulsa_G	7078	ENTERGY	EES_1_MSA_Jackson_L	8760	5.6	2899	33%
SPP	AEPW_9_MSA_MountPleasant	7520	ENTERGY	EES_1_MSA_Jackson_L	8760	1.2	8715	99%
ENTERGY	EES_9_MSA_Russellville_G	2760	ENTERGY	EES_1_MSA_Jackson_L	8760	7.8	2745	31%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	4.2	7018	80%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	4.3	7010	80%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.9	6752	77%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	4.7	6965	79%
ENTERGY	EES_8_MSA_BatonRouge_G	8496	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.0	5394	61%
ENTERGY	EES_4_GEN_Ouachita_G	6486	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.6	6488	74%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	ENTERGY	EES_5_MSA_NewOrleans_G	8760	4.7	6986	80%
ENTERGY	EES_9_MSA_Russellville_G	2760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	14.1	6873	78%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_9_MSA_MountPleasant_G	7520	ENTERGY	EES_5_MSA_NewOrleans_G	8760	7.5	8714	99%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.0	6486	74%
SPP	AEPW_5_MSA_Tulsa_G	7078	ENTERGY	EES_5_MSA_NewOrleans_G	8760	11.9	6939	79%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_5_MSA_NewOrleans_G	8760	5.4	6529	74%
SPP	AEPW_9_MSA_MountPleasant_G	7520	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	1.9	8715	99%
SPP	AEPW_5_MSA_Tulsa_G	7078	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	6.3	4247	48%
ENTERGY	EES_9_MSA_Russellville_G	2760	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6502	8.5	7219	82%
ENTERGY	EES_2_MSA_Batesville_G	8743	ENTERGY	EES_9_MSA_Russellville_G	6000	3.7	1843	21%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6000	1.9	0	0%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_9_MSA_Russellville_G	6000	1.3	0	0%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6000	6.6	3522	40%
SPP	AEPW_9_MSA_MountPleasant_G	7520	ENTERGY	EES_9_MSA_Russellville_G	6000	3.4	8716	99%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	ENTERGY	EES_9_MSA_Russellville_G	6000	3.4	3043	35%
SPP	AEPW_5_MSA_Tulsa_G	7078	ENTERGY	EES_9_MSA_Russellville_G	6000	7.8	265	3%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	ENTERGY	EES_9_MSA_Russellville_G	6000	3.1	1658	19%
MISO	FE_9_MSA>Weirton_G	8760	MISO	FE_5_MSA_Cleveland_L	8040	1.3	2229	25%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	FE_5_MSA_Cleveland_L	8040	1.4	4061	46%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	FE_5_MSA_Cleveland_L	8040	1.2	4297	49%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	MISO	FE_5_MSA_Cleveland_L	8040	1.6	4200	48%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	FRCC	FPC_3_MSA_Orlando_L	8760	5.2	4736	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	5.6	4648	53%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	6.0	4644	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	FRCC	FPC_3_MSA_Orlando_L	8760	6.0	4646	53%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	5.5	4639	53%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	FRCC	FPC_4_MSA_Tampa_L	8760	5.8	5076	58%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	6.1	5017	57%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	6.2	5020	57%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	FRCC	FPC_4_MSA_Tampa_L	8760	6.6	5020	57%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	6.6	5020	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8701	6.8	5335	61%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_2_MSA_FortMyers_G	8701	1.5	5142	59%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	FRCC	FPL_2_MSA_FortMyers_G	8701	6.5	5400	61%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8701	6.9	5338	61%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	FRCC	FPL_2_MSA_FortMyers_G	8701	7.3	5344	61%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8701	7.2	5341	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	7.3	5241	60%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	FRCC	FPL_3_MSA_Miami_L	8760	7.8	5246	60%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	1.4	4906	56%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	7.3	5242	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	FRCC	FPL_3_MSA_Miami_L	8760	6.9	5294	60%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_3_MSA_Miami_L	8760	1.9	5236	60%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	7.7	5244	60%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	7.3	5277	60%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	7.7	5277	60%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	7.2	5273	60%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	FRCC	FPL_7_MSA_Miami_L	8760	7.7	5279	60%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	1.4	4971	57%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_7_MSA_Miami_L	8760	1.9	5289	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	FRCC	FPL_7_MSA_Miami_L	8760	6.9	5323	61%
MISO	XEL_3_MSA_Minneapolis_G	2885	MISO	GRE_4_MSA_Minneapolis_L	8760	14.0	6	0%
MISO	ITC_3_MSA_Detroit_G	8745	ONTARIO	IESO_11_G	8760	2.5	7753	88%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_11_G	8760	3.0	6042	69%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_15_G	8760	2.8	5873	67%
MISO	ITC_3_MSA_Detroit_G	8745	ONTARIO	IESO_15_G	8760	2.3	7255	83%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_3_L	8760	1.9	7882	90%
MISO	ITC_3_MSA_Detroit_G	8745	ONTARIO	IESO_3_L	8760	1.5	7408	84%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.5	2582	29%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.4	6131	70%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	1.5	6188	70%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	1.6	2640	30%
MISO	FE_9_MSA>Weirton_G	8760	MISO	ITC_2_MSA_Detroit_L	8625	1.5	6416	73%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	ITC_2_MSA_Detroit_L	8625	1.6	6980	79%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	ITC_9_MSA_Detroit_L	8760	1.5	7682	87%
MISO	FE_9_MSA_Weirton_G	8760	MISO	ITC_9_MSA_Detroit_L	8760	1.4	7322	83%
SPP	WERE_1_MSA_Manhattan_G	8641	SPP	KACP_7_MSA_KansasCity_L	8760	4.6	771	9%
MISO	BREC_3_County_Webster_G	8760	MISO	LGEE_5_MSA_Lexington_L	8760	1.3	2763	31%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_8_MSA_BayCity_G	8149	8.2	5208	59%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	METC_8_MSA_BayCity_G	8149	1.8	3176	36%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	METC_9_MSA_Kalamazoo_L	8760	1.2	1194	14%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_9_MSA_Kalamazoo_L	8760	7.6	4687	53%
NYPP	NYISO_1_NYA	8310	NEPOOL	NEPOOL_10_RI	6779	6.3	6123	70%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_10_RI	6779	2.7	8760	100%
NEPOOL	NEPOOL_2_NH	8396	NEPOOL	NEPOOL_10_RI	6779	1.2	6923	79%
NEPOOL	NEPOOL_3_ME	3621	NEPOOL	NEPOOL_10_RI	6779	2.3	6904	79%
NEPOOL	NEPOOL_2_NH	8396	NEPOOL	NEPOOL_4_NEBOS	8727	1.7	6923	79%
NEPOOL	NEPOOL_3_ME	3621	NEPOOL	NEPOOL_4_NEBOS	8727	2.7	6920	79%
NYPP	NYISO_1_NYA	8310	NEPOOL	NEPOOL_4_NEBOS	8727	6.7	6123	70%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_4_NEBOS	8727	3.1	8760	100%
NEPOOL	NEPOOL_3_ME	3621	NEPOOL	NEPOOL_6_WCMA	8554	2.8	7027	80%
NEPOOL	NEPOOL_2_NH	8396	NEPOOL	NEPOOL_6_WCMA	8554	1.7	7045	80%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_6_WCMA	8554	3.2	8570	98%
NYPP	NYISO_1_NYA	8310	NEPOOL	NEPOOL_6_WCMA	8554	6.8	6125	70%
NEPOOL	NEPOOL_2_NH	8396	NEPOOL	NEPOOL_7_CT	1561	6.9	7640	87%
NEPOOL	NEPOOL_3_ME	3621	NEPOOL	NEPOOL_7_CT	1561	7.9	7617	87%
NYPP	NYISO_1_NYA	8310	NEPOOL	NEPOOL_7_CT	1561	11.9	6127	70%
NEPOOL	NEPOOL_5_SEMA	8760	NEPOOL	NEPOOL_7_CT	1561	5.1	2659	30%
NYPP	NYISO_8_NYH	8760	NEPOOL	NEPOOL_7_CT	1561	3.4	8752	100%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_7_CT	1561	8.3	8760	100%
NEPOOL	NEPOOL_8_SWCT	6096	NEPOOL	NEPOOL_7_CT	1561	1.1	7361	84%
NYPP	NYISO_6_NYF	7576	NEPOOL	NEPOOL_7_CT	1561	6.0	8749	100%
NEPOOL	NEPOOL_2_NH	8396	NEPOOL	NEPOOL_9_NWKST	8760	3.2	8758	100%
NYPP	NYISO_6_NYF	7576	NEPOOL	NEPOOL_9_NWKST	8760	2.3	8759	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_1_NYA	8310	NEPOOL	NEPOOL_9_NWKST	8760	8.2	6133	70%
NEPOOL	NEPOOL_7_CT	7199	NEPOOL	NEPOOL_9_NWKST	8760	1.4	8757	100%
NEPOOL	NEPOOL_5_SEMA	8760	NEPOOL	NEPOOL_9_NWKST	8760	1.4	8756	100%
NEPOOL	NEPOOL_3_ME	3621	NEPOOL	NEPOOL_9_NWKST	8760	4.2	8757	100%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_9_NWKST	8760	4.6	8760	100%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_13_MSA_Chicago_L	8760	6.4	2910	33%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_13_MSA_Chicago_L	8760	2.4	3987	45%
MISO	IP_8_GEN_Clinton_G	8002	PJM	NI_13_MSA_Chicago_L	8760	1.0	1287	15%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	NI_13_MSA_Chicago_L	8760	6.2	6423	73%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_13_MSA_Chicago_L	8760	3.7	3161	36%
MISO	ALTE_2_MSA_Madison_G	8747	PJM	NI_13_MSA_Chicago_L	8760	6.3	4833	55%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_3_MSA_Chicago_L	8760	2.3	3712	42%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	NI_3_MSA_Chicago_L	8760	6.1	6374	73%
MISO	ALTE_2_MSA_Madison_G	8747	PJM	NI_3_MSA_Chicago_L	8760	6.2	4843	55%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_3_MSA_Chicago_L	8760	3.6	3198	36%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_3_MSA_Chicago_L	8760	6.2	2944	34%
MISO	ALTE_2_MSA_Madison_G	8747	PJM	NI_6_MSA_Chicago_G	1095	4.9	4510	51%
MISO	AMRN_12_MSA_StLouis_L	6277	PJM	NI_6_MSA_Chicago_G	1095	4.8	6423	73%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_6_MSA_Chicago_G	1095	4.9	2939	33%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_6_MSA_Chicago_G	1095	1.0	3985	45%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_6_MSA_Chicago_G	1095	2.3	3239	37%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_10_NYJ	8760	10.8	8760	100%
NYPP	NYISO_6_NYF	7576	NYPP	NYISO_10_NYJ	8760	4.1	8758	100%
NEPOOL	NEPOOL_5_SEMA	8760	NYPP	NYISO_10_NYJ	8760	3.3	8760	100%
NEPOOL	NEPOOL_7_CT	7199	NYPP	NYISO_10_NYJ	8760	3.2	8758	100%
NEPOOL	NEPOOL_3_ME	3621	NYPP	NYISO_10_NYJ	8760	6.1	8760	100%
PJM	PENELEC_2_MSA_DuBois_G	8601	NYPP	NYISO_10_NYJ	8760	9.1	6126	70%
NYPP	NYISO_1_NYA	8310	NYPP	NYISO_10_NYJ	8760	10.0	8759	100%
ONTARIO	IESO_2_G	1918	NYPP	NYISO_10_NYJ	8760	3.6	8760	100%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_10_NYJ	8760	1.6	8759	100%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_10_NYJ	8760	10.8	8760	100%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_10_NYJ	8760	6.4	8758	100%
NEPOOL	NEPOOL_2_NH	8396	NYPP	NYISO_10_NYJ	8760	5.0	8760	100%
NEPOOL	NEPOOL_7_CT	7199	NYPP	NYISO_11_NYK	8760	3.7	8760	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_11_NYK	8760	2.1	8754	100%
NYPP	NYISO_1_NYA	8310	NYPP	NYISO_11_NYK	8760	10.5	6130	70%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_11_NYK	8760	11.3	6130	70%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_11_NYK	8760	6.9	8760	100%
NEPOOL	NEPOOL_2_NH	8396	NYPP	NYISO_11_NYK	8760	5.5	8760	100%
NEPOOL	NEPOOL_5_SEMA	8760	NYPP	NYISO_11_NYK	8760	3.8	8760	100%
NYPP	NYISO_6_NYF	7576	NYPP	NYISO_11_NYK	8760	4.6	8760	100%
NEPOOL	NEPOOL_3_ME	3621	NYPP	NYISO_11_NYK	8760	6.6	8760	100%
PJM	PENELEC_2_MSA_DuBois_G	8601	NYPP	NYISO_11_NYK	8760	9.6	6130	70%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_11_NYK	8760	11.3	6130	70%
ONTARIO	IESO_2_G	1918	NYPP	NYISO_11_NYK	8760	4.1	6130	70%
NYPP	NYISO_1_NYA	8310	NYPP	NYISO_7_NYG	8164	6.7	6035	69%
PJM	PENELEC_2_MSA_DuBois_G	8601	NYPP	NYISO_7_NYG	8164	5.8	6074	69%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_7_NYG	8164	7.5	6109	70%
NEPOOL	NEPOOL_2_NH	8396	NYPP	NYISO_7_NYG	8164	1.6	6526	74%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_7_NYG	8164	7.4	6114	70%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_7_NYG	8164	3.1	5609	64%
NEPOOL	NEPOOL_3_ME	3621	NYPP	NYISO_7_NYG	8164	2.7	5962	68%
PJM	PENELEC_2_MSA_DuBois_G	8601	NYPP	NYISO_9_NYI	8288	8.5	6081	69%
NEPOOL	NEPOOL_2_NH	8396	NYPP	NYISO_9_NYI	8288	4.4	8743	100%
ONTARIO	IESO_2_G	1918	NYPP	NYISO_9_NYI	8288	3.0	6119	70%
NYPP	NYISO_6_NYF	7576	NYPP	NYISO_9_NYI	8288	3.5	8615	98%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_9_NYI	8288	10.2	6121	70%
NEPOOL	NEPOOL_3_ME	3621	NYPP	NYISO_9_NYI	8288	5.4	8741	100%
NEPOOL	NEPOOL_7_CT	7199	NYPP	NYISO_9_NYI	8288	2.6	8538	97%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_9_NYI	8288	5.8	8686	99%
NEPOOL	NEPOOL_5_SEMA	8760	NYPP	NYISO_9_NYI	8288	2.6	8630	98%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_9_NYI	8288	10.2	6123	70%
NYPP	NYISO_1_NYA	8310	NYPP	NYISO_9_NYI	8288	9.4	6092	69%
SPP	AEPW_5_MSA_Tulsa_G	7078	SPP	OKGE_4_MSA_OklahomaCity_L	8742	19.3	6394	73%
ENTERGY	EES_2_MSA_Batesville_G	8743	SPP	OKGE_4_MSA_OklahomaCity_L	8742	15.2	7720	88%
SPP	WERE_1_MSA_Manhattan_G	8641	SPP	OKGE_4_MSA_OklahomaCity	8742	24.0	8218	94%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_9_MSA_MountPleasant_	7520	SPP	OKGE_4_MSA_OklahomaCity_L	8742	14.9	6720	77%
ENTERGY	EES_9_MSA_Russellville_G	2760	SPP	OKGE_4_MSA_OklahomaCity_L	8742	21.5	7335	84%
MAPP	NPPD_4_GEN_Gentleman_G	8240	MAPP	OPPD_5_MSA_Omaha_L	8760	6.2	7560	86%
PJM	BGE_7_MSA_Baltimore-Towson	7816	PJM	PECO_5_MSA_Philadelphia_L	6966	2.7	3910	45%
PJM	PJM500_4_MSA_Philadelphia_G	8690	PJM	PECO_5_MSA_Philadelphia_L	6966	3.7	0	0%
PJM	PJM500_7_MSA_York-Hanover_	8760	PJM	PECO_5_MSA_Philadelphia_L	6966	3.7	1444	16%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	8.1	7624	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PEPCO_1_MSA_DC_L	8760	7.8	7616	87%
PJM	AP_1_County_Harrison_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	8.3	7622	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_5_MSA_Lancaster_L	8760	6.9	5782	66%
PJM	PENELEC_2_MSA_DuBois_G	8601	PJM	PL_5_MSA_Lancaster_L	8760	6.0	7664	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_5_MSA_Lancaster_L	8760	7.3	7234	82%
PJM	PENELEC_2_MSA_DuBois_G	8601	PJM	PL_7_MSA_Allentown_L	8760	5.8	7259	83%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_7_MSA_Allentown_L	8760	7.1	8264	94%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_7_MSA_Allentown_L	8760	6.8	7353	84%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_3_MSA_NewYork_L	8760	3.5	8075	92%
NYPP	NYISO_1_NYA	8310	PJM	PSEG_3_MSA_NewYork_L	8760	7.1	8154	93%
NYPP	NYISO_6_NYF	7576	PJM	PSEG_3_MSA_NewYork_L	8760	1.2	8146	93%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_5_MSA_Philadelphia_L	8760	3.9	7743	88%
NYPP	NYISO_1_NYA	8310	PJM	PSEG_5_MSA_Philadelphia_L	8760	7.5	8156	93%
NYPP	NYISO_6_NYF	7576	PJM	PSEG_5_MSA_Philadelphia_L	8760	1.6	8181	93%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_8_MSA_NewYork_G	8760	3.5	8005	91%
NYPP	NYISO_1_NYA	8310	PJM	PSEG_8_MSA_NewYork_G	8760	7.1	8043	92%
NYPP	NYISO_6_NYF	7576	PJM	PSEG_8_MSA_NewYork_G	8760	1.2	7974	91%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCEG_9_MSA_Charleston_G	8669	1.0	2133	24%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	VACAR	SCEG_9_MSA_Charleston_G	8669	1.1	2120	24%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.5	1653	19%
VACAR	CPLE_1_MSA_Durham_G	7607	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.2	2121	24%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.4	4349	50%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.3	4349	50%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.9	4350	50%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.6	4791	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.9	983	11%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8438	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	2.1	479	5%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7963	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	1.2	720	8%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	2.8	764	9%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	4.9	2390	27%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	1.5	428	5%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	1.6	443	5%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	4.6	491	6%
VACAR	DUK_9_MSA_Charlotte_G	8544	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	2.4	629	7%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7956	11.4	3124	36%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdo	7956	2.0	489	6%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	3.0	91	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	3.3	1580	18%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	9.9	2924	33%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	1.2	387	4%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_17_MSA-Mobile_G	7378	1.7	3196	36%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_17_MSA-Mobile_G	7378	1.4	2947	34%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_17_MSA-Mobile_G	7378	8.3	2961	34%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	2.7	86	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	3.0	1959	22%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_21_MSA_Atlanta_G	8673	9.6	2918	33%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	1.2	547	6%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3.0	244	3%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	9.9	3007	34%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3.3	1733	20%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	10.0	3058	35%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	1.3	626	7%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.1	372	4%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.4	1787	20%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	3.0	63	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_6_MSA_Augusta-Richm	8760	3.4	1400	16%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	9.9	2743	31%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	1.3	337	4%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8755	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	3.0	241	3%
ENTERGY	EES_9_MSA_Russellville_G	2760	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	9.9	3006	34%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	3.3	1717	20%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	1.2	547	6%
ENTERGY	EES_9_MSA_Russellville_G	2760	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	5.2	2879	33%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	2.9	4983	57%
MISO	EKPC_8_MSA_Maysville_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	1.4	1244	14%
ENTERGY	EES_9_MSA_Russellville_G	2760	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	7.0	2797	32%
MISO	BREC_3_County_Webster_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	5.3	6736	77%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	4.7	6183	70%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8677	3.6	2591	29%
ENTERGY	EES_9_MSA_Russellville_G	2760	TVAUTHOR	TVA_7_MSA_Memphis_L	8745	6.7	790	9%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_7_MSA_Memphis_L	8745	4.4	5269	60%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	5.3	7756	88%
VACAR	CPLE_1_MSA_Durham_G	7607	PJM	VAP_15_MSA_VB-Norfolk_L	8760	4.9	6570	75%
PJM	VAP_7_G	6808	PJM	VAP_15_MSA_VB-Norfolk_L	8760	1.0	5582	64%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_15_MSA_VB-Norfolk_L	8760	5.0	7745	88%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	5.5	7684	87%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	9.2	8020	91%
PJM	VAP_7_G	6808	PJM	VAP_27_MSA_DC_L	8760	3.0	5537	63%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_27_MSA_DC_L	8760	1.4	3050	35%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_27_MSA_DC_L	8760	11.2	8018	91%
VACAR	CPLE_1_MSA_Durham_G	7607	PJM	VAP_27_MSA_DC_L	8760	6.9	7534	86%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_27_MSA_DC_L	8760	7.5	7671	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_27_MSA_DC_L	8760	7.3	7696	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_27_MSA_DC_L	8760	6.9	7616	87%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_33_MSA_DC_L	8760	7.5	7707	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_33_MSA_DC_L	8760	7.0	7772	88%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_33_MSA_DC_L	8760	11.2	8151	93%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_33_MSA_DC_L	8760	7.3	7772	88%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_33_MSA_DC_L	8760	1.5	3756	43%
VACAR	CPLE_1_MSA_Durham_G	7607	PJM	VAP_33_MSA_DC_L	8760	6.9	7702	88%
PJM	VAP_7_G	6808	PJM	VAP_33_MSA_DC_L	8760	3.1	5547	63%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_7_G	1952	16.5	7222	82%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_7_G	1952	16.7	5725	65%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_7_G	1952	10.7	5484	62%
PJM	PJM500_7_MSA_York-Hanover_G	8760	PJM	VAP_7_G	1952	8.7	6107	70%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_7_G	1952	20.4	6178	70%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_7_G	1952	16.2	7260	83%
PJM	PJM500_4_MSA_Philadelphia_G	8690	PJM	VAP_7_G	1952	8.8	5739	65%
PJM	PJM500_5_MSA_DC_G	8760	PJM	VAP_7_G	1952	8.1	5131	58%
VACAR	CPLE_1_MSA_Durham_G	7607	PJM	VAP_7_G	1952	16.1	5448	62%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	SPP	WERE_4_GEN_Wolfcreek_G	4485	7.7	7905	90%
SPP	KACP_4_MSA_KansasCity_G	7896	SPP	WERE_4_GEN_Wolfcreek_G	4485	29.6	7378	84%
SPP	AEPW_5_MSA_Tulsa_G	7078	SPP	WERE_4_GEN_Wolfcreek_G	4485	8.8	4175	48%
SPP	WERE_1_MSA_Manhattan_G	8641	SPP	WERE_4_GEN_Wolfcreek_G	4485	13.6	1182	13%
MAPP	NPPD_4_GEN_Gentleman_G	8240	SPP	WERE_4_GEN_Wolfcreek_G	4485	29.9	8734	99%
MISO	ALTE_2_MSA_Madison_G	8747	MISO	XEL_3_MSA_Minneapolis_G	5875	8.0	2794	32%
MISO	OTP_9_GEN_BigStone_G	8640	MISO	XEL_3_MSA_Minneapolis_G	5875	26.8	8641	98%

**Task 2: Appendix 5, Corridor Congestion by Scenario
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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AEP_1_MSA_Lynchburg_G	8760	1.2	6619	75%
MISO	NIPS_8_MSA_Chicago_G	8643	PJM	AEP_1_MSA_Lynchburg_G	8760	5.1	4070	46%
PJM	NI_20_MSA_Chicago_G	7868	PJM	AEP_1_MSA_Lynchburg_G	8760	5.0	4098	47%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_1_MSA_Lynchburg_G	8760	13.1	4729	54%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	9.6	5243	60%
PJM	NI_6_MSA_Chicago_G	7271	PJM	AEP_1_MSA_Lynchburg_G	8760	4.4	4299	49%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	4.8	4280	49%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	AEP_1_MSA_Lynchburg_G	8760	13.2	7137	81%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	4.3	6892	78%
PJM	NI_6_MSA_Chicago_G	7271	PJM	AEP_2_STA_TN-WV_L	8760	4.6	1401	16%
MISO	NIPS_8_MSA_Chicago_G	8643	PJM	AEP_2_STA_TN-WV_L	8760	5.3	1166	13%
PJM	NI_20_MSA_Chicago_G	7868	PJM	AEP_2_STA_TN-WV_L	8760	5.2	1242	14%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	9.8	3386	39%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	5.0	1386	16%
MISO	LGEE_3_GEN_Gehrt2_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	5.7	5053	58%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	AEP_2_STA_TN-WV_L	8760	13.4	6244	71%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_2_STA_TN-WV_L	8760	13.3	2778	32%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	4.5	6210	71%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AEP_2_STA_TN-WV_L	8760	1.4	5365	61%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	5.0	1559	18%
PJM	NI_6_MSA_Chicago_G	7271	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.6	1558	18%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	9.8	3806	43%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_9_MSA_Canton-Massillon_L	8760	13.3	3361	38%
MISO	NIPS_8_MSA_Chicago_G	8643	PJM	AEP_9_MSA_Canton-Massillon_L	8760	5.3	1172	13%
PJM	NI_20_MSA_Chicago_G	7868	PJM	AEP_9_MSA_Canton-Massillon_L	8760	5.1	1557	18%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.5	6405	73%

**Task 2: Appendix 5, Corridor Congestion by Scenario
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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AEP_9_MSA_Canton-Massillon_L	8760	1.4	4647	53%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AEP_9_MSA_Canton-Massillon_L	8760	1.5	4750	54%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	AEP_9_MSA_Canton-Massillon_L	8760	13.4	6519	74%
PJM	NI_20_MSA_Chicago_G	7868	MISO	AMRN_12_MSA_StLouis_L	2474	9.5	951	11%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	MISO	AMRN_12_MSA_StLouis_L	2474	3.0	1276	15%
PJM	NI_2_MSA_Chicago_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	9.4	1265	14%
MAPP	MEC_3_MSA_DesMoines_G	8371	MISO	AMRN_12_MSA_StLouis_L	2474	28.1	2364	27%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_12_MSA_StLouis_L	2474	17.6	2572	29%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	14.2	3556	40%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	8.9	6183	70%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	14.3	0	0%
MISO	IP_8_GEN_Clinton_G	7994	MISO	AMRN_12_MSA_StLouis_L	2474	11.1	446	5%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	4.3	64	1%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	MISO	AMRN_12_MSA_StLouis_L	2474	6.9	2961	34%
PJM	NI_6_MSA_Chicago_G	7271	MISO	AMRN_12_MSA_StLouis_L	2474	9.0	1277	15%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_2_County_Macon_L	8760	8.0	4183	48%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_2_County_Macon_L	8760	4.5	4638	53%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_2_County_Macon_L	8760	4.6	4366	50%
MISO	AMRN_12_MSA_StLouis_L	6286	MISO	AMRN_2_County_Macon_L	8760	8.1	4142	47%
MISO	IP_8_GEN_Clinton_G	7994	MISO	AMRN_2_County_Macon_L	8760	1.4	222	3%
MAPP	MEC_3_MSA_DesMoines_G	8371	MISO	AMRN_2_County_Macon_L	8760	18.4	4402	50%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_2_GEN_Albright3_L	8760	3.4	5077	58%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_2_GEN_Albright3_L	8760	3.9	4980	57%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_2_GEN_Albright3_L	8760	2.5	6277	71%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_2_GEN_Albright3_L	8760	4.1	5086	58%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.8	7629	87%
PJM	VAP_7_G	6600	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	3.9	5104	58%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	2.3	4599	52%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.2	7611	87%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	19.3	8182	93%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	19.5	8199	93%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	11.8	7553	86%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	17.9	8324	95%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	18.8	8196	93%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	3.1	3836	44%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_8_MSA_DC-VA-MD_L	8760	12.0	7699	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	12.5	7675	87%
MISO	FE_9_MSA>Weirton_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	19.6	8216	94%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_8_MSA_DC-VA-MD_L	8760	20.2	8216	94%
PJM	VAP_7_G	6600	PJM	AP_8_MSA_DC-VA-MD_L	8760	4.7	5382	61%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	18.6	8020	91%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	12.5	7599	87%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_8_MSA_DC-VA-MD_L	8760	20.0	8198	93%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	13.5	7641	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	14.0	7700	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	13.9	7696	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	13.3	7634	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	14.5	7711	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	14.0	7670	87%
MISO	NIPS_8_MSA_Chicago_G	8643	MISO	CIN_1_MSA_Indianapolis_L	8760	2.3	524	6%
MISO	LGEE_3_GEN_Gehnt2_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	2.7	4959	56%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	CIN_8_MSA_Evansville_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.5	2912	33%
MISO	AMRN_12_MSA_StLouis_L	6286	MISO	CIN_1_MSA_Indianapolis_L	8760	10.4	3394	39%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.5	2711	31%
MISO	NIPS_8_MSA_Chicago_G	8643	MISO	CIN_7_MSA_Lafayette_L	8760	1.4	502	6%
MISO	LGEE_3_GEN_Gehrt2_G	8760	MISO	CIN_7_MSA_Lafayette_L	8760	1.8	5772	66%
VACAR	SCEG_1_MSA_Columbia_G	7998	VACAR	CPLE_1_MSA_Durham_G	830	10.1	2292	26%
PJM	VAP_7_G	6600	VACAR	CPLE_1_MSA_Durham_G	830	2.7	4936	56%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	CPLE_1_MSA_Durham_G	830	10.9	1324	15%
VACAR	DUK_9_MSA_Charlotte_G	8549	VACAR	CPLE_1_MSA_Durham_G	830	12.6	555	6%
VACAR	DUK_5_MSA_Seneca_G	6330	VACAR	CPLE_1_MSA_Durham_G	830	4.9	4626	53%
PJM	VAP_1_MSA_Richmond_G	8760	VACAR	CPLE_1_MSA_Durham_G	830	1.0	563	6%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	CPLE_1_MSA_Durham_G	830	16.6	6778	77%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_4_MSA_Greenville_L	6832	4.3	4035	46%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_8_MSA_Charlotte_L	8760	4.8	3772	43%
VACAR	SCEG_1_MSA_Columbia_G	7998	VACAR	DUK_9_MSA_Charlotte_G	211	33.9	181	2%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	VACAR	DUK_9_MSA_Charlotte_G	211	34.1	2560	29%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	35.5	802	9%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	35.8	2756	31%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	35.4	527	6%
SOUTHERN	SOCO_17_MSA-Mobile_G	1894	VACAR	DUK_9_MSA_Charlotte_G	211	30.1	2781	32%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	VACAR	DUK_9_MSA_Charlotte_G	211	35.8	2712	31%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	40.4	3971	45%
VACAR	CPLE_1_MSA_Durham_G	7930	VACAR	DUK_9_MSA_Charlotte_G	211	33.8	290	3%
VACAR	DUK_5_MSA_Seneca_G	6330	VACAR	DUK_9_MSA_Charlotte_G	211	28.7	34	0%
SPP	AEPW_5_MSA_Tulsa_G	7582	ENTERGY	EES_1_MSA_Jackson_L	8760	5.8	3124	36%
SPP	AEPW_9_MSA_MountPleasant	8404	ENTERGY	EES_1_MSA_Jackson_L	8760	1.6	8741	100%
ENTERGY	EES_4_GEN_Ouachita_G	6519	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.5	6455	73%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.6	6450	73%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.4	6495	74%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.4	7072	81%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.6	7017	80%
ENTERGY	EES_8_MSA_BatonRouge_G	8496	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.7	5423	62%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.6	7041	80%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	6.2	7101	81%
SPP	AEPW_5_MSA_Tulsa_G	7582	ENTERGY	EES_5_MSA_NewOrleans_G	8760	13.2	6883	78%
SPP	AEPW_9_MSA_MountPleasant_G	8404	ENTERGY	EES_5_MSA_NewOrleans_G	8760	8.9	8733	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	ENTERGY	EES_5_MSA_NewOrleans_G	8760	5.0	6704	76%
SPP	AEPW_5_MSA_Tulsa_G	7582	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	7.2	4350	50%
SPP	AEPW_9_MSA_MountPleasant_G	8404	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	7005	3.0	8735	99%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6267	2.3	2	0%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	ENTERGY	EES_9_MSA_Russellville_G	6267	5.6	3657	42%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	ENTERGY	EES_9_MSA_Russellville_G	6267	5.0	2108	24%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_9_MSA_Russellville_G	6267	2.2	0	0%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6267	2.1	1536	17%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6267	1.9	2012	23%
SPP	AEPW_9_MSA_MountPleasant_G	8404	ENTERGY	EES_9_MSA_Russellville_G	6267	4.7	8740	99%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	ENTERGY	EES_9_MSA_Russellville_G	6267	2.4	1582	18%
ENTERGY	EES_2_MSA_Batesville_G	8743	ENTERGY	EES_9_MSA_Russellville_G	6267	5.6	1825	21%
SPP	AEPW_5_MSA_Tulsa_G	7582	ENTERGY	EES_9_MSA_Russellville_G	6267	8.9	260	3%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6267	9.6	3914	45%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	ENTERGY	EES_9_MSA_Russellville_G	6267	2.4	2119	24%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	MISO	FE_4_MSA_Akron_L	8760	1.4	4202	48%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	FE_4_MSA_Akron_L	8760	1.2	4085	47%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	FE_5_MSA_Cleveland_L	7570	2.9	4694	53%
MISO	FE_9_MSA>Weirton_G	8760	MISO	FE_5_MSA_Cleveland_L	7570	2.4	2462	28%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AEP_8_GEN_Amos01_G	8760	MISO	FE_5_MSA_Cleveland_L	7570	1.5	4094	47%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	MISO	FE_5_MSA_Cleveland_L	7570	3.1	4795	55%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	FE_7_MSA_Toledo_L	8710	2.3	6382	73%
MISO	FE_9_MSA>Weirton_G	8760	MISO	FE_7_MSA_Toledo_L	8710	1.9	5376	61%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	MISO	FE_7_MSA_Toledo_L	8710	2.5	6449	73%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	MISO	FE_8_MSA_Youngstown_L	8760	1.0	107	1%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	FRCC	FPC_3_MSA_Orlando_L	8760	7.7	5088	58%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	9.0	4973	57%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	9.3	4975	57%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	FRCC	FPC_3_MSA_Orlando_L	8760	3.6	5043	57%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	FRCC	FPC_3_MSA_Orlando_L	8760	9.3	4976	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	8.9	4964	57%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	9.7	5363	61%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	FRCC	FPC_4_MSA_Tampa_L	8760	8.4	5439	62%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	10.1	5368	61%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	FRCC	FPC_4_MSA_Tampa_L	8760	4.3	5405	62%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	FRCC	FPC_4_MSA_Tampa_L	8760	10.1	5368	61%
FRCC	OUC_1_MSA_Orlando_G	8688	FRCC	FPC_4_MSA_Tampa_L	8760	1.3	4809	55%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	9.8	5369	61%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8709	10.9	5615	64%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	FRCC	FPL_2_MSA_FortMyers_G	8709	5.6	5660	64%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_2_MSA_FortMyers_G	8709	2.2	5162	59%
FRCC	JEA_6_MSA_Jacksonville_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8709	1.1	4109	47%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8709	1.6	4137	47%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8709	11.4	5616	64%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8709	11.1	5615	64%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	FRCC	FPL_2_MSA_FortMyers_G	8709	9.7	5680	65%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	FRCC	FPL_2_MSA_FortMyers_G	8709	11.3	5618	64%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	2.5	4877	56%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_3_MSA_Miami_L	8760	3.0	5257	60%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	FRCC	FPL_3_MSA_Miami_L	8760	10.5	5614	64%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	11.9	5552	63%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	12.2	5552	63%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	11.7	5550	63%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	FRCC	FPL_3_MSA_Miami_L	8760	12.2	5553	63%
FRCC	FPC_10_MSA_Lakeland_G	8320	FRCC	FPL_3_MSA_Miami_L	8760	1.5	4261	49%
FRCC	JEA_6_MSA_Jacksonville_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	2.0	3650	42%
FRCC	FPL_8_MSA_PortStLucie_G	8628	FRCC	FPL_3_MSA_Miami_L	8760	1.0	3155	36%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	FRCC	FPL_3_MSA_Miami_L	8760	6.4	5597	64%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_7_MSA_Miami_L	8760	3.0	5309	60%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	FRCC	FPL_7_MSA_Miami_L	8760	12.2	5578	64%
FRCC	FPL_8_MSA_PortStLucie_G	8628	FRCC	FPL_7_MSA_Miami_L	8760	1.0	3169	36%
FRCC	FPC_10_MSA_Lakeland_G	8320	FRCC	FPL_7_MSA_Miami_L	8760	1.5	4371	50%
FRCC	JEA_6_MSA_Jacksonville_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	2.0	3779	43%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	2.4	4980	57%
SOUTHERN	SOCO_17_MSA_Mobile_G	1894	FRCC	FPL_7_MSA_Miami_L	8760	6.4	5621	64%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	11.7	5576	63%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	12.2	5575	63%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	11.9	5575	63%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	FRCC	FPL_7_MSA_Miami_L	8760	10.5	5635	64%
MISO	XEL_3_MSA_Minneapolis_G	2891	MISO	GRE_4_MSA_Minneapolis_L	8760	21.6	4	0%
MISO	ITC_3_MSA_Detroit_G	8744	ONTARIO	IESO_11_G	8760	4.2	7837	89%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_11_G	8760	5.0	5778	66%
MISO	ITC_3_MSA_Detroit_G	8744	ONTARIO	IESO_15_G	8760	4.0	7395	84%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_15_G	8760	4.7	5707	65%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_2_G	6935	1.0	7620	87%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_3_L	8760	3.5	8038	92%
MISO	ITC_3_MSA_Detroit_G	8744	ONTARIO	IESO_3_L	8760	2.8	7520	86%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.9	2435	28%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.9	6102	69%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	1.9	6136	70%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	2.0	2471	28%
MISO	FE_9_MSA>Weirton_G	8760	MISO	ITC_2_MSA_Detroit_L	8624	3.2	6691	76%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	ITC_2_MSA_Detroit_L	8624	3.7	7278	83%
MISO	FE_6_MSA_Pittsburgh_G	8592	MISO	ITC_9_MSA_Detroit_L	8760	3.5	7896	90%
MISO	FE_9_MSA>Weirton_G	8760	MISO	ITC_9_MSA_Detroit_L	8760	3.0	7535	86%
SPP	WERE_1_MSA_Manhattan_G	8684	SPP	KACP_7_MSA_KansasCity_L	8760	6.4	757	9%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	BREC_3_County_Webster_G	8760	MISO	LGEE_5_MSA_Lexington_L	8760	4.0	3283	37%
MISO	LGEE_3_GEN_Gehnt2_G	8760	MISO	LGEE_5_MSA_Lexington_L	8760	1.0	4322	49%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_8_MSA_BayCity_G	8173	12.3	5315	61%
MISO	ITC_7_MSA_Monroe_G	8472	MISO	METC_8_MSA_BayCity_G	8173	1.3	3286	37%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	METC_8_MSA_BayCity_G	8173	2.8	3405	39%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	METC_9_MSA_Kalamazoo_L	8760	2.2	1541	18%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_9_MSA_Kalamazoo_L	8760	11.7	4823	55%
NEPOOL	NEPOOL_3_ME	3787	NEPOOL	NEPOOL_10_RI	6427	3.3	7160	82%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_10_RI	6427	4.8	8760	100%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_10_RI	6427	12.6	5832	66%
NEPOOL	NEPOOL_2_NH	8425	NEPOOL	NEPOOL_10_RI	6427	1.9	7181	82%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_3_ME	4973	4.3	5832	66%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_4_NEBOS	8715	5.7	8760	100%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_4_NEBOS	8715	13.5	5832	66%
NEPOOL	NEPOOL_3_ME	3787	NEPOOL	NEPOOL_4_NEBOS	8715	4.2	7176	82%
NEPOOL	NEPOOL_2_NH	8425	NEPOOL	NEPOOL_4_NEBOS	8715	2.8	7182	82%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_6_WCMA	8644	5.8	8612	98%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_6_WCMA	8644	13.6	5836	66%
NEPOOL	NEPOOL_3_ME	3787	NEPOOL	NEPOOL_6_WCMA	8644	4.3	7245	82%
NEPOOL	NEPOOL_2_NH	8425	NEPOOL	NEPOOL_6_WCMA	8644	2.9	7267	83%
NEPOOL	NEPOOL_5_SEMA	8739	NEPOOL	NEPOOL_7_CT	1543	11.0	2199	25%
NEPOOL	NEPOOL_2_NH	8425	NEPOOL	NEPOOL_7_CT	1543	13.9	7798	89%
NEPOOL	NEPOOL_8_SWCT	6228	NEPOOL	NEPOOL_7_CT	1543	4.1	7476	85%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_7_CT	1543	24.6	5836	66%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_7_CT	1543	16.8	8760	100%
NYPP	NYISO_6_NYF	7512	NEPOOL	NEPOOL_7_CT	1543	11.7	8757	100%
NEPOOL	NEPOOL_3_ME	3787	NEPOOL	NEPOOL_7_CT	1543	15.4	7777	89%
NYPP	NYISO_8_NYH	8760	NEPOOL	NEPOOL_7_CT	1543	7.2	8756	100%
NEPOOL	NEPOOL_3_ME	3787	NEPOOL	NEPOOL_9_NWKST	8760	6.9	8756	100%
NEPOOL	NEPOOL_5_SEMA	8739	NEPOOL	NEPOOL_9_NWKST	8760	2.6	8757	100%
NYPP	NYISO_1_NYA	8292	NEPOOL	NEPOOL_9_NWKST	8760	16.2	5840	66%
NYPP	NYISO_6_NYF	7512	NEPOOL	NEPOOL_9_NWKST	8760	3.3	8760	100%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_9_NWKST	8760	8.4	8760	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NEPOOL	NEPOOL_2_NH	8425	NEPOOL	NEPOOL_9_NWKST	8760	5.5	8758	100%
NEPOOL	NEPOOL_7_CT	7217	NEPOOL	NEPOOL_9_NWKST	8760	3.0	8757	100%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_13_MSA_Chicago_L	8760	4.4	4034	46%
MISO	ALTE_2_MSA_Madison_G	8749	PJM	NI_13_MSA_Chicago_L	8760	8.0	4790	55%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_13_MSA_Chicago_L	8760	4.7	2893	33%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	NI_13_MSA_Chicago_L	8760	8.4	6268	71%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_13_MSA_Chicago_L	8760	8.2	2519	29%
MISO	IP_8_GEN_Clinton_G	7994	PJM	NI_13_MSA_Chicago_L	8760	1.6	1092	12%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_3_MSA_Chicago_L	8760	4.2	3788	43%
MISO	IP_8_GEN_Clinton_G	7994	PJM	NI_3_MSA_Chicago_L	8760	1.4	1025	12%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	NI_3_MSA_Chicago_L	8760	8.2	6210	71%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_3_MSA_Chicago_L	8760	8.0	2558	29%
MISO	ALTE_2_MSA_Madison_G	8749	PJM	NI_3_MSA_Chicago_L	8760	7.9	4795	55%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_3_MSA_Chicago_L	8760	4.5	2941	33%
MISO	AMRN_12_MSA_StLouis_L	6286	PJM	NI_6_MSA_Chicago_G	1489	9.0	6277	71%
MISO	IP_8_GEN_Clinton_G	7994	PJM	NI_6_MSA_Chicago_G	1489	2.3	462	5%
MISO	ALTE_2_MSA_Madison_G	8749	PJM	NI_6_MSA_Chicago_G	1489	8.7	4518	51%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_6_MSA_Chicago_G	1489	5.1	4033	46%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_6_MSA_Chicago_G	1489	8.9	2536	29%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_6_MSA_Chicago_G	1489	5.4	2964	34%
NYPP	NYISO_6_NYF	7512	NYPP	NYISO_10_NYJ	8760	7.5	8759	100%
NEPOOL	NEPOOL_2_NH	8425	NYPP	NYISO_10_NYJ	8760	9.8	8760	100%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_10_NYJ	8760	21.8	8760	100%
NYPP	NYISO_1_NYA	8292	NYPP	NYISO_10_NYJ	8760	20.4	8759	100%
PJM	PENELEC_2_MSA_DuBois_G	8745	NYPP	NYISO_10_NYJ	8760	19.2	5837	66%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_10_NYJ	8760	3.0	8757	100%
NEPOOL	NEPOOL_3_ME	3787	NYPP	NYISO_10_NYJ	8760	11.2	8760	100%
NEPOOL	NEPOOL_5_SEMA	8739	NYPP	NYISO_10_NYJ	8760	6.8	8760	100%
NEPOOL	NEPOOL_7_CT	7217	NYPP	NYISO_10_NYJ	8760	7.3	8759	100%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_10_NYJ	8760	12.7	8759	100%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_10_NYJ	8760	21.9	8760	100%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_11_NYK	8760	21.5	5838	66%
PJM	PENELEC_2_MSA_DuBois_G	8745	NYPP	NYISO_11_NYK	8760	18.8	5838	66%
NYPP	NYISO_6_NYF	7512	NYPP	NYISO_11_NYK	8760	7.2	8760	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NEPOOL	NEPOOL_3_ME	3787	NYPP	NYISO_11_NYK	8760	10.8	8760	100%
NYPP	NYISO_1_NYA	8292	NYPP	NYISO_11_NYK	8760	20.1	5838	66%
NEPOOL	NEPOOL_5_SEMA	8739	NYPP	NYISO_11_NYK	8760	6.5	8760	100%
NEPOOL	NEPOOL_2_NH	8425	NYPP	NYISO_11_NYK	8760	9.4	8760	100%
NEPOOL	NEPOOL_7_CT	7217	NYPP	NYISO_11_NYK	8760	6.9	8760	100%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_11_NYK	8760	12.3	8760	100%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_11_NYK	8760	2.6	8749	100%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_11_NYK	8760	21.5	5838	66%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_7_NYG	8404	16.2	5801	66%
NYPP	NYISO_1_NYA	8292	NYPP	NYISO_7_NYG	8404	14.7	5700	65%
NEPOOL	NEPOOL_2_NH	8425	NYPP	NYISO_7_NYG	8404	4.1	6318	72%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_7_NYG	8404	16.2	5802	66%
NEPOOL	NEPOOL_7_CT	7217	NYPP	NYISO_7_NYG	8404	1.6	5257	60%
PJM	PENELEC_2_MSA_DuBois_G	8745	NYPP	NYISO_7_NYG	8404	13.5	5769	66%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_7_NYG	8404	7.0	5475	62%
NEPOOL	NEPOOL_3_ME	3787	NYPP	NYISO_7_NYG	8404	5.5	5699	65%
NYPP	NYISO_6_NYF	7512	NYPP	NYISO_7_NYG	8404	1.8	4398	50%
NEPOOL	NEPOOL_5_SEMA	8739	NYPP	NYISO_7_NYG	8404	1.1	5429	62%
NEPOOL	NEPOOL_5_SEMA	8739	NYPP	NYISO_9_NYI	8288	5.6	8670	99%
NEPOOL	NEPOOL_7_CT	7217	NYPP	NYISO_9_NYI	8288	6.1	8599	98%
NEPOOL	NEPOOL_3_ME	3787	NYPP	NYISO_9_NYI	8288	10.0	8751	100%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_9_NYI	8288	1.8	7125	81%
NEPOOL	NEPOOL_2_NH	8425	NYPP	NYISO_9_NYI	8288	8.5	8751	100%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_9_NYI	8288	20.6	5821	66%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_9_NYI	8288	11.4	8675	99%
NYPP	NYISO_1_NYA	8292	NYPP	NYISO_9_NYI	8288	19.2	5780	66%
NYPP	NYISO_6_NYF	7512	NYPP	NYISO_9_NYI	8288	6.3	8625	98%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_9_NYI	8288	20.6	5818	66%
PJM	PENELEC_2_MSA_DuBois_G	8745	NYPP	NYISO_9_NYI	8288	17.9	5767	66%
SPP	AEPW_9_MSA_MountPleasant	8404	SPP	OKGE_4_MSA_OklahomaCity_L	8737	20.6	7126	81%
SPP	WERE_1_MSA_Manhattan_G	8684	SPP	OKGE_4_MSA_OklahomaCity_L	8737	33.8	8204	93%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	AEPW_5_MSA_Tulsa_G	7582	SPP	OKGE_4_MSA_OklahomaCity_L	8737	24.8	6318	72%
ENTERGY	EES_2_MSA_Batesville_G	8743	SPP	OKGE_4_MSA_OklahomaCity_L	8737	21.5	7906	90%
MAPP	NPPD_4_GEN_Gentleman_G	8247	MAPP	OPPD_5_MSA_Omaha_L	8760	8.3	7482	85%
PJM	BGE_7_MSA_Baltimore-Towson	8161	PJM	PECO_5_MSA_Philadelphia_L	6627	7.7	4391	50%
PJM	PJM500_7_MSA_York-Hanover	8760	PJM	PECO_5_MSA_Philadelphia_L	6627	8.3	1968	22%
PJM	PJM500_4_MSA_Philadelphia_G	8645	PJM	PECO_5_MSA_Philadelphia_L	6627	8.0	0	0%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	13.6	7630	87%
PJM	AP_1_County_Harrison_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	13.6	7610	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PEPCO_1_MSA_DC_L	8760	13.1	7593	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_5_MSA_Lancaster_L	8760	12.5	5869	67%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_5_MSA_Lancaster_L	8760	13.1	7248	83%
PJM	PENELEC_2_MSA_DuBois_G	8745	PJM	PL_5_MSA_Lancaster_L	8760	10.5	7727	88%
PJM	PENELEC_2_MSA_DuBois_G	8745	PJM	PL_7_MSA_Allentown_L	8760	10.4	7432	85%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_7_MSA_Allentown_L	8760	12.4	7292	83%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_7_MSA_Allentown_L	8760	13.0	8255	94%
NYPP	NYISO_1_NYA	8292	PJM	PSEG_3_MSA_NewYork_L	8760	12.5	8353	95%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_3_MSA_NewYork_L	8760	4.8	8262	94%
NYPP	NYISO_1_NYA	8292	PJM	PSEG_5_MSA_Philadelphia_L	8760	13.2	8348	95%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_5_MSA_Philadelphia_L	8760	5.4	7883	90%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_8_MSA_NewYork_G	8760	4.7	8181	93%
NYPP	NYISO_1_NYA	8292	PJM	PSEG_8_MSA_NewYork_G	8760	12.5	8148	93%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	SCEG_9_MSA_Charleston_G	8571	1.2	1866	21%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCEG_9_MSA_Charleston_G	8571	1.5	1866	21%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	SCEG_9_MSA_Charleston_G	8571	1.0	1587	18%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	VACAR	SCEG_9_MSA_Charleston_G	8571	1.5	1853	21%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.1	853	10%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.6	4119	47%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.3	4116	47%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.5	1282	15%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.6	4118	47%
VACAR	DUK_9_MSA_Charlotte_G	8549	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	4.0	472	5%
ENERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3.2	474	5%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3.0	143	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	6.7	2147	24%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_10_MSA_Albany-Valdo	7847	6.1	228	3%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	7473	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	1.8	525	6%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3.2	146	2%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3.5	224	3%
VACAR	SCEG_1_MSA_Columbia_G	7998	SOUTHERN	SOCO_10_MSA_Albany-Valdo	7847	1.5	354	4%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8507	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	7847	3.4	215	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	2.9	103	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	3.5	1555	18%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_17_MSA_Mobile_G	6866	2.8	3405	39%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_17_MSA_Mobile_G	6866	2.2	3024	34%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_21_MSA_Atlanta_G	8716	2.7	94	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_21_MSA_Atlanta_G	8716	3.3	1947	22%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3.5	1670	19%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	2.9	219	2%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.0	389	4%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.7	1764	20%
VACAR	DUK_9_MSA_Charlotte_G	8549	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	1.1	314	4%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	3.1	83	1%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	3.7	1393	16%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	3.5	1651	19%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8754	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	2.9	219	2%
MISO	EKPC_8_MSA_Maysville_G	8760	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	1.1	2173	25%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	6.0	5050	57%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	8.2	6728	77%
MISO	EKPC_8_MSA_Maysville_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	3.3	1444	16%
ENTERGY	EES_2_MSA_Batesville_G	8743	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	1.1	2464	28%
MISO	BREC_3_County_Webster_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	11.2	7262	83%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	5.1	2808	32%
PJM	AEP_8_GEN_Amos01_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	2.4	2876	33%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	TVAUTHOR	TVA_5_MSA_Nashville_L	8646	1.1	0	0%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_7_MSA_Memphis_L	8753	7.2	5507	63%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AEP_8_GEN_Amos01_G	8760	TVAUTHOR	TVA_7_MSA_Memphis_L	8753	1.5	864	10%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	14.6	7929	90%
VACAR	CPL_1_MSA_Durham_G	7930	PJM	VAP_15_MSA_VB-Norfolk_L	8760	8.0	6562	75%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	8.5	7645	87%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_15_MSA_VB-Norfolk_L	8760	8.0	7675	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	8.5	7705	88%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_27_MSA_DC_L	8760	18.2	7965	91%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_27_MSA_DC_L	8760	2.6	2897	33%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_27_MSA_DC_L	8760	11.6	7547	86%
PJM	VAP_7_G	6600	PJM	VAP_27_MSA_DC_L	8760	4.2	5383	61%
VACAR	CPL_1_MSA_Durham_G	7930	PJM	VAP_27_MSA_DC_L	8760	11.6	7450	85%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_27_MSA_DC_L	8760	12.1	7573	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_27_MSA_DC_L	8760	12.1	7601	87%
PJM	VAP_7_G	6600	PJM	VAP_33_MSA_DC_L	8760	4.4	5401	61%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_33_MSA_DC_L	8760	2.7	3574	41%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_33_MSA_DC_L	8760	12.2	7624	87%
VACAR	CPL_1_MSA_Durham_G	7930	PJM	VAP_33_MSA_DC_L	8760	11.7	7618	87%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_33_MSA_DC_L	8760	12.2	7707	88%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_33_MSA_DC_L	8760	18.3	8060	92%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_33_MSA_DC_L	8760	11.7	7705	88%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_7_G	2160	19.6	5807	66%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_7_G	2160	25.7	6065	69%
PJM	PJM500_5_MSA_DC_G	8760	PJM	VAP_7_G	2160	5.3	5141	59%
PJM	PJM500_4_MSA_Philadelphia_G	8645	PJM	VAP_7_G	2160	5.2	5728	65%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_7_G	2160	10.1	5479	62%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_7_G	2160	19.1	7205	82%
VACAR	CPL_1_MSA_Durham_G	7930	PJM	VAP_7_G	2160	19.1	5410	62%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_7_G	2160	19.6	7148	81%
PJM	PJM500_7_MSA_York-Hanover_G	8760	PJM	VAP_7_G	2160	5.5	6187	70%
SPP	KACP_4_MSA_KansasCity_G	7896	SPP	WERE_4_GEN_Wolfcreek_G	4506	41.9	7403	84%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	SPP	WERE_4_GEN_Wolfcreek_G	4506	11.0	7927	90%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SPP	WERE_1_MSA_Manhattan_G	8684	SPP	WERE_4_GEN_Wolfcreek_G	4506	19.3	1483	17%
SPP	AEPW_5_MSA_Tulsa_G	7582	SPP	WERE_4_GEN_Wolfcreek_G	4506	10.3	4447	51%
MAPP	NPPD_4_GEN_Gentleman_G	8247	SPP	WERE_4_GEN_Wolfcreek_G	4506	41.3	8717	99%
MISO	OTP_9_GEN_BigStone_G	8640	MISO	XEL_3_MSA_Minneapolis_G	5869	36.1	8647	98%
MISO	ALTE_2_MSA_Madison_G	8749	MISO	XEL_3_MSA_Minneapolis_G	5869	12.6	3293	37%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	3.8	4673	53%
PJM	NI_6_MSA_Chicago_G	7988	PJM	AEP_1_MSA_Lynchburg_G	8760	3.6	4687	53%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	7.3	5854	67%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_1_MSA_Lynchburg_G	8760	9.5	5687	65%
PJM	NI_20_MSA_Chicago_G	7900	PJM	AEP_1_MSA_Lynchburg_G	8760	3.9	4663	53%
MISO	NIPS_8_MSA_Chicago_G	8692	PJM	AEP_1_MSA_Lynchburg_G	8760	4.0	4403	50%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_1_MSA_Lynchburg_G	8760	3.3	6977	79%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	AEP_1_MSA_Lynchburg_G	8760	9.2	7617	87%
PJM	NI_20_MSA_Chicago_G	7900	PJM	AEP_2_STA_TN-WV_L	8760	3.3	1433	16%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	3.3	1350	15%
PJM	NI_6_MSA_Chicago_G	7988	PJM	AEP_2_STA_TN-WV_L	8760	3.0	1364	16%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	6.8	4048	46%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_2_STA_TN-WV_L	8760	9.0	3712	42%
MISO	NIPS_8_MSA_Chicago_G	8692	PJM	AEP_2_STA_TN-WV_L	8760	3.5	1022	12%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	AEP_2_STA_TN-WV_L	8760	8.7	6695	76%
MISO	LGEE_3_GEN_Gehrt2_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	3.0	4876	56%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_2_STA_TN-WV_L	8760	2.7	6236	71%
PJM	NI_2_MSA_Chicago_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.8	1955	22%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	AEP_9_MSA_Canton-Massillon_L	8760	9.2	6851	78%
MISO	IPL_2_MSA_Jasper_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.2	6369	73%
PJM	NI_6_MSA_Chicago_G	7988	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.5	1961	22%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	AEP_9_MSA_Canton-Massillon_L	8760	7.3	4305	49%
PJM	NI_15_MSA_Davenport_G	8712	PJM	AEP_9_MSA_Canton-Massillon_L	8760	9.5	4503	51%
PJM	NI_20_MSA_Chicago_G	7900	PJM	AEP_9_MSA_Canton-Massillon_L	8760	3.8	2086	24%
MISO	NIPS_8_MSA_Chicago_G	8692	PJM	AEP_9_MSA_Canton-Massillon_L	8760	4.0	1193	14%
PJM	NI_20_MSA_Chicago_G	7900	MISO	AMRN_12_MSA_StLouis_L	2475	3.8	1398	16%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MAPP	MEC_3_MSA_DesMoines_G	8494	MISO	AMRN_12_MSA_StLouis_L	2475	15.9	2977	34%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_12_MSA_StLouis_L	2475	9.4	3311	38%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_12_MSA_StLouis_L	2475	7.2	4187	48%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	MISO	AMRN_12_MSA_StLouis_L	2475	3.8	2207	25%
PJM	NI_6_MSA_Chicago_G	7988	MISO	AMRN_12_MSA_StLouis_L	2475	3.5	1856	21%
PJM	NI_2_MSA_Chicago_G	8760	MISO	AMRN_12_MSA_StLouis_L	2475	3.7	1832	21%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	AMRN_12_MSA_StLouis_L	2475	3.1	6136	70%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_12_MSA_StLouis_L	2475	7.3	0	0%
MISO	IP_8_GEN_Clinton_G	8009	MISO	AMRN_12_MSA_StLouis_L	2475	4.5	492	6%
PJM	NI_7_MSA_Rochelle_G	8760	MISO	AMRN_2_County_Macon_L	8760	3.5	5351	61%
MISO	AMRN_12_MSA_StLouis_L	6285	MISO	AMRN_2_County_Macon_L	8760	5.5	4660	53%
PJM	NI_15_MSA_Davenport_G	8712	MISO	AMRN_2_County_Macon_L	8760	5.7	4808	55%
MISO	IP_7_GEN_Baldwin_G	8760	MISO	AMRN_2_County_Macon_L	8760	3.6	5263	60%
MAPP	MEC_3_MSA_DesMoines_G	8494	MISO	AMRN_2_County_Macon_L	8760	12.2	5064	58%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_2_GEN_Albright3_L	8760	1.1	4094	47%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_2_GEN_Albright3_L	8760	1.3	5794	66%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	5.3	7460	85%
MISO	FE_9_MSA>Weirton_G	8741	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	7.9	7753	88%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	7.9	7758	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	5.0	7447	85%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	1.1	4972	57%
PJM	VAP_7_G	7408	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	3.2	5773	66%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	5.6	7492	85%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	8.2	7947	90%
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_7_MSA_Hagerstown-Martinsburg_L	8760	8.0	7778	89%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	DLCO_7_MSA_Pittsburgh_G	8232	PJM	AP_8_MSA_DC-VA-MD_L	8760	8.4	7938	90%
MISO	FE_6_MSA_Pittsburgh_G	8592	PJM	AP_8_MSA_DC-VA-MD_L	8760	8.3	7908	90%
MISO	FE_9_MSA>Weirton_G	8741	PJM	AP_8_MSA_DC-VA-MD_L	8760	8.3	7897	90%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	5.7	7701	88%
PJM	AP_1_County_Harrison_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	6.0	7665	87%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	8.6	7989	91%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	AP_8_MSA_DC-VA-MD_L	8760	5.5	7695	88%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	AP_8_MSA_DC-VA-MD_L	8760	1.5	4368	50%
PJM	VAP_7_G	7408	PJM	AP_8_MSA_DC-VA-MD_L	8760	3.6	5923	67%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	6.0	7692	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_10_MSA_Baltimore-Towson_L	8760	6.3	7733	88%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	5.9	7691	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_5_MSA_Baltimore-Towson_L	8760	6.2	7736	88%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	6.5	7747	88%
PJM	PJM500_4_MSA_Philadelphia_G	8702	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	1.0	7309	83%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	BGE_9_MSA_Baltimore-Towson_L	8760	6.3	7715	88%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.1	3051	35%
MISO	NIPS_8_MSA_Chicago_G	8692	MISO	CIN_1_MSA_Indianapolis_L	8760	2.0	1224	14%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.2	3135	36%
MISO	LGEE_3_GEN_Gehnt2_G	8760	MISO	CIN_1_MSA_Indianapolis_L	8760	1.5	4711	54%
MISO	AMRN_12_MSA_StLouis_L	6285	MISO	CIN_1_MSA_Indianapolis_L	8760	7.2	4567	52%
MISO	EKPC_8_MSA_Maysville_G	8760	MISO	CIN_4_MSA_Cincinnati-Middletown_G	6707	1.1	498	6%
MISO	NIPS_8_MSA_Chicago_G	8692	MISO	CIN_7_MSA_Lafayette_L	8760	1.2	960	11%
PJM	VAP_7_G	7408	VACAR	CPL_1_MSA_Durham_G	1223	2.2	5404	62%
VACAR	DUK_5_MSA_Seneca_G	7069	VACAR	CPL_1_MSA_Durham_G	1223	1.6	4432	50%
VACAR	DUK_9_MSA_Charlotte_G	8549	VACAR	CPL_1_MSA_Durham_G	1223	4.6	600	7%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
VACAR	SCEG_1_MSA_Columbia_G	8403	VACAR	CPLE_1_MSA_Durham_G	1223	3.0	2127	24%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	CPLE_1_MSA_Durham_G	1223	3.8	1892	22%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	CPLE_1_MSA_Durham_G	1223	7.2	6719	76%
VACAR	DUK_9_MSA_Charlotte_G	8549	VACAR	DUK_4_MSA_Greenville_L	7764	1.3	25	0%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	VACAR	DUK_4_MSA_Greenville_L	7764	1.6	4035	46%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	DUK_4_MSA_Greenville_L	7764	1.7	4013	46%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	DUK_4_MSA_Greenville_L	7764	1.0	1051	12%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	VACAR	DUK_4_MSA_Greenville_L	7764	1.5	4119	47%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_4_MSA_Greenville_L	7764	3.9	5013	57%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_8_MSA_Charlotte_L	8760	3.1	3953	45%
PJM	AEP_8_GEN_Amos01_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	19.9	4230	48%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	VACAR	DUK_9_MSA_Charlotte_G	211	17.5	2412	27%
VACAR	CPLE_1_MSA_Durham_G	7537	VACAR	DUK_9_MSA_Charlotte_G	211	16.5	230	3%
VACAR	DUK_5_MSA_Seneca_G	7069	VACAR	DUK_9_MSA_Charlotte_G	211	14.3	16	0%
VACAR	SCEG_1_MSA_Columbia_G	8403	VACAR	DUK_9_MSA_Charlotte_G	211	15.7	226	3%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	VACAR	DUK_9_MSA_Charlotte_G	211	17.6	2472	28%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	16.9	752	9%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	17.6	2546	29%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	DUK_9_MSA_Charlotte_G	211	17.0	1243	14%
ENTERGY	EES_9_MSA_Russellville_G	3149	ENTERGY	EES_1_MSA_Jackson_L	8760	5.2	2669	30%
SPP	AEPW_5_MSA_Tulsa_G	7180	ENTERGY	EES_1_MSA_Jackson_L	8760	5.4	2806	32%
SPP	AEPW_9_MSA_MountPleasant	7212	ENTERGY	EES_1_MSA_Jackson_L	8760	2.2	8706	99%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.3	6911	79%
SPP	AEPW_5_MSA_Tulsa_G	7180	ENTERGY	EES_5_MSA_NewOrleans_G	8760	11.1	7060	80%
ENTERGY	EES_7_MSA_Beaumont-PortArt	2674	ENTERGY	EES_5_MSA_NewOrleans_G	8760	2.0	6655	76%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	2.8	7109	81%
SPP	CELE_10_MSA_Alexandria_G	8344	ENTERGY	EES_5_MSA_NewOrleans_G	8760	4.0	6855	78%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	2.7	7124	81%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_8_MSA_BatonRouge_G	8496	ENTERGY	EES_5_MSA_NewOrleans_G	8760	5.8	5468	62%
ENTERGY	EES_4_GEN_Ouachita_G	6307	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.9	6656	76%
ENTERGY	EES_9_MSA_Russellville_G	3149	ENTERGY	EES_5_MSA_NewOrleans_G	8760	10.9	7036	80%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_5_MSA_NewOrleans_G	8760	5.1	6691	76%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	5.7	6651	76%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.4	7091	81%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	ENTERGY	EES_5_MSA_NewOrleans_G	8760	3.5	7085	81%
SPP	AEPW_9_MSA_MountPleasant_	7212	ENTERGY	EES_5_MSA_NewOrleans_G	8760	7.9	8709	99%
ENTERGY	EES_9_MSA_Russellville_G	3149	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6086	5.8	6993	80%
SPP	AEPW_9_MSA_MountPleasant_	7212	ENTERGY	EES_7_MSA_Beaumont-PortA	6086	2.8	8707	99%
SPP	AEPW_5_MSA_Tulsa_G	7180	ENTERGY	EES_7_MSA_Beaumont-PortArthur_G	6086	6.0	4079	46%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	ENTERGY	EES_9_MSA_Russellville_G	5611	2.2	2181	25%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	ENTERGY	EES_9_MSA_Russellville_G	5611	2.1	1112	13%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	ENTERGY	EES_9_MSA_Russellville_G	5611	1.0	0	0%
ENTERGY	LAGN_1_MSA_BatonRouge_G	8760	ENTERGY	EES_9_MSA_Russellville_G	5611	1.7	0	0%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	ENTERGY	EES_9_MSA_Russellville_G	5611	5.1	2816	32%
ENTERGY	EES_2_MSA_Batesville_G	8743	ENTERGY	EES_9_MSA_Russellville_G	5611	2.8	1775	20%
SPP	AEPW_9_MSA_MountPleasant_	7212	ENTERGY	EES_9_MSA_Russellville_G	5611	3.8	8707	99%
SPP	AEPW_5_MSA_Tulsa_G	7180	ENTERGY	EES_9_MSA_Russellville_G	5611	7.0	280	3%
PJM	AEP_8_GEN_Amos01_G	8760	MISO	FE_5_MSA_Cleveland_L	8355	1.1	4706	54%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	3.7	4002	46%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	FRCC	FPC_3_MSA_Orlando_L	8760	4.3	4006	46%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	FRCC	FPC_3_MSA_Orlando_L	8760	4.2	4183	48%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	3.8	4017	46%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_3_MSA_Orlando_L	8760	4.4	4010	46%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	FRCC	FPC_4_MSA_Tampa_L	8760	4.8	4487	51%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	4.2	4350	50%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	4.9	4354	50%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	FRCC	FPC_4_MSA_Tampa_L	8760	4.9	4353	50%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPC_4_MSA_Tampa_L	8760	4.3	4352	50%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_2_MSA_FortMyers_G	8680	1.2	5035	57%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	FRCC	FPL_2_MSA_FortMyers_G	8680	5.4	4773	54%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8680	4.8	4764	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8680	4.8	4769	54%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_2_MSA_FortMyers_G	8680	5.5	4774	54%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	FRCC	FPL_2_MSA_FortMyers_G	8680	5.3	4890	56%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_3_MSA_Miami_L	8760	1.5	5120	58%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	5.8	4680	53%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	FRCC	FPL_3_MSA_Miami_L	8760	5.7	4680	53%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	5.1	4671	53%
FRCC	SEC_6_MSA_Palatka_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	1.0	4854	55%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	FRCC	FPL_3_MSA_Miami_L	8760	5.6	4791	55%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_3_MSA_Miami_L	8760	5.1	4673	53%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	FRCC	FPL_7_MSA_Miami_L	8760	5.6	4820	55%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	5.0	4707	54%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	5.7	4716	54%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	FRCC	FPL_7_MSA_Miami_L	8760	5.1	4710	54%
FRCC	FPC_2_MSA_HomosassaSpring	8544	FRCC	FPL_7_MSA_Miami_L	8760	1.5	5182	59%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	FRCC	FPL_7_MSA_Miami_L	8760	5.7	4714	54%
MISO	XEL_3_MSA_Minneapolis_G	2949	MISO	GRE_4_MSA_Minneapolis_L	8760	10.4	6	0%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_11_G	8760	1.7	5943	68%
NYPP	NYISO_4_NYD	7592	ONTARIO	IESO_11_G	8760	16.0	8087	92%
MISO	ITC_3_MSA_Detroit_G	8744	ONTARIO	IESO_11_G	8760	1.3	7608	87%
NYPP	NYISO_4_NYD	7592	ONTARIO	IESO_15_G	8760	15.8	8087	92%
MISO	ITC_3_MSA_Detroit_G	8744	ONTARIO	IESO_15_G	8760	1.2	7005	80%
MISO	ITC_7_MSA_Monroe_G	8472	ONTARIO	IESO_15_G	8760	1.6	5771	66%
NYPP	NYISO_4_NYD	7592	ONTARIO	IESO_2_G	6738	14.4	8222	94%
NYPP	NYISO_4_NYD	7592	ONTARIO	IESO_3_L	8760	15.2	8090	92%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.4	2888	33%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_5_MSA_Indianapolis_L	8760	1.3	6004	68%
MISO	IPL_2_MSA_Jasper_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	1.4	2944	34%
MISO	CIN_8_MSA_Evansville_G	8760	MISO	IPL_8_MSA_Indianapolis_L	8760	1.3	6099	69%
SPP	WERE_1_MSA_Manhattan_G	8145	SPP	KACP_7_MSA_KansasCity_L	8760	3.5	893	10%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_8_MSA_BayCity_G	8013	6.5	5238	60%
MISO	WEC_1_MSA_Chicago_G	8592	MISO	METC_9_MSA_Kalamazoo_L	8760	6.1	4717	54%
NYPP	NYISO_1_NYA	8298	NEPOOL	NEPOOL_10_RI	6733	4.5	6038	69%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_10_RI	6733	2.0	8758	100%
NEPOOL	NEPOOL_3_ME	3832	NEPOOL	NEPOOL_10_RI	6733	2.8	6752	77%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_10_RI	6733	20.9	8757	100%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_3_ME	4928	15.6	8605	98%
NEPOOL	NEPOOL_2_NH	8300	NEPOOL	NEPOOL_4_NEBOS	8717	1.4	6761	77%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_4_NEBOS	8717	21.3	8611	98%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_4_NEBOS	8717	2.4	8758	100%
NYPP	NYISO_1_NYA	8298	NEPOOL	NEPOOL_4_NEBOS	8717	4.9	6038	69%
NEPOOL	NEPOOL_3_ME	3832	NEPOOL	NEPOOL_4_NEBOS	8717	3.2	6769	77%
NEPOOL	NEPOOL_2_NH	8300	NEPOOL	NEPOOL_6_WCMA	8556	1.5	6912	79%
NEPOOL	NEPOOL_3_ME	3832	NEPOOL	NEPOOL_6_WCMA	8556	3.3	6900	79%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_6_WCMA	8556	21.4	8611	98%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_6_WCMA	8556	2.5	8578	98%
NYPP	NYISO_1_NYA	8298	NEPOOL	NEPOOL_6_WCMA	8556	5.0	6043	69%
NEPOOL	NEPOOL_2_NH	8300	NEPOOL	NEPOOL_7_CT	1734	4.4	7608	87%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_7_CT	1734	24.3	8759	100%
NYPP	NYISO_6_NYF	7760	NEPOOL	NEPOOL_7_CT	1734	3.7	8756	100%
NYPP	NYISO_1_NYA	8298	NEPOOL	NEPOOL_7_CT	1734	7.9	6043	69%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_7_CT	1734	5.4	8758	100%
NEPOOL	NEPOOL_5_SEMA	8757	NEPOOL	NEPOOL_7_CT	1734	3.0	2790	32%
NEPOOL	NEPOOL_3_ME	3832	NEPOOL	NEPOOL_7_CT	1734	6.2	7583	86%
NYPP	NYISO_8_NYH	8760	NEPOOL	NEPOOL_7_CT	1734	1.3	8754	100%
NYPP	NYISO_6_NYF	7760	NEPOOL	NEPOOL_9_NWKST	8760	2.0	8760	100%
NEPOOL	NEPOOL_5_SEMA	8757	NEPOOL	NEPOOL_9_NWKST	8760	1.2	8759	100%
NYPP	NYISO_4_NYD	7592	NEPOOL	NEPOOL_9_NWKST	8760	22.5	8760	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NEPOOL	NEPOOL_3_ME	3832	NEPOOL	NEPOOL_9_NWKST	8760	4.4	8758	100%
NYPP	NYISO_1_NYA	8298	NEPOOL	NEPOOL_9_NWKST	8760	6.1	6047	69%
NEPOOL	NEPOOL_2_NH	8300	NEPOOL	NEPOOL_9_NWKST	8760	2.6	8759	100%
NYPP	NYISO_3_NYC	8760	NEPOOL	NEPOOL_9_NWKST	8760	3.6	8760	100%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_13_MSA_Chicago_L	8760	5.6	3352	38%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_13_MSA_Chicago_L	8760	3.4	3339	38%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_13_MSA_Chicago_L	8760	2.0	4176	48%
MISO	ALTE_2_MSA_Madison_G	8746	PJM	NI_13_MSA_Chicago_L	8760	5.6	5204	59%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	NI_13_MSA_Chicago_L	8760	5.3	6674	76%
MISO	ALTE_2_MSA_Madison_G	8746	PJM	NI_3_MSA_Chicago_L	8760	5.5	5204	59%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_3_MSA_Chicago_L	8760	1.9	3825	44%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_3_MSA_Chicago_L	8760	5.5	3369	38%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_3_MSA_Chicago_L	8760	3.3	3369	38%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	NI_3_MSA_Chicago_L	8760	5.2	6630	75%
PJM	NI_15_MSA_Davenport_G	8712	PJM	NI_6_MSA_Chicago_G	772	4.8	3363	38%
PJM	NI_7_MSA_Rochelle_G	8760	PJM	NI_6_MSA_Chicago_G	772	2.7	3402	39%
MISO	AMRN_12_MSA_StLouis_L	6285	PJM	NI_6_MSA_Chicago_G	772	4.6	6668	76%
MISO	WEC_1_MSA_Chicago_G	8592	PJM	NI_6_MSA_Chicago_G	772	1.2	4173	48%
MISO	ALTE_2_MSA_Madison_G	8746	PJM	NI_6_MSA_Chicago_G	772	4.8	4782	54%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_1_NYA	462	11.2	8081	92%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_10_NYJ	8760	24.1	8759	100%
NEPOOL	NEPOOL_7_CT	7026	NYPP	NYISO_10_NYJ	8760	2.5	8759	100%
NEPOOL	NEPOOL_3_ME	3832	NYPP	NYISO_10_NYJ	8760	6.0	8760	100%
NEPOOL	NEPOOL_2_NH	8300	NYPP	NYISO_10_NYJ	8760	4.2	8760	100%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_10_NYJ	8760	1.2	8758	100%
NEPOOL	NEPOOL_5_SEMA	8757	NYPP	NYISO_10_NYJ	8760	2.8	8760	100%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_10_NYJ	8760	8.4	8760	100%
NYPP	NYISO_1_NYA	8298	NYPP	NYISO_10_NYJ	8760	7.8	8759	100%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_10_NYJ	8760	8.4	8759	100%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_10_NYJ	8760	5.2	8760	100%
PJM	PENELEC_2_MSA_DuBois_G	8368	NYPP	NYISO_10_NYJ	8760	6.5	6039	69%
ONTARIO	IESO_2_G	2022	NYPP	NYISO_10_NYJ	8760	4.0	8760	100%
NYPP	NYISO_6_NYF	7760	NYPP	NYISO_10_NYJ	8760	3.6	8760	100%
NEPOOL	NEPOOL_5_SEMA	8757	NYPP	NYISO_11_NYK	8760	3.4	8760	100%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_11_NYK	8760	5.8	8760	100%
NEPOOL	NEPOOL_3_ME	3832	NYPP	NYISO_11_NYK	8760	6.6	8760	100%
ONTARIO	IESO_2_G	2022	NYPP	NYISO_11_NYK	8760	4.5	6040	69%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_11_NYK	8760	24.7	8760	100%
NEPOOL	NEPOOL_7_CT	7026	NYPP	NYISO_11_NYK	8760	3.1	8760	100%
NYPP	NYISO_8_NYH	8760	NYPP	NYISO_11_NYK	8760	1.7	8756	100%
NEPOOL	NEPOOL_2_NH	8300	NYPP	NYISO_11_NYK	8760	4.8	8760	100%
NYPP	NYISO_1_NYA	8298	NYPP	NYISO_11_NYK	8760	8.3	6040	69%
PJM	PENELEC_2_MSA_DuBois_G	8368	NYPP	NYISO_11_NYK	8760	7.0	6040	69%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_11_NYK	8760	9.0	6040	69%
NYPP	NYISO_6_NYF	7760	NYPP	NYISO_11_NYK	8760	4.1	8760	100%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_11_NYK	8760	9.0	6040	69%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_2_NYB	8760	15.9	7958	91%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_6_NYF	1000	15.1	8632	98%
NEPOOL	NEPOOL_3_ME	3832	NYPP	NYISO_7_NYG	8191	3.4	5819	66%
PJM	PENELEC_2_MSA_DuBois_G	8368	NYPP	NYISO_7_NYG	8191	3.8	5983	68%
NEPOOL	NEPOOL_2_NH	8300	NYPP	NYISO_7_NYG	8191	1.6	6368	72%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_7_NYG	8191	2.6	5530	63%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_7_NYG	8191	21.5	5757	66%
NYPP	NYISO_1_NYA	8298	NYPP	NYISO_7_NYG	8191	5.1	5925	67%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_7_NYG	8191	5.8	6005	68%
ONTARIO	IESO_2_G	2022	NYPP	NYISO_7_NYG	8191	1.3	6017	68%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_7_NYG	8191	5.8	6005	68%
NYPP	NYISO_1_NYA	8298	NYPP	NYISO_9_NYI	8288	7.2	5996	68%
NYPP	NYISO_4_NYD	7592	NYPP	NYISO_9_NYI	8288	23.6	8733	99%
NYPP	NYISO_6_NYF	7760	NYPP	NYISO_9_NYI	8288	3.0	8596	98%
NEPOOL	NEPOOL_2_NH	8300	NYPP	NYISO_9_NYI	8288	3.7	8731	99%
NYPP	NYISO_3_NYC	8760	NYPP	NYISO_9_NYI	8288	4.7	8671	99%
NEPOOL	NEPOOL_5_SEMA	8757	NYPP	NYISO_9_NYI	8288	2.3	8602	98%
PJM	PENELEC_2_MSA_DuBois_G	8368	NYPP	NYISO_9_NYI	8288	5.9	5987	68%
NEPOOL	NEPOOL_7_CT	7026	NYPP	NYISO_9_NYI	8288	2.0	8512	97%
NEPOOL	NEPOOL_3_ME	3832	NYPP	NYISO_9_NYI	8288	5.5	8730	99%
ONTARIO	IESO_7_G	8760	NYPP	NYISO_9_NYI	8288	7.9	6021	69%
ONTARIO	IESO_6_G	8760	NYPP	NYISO_9_NYI	8288	7.9	6021	69%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ONTARIO	IESO_2_G	2022	NYPP	NYISO_9_NYI	8288	3.4	6022	69%
ENTERGY	EES_9_MSA_Russellville_G	3149	SPP	OKGE_4_MSA_OklahomaCity_L	8719	14.9	7130	81%
ENTERGY	EES_2_MSA_Batesville_G	8743	SPP	OKGE_4_MSA_OklahomaCity_L	8719	10.8	7579	86%
SPP	AEPW_5_MSA_Tulsa_G	7180	SPP	OKGE_4_MSA_OklahomaCity_L	8719	15.0	6322	72%
SPP	WERE_1_MSA_Manhattan_G	8145	SPP	OKGE_4_MSA_OklahomaCity_L	8719	16.5	8397	96%
SPP	AEPW_9_MSA_MountPleasant	7212	SPP	OKGE_4_MSA_OklahomaCity_L	8719	11.8	6538	74%
MAPP	NPPD_4_GEN_Gentleman_G	8235	MAPP	OPPD_5_MSA_Omaha_L	8760	6.1	7769	88%
PJM	PJM500_7_MSA_York-Hanover	8760	PJM	PECO_5_MSA_Philadelphia_L	7264	2.1	977	11%
PJM	PJM500_4_MSA_Philadelphia_G	8702	PJM	PECO_5_MSA_Philadelphia_L	7264	2.3	0	0%
PJM	AP_1_County_Harrison_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	6.7	7511	86%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PEPCO_1_MSA_DC_L	8760	6.4	7514	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PEPCO_1_MSA_DC_L	8760	6.1	7503	85%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_5_MSA_Lancaster_L	8760	5.3	7044	80%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_5_MSA_Lancaster_L	8760	5.0	5819	66%
PJM	PENELEC_2_MSA_DuBois_G	8368	PJM	PL_5_MSA_Lancaster_L	8760	4.3	7397	84%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	PL_7_MSA_Allentown_L	8760	5.1	8234	94%
PJM	PENELEC_2_MSA_DuBois_G	8368	PJM	PL_7_MSA_Allentown_L	8760	4.1	7335	84%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	PL_7_MSA_Allentown_L	8760	4.8	7379	84%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_3_MSA_NewYork_L	8760	3.2	8194	93%
NYPP	NYISO_4_NYD	7592	PJM	PSEG_3_MSA_NewYork_L	8760	22.1	8338	95%
NYPP	NYISO_1_NYA	8298	PJM	PSEG_3_MSA_NewYork_L	8760	5.7	8174	93%
NYPP	NYISO_6_NYF	7760	PJM	PSEG_3_MSA_NewYork_L	8760	1.5	8206	93%
NYPP	NYISO_4_NYD	7592	PJM	PSEG_5_MSA_Philadelphia_L	8760	22.4	8330	95%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_5_MSA_Philadelphia_L	8760	3.5	7891	90%
NYPP	NYISO_1_NYA	8298	PJM	PSEG_5_MSA_Philadelphia_L	8760	6.0	8152	93%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
NYPP	NYISO_6_NYF	7760	PJM	PSEG_5_MSA_Philadelphia_L	8760	1.8	8260	94%
NYPP	NYISO_6_NYF	7760	PJM	PSEG_8_MSA_NewYork_G	8758	1.5	8051	92%
NYPP	NYISO_4_NYD	7592	PJM	PSEG_8_MSA_NewYork_G	8758	22.1	8372	95%
NYPP	NYISO_3_NYC	8760	PJM	PSEG_8_MSA_NewYork_G	8758	3.2	8087	92%
NYPP	NYISO_1_NYA	8298	PJM	PSEG_8_MSA_NewYork_G	8758	5.7	8110	92%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	VACAR	SCEG_9_MSA_Charleston_G	8736	1.4	2293	26%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	VACAR	SCEG_9_MSA_Charleston_G	8736	1.3	2502	28%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCEG_9_MSA_Charleston_G	8736	1.5	2313	26%
VACAR	SCPSA_10_MSA_Charleston_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.5	1827	21%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.6	4390	50%
SOUTHERN	SOCO_26_MSA_Macon_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.0	1156	13%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.7	4387	50%
SOUTHERN	SOCO_31_MSA_Atlanta_G	8760	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.1	4423	50%
VACAR	CPLE_1_MSA_Durham_G	7537	VACAR	SCPSA_2_MSA_Charleston_L	8760	1.5	2299	26%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	VACAR	SCPSA_2_MSA_Charleston_L	8760	2.5	4755	54%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	4.4	2388	27%
VACAR	DUK_9_MSA_Charlotte_G	8549	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	1.2	596	7%
ENTERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	9.1	3200	36%
SOUTHERN	SOCO_28_MSA_Birmingham_G	8760	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	1.6	526	6%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENTERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	2.0	1249	14%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	3.2	947	11%
SOUTHERN	SOCO_15_MSA_Birmingham_G	8553	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	1.5	511	6%
SOUTHERN	SOCO_32_MSA_Pascagoula_G	8204	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	1.4	827	9%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_10_MSA_Albany-Valdosta_L	8122	4.3	530	6%
ENTERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	1.2	1039	12%
ENTERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	8.2	3082	35%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	2.4	605	7%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	3.5	1564	18%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_16_MSA_Atlanta_L	8760	3.4	197	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_17_MSA-Mobile_G	7920	1.9	3018	34%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_17_MSA-Mobile_G	7920	1.8	2890	33%
ENTERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_17_MSA-Mobile_G	7920	6.6	3141	36%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3.1	207	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	3.2	1961	22%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	2.1	595	7%
ENTERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_21_MSA_Atlanta_G	8631	7.9	3045	35%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
ENERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	8.3	3305	38%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3.5	613	7%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	3.6	1976	22%
ENERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	2.4	1061	12%
ENERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_33_MSA_Atlanta_L	8760	1.2	1365	16%
ENERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	2.6	987	11%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.7	1853	21%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	3.6	593	7%
ENERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	8.4	3233	37%
ENERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_5_GEN_GEPCHY_L	8760	1.4	1890	22%
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_6_MSA_Augusta-Richm	8760	3.4	134	2%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	3.5	1297	15%
ENERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	2.4	529	6%
ENERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	1.2	1632	19%
ENERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_6_MSA_Augusta-Richmond_L	8760	8.2	2847	32%
ENERGY	EES_9_MSA_Russellville_G	3149	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	8.3	3298	38%
ENERGY	EES_4_GEN_Ouachita_G	6307	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	1.2	1377	16%
TVAUTHOR	TVA_4_MSA_Clarksville_G	8592	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	3.6	1934	22%

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Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
TVAUTHOR	TVA_1_MSA_Chatt-Hunts_G	8756	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	3.5	603	7%
ENTERGY	EES_10_MSA_Vicksburg_G	8064	SOUTHERN	SOCO_8_MSA_Atlanta_L	8760	2.4	1062	12%
ENTERGY	EES_9_MSA_Russellville_G	3149	TVAUTHOR	TVA_3_MSA_Knoxville_L	8760	2.7	2967	34%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	2.8	5473	62%
MISO	BREC_3_County_Webster_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	2.9	6069	69%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	3.1	2455	28%
ENTERGY	EES_9_MSA_Russellville_G	3149	TVAUTHOR	TVA_5_MSA_Nashville_L	8689	4.9	2889	33%
ENTERGY	EES_9_MSA_Russellville_G	3149	TVAUTHOR	TVA_7_MSA_Memphis_L	8714	4.8	1044	12%
MISO	LGEE_3_GEN_Gehnt2_G	8760	TVAUTHOR	TVA_7_MSA_Memphis_L	8714	2.7	4945	56%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	3.9	7585	86%
PJM	VAP_7_G	7408	PJM	VAP_15_MSA_VB-Norfolk_L	8760	1.8	5870	67%
VACAR	CPLE_1_MSA_Durham_G	7537	PJM	VAP_15_MSA_VB-Norfolk_L	8760	3.3	6460	74%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_15_MSA_VB-Norfolk_L	8760	3.6	7557	86%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	6.7	7842	89%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_15_MSA_VB-Norfolk_L	8760	4.1	7391	84%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_27_MSA_DC_L	8760	5.3	7569	86%
PJM	VAP_7_G	7408	PJM	VAP_27_MSA_DC_L	8760	3.2	5847	67%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_27_MSA_DC_L	8760	1.1	3375	38%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_27_MSA_DC_L	8760	8.1	7841	89%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_27_MSA_DC_L	8760	5.5	7564	86%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_27_MSA_DC_L	8760	5.0	7472	85%
VACAR	CPLE_1_MSA_Durham_G	7537	PJM	VAP_27_MSA_DC_L	8760	4.7	7349	84%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_33_MSA_DC_L	8760	5.3	7646	87%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_33_MSA_DC_L	8760	1.1	4125	47%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_33_MSA_DC_L	8760	5.0	7643	87%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_33_MSA_DC_L	8760	8.1	8041	92%
VACAR	CPLE_1_MSA_Durham_G	7537	PJM	VAP_33_MSA_DC_L	8760	4.7	7567	86%
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_33_MSA_DC_L	8760	5.5	7609	87%
PJM	VAP_7_G	7408	PJM	VAP_33_MSA_DC_L	8760	3.2	5853	67%
PJM	PJM500_3_MSA_Pittsburgh_G	8760	PJM	VAP_7_G	1352	15.4	7063	80%
PJM	PJM500_4_MSA_Philadelphia_G	8702	PJM	VAP_7_G	1352	9.9	5628	64%
VACAR	CPLE_1_MSA_Durham_G	7537	PJM	VAP_7_G	1352	14.9	5361	61%

**Task 2: Appendix 5, Corridor Congestion by Scenario
LowCase2011R2**

Source Hub Information			Sink Hub Information			Congestion Indicators		
Market Area	Hub Name	Source Hours	Market Area	Hub Name	Sink Hours	Price Differential	U90 Hours	U90 %
PJM	AP_1_County_Harrison_G	8760	PJM	VAP_7_G	1352	15.7	5584	64%
PJM	AEP_8_GEN_Amos01_G	8760	PJM	VAP_7_G	1352	18.3	6164	70%
PJM	PJM500_9_MSA_Pittsburgh_G	8664	PJM	VAP_7_G	1352	15.1	7062	80%
PJM	PJM500_7_MSA_York-Hanover_G	8760	PJM	VAP_7_G	1352	9.8	5770	66%
PJM	PJM500_5_MSA_DC_G	8760	PJM	VAP_7_G	1352	9.0	4867	55%
PJM	VAP_1_MSA_Richmond_G	8760	PJM	VAP_7_G	1352	11.2	5715	65%
MAPP	NPPD_4_GEN_Gentleman_G	8235	SPP	WERE_4_GEN_Wolfcreek_G	4445	25.4	8757	100%
ENTERGY	AECI_4_GEN_NewMadrid1_G	8760	SPP	WERE_4_GEN_Wolfcreek_G	4445	6.4	7749	88%
SPP	AEPW_5_MSA_Tulsa_G	7180	SPP	WERE_4_GEN_Wolfcreek_G	4445	8.4	3204	36%
SPP	WERE_1_MSA_Manhattan_G	8145	SPP	WERE_4_GEN_Wolfcreek_G	4445	9.9	807	9%
SPP	KACP_4_MSA_KansasCity_G	7896	SPP	WERE_4_GEN_Wolfcreek_G	4445	23.6	7380	84%
MISO	OTP_9_GEN_BigStone_G	8640	MISO	XEL_3_MSA_Minneapolis_G	5811	21.8	8645	98%
MISO	ALTE_2_MSA_Madison_G	8746	MISO	XEL_3_MSA_Minneapolis_G	5811	6.0	2393	27%

Task 4



**Eastern Interconnection Modeling vis-à-vis
Regional Studies and Historical Data
A Report to the US Department of Energy**



INTERNATIONAL

**DOE Congestion Study: Task 4
April 28, 2006**

Task 4 Project Team

CRA International

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Task 4 Objectives

- **Assess the results of the review of regional transmission studies and data obtained at Task 1 against modeling results obtained at Task 2**
- **Identify whether modeling results are consistent with industry studies and observations and if not, find major reasons why not**
- **Identify major corridors most affected by major congested constraints**
- **Identify whether there are other problems identified in the modeling (Task 2) and not identified in regional studies**
- **Determine major transmission corridors influenced by these transmission problems**

Methodology

- **First we identified all known constrained areas for which modeling results show no or little congestion and investigated key reasons behind this outcome, e.g.:**
 - Recent or planned before 2008 transmission upgrades which could relieve these constraints
 - Similarly located (parallel, upstream or downstream) known constraints bind and prevent other constraints from binding
 - Similarly located (parallel, upstream or downstream) and “unknown” constraints bind and prevent other constraints from binding
- **Next, as we found several “unknown” constraints with very large number of binding hours and congestion costs, we contacted regional transmission coordinators to verify whether the constraint is properly defined and whether there exist special protection schemes around these constraints**
- **In conducting this investigation, we have performed several iterations of excluding or modifying constraints, primarily in MISO, from modeling analysis and re-running the model until all concerns have been addressed**
- **The comparison of the results of Tasks 1 and 2 are summarized in Table 2 presented in Appendix 4-1 (attached)**

Table 2 in Appendix 4-1 explained

- **Constrained area**: same is in Table 1 per Task 1
- **Constraint name as modeled**: abbreviations for relevant constraints representing the constrained area as used in the Task 2 model
- **U90 hours**: number of hours this constraint is loaded at the level at or above 90% of its capacity in the 2008 Base Case simulation scenario
- **Constraint rankings** are based on the 2008 Base Case simulation scenario. All indicators except U90 are meaningful only for constraints that bind. For non-binding constraints ranks in corresponding cell in the table appear blank
- **Corridors that are most impacted by constraint**: as discussed in the Task 2 report, a corridor analysis identifies constraints that are first, second and third most limiting for an incremental power transfer from source to sink nodes of the corridor. The results of this analysis are compiled in the database. For a given constraint, this database is queried to determine which corridors are most affected by that constraint
- **Constraints that are most limiting the corridor**: when most affected corridors are identified, the same database is queried for the second time to determine which constraints are the most limiting for that corridor. As a result, if the constraint in question is not binding as much as expected, this analysis could reveal other similarly situated constraints that are more limiting and prevent the constraint in question from binding
- **U90 hours and rankings** of most limiting constraints associated with same corridors as the constraint in question
- **Comments** provide an assessment of whether modeling results are consistent with regional analysis and historical data and provide information on relevant transmission upgrades incorporated in the model

Congestion not confirmed in modeling

Constraint	Comments
Branchburg Transformer	The Branchburg transformer is not binding in the model. The MMWG load flow case reflects an addition of the third transformer. The flow is however limited by other constraints up- and downstream of the Branchburg transformer
Kanawha-Matt Funk	The interface is not binding in the model. The load flow used in the model contains the Wyoming to Jackson's Ferry line which relieves the specified constraint
Minnesota – Wisconsin, Eau Claire-Arpin	The Eau Claire-Arpin constraint does not bind in the model. The MMWG 2007 load flow used in the model contains part of the Arrowhead-Weston upgrade (a 345 kV circuit from Stone Lake to Weston). This upgrade picks up a portion of the flow from Minnesota to Wisconsin and relieves flow on Eau Claire-Arpin
NE Kansas -- Iatan to Stranger Creek 345 kV	Conversation with SPP confirms that this constraint should not be causing problems except for non-firm curtailments
Tennessee to Georgia and into Atlanta constraints	The constraints do not bind in the model; several upgrades near Atlanta have been represented in the model including: Clermont Jct-South Hall Addition, Davis Street-East Point addition and Bull Sluice and Big Shanty substation upgrades.

Top Transmission Constraints not Addressed in Table 2

- In Task 2 we identified 118 top transmission constraints in Eastern Interconnection. Of those, only 35 were mentioned in Table 2 either directly or indirectly
- Table 3 in Appendix 4-2 provides an assessment of all 118 top constraints. In this assessment, we evaluate the extent to which these top constraints overlap along certain corridors
- The findings from this assessment vary by market and discussed below

Assessment of additional constraints by market area

- **Entergy**: Top constraints not identified in Table 2 are either “local” – they appear to affect no corridors, or affect corridors that are different from those influenced by Table 2 constraints
- **Florida**: Top constraints not identified in Table 2 are either “local” – they appear to affect no corridors, or affect corridors that are different from those influenced by Table 2 constraints
- **MAPP**: All top constraint appear to be primarily related to the same corridor from NPPD to OPPD (Omaha)

Assessment of additional constraints by market area

- **MISO**: Top constraints not identified in Table 2 are either “local” – they appear to affect no corridors, or affect corridors that are different from those influenced by Table 2 constraints
- **New England**: With one exception, all top constraints are identified in Table 2. While this constraint appears to be affecting a different corridor (from NYISO Zone C to NEMA-Boston area), it also affect other corridors connecting upstate New York with NEMA-Boston similar to constraints included in Table 2
- **NYISO**: All top constraint that do not appear in Table 2 are related to same corridors as constraints that appear in Table 2

Assessment of additional constraints by market area

- **MISO**: Top constraints not identified in Table 2 are either “local” – they appear to affect no corridors, or affect corridors that are different from those influenced by Table 2 constraints
- **New England**: With one exception, all top constraints are identified in Table 2. While this constraint appears to be affecting a different corridor (from NYISO Zone C to NEMA-Boston area), it also affect other corridors connecting upstate New York with NEMA-Boston similar to constraints included in Table 2
- **NYISO**: All top constraint that do not appear in Table 2 are related to same corridors as constraints that appear in Table 2

Assessment of additional constraints by market area

- **SPP**: Some top constraint that do not appear in Table 2 are related to same corridors as constraints that appear in Table 2, some appear local (i.e. affecting no corridors), some of the not mentioned constraints are not related to mentioned constraints (two constraints in WERE and one between Cleco and Entergy)
- **VACAR (non-Dominion)**: None of the top constraints identified for VACAR are mentioned in Table 2

Table 3 in Appendix 4-2 explained

- Constraints are organized by market area
- Constraint name as modeled: abbreviations for relevant constraints representing the constrained area as used in the Task 2 model
- From Area, To Area: indicate ACPF areas in the load flow to which to ends of the monitored line(s) of the constraint belongs
- EI Ranking: rankings with respect to four congestion criteria developed with respect to all modeled constraints for Eastern Interconnection (EI). Rankings are based on the 2008 Base Case simulation scenario. For non-binding constraints ranks in corresponding cell in the table appear blank
- Regional ranking: rankings with respect to four congestion criteria developed with respect to all modeled constraints for the market area/region. Rankings are based on the 2008 Base Case simulation scenario. For non-binding constraints ranks in corresponding cell in the table appear blank
- Absolute value: values for the four congestion criteria based on the 2008 Base Case.
- Corridors that are most impacted by constraint: as discussed in the Task 2 report, a corridor analysis identifies constraints that are first, second and third most limiting for an incremental power transfer from source to sink nodes of the corridor. The results of this analysis are compiled in the database. For a given constraint, this database is queried to determine up to three corridors that are most affected by that constraint

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
			Cong Rent	U90	Bind Hrs	Price	From Hub	To Hub	Corridor U90	Name	U90 hours	Cong Rent	U90	Bind Hrs		Price
New Brunswick to Maine -- Le Preau to Orrington																Imports from New Brunswick to Maine are modeled based on historical flows
Southwest Connecticut	SW Connecticut Imp	197	298	350	288	332	NYISO_6_NYF	NEPOOL_9_NWKST	8770	CP10_12_1-trips, ReacBus-Dvnp	8676	79	2	2	127	The constraint itself does not bind in the model; The flow on this interface is limited by the frequently binding up stream constrains.
										New England North-South	2405	105	140	96	206	
							NEPOOL_7_CT	NEPOOL_9_NWKST	8754	CP10_12_1-trips, ReacBus-Dvnp	8676	79	2	2	127	
										NORHR138 138-NRTHPT P 138- 1	286	355	327	219	355	
							NYISO_3_NYC	NEPOOL_9_NWKST	8774	CP10_12_1-trips, ReacBus-Dvnp	8676	79	2	2	127	
										NORHR138 138-NRTHPT P 138- 1	286	355	327	219	355	
Maine to New Hampshire -- North South Interface (Scobie)	North New England Scobie	6647	32	18	16	88	NEPOOL_3_ME	NEPOOL_4_NEBOS	6692	North New England Scobie	6647	32	18	16	88	Modeling results are consistent with historical data
	New England North-South	21					NEPOOL_3_ME	NEPOOL_10_RI	6688	North New England Scobie	6647	32	18	16	88	
Into Boston	Boston Import	0					NEPOOL_2_NH	NEPOOL_4_NEBOS	6695	North New England Scobie	6647	32	18	16	88	The Boston imports constraints do not bind in the model; The MMWG 2007 loadflow used in the model contains part of the
	NEMA Boston Import	0					NEPOOL_3_ME	NEPOOL_4_NEBOS	6692	North New England Scobie	6647	32	18	16	88	NSTAR project which relieves the Boston Import
Southern New England	New England East-West Low	2118	128	157	118	225	NEPOOL_5_SE MA	NYISO_11_NYK	8784	CP10_12_1-tips, ReacBus-Dvnp	8676	79	2	2	127	Modeling results are consistent with historical data. Note that the flow on this constraint is also limited

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
	SEMARI: SE MA RI Export	1					NEPOOL_5_SE MA	NYISO_9_NYI	8605	2TRIP Norwalk H-Northport	6972	104	10	10	92	by LIPA Import interface downstream
Northwest Vermont	W Rutland Tap - Blissville 11	6732	234	13	8	196	NEPOOL_2_NH	NYISO_9_NYI	8771	W Rutland Tap - Blissville 11	6732	234	13	8	196	Modeling results are consistent with historical data
Flows from Western to Eastern NY -- (Central East and Total East Interface)	16 I/F TOTAL EAST	1116	195	231	239	319	NYISO_3_NYC	NYISO_9_NYI	8687	1TRIP Leeds-Pleasant Val	5160	9	49	43	45	Modeling results are consistent with historical data
	7 I/F CENTRAL EAST	4803	43	57	56	145	NYISO_3_NYC	NYISO_7_NYG	6185	7 I/F CENTRAL EAST	4803	43	57	56	145	
Westchester to NYC (Sprainbrook - Dunwoodie South Interface: Sprainbrook- Dunwoodie South, W. 49th St. 345 kV, Rainey to Dunwoodie 345 kV, Rainey to Vernon 345 kV)	I/F DUNWOODIE SOUTH	0					NYISO_6_NYF	NYISO_10_NYJ	8784	Actual:SPRBROOK- TREMONT	5279	157	41	65	166	Modeling results are consistent with historical data
	1- TRIPS,SPRBROOK- W 49 ST - 2	3168	132	112	103	125	NYISO_8_NYH	NYISO_9_NYI	6506	1-TRIPS,SPRBROOK-W 49 ST - 2	3168	132	112	103	125	
	1- TRIPS,SPRBROOK- DUN NO T- 6	19					NYISO_8_NYH	NYISO_10_NYJ	8783	CP10_20_E179St_Hg4_E17 9St_Hg	5737	187	32	39	161	
Flows from Northern NY (Moses South Interface: Massena to Marcy, Moses to Adirondack)	7 I/F MOSES SOUTH OPEN	3967	114	80	85	220	NYISO_4_NYD	NYISO_2_NYB	8340	7 I/F MOSES SOUTH CLOSE	6039	25	27	18	71	Modeling results are consistent with historical data
	7 I/F MOSES SOUTH CLOSE	6039	25	27	18	71	NYISO_4_NYD	NYISO_7_NYG	6864	7 I/F MOSES SOUTH CLOSE	6039	25	27	18	71	
Flows into Western NY (Dysinger East Interface: AES Capeport to	8 I/F DYSINGER- EAST CLOSE	157					IESO_15_G	NYISO_2_NYB	8449	1454 - IMO-NYIS	2182	90	151	84	147	The flowgate itself does not bind significantly in the model. There are other constraints in the model

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
			297	346	349	346	IESO_6_G	NYISO_2_NYB	8460	NFG7010 - IMO - ADIRONDACK	7200	88	7	5		76
Comerston to Rochester, Niagara to Rochester, Stolle to Meyer)	8 I/F DYSINGER- EAST OPEN	203	297	346	349	346	IESO_6_G	NYISO_2_NYB	8460	NFG7010 - IMO - ADIRONDACK	7200	88	7	5	76	constraints in the model limiting the flow from Ontario to western NY
Flows into Central NY (West Central Interface: Pannell Road to Clay, Stolle to Meyer)	14 I/F WEST CENTRAL CLOSE	2332	60	144	97	176	NYISO_1_NYA	NYISO_7_NYG	6792	14 I/F WEST CENTRAL OP LO	6791	41	12	12	95	Modeling results are consistent with historical data
	14 I/F WEST CENTRAL OPEN	6791	41	12	12	95	NYISO_1_NYA	NYISO_9_NYI	6868	14 I/F WEST CENTRAL OP LO	6791	41	12	12	95	
Westchester to Long Island (Coned-LIPA Interface: Dunwoodie to Shore Road, Sprain Brook to East Garden City)	Actual:HUDAVE E- JAMAICA	6699	137	15	9	67	NYISO_8_NYH	NYISO_11_NYK	8784	Actual:HUDAVE E- JAMAICA	6699	137	15	9	67	Modeling results are consistent with historical data; The "/F LIPA IMPORT" is a flowgate containing all the specified lines.
	1TRIP Dun-ShoreRd SpBrk-EGC	7721	67	5	3	120	NYISO_8_NYH	NYISO_11_NYK	8784	Actual:HUDAVE E- JAMAICA	6699	137	15	9	67	
	NFG7007 - WESTCHESTER - LONG	4					NYISO_8_NYH	NYISO_11_NYK	8784	Actual:HUDAVE E- JAMAICA	6699	137	15	9	67	
Flows into NY Metro Region (UPNY-Coned Interface: Ladentown to Buchanan South, Pleasant Valley to Wood St., Pleasant Valley to E. Fishkill, Pleasant Valley to Millwood, Roseton to E. Fishkill, Ramapo to	9 I/F UPNY - CON ED CLOSE	0					NYISO_6_NYF	NYISO_10_NYJ	8784	Actual:SPRBROOK- TREMONT	5279	157	41	65	166	The interface is not significantly binding in the model. The flow is mainly limited by the up- and downstream constraints monitored in the model.
	9 I/F UPNY - CON ED OPEN	17					NYISO_8_NYH	NYISO_10_NYJ	8783	CP10_20_E179St_Hg4_E17 9St_Hg	5737	187	32	39	161	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
West Virginia to Virginia and Maryland -- Bedington-Black Oak and APS South (Doubs- Mt. Storm 500 KV line and Meadowbrook Mt. Storm 500)	APS South Interface	5140	1	50	98	38	VAP_7_G	VAP_33_MSA_DC_L	5395	APS South Interface	5140	1	50	98	38	Modeling results are consistent with historical data
	78 - Black Oak- Bedington 500	3452	68	99	223	193	AP_1_County_H arrison_G	AP_7_MSA_Hagerst own-Martinsburg_L	7615	APS South Interface	5140	1	50	98	38	
Central PA to Eastern PA (PJM Western Interface: Keystone &	INTERFACE= PJM - WESTERN	4681	3	60	101	100	PJM500_9_MSA _Pittsburgh_G	BGE_5_MSA_Baltim ore-Towson_L	7887	INTERFACE= PJM - WESTERN	4681	3	60	101	100	Modeling results are consistent with historical data
Eastern PA to New Jersey -- (PJM Eastern Interface: Wescosville	INTERFACE= PJM - EASTERN	3177	21	111	162	162	PJM500_7_MSA _York- Hanover_G	PECO_5_MSA_Philad elphia_L	3177	INTERFACE= PJM - EASTERN	3177	21	111	162	162	Modeling results are consistent with historical data
Branchburg Transformer	BRANCHBG 230- BRANCHBG 500	0					PL_8_MSA_Alle ntown_G	JCPL_1_MSA_NewY ork_L	7808	11 I/F UPNY - SENY OPEN	4952	34	54	54	169	The Branchburg transformer is not binding in the model. The MMWG load flow case reflects an addition of the third transformer. The flow is however limited by other constraints up- and downstream of the Branchburg transformer
	70 - Branchburg- Flagtown 230	5724	29	34	37	47	PJM500_4_MSA _Philadelphia_G	PSEG_8_MSA_New York_G	7112	70 - Branchburg-Flagtown 230	5724	29	34	37	47	
	71 - Branchburg- Readington 2	268					PJM500_4_MSA _Philadelphia_G	PSEG_3_MSA_New York_L	7009	70 - Branchburg-Flagtown 230	5724	29	34	37	47	
PJM to New York City -- Hudson to Farragut, Linden to Goethals	320 - Hudson 1- Farragut 1 34	939					PENELEC_2_M SA_DuBois_G	NYISO_10_NYJ	6961	RAMAPO 1000MW WHEEL	4300	144	70	13	167	Modeling results are consistent with historical data; the Ramapo and Farragut constraints are used to model the contract flow from PSEG to NYC
	LINDEN 230- GOETHALS 230- 1	0					PENELEC_2_M SA_DuBois_G	NYISO_9_NYI	6925	RAMAPO 1000MW WHEEL	4300	144	70	13	167	
	FARRGUT 1000MW WHEEL	5060	112	53	6	134	NYISO_8_NYH	NYISO_9_NYI	6506	FARRGUT 1000MW WHEEL	5060	112	53	6	134	
	RAMAPO 1000MW WHEEL	4300	144	70	13	167	PL_8_MSA_Alle ntown_G	JCPL_1_MSA_NewY ork_L	7808	RAMAPO 1000MW WHEEL	4300	144	70	13	167	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
Ohio to West Virginia and Pennsylvania -- Wylie Ridge-Kammer	1130 - Wylie Ridge 345/500 X	3604	26	95	81	49	FE_9_MSA_Wei rton_G	AEP_2_L	5052	1130 - Wylie Ridge 345/500 X	3604	26	95	81	49	Modeling results are consistent with historical data
	637 - Sammis-Wylie Ridge 345	58					FE_9_MSA_Wei rton_G	AP_2_L	4618	1130 - Wylie Ridge 345/500 X	3604	26	95	81	49	
	335 - Kammer 765/500 Xfm (fl	156						AEP_8_G	AP_2_L	6148	148 - Cloverdale-Lexington 5	3856	4	84	74		34
Illinois to Indiana -- Crete-St. Johns Tap, Dune Acres-Michigan City, State Line-Wolf Lake	180 - Crete-St. John 345 B (1837	196	176	221	262	NI_2_MSA_Chic ago_G	AEP_2_L	2494	178 - Crete-E. Frankfort 345	2198	101	150	157	171	Modeling results are consistent with historical data
	884 - Dune Acres- Michigan C	5592	36	37	64	13	Appears to be a local constraint affecting no									
	664 - State Line- Wolf Lake 1	3730	167	90	78	157	NIPS_8_MSA_C hicago_G	NI_13_MSA_Chicago _L	162	103 - Burnham-Munster 345	3730	167	90	78	157	
Central PA to Central NY -- Homer City- Watercure, Homer City 345/230kV	1361 - Homer City- Watercure	81					PENELEC_2_M SA_DuBois_G	PL_7_MSA_Allentow n_L	7495	14 I/F WEST CENTRAL OPEN	6791	41	12	12	95	The interface is not significantly binding in the model. The flow is mainly limited by the upstream constraints.
	317 - Homer City 345/230 Xfm	137	284	359	319	303	PENELEC_2_M SA_DuBois_G	NYISO_7_NYG	6924	14 I/F WEST CENTRAL OPEN	6791	41	12	12	95	
NW Pennsylvania to W. New York -- Erie West to Erie South, Erie E. to Erie SE 230 kV	1348 - Erie West- Erie South	1824	99	178	133	119	Appears to be a local constraint affecting no corridor									Modeling results are consistent with historical data
West Virginia to Southern Virginia -- Kanawha-Matt Funk	Kanawha-Matt Funk 345 BJF	0					AEP_8_G	VAP_7_G	6655	148 - Cloverdale-Lexington 5	3856	4	84	74	34	The interface is not binding in the model. The loadflow used in the model contains the Wyoming to Jackson's Ferry line which relieves the specified constraint.
	49305KANAWZ05M FUNK	0					AEP_8_G	VAP_7_G	6655	148 - Cloverdale-Lexington 5	3856	4	84	74	34	
North Carolina to Southern Virginia	299 - Halifax-Person 230 (fl	171	222	354	296	254	CPL_1_MSA_ Durham_G	VAP_7_G	5436	148 - Cloverdale-Lexington 5	3856	4	84	74	34	The interface is binding in the model but not in the top list. The flow is mainly limited by the Cloverdale- Lexington constraint.
	1228 - Clover 230/500 Xfm (f	320	199	318	318	257	CPL_1_MSA_ Durham_G	VAP_15_MSA_VB- Norfolk_L	6487	1228 - Clover 230/500 Xfm (f	320	199	318	318	257	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
Michigan to Ontario -- Belle River - St. Clair 345 kV	690 - St. Clair 345/230 Xfm	1419	359	208	129	360	ITC_7_MSA_Mo nroe_G	IESO_2_G	7404	1343 - Detroit Industrial-Wa	7404	289	105	63	317	Modeling results are consistent with historical data
	19BUNCE 230- SCOTT 220- 1	6014	345	28	17	348	ITC_7_MSA_Mo nroe_G	IESO_3_L	7987	19BUNCE 230-SCOTT 220- 1	7987	345	28	17	348	
	ONT Hydro to Michigan	144	224	358	335	286	ITC_7_MSA_Mo nroe_G	IESO_11_G	6962	19BUNCE 230-SCOTT 220- 1	6962	345	28	17	348	
Manitoba to Minnesota																The flow from Manitoba to Minnesota is modeled based on the historical flow
Minnesota to Wisconsin -- Eau Claire-Arpin, Minnesota- Wisconsin Stability Interface	1528 - Eau Claire- Arpin 345	0					XEL_3_MSA_Mi nneapolis_G	WEC_7_MSA_Milwa ukee_G	4810	NFG3033 - Arpin Xformer+Arpi	1852	75	174	143	68	The Eau Claire-Arpin constraint does not bind in the model. The MMWG 2007 loadflow used in the model contains part of the Arrowhead-Weston upgrade (a 345 kV circuit from Weston to Stone Lake). This upgrade shares a portion of the flow from Minnesota to
	468 - Minnesota- Wisconsin St	0					XEL_3_MSA_Mi nneapolis_G	WEC_3_MSA_Milwa ukee_G	4631	NFG3033 - Arpin Xformer+Arpi	1852	75	174	143	68	
Upper Peninsula Michigan to Wisconsin -- Flow South	1001 - Nordic-Perch Lake 138	0					Appears to be a local constraint affecting no corridor									Modeling results are consistent with historical data
	249 - ATC Flow South	2849	158	121	67	118										
Illinois and Iowa to Wisconsin -- Paddock Transformer	546 - Paddock 345/138 Xfm (f	676	305	269	362	321	NI_7_MSA_Roc helle_G	WEC_3_MSA_Milwa ukee_G	4580	406 - Marengo-Pleasant Valle	3705	39	91	94	27	The interface is binding in the model, but not in the top list. The flow is mainly
W. Nebraska to W. Kansas -- Gentleman-	SPP 93-WNE_WKS	7724	17	4	7	15	NPPD_4_G	OPPD_5_MSA_Oma ha_L	8367	SPP 93-WNE_WKS	7724	17	4	7	15	Modeling results are consistent with historical
LGE System -- Blue Lick 345 k/161/ Xfmr, Frankfort to East- Tyrone 138 kV	1156 - Blue Lick 345/161 Xfm	1942					LGEE_3_G	AEP_2_L	4295	246 - Frankfort East-Tyrone	4252	23	72	59	8	Modeling results are consistent with historical data
	246 - Frankfort East- Tyrone	4252	23	72	59	8	LGEE_3_G	LGEE_5_MSA_Lexin gton_L	4258	246 - Frankfort East-Tyrone	4252	23	72	59	8	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints	Constraints that are Most Limiting the Corridor						Comment		
Wisconsin -- Stiles- Amberg and Crivitz 138 kV, Kewaunee 345/138 Xfmr, Highway-Preble 138 kV	249 - ATC Flow South	2849	158	121	67	118	Appears to be a local constraint affecting no corridor								Modeling results are consistent with historical data; the "ATC south" constraint constains the specified lines	
	309 - Highway V- Preble 138 (	0													
	693 - Stiles-Crivitz 138 (fl	0														
	1539 - Kewaunee 345/138 Xfm	0														
Indiana-Ohio Border Miami Fort 345/138 kV	437 - Miami 345/138 Xfm (flo	260	304	332	344	314	Appears to be a local constraint affecting no corridor								The previous study shows that this constraint is binding about 400 hours a year. Modeling results indicates about 260 U90 hours. The results are consistent.	
	424 - Miami Fort 345/138 Xfm	8														
	978 - Miami Fort 345/138 Xfm	0														
	1-TRIPS,09MIAMI -	0														
Illinois to Kentucky	1225 - Joppa 345/161 Xfmr (f	68					AMRN_12_MSA_ StLouis_L	TVA_5_MSA_Nashvil le_L	5412	1216 - Cumberland- Davidson 5	5196	13	46	79	96	The constraint does not bind in the model. The flow from AMRN to TVA is mainly limited by the downstream constraints.
										1266 - Fredtown-Fredtown Tap	213	239	342	338	202	
W. Oklahoma to W. Texas -- Elk City 230/138 kV Transformer	237 - Elk City 230/138 Xfm (25					AEPW_5_MSA_ Tulsa_G	SPS_2_G	8784	SPP 69-SPPSPSTIES	5176	46	48	23	48	The interface is not significantly binding in the model. The flow is mainly limited by constraints in northwest Texas.
										FG 5196 SPS North - South	7167	11	8	15	18	
Central Oklahoma -- Redbud-Arcadia 345 Kv	SPP 59- REDARCREDCARC	5505	5	38	35	32	AEPW_5_MSA_ Tulsa_G	EES_9_MSA_Russel lville_G	5900	SPP 59-REDARCREDCARC	5505	5	38	35	32	Modeling results are consistent with historical data. Based on the information that became available after the modeling have been completed, this constraints is currently being resolved
Southeast Oklahoma - Valliant-Lydia 345 kV and Pittsburg-Seminole	SPP 57- PITSEMPITSUN	1372	172	215	202	234	EES_9_MSA_R ussellville_G	OKGE_4_MSA_Okla homaCity_L	3996	SPP 57-PITSEMPITSUN	1372	172	215	202	234	Modeling results are consistent with historical data

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking					Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
345 kV	1415 - Valliant-Lydia 345	0						AEPW_5_MSA_Tulsa_G	OKGE_4_MSA_OklahomaCity_L	1435	SPP 68-SILDIVNWSCIM	101					
Arkansas to Oklahoma -- Ft. Smith 500/345 kV Transformer	255 - Fort Smith 500/161 Xfm	0						EES_2_MSA_Batesville_G	OKGE_4_MSA_OklahomaCity_L	5940	SPP111-SUMHE_BULSLD	3178	58	110	62	23	Historical data shows 40 hours level 3 TLR. The constraints are binding about 400 hours in the model. The results are consistent.
	254 - Fort Smith-Arkansas Nu	437	231	299	224	230	AEPW_9_MSA_MountPleasant_G	OKGE_4_MSA_OklahomaCity_L	4668	SPP 76-SUNXFRPITSEM	4050	12	78	61	5		
NE Kansas -- Iatan to Stranger Creek 345 kV	SPP 32-IASCLKNASJHA	0						MEC_3_MSA_DesMoines_G	AMRN_12_MSA_StLouis_L	3893	SPP 89-COOPER_S	1383	183	214	190	246	Conversation with SPP confirms that this constraint should not be causing problems except for non-firm curtailments
	695 - StjLaklatStr	0															
SE Missouri to NE Arkansas	FG 1382 Blytheville - Hayti	1584	242	195	181	235	AECL_4_G	EES_9_MSA_Russellville_G	4674	FG 1382 Blytheville - Hayti	1584	242	195	181	235	Modeling results are consistent with the historical data	
Central Arkansas to S. Arkansas	FG 1341 Sheridan-Eldorado_Ho	407	179	301	255	271	EES_9_MSA_Russellville_G	EES_1_MSA_Jackson_L	2779	FG 1330 McAdams500-230_McAda	364	241	309	273	260	Modeling results are consistent with historical data	
	1-TRIPS,8ELDEHV - 3ELDEHV - 1	1764	71	180	160	85	Appears to be a local constraint affecting no										
Into New Orleans	FG 1376 Coly-Vignes for the	6308	16	20	30	22	LAGN_1_MSA_BatonRouge_G	EES_5_MSA_NewOrleans_G	6322	FG 1376 Coly-Vignes for the	6308	16	20	30	22	Modeling results are consistent with historical data	
	NFG1314 - Little Gypsy-South	3863	27	83	111	36	EES_10_MSA_Vicksburg_G	EES_5_MSA_NewOrleans_G	6331	FG 1376 Coly-Vignes for the	6308	16	20	30	22		
SE Louisiana to W Louisiana	607 - Richard 500/138 Xfm #2	634	252	272	271	269	Appears to be a local constraint affecting no									Modeling results are consistent with historical data	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
	1-TRIPS,8RICHARD-8WEBRE - 1	0					corridor									
NW Alabama to NE Mississippi -- McAdams 500/230 kV AutoXfmr	FG 1330 McAdams500- 230_McAda	364	241	309	273	260	TVA_1_MSA_Ch att-Hunts_G	EES_9_MSA_Russel lville_G	1253	FG 1330 McAdams500- 230_McAda	364	241	309	273	260	Modeling results are consistent with historical data
Tennessee to Kentucky -- Volunteer to Sullivan	747 - Volunteer- Phipps Bend	0					TVA_4_MSA_CI arksville_G	AEP_2_L	5272	1216 - Cumberland- Davidson 5	5196	13	46	79	96	The constraint is not binding in the model. The flow are mainly limited by the upstream constraint.
Flows into Western Tennessee -- Cumberland-Davidson, Johnsonville-Davidson	1216 - Cumberland- Davidson 5	5196	13	46	79	96	TVA_4_MSA_CI arksville_G	TVA_5_MSA_Nashvil le_L	5984	1216 - Cumberland- Davidson 5	5196	13	46	79	96	Modeling results are consistent with the historical data
Tennessee to Georgia	1223 - Sequoyah- Conasauga 50	6					TVA_1_MSA_Ch att-Hunts_G	SOCO_16_MSA_Ata nta_L	155	1223 - Sequoyah- Conasauga 50	6					The constraints do not bind in the model; Several upgrades near Atlanta have been represented in the model including: Clermont Jct-South Hall Addition, Davis Street-East Point Addition and Bull Sluice and Big Shanty substation upgrades.
E. Georgia to E. Florida -- Southern FRCC Interface	SOUTHERN - GRIDFLORIDA	3355	15	102	70	111	SOCO_26_MSA _Macon_G	FPC_3_MSA_Orland o_L	4390	SOUTHERN - GRIDFLORIDA	3355	15	102	70	111	Modeling results are consistent with historical data
	FG 1519 8THALMAN 500 DUVAL 5	2896	81	119	154	204	SOCO_26_MSA _Macon_G	FPC_4_MSA_Tampa _L	4895	SOUTHERN - GRIDFLORIDA	3355	15	102	70	111	

TABLE 2 - COMPARISON OF EXISTING STUDIES - DOE Task 1 AND A MODELING STUDY - DOE Task 2
SUMMARY OF EASTERN INTERCONNECTION CONGESTION AREAS

Congestion Area Path Number & Name or Map Reference Number	Constraint name as modeled	U90 hours	Constraint Ranking				Corridors that are Most Impacted by Constraints			Constraints that are Most Limiting the Corridor					Comment	
			152	146	226	201	SCPSA_10_MS A_Charleston_G	SCPSA_2_MSA_Cha rleston_L	2236	1-TRIPS,6CROAS -6JEFF - 1	2236	152	146	226		201
Eastern South Carolina	1-TRIPS,6CROAS - 6JEFF - 1	2236	152	146	226	201	SCPSA_10_MS A_Charleston_G	SCPSA_2_MSA_Cha rleston_L	2236	1-TRIPS,6CROAS -6JEFF - 1	2236	152	146	226	201	Modeling results are consistent with the historical data
Atlanta	1- TRIPS,6CONYERS- 3CONYERS- 1	0					TVA_1_MSA_Ch att-Hunts_G	SOCO_33_MSA_Atl anta_L	194	1216 - Cumberland- Davidson 5	5196	13	46	79	96	The constraints do not bind in the model; Several upgrades have been represented in the model including: Clermont Jct- South Hall Addition, Davis Street-East Point Addition and Bull Sluice and Big Shanty substation upgrades.
	1- TRIPS,6WDLAWN - 6NMARIET- 1	89					TVA_4_MSA_Ci arksville_G	SOCO_8_MSA_Atlan ta_L	5494	1216 - Cumberland- Davidson 5	5196	13	46	79	96	
	1223 - Sequoyah- Conasauga 50	6					TVA_5_MSA_Na shville_L	SOCO_16_MSA_Atl anta_L	155	1223 - Sequoyah- Conasauga 50	5196	13	46	79	96	

Legend used in the tables**Implication**

	Constraint appears in Table 2 as a critical constraint identified in regional studies or as related to such a constraint along one or several significant corridors
	Constraint does not appear in Table 2 but affects one or several significant corridors
	Constraint does not appear in Table 2 and does not affect any significant corridors (may be considered as local constraints)

Criteria EI ranks

All ranks shown are based on the Base Case 2008 results
 All constraints were ranked with respect to the following criteria

Congestion rent
 U90
 Number of binding hours
 All-hours shadow price

The lower is the rank the more serious is the congestion
 A constraint is included in this list if and only if it is ranked at or below 100 according to at least one of the above criteria in each of the 6 simulated scenarios

Regional ranks

Regional ranks reflect the order of EI ranks

Corridors

Corridors are identified by source hubs (nodes) and sink hubs (nodes)
 A constraint affects a corridor in a given hour if it is the first, second or third most limiting in the ATC calculation for the corridor
 For each constraint, up to three corridors were selected on the basis of the number of hours the constraint limits the ATC calculation for the corridor

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor		EI Rankings				Regional Ranking				Value	
Constraint Name	From Area	To Area	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
			FG 1376 Coly-Vignes for the	LAGN	EES	16	20	30	22	1	3	8	1
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	20	6	4	28	2	2	2	3	99.03	7354	
NFG1314 - Little Gypsy-South	EES	EES	27	83	111	36	3	10	12	4	75.01	3863	
NFG1350 - North Crowley-Scot	LAGN	EES	45	98	106	26	4	11	11	2	46.32	3471	
FG 1324 WhiteBluff-Sheridan	EES	EES	59	164	144	149	5	13	13	13	30.06	1977	
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	71	180	160	85	6	14	14	10	23.63	1764	
FG 1379 Grimes-Mt Zion for t	EES	EES	72	1	1	42	7	1	1	5	23.60	8719	
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	110	21	22	79	8	4	3	7	12.18	6288	
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	111	22	24	81	9	5	4	8	12.08	6239	
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	115	26	27	87	10	6	6	11	11.76	6083	
FG 1308 Dodson-Danville_Hart	EES	EES	154	31	26	83	11	7	5	9	6.39	5742	
FG 1380 Batesville-Marks for	EES	EES	171	40	28	77	12	8	7	6	4.72	5417	
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	228	101	83	140	13	12	10	12	1.80	3385	
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	281	76	58	195	14	9	9	14	0.72	4088	

Table 3. Top Constraints, Ranks and Most Affected

Constraint Name	From Area	To Area	Uses		To Hub	From hub								
			Bind Hrs	All-hrs Price		EES_7_MSA_B eamont- PortArthur_G	EES_9_MSA_R ussellville_G	EES_5_MSA_N ewOrleans_G	EES_1_MSA_J ackson_L	EES_5_MSA_N ewOrleans_G	EES_7_MSA_B eamont- PortArthur_G	EES_5_MSA_B eamont- PortArthur_G	LAGN_1_MSA_B atonRouge_G	
FG 1376 Coly-Vignes for the	LAGN	EES	4408	26.42				x						x
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	7326	20.24										
NFG1314 - Little Gypsy-South	EES	EES	1372	14.98				x		x				x
NFG1350 - North Crowley-Scot	LAGN	EES	1437	24.41										
FG 1324 WhiteBluff-Sheridan	EES	EES	858	1.98			x		x			x		
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	687	6.00										
FG 1379 Grimes-Mt Zion for t	EES	EES	8622	13.04		x	x							
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	4934	6.16										
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	4894	6.11										
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	4784	5.95										
FG 1308 Dodson-Danville_Hart	EES	EES	4790	6.06								x		
FG 1380 Batesville-Marks for	EES	EES	4777	6.18										
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	1884	2.14										
1-TRIPS,3BVRCRK -3STAND -99	EES	EES	2653	1.03										

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		SOCO_32_MSA_ Pascagoula_G
Constraint Name	From Area	To Area	EES_5_MSA_N ewOrleans_G	
FG 1376 Coly-Vignes for the	LAGN	EES		x
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI		
NFG1314 - Little Gypsy-South	EES	EES		
NFG1350 - North Crowley-Scot	LAGN	EES		
FG 1324 WhiteBluff-Sheridan	EES	EES		
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES		
FG 1379 Grimes-Mt Zion for t	EES	EES		
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES		
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES		
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES		
FG 1308 Dodson-Danville_Hart	EES	EES		
FG 1380 Batesville-Marks for	EES	EES		
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES		
1-TRIPS,3BVRCRK -3STAND -99	EES	EES		

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor											
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Value		
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
SPP 93-WNE_WKS	NPPD	NPPD	17	4	7	15	1	1	1	3	107.06	7724	
1441 - Grand Island-Aurora 1	NPPD	NPPD	37	74	36	7	2	2	2	1	55.03	4125	
901 - Galesburg 161/138 Xfm	MEC	IP	65	108	88	14	3	3	4	2	26.47	3207	
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	159	109	49	51	4	4	3	4	6.10	3184	

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		Values		From hub	OPPD_4_G
Constraint Name	From Area	To Area	Bind Hrs	All-hrs Price	To Hub	OPPD_5_MSA_Omaha_L	NPPD_4_G
1441 - Grand Island-Aurora 1	NPPD	NPPD	3842	45.73			x
901 - Galesburg 161/138 Xfm	MEC	IP	1813	30.14			
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	3183	10.37			

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor		EI Rankings				Regional Ranking				Value	
Constraint Name	From Area	To Area	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
			SOUTHERN - GRIDFLORIDA	FPL	SOCO	15	102	70	111	1	3	1	3
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	106	161	114	70	2	2	2	1	12.52	2027	
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	136	120	122	72	3	1	3	2	8.97	2853	

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		Values		From hub	SOCO_15_MSA_Bir mingham_G	SOCO_28_MSA_Bir mingham_G	SOCO_31_MSA_Atl anta_G
Constraint Name	From Area	To Area	Bind Hrs	All-hrs Price	To Hub	FPC_3_MSA_O rlando_L	FPC_3_MSA_O rlando_L	FPC_3_MSA_O rlando_L	
						SOUTHERN - GRIDFLORIDA	FPL	SOCO	2300
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	1327	7.12					
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	1184	6.80					

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor											
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Value		
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
1203 - Leesburg-Northeast 13	NIPS	NIPS	8	52	80	2	1	10	17	1	164.51	5109	
1162 - Dune Acres-Michigan C	NIPS	NIPS	14	62	66	4	2	13	13	2	116.72	4585	
1509 - Bain-Kenosha 138 (flo	WEC	WEC	28	66	51	17	3	14	9	5	72.66	4476	
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	33	206	147	19	4	23	21	6	59.14	1427	
884 - Dune Acres-Michigan C	NIPS	NIPS	36	37	64	13	5	3	12	4	55.72	5592	
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	42	69	50	35	6	15	8	11	48.06	4411	
SPP 69-SPPSPSTIES	WEPL	SPS	46	48	23	48	7	8	3	14	44.81	5176	
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	47	122	119	44	8	20	18	13	44.16	2834	
876 - Cranberry Loop 115kV	WPS	WPS	52	209	215	31	9	24	25	9	34.84	1417	
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	57	61	71	54	10	12	16	16	30.50	4671	
679 - Spencer-Triboji 161 (f	ALTW	WAPA	61	159	120	33	11	21	19	10	29.54	2091	
519 - Northpoint-Dewey 115 (	ALTE	WPS	63	44	29	12	12	6	4	3	27.75	5212
1272 - Oak Creek 345/230 Xfm	WEC	WEC	66	39	52	53	13	4	10	15	25.98	5452	
1196 - Smith-Green River Ste	LGEE	LGEE	78	30	41	56	14	2	7	17	21.98	5799	
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	80	47	32	24	15	7	6	8	21.75	5188	
Petersburg 345/138 Xfm E	IPL	IPL	87	247	187	37	16	26	23	12	18.36	862	
1253 - Genoa-Coulee 161 (flo	XEL	DPC	97	232	189	69	17	25	24	18	15.40	1092	
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	109	100	68	20	18	17	15	7	12.35	3440	
1204 - Farr RDJ-Tippy 138 (f	METC	METC	126	185	126	74	19	22	20	19	10.07	1742	
WNTR ST7 115 HIBBARD7 115	MP	MP	129	51	21	75	20	9	2	20	9.96	5112	
249 - ATC Flow South	WEC	WPS	158	121	67	118	21	19	14	23	6.12	2849	
SLVRBYH7 115 TWO HBR7 115	MP	MP	177	59	31	103	22	11	5	22	4.09	4745	
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	216	77	184	128	23	16	22	24	2.08	4085	
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	235	316	294	91	24	27	26	21	1.67	329	
1343 - Detroit Industrial-Wa	ITC	ITC	289	105	63	317	25	18	11	25	0.61	3238	
19BUNCE 230-SCOTT 220- 1	ITC	IESO	345	28	17	348	26	1	1	26	0.07	6014	

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		Values		From hub	AEPW_5_M SA_Tulsa_G	ALTE_2_MS A_Madison_G	ITC_7_MSA _Monroe_G	ITC_7_MSA _Monroe_G	ITC_7_MSA _Monroe_G	ITC_7_MSA _Monroe_G	MEC_3_MS A_DesMoine s_G	NI_7_MSA_ Rochelle_G
Constraint Name	From Area	To Area	Bind Hrs	All-hrs Price	To Hub	SPS_2_G	XEL_3_MSA_ Minneapolis_G	FE_5_MSA_C leveland_L	IESO_11_G	IESO_2_G	IESO_3_L	AMRN_12_M SA_StLouis_L	WEC_3_MSA _Milwaukee_G	
						1203 - Leesburg-Northeast 13	NIPS	NIPS	1959	84.36				
1162 - Dune Acres-Michigan C	NIPS	NIPS	2434	69.57										
1509 - Bain-Kenosha 138 (flo	WEC	WEC	3130	28.82										
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	827	28.17										
884 - Dune Acres-Michigan C	NIPS	NIPS	2483	33.21										
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	3151	16.48										
SPP 69-SPPSPSTIES	WEPL	SPS	4915	10.48		x								
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	1265	12.57								x		
876 - Cranberry Loop 115kV	WPS	WPS	252	18.89										
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	2299	9.64										
679 - Spencer-Triboji 161 (f	ALTW	WAPA	1192	17.24			x							
519 - Northpoint-Dewey 115 (	ALTE	WPS	4707	33.97									
1272 - Oak Creek 345/230 Xfm	WEC	WEC	3126	9.86									x	
1196 - Smith-Green River Ste	LGEE	LGEE	3519	9.51										
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	4250	25.80										
Petersburg 345/138 Xfm E	IPL	IPL	438	13.93										
1253 - Genoa-Coulee 161 (flo	XEL	DPC	432	7.30										
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	2321	28.12										
1204 - Farr RDJ-Tippy 138 (f	METC	METC	1128	6.37										
WNTR ST7 115 HIBBARD7 115	MP	MP	5001	6.23										
249 - ATC Flow South	WEC	WPS	2368	3.17										
SLVRBYH7 115 TWO HBR7 115	MP	MP	4386	4.75										
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	450	2.52										
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	71	5.59										
1343 - Detroit Industrial-Wa	ITC	ITC	2503	0.08				x		x	x			
19BUNCE 230-SCOTT 220- 1	ITC	IESO	5637	0.02					x	x	x			

Table 3. Top Constraints, Ranks and Most Affected

Constraint	Corridor		OTP_9_G	WEC_1_MS A_Chicago_
	Constraint Name	From Area	To Area	XEL_3_MSA_Minneapolis_G	NI_13_MSA_Chicago_L
1203 - Leesburg-Northeast 13	NIPS	NIPS		
1162 - Dune Acres-Michigan C	NIPS	NIPS		
1509 - Bain-Kenosha 138 (flo	WEC	WEC		x
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	x	
884 - Dune Acres-Michigan C	NIPS	NIPS		
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	x	
SPP 69-SPPSPSTIES	WEPL	SPS		
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN		
876 - Cranberry Loop 115kV	WPS	WPS		
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP		
679 - Spencer-Triboji 161 (f	ALTW	WAPA		
519 - Northpoint-Dewey 115 (	ALTE	WPS		
1272 - Oak Creek 345/230 Xfm	WEC	WEC		
1196 - Smith-Green River Ste	LGEE	LGEE		
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	x	
Petersburg 345/138 Xfm E	IPL	IPL		
1253 - Genoa-Coulee 161 (flo	XEL	DPC		
MINVALY7 115-MINVALT4 230- 1	XEL	XEL		
1204 - Farr RDJ-Tippy 138 (f	METC	METC		
WNTR ST7 115 HIBBARD7 115	MP	MP		
249 - ATC Flow South	WEC	WPS		
SLVRBYH7 115 TWO HBR7 115	MP	MP		
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	x	
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE		
1343 - Detroit Industrial-Wa	ITC	ITC		
19BUNCE 230-SCOTT 220- 1	ITC	IESO		

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor											
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Value		
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
North New England Scobie Low	NEPOOL	NEPOOL	32	18	16	88	1	3	3	1	59.92	6647	
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	104	10	10	92	2	1	2	2	14.08	6972	
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	223	96	48	205	4	4	4	4	1.95	3571	
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	234	13	8	196	5	2	1	3	1.67	6732	

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor			From hub														
Constraint Name	From Area	To Area	Uses		To Hub	NEPOOL_10_RI	NEPOOL_2_NH	NEPOOL_2_NH	NEPOOL_2_NH	NEPOOL_2_NH	NEPOOL_3_ME	NEPOOL_3_ME	NEPOOL_5_SE	NEPOOL_7_CT	NEPOOL_3_NYC	NEPOOL_6_NYF	NEPOOL_6_NYF	NEPOOL_6_NYF	
			Bind Hrs	All-hrs Price		MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA
North New England Scobie Low	NEPOOL	NEPOOL	5840	5.93		x				x	x								
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	6423	5.58									x	x					x
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	3186	0.91											x				
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	6555	1.02				x	x								x		

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor											
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Value		
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO	2	73	44	30	1	20	14	1	282.33	4148	
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	9	49	43	45	2	13	13	4	163.54	5160	
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO	25	27	18	71	3	11	8	7	80.99	6039	
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	31	19	53	82	4	8	15	9	62.70	6461	
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	34	54	54	169	5	15	16	19	58.79	4952	
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	41	12	12	95	6	5	7	11	50.32	6791	
7 I/F CENTRAL EAST LO	NYISO	NYISO	43	57	56	145	7	16	17	17	47.80	4803	
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	44	116	117	191	8	25	21	20	46.32	3078	
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	67	5	3	120	9	3	2	14	25.41	7721	
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	70	25	20	40	10	10	9	2	23.69	6089	
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	79	2	2	127	11	1	1	15	21.87	8676	
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	85	58	38	41	12	17	11	3	19.78	4746	
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	88	7	5	76	13	4	3	8	18.32	7200	
Actual:GREENWOOD-VERNON-E	NYISO	NYISO	100	124	73	52	14	26	18	5	14.75	2803	
FARRGUT 1000MW WHEEL	NYISO	NYISO	112	53	6	134	15	14	4	16	12.07	5060	
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	114	80	86	220	16	21	19	21	11.89	3967	
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	117	17	11	98	17	7	6	13	11.49	6670	
Actual:GOWNUS1R-GREENWOOD	NYISO	NYISO	123	89	146	93	18	23	22	10	10.46	3731	
Actual:E179 ST-HG 6	NYISO	NYISO	130	136	92	97	19	27	20	12	9.88	2474	
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	137	15	9	67	20	6	5	6	8.94	6699	
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	187	32	39	161	21	12	12	18	3.48	5737	
Actual:DUN SO1R-E179 ST	NYISO	NYISO	357	3	180	356	22	2	23	22	0.01	7745	
Actual:V STRM P-JAMAICA	NYISO	NYISO	360	65	34	358	23	19	10	23	0.00	4480	
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	365	23	366	365	24	9	24	24	-	6232	
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	368	64	370	368	25	18	25	25	-	4487	
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	371	86	371	371	26	22	26	26	-	3799	

Table 3. Top Constraints, Ranks and Most Affected

Constraint	Corridor		Values		From hub	IESO_15_G	IESO_6_G	IESO_7_G	ITC_3_MSA_Detroit_G	NEPOOL_2_N_H	NEPOOL_5_SE_MA	NEPOOL_7_CT	NEPOOL_7_CT	NYISO_1_NYA	NYISO_1_NYA	
	Constraint Name	From Area	To Area	Bind Hrs	All-hrs Price	To Hub	NYISO_2_NY_B	NYISO_2_NY_B	NYISO_2_NY_B	FE_5_MSA_Cleveland_L	NYISO_10_N_YJ	NYISO_11_N_YK	NEPOOL_9_NWKST	NYISO_9_NY_L	NYISO_7_NY_G	NYISO_9_NY_L
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO	3259	18.91												
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	3340	12.11								x	x			
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO	5343	7.09												
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	3056	6.08											x	x
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	2919	1.50								x	x			
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	6196	5.21					x							
7 I/F CENTRAL EAST LO	NYISO	NYISO	2742	2.07												
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	1294	1.04										x		
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	7466	3.13								x				
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	5246	13.69												
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	8533	2.63								x				
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	3678	13.32												
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	6966	6.21		x			x							
Actual:GREENWOOD-VERNON-E	NYISO	NYISO	2194	9.94												
FARRGUT 1000MW WHEEL	NYISO	NYISO	6903	1.37										x		
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	1879	0.72		x	x	x								
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	6359	5.05		x	x	x								
Actual:GOWNUS1R-GREENWOOD	NYISO	NYISO	837	5.27												
Actual:E179 ST-HG 6	NYISO	NYISO	1765	5.07						x						
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	6503	7.89												
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	3583	1.62												
Actual:DUN SO1R-E179 ST	NYISO	NYISO	495	0.00												
Actual:V STRM P-JAMAICA	NYISO	NYISO	4166	0.00							x					
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	0	0.00		x	x	x								
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	0	0.00												
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	0	0.00												

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		NYISO_3_NYC	NYISO_3_NYC	NYISO_3_NYC	NYISO_3_NYC	NYISO_6_NYF	NYISO_6_NYF	NYISO_6_NYF	NYISO_6_NYF	NYISO_6_NYF	NYISO_8_NYH	NYISO_3_NYC	NYISO_6_NYF	NYISO_8_NYH
				NYISO_10_N_YJ	NYISO_7_NY_G	PSEG_3_MS_A_NewYork_L	PSEG_8_MS_A_NewYork_G	NEPOOL_10_RI	NEPOOL_6_WCMA	NEPOOL_9_NWKST	NYISO_10_N_YJ	PSEG_3_MS_A_NewYork_L	NYISO_10_N_YJ	NYISO_11_N_YK	NYISO_11_N_YK	NYISO_11_N_YK
Constraint Name	From Area	To Area	NYISO_10_N_YJ	NYISO_7_NY_G	PSEG_3_MS_A_NewYork_L	PSEG_8_MS_A_NewYork_G	NEPOOL_10_RI	NEPOOL_6_WCMA	NEPOOL_9_NWKST	NYISO_10_N_YJ	PSEG_3_MS_A_NewYork_L	NYISO_10_N_YJ	NYISO_11_N_YK	NYISO_11_N_YK	NYISO_11_N_YK	NYISO_11_N_YK
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO														
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO									x					
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO														
14 I/F WEST CENTRAL OP HI	NYISO	NYISO														
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO														
14 I/F WEST CENTRAL OP LO	NYISO	NYISO														
7 I/F CENTRAL EAST LO	NYISO	NYISO		x	x	x										
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO		x					x							
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO							x							
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO						x								
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO					x		x							
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO														
NFG7010 - IMO - ADIRONDACK	NYISO	IESO														
Actual:GREENWOOD-VERNON-E	NYISO	NYISO														
FARRGUT 1000MW WHEEL	NYISO	NYISO											x			
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO														
NFG7105 - ADIRONDACK - IMO	NYISO	IESO														
Actual:GOWNUS1R-GREENWOOD	NYISO	NYISO														
Actual:E179 ST-HG 6	NYISO	NYISO	x							x			x			
Actual:HUDAVE E-JAMAICA	NYISO	NYISO												x	x	x
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	x							x			x			
Actual:DUN SO1R-E179 ST	NYISO	NYISO								x			x			
Actual:V STRM P-JAMAICA	NYISO	NYISO							x					x		
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO														
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO														
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO														

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		NYISO_8_NYH	PENELEC_2_M SA_DuBois_G	PENELEC_2_M SA_DuBois_G	PJM500_9_MS A_Pittsburgh_G	PL_8_MSA_All entown_G
Constraint Name	From Area	To Area	NYISO_9_NY I	NYISO_10_N YJ	PL_7_MSA_A Ilentown_L	PL_7_MSA_A Ilentown_L	JCPL_1_MSA _NewYork_L	
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO						
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO						
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO						
14 I/F WEST CENTRAL OP HI	NYISO	NYISO				x		
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO					x	
14 I/F WEST CENTRAL OP LO	NYISO	NYISO			x	x		
7 I/F CENTRAL EAST LO	NYISO	NYISO						
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO						
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO						
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO						
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO						
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO						
NFG7010 - IMO - ADIRONDACK	NYISO	IESO		x				
Actual:GREENWOOD-VERNON-E	NYISO	NYISO						
FARRGUT 1000MW WHEEL	NYISO	NYISO	x					
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO						
NFG7105 - ADIRONDACK - IMO	NYISO	IESO						
Actual:GOWNUS1R-GREENWOOD	NYISO	NYISO						
Actual:E179 ST-HG 6	NYISO	NYISO						
Actual:HUDAVE E-JAMAICA	NYISO	NYISO						
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO						
Actual:DUN SO1R-E179 ST	NYISO	NYISO						
Actual:V STRM P-JAMAICA	NYISO	NYISO						
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO						
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO						
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO						

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor		EI Rankings				Regional Ranking				Value	
				Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90
Constraint Name		From Area	To Area										
APS South Interface		VAP	AP	1	50	98	38	1	2	7	3	403.14	5140
INTERFACE= PJM - WESTERN		AP	PJM500	3	60	101	100	2	3	8	8	263.26	4681
148 - Cloverdale-Lexington 5		VAP	AEP	4	84	74	34	3	6	5	2	256.93	3856
1-TRIPS,8MT STM -01PRNTY - 1		VAP	AP	6	92	130	78	4	7	10	7	180.32	3643
461 - Mt. Storm-Doubs 500 (f		VAP	AP	7	153	168	62	5	14	12	6	171.05	2141
INTERFACE= PJM - CENTRAL		PJM500	PJM500	22	126	149	138	6	11	11	9	86.41	2731
1130 - Wylie Ridge 345/500 X		AP	AP	26	95	81	49	7	8	6	5	80.67	3604
1530 - Elrama-Mitchell 138 (		DLCO	AP	30	43	45	39	8	1	2	4	67.68	5241
78 - Black Oak-Bedington 500		AP	AP	68	99	223	193	10	9	13	12	25.28	3452
1386 - Oglesby-Mazon 138		NI	NI	82	127	124	21	11	12	9	1	20.48	2708
RAMAPO 1000MW WHEEL		PSEG	PSEG	144	70	13	167	12	4	1	10	8.06	4300
NFG 23 - Roseland-Cedar Gro		PSEG	PSEG	203	114	60	258	13	10	3	13	2.47	3119
130 - Cedar Grove-Clifton 23		PSEG	PSEG	322	131	69	342	14	13	4	14	0.19	2651

Table 3. Top Constraints, Ranks and Most Affected

Constraint Name	Corridor		Ranks		From hub	AEP_8_G	AP_1_County_Harrison_G	AP_1_County_Harrison_G	FE_9_MSA_Weirton_G	FE_9_MSA_Weirton_G	FE_9_MSA_Weirton_G	NYISO_3_NYC	NYISO_3_NYC	NYISO_6_NYF	PJM500_4_MSA_Philadelphia_G	
	From Area	To Area	Bind Hrs	All-hrs Price												To Hub
APS South Interface	VAP	AP	1625	13.87												
INTERFACE= PJM - WESTERN	AP	PJM500	1535	4.93												
148 - Cloverdale-Lexington 5	VAP	AEP	2147	16.58												
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	1087	6.17			x									
461 - Mt. Storm-Doubs 500 (f	VAP	AP	621	8.57												
INTERFACE= PJM - CENTRAL	PJM500	PJM500	772	2.17												
1130 - Wylie Ridge 345/500 X	AP	AP	1911	10.47				x	x	x						
1530 - Elrama-Mitchell 138 (	DLCO	AP	3256	13.71	x				x						
78 - Black Oak-Bedington 500	AP	AP	209	1.03		x	x									
1386 - Oglesby-Mazon 138	NI	NI	1177	27.11												
RAMAPO 1000MW WHEEL	PSEG	PSEG	6166	0.92										x		
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	2569	0.32							x	x				
130 - Cedar Grove-Clifton 23	PSEG	PSEG	2319	0.02										x	x	

Table 3. Top Constraints, Ranks and Most Affected

Constraint	Corridor												
	From Area	To Area	PJM500_4_MSA_Philadelphia_G	PJM500_4_MSA_Philadelphia_G	PJM500_5_MSA_DC_G	PJM500_9_MSA_Pittsburgh_G	PJM500_9_MSA_Pittsburgh_G	PJM500_9_MSA_Pittsburgh_G	PJM500_9_MSA_Pittsburgh_G	PL_8_MSA_Allentown_G	VAP_1_MSA_Richmond_G	VAP_1_MSA_Richmond_G	VAP_7_G
Constraint Name	From Area	To Area	PSEG_8_MSA_NewYork_G	VAP_7_G	VAP_7_G	BGE_10_MSA_Baltimore-Towson_L	BGE_5_MSA_Baltimore-Towson_L	BGE_9_MSA_Baltimore-Towson_L	PL_7_MSA_Allentown_L	JCPL_1_MSA_NewYork_L	AP_7_MSA_Hagerstown-Martinsburg_L	VAP_7_G	AP_7_MSA_Hagerstown-Martinsburg_L
APS South Interface	VAP	AP											x
INTERFACE= PJM - WESTERN	AP	PJM500				x	x	x					
148 - Cloverdale-Lexington 5	VAP	AEP		x	x							x	
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP		x	x								
461 - Mt. Storm-Doubs 500 (f	VAP	AP											x
INTERFACE= PJM - CENTRAL	PJM500	PJM500				x	x	x					
1130 - Wylie Ridge 345/500 X	AP	AP											
1530 - Elrama-Mitchell 138 (	DLCO	AP											
78 - Black Oak-Bedington 500	AP	AP									x		
1386 - Oglesby-Mazon 138	NI	NI											
RAMAPO 1000MW WHEEL	PSEG	PSEG							x	x			
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	x										
130 - Cedar Grove-Clifton 23	PSEG	PSEG	x										

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		VAP_7_G	VAP_7_G
Constraint Name	From Area	To Area	AP_8_MSA_DC-VA-MD_L	VAP_33_MSA_DC_L	
APS South Interface	VAP	AP	x	x	
INTERFACE= PJM - WESTERN	AP	PJM500			
148 - Cloverdale-Lexington 5	VAP	AEP			
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP			
461 - Mt. Storm-Doubs 500 (f	VAP	AP	x	x	
INTERFACE= PJM - CENTRAL	PJM500	PJM500			
1130 - Wylie Ridge 345/500 X	AP	AP			
1530 - Elrama-Mitchell 138 (	DLCO	AP		
78 - Black Oak-Bedington 500	AP	AP			
1386 - Oglesby-Mazon 138	NI	NI			
RAMAPO 1000MW WHEEL	PSEG	PSEG			
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG			
130 - Cedar Grove-Clifton 23	PSEG	PSEG			

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor											
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Value		
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	
SPP 59-REDARCREDARC	OKGE	OKGE	5	38	35	32	1	5	4	11	194.26	5505	
SPP 15-CREKILWICWOO	OKGE	WERE	10	68	40	1	2	9	5	1	149.28	4429	
FG 5196 SPS North - South	SPS	SPS	11	8	15	18	3	1	1	8	149.00	7167	
SPP 76-SUNXFRPITSEM	OKGE	OKGE	12	78	61	5	4	10	7	3	139.26	4050	
1292 - Lake Road-Nashua 161	KACP	MIPU	19	45	33	3	5	6	3	2	100.55	5201	
567 - Philips-S. Philips Jct	WERE	WERE	35	14	19	10	6	3	2	6	57.22	6717	
SPP 13-CORCORSWSANA	AEPW	WFEC	38	56	77	9	7	8	11	5	53.45	4860	
SPP118-STOMORLACNEO	SWPA	AECI	40	93	82	25	8	12	12	10	51.05	3630	
SPP 52-OKMHENOKMKEL	AEPW	AEPW	48	82	72	6	9	11	9	4	43.94	3867	
733 - Toledo Bend-Leesville	CELE	EES	50	104	85	16	10	13	13	7	37.55	3270	
SPP111-SUMHE_BULSLD	SWPA	EES	58	110	62	23	11	14	8	9	30.14	3178	
SPP109-SCOBONCOCVIL	Lafa	EES	74	130	131	46	12	16	15	12	23.38	2656	
SPP 65-SABSEMPIRDIA	AEPW	AEPW	76	184	108	60	13	17	14	14	22.30	1743	
SPP 27-EUFXFRWELXFR	SWPA	SWPA	141	233	211	58	14	18	16	13	8.49	1065	
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	215	118	75	129	15	15	10	15	2.11	2929	
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES	253	55	42	168	16	7	6	16	1.24	4860	
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	364	9	364	364	17	2	17	17	-	7162	
FG 5204 SphWmcSumEmc	WERE	WERE	366	35	365	366	18	4	18	18	-	5713	

Table 3. Top Constraints, Ranks and Most Affected

Constraint	Corridor		Values		From hub	AECI_4_G	AEPW_5_MSA_Tulsa_G	AEPW_9_MSA_MountPleasant_G	AEPW_9_MSA_MountPleasant_G	AEPW_9_MSA_MountPleasant_G	CELE_10_MSA_Alexandria_G	EES_2_MSA_Batesville_G
	Constraint Name	From Area	To Area	Bind Hrs	All-hrs Price	To Hub	WERE_4_G	EES_9_MSA_Russellville_G	EES_7_MSA_Beaumont-PortArthur_G	EES_9_MSA_Russellville_G	OKGE_4_MSA_OklahomaCity_L	EES_5_MSA_NewOrleans_G	OKGE_4_MSA_OklahomaCity_L
SPP 59-REDARCREDARC	OKGE	OKGE	4107	18.51			x	x	x			
SPP 15-CREKILWICWOO	OKGE	WERE	3561	101.15		x						
FG 5196 SPS North - South	SPS	SPS	5965	28.27								
SPP 76-SUNXFRPITSEM	OKGE	OKGE	2568	48.04						x		
1292 - Lake Road-Nashua 161	KACP	MIPU	4204	74.82								
567 - Philips-S. Philips Jct	WERE	WERE	5306	40.72								
SPP 13-CORCORSWSANA	AEPW	WFEC	2035	42.55								
SPP118-STOMORLACNEO	SWPA	AECI	1895	25.60								
SPP 52-OKMHENOKMKEL	AEPW	AEPW	2255	47.64								
733 - Toledo Bend-Leesville	CELE	EES	1879	28.89				x				
SPP111-SUMHE_BULSLD	SWPA	EES	2528	25.80		x						x
SPP109-SCOBONCOCVIL	Lafa	EES	1078	11.83								
SPP 65-SABSEMPIRDIA	AEPW	AEPW	1391	8.85								
SPP 27-EUFXFRWELXFR	SWPA	SWPA	297	9.21								
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	2115	2.48								
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES	3430	1.52							x	
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	0	0.00								
FG 5204 SphWmcSumEmc	WERE	WERE	0	0.00								

Table 3. Top Constraints, Ranks and Most Affected

Constraint		Corridor		WERE_1_MSA _Manhattan_G	WERE_1_MSA _Manhattan_G	WERE_1_MSA _Manhattan_G
Constraint Name	From Area	To Area	AEPW_1_MSA _Tulsa_G	OKGE_4_MSA OklahomaCity_ L	WERE_4_G	
SPP 59-REDARCREDARC	OKGE	OKGE				
SPP 15-CREKILWICWOO	OKGE	WERE				
FG 5196 SPS North - South	SPS	SPS	x	x		
SPP 76-SUNXFRPITSEM	OKGE	OKGE				
1292 - Lake Road-Nashua 161	KACP	MIPU				
567 - Philips-S. Philips Jct	WERE	WERE				x
SPP 13-CORCORSWSANA	AEPW	WFEC				
SPP118-STOMORLACNEO	SWPA	AECI	x			
SPP 52-OKMHENOKMKEL	AEPW	AEPW				
733 - Toledo Bend-Leesville	CELE	EES				
SPP111-SUMHE_BULSLD	SWPA	EES				
SPP109-SCOBONCOCVIL	Lafa	EES				
SPP 65-SABSEMPIRDIA	AEPW	AEPW				
SPP 27-EUFXFRWELXFR	SWPA	SWPA				
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE				
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES				
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE				
FG 5204 SphWmcSumEmc	WERE	WERE				x

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor													
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Values				
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price	
FN/FS INT	IESO	IESO	62	225	169	133	1	2	2	2	28.64	1265	612	2.33	
East West Transfer West	IESO	IESO	69	67	47	64	2	1	1	1	23.90	4461	3190	8.37	

Ontario

These constraints affect no corridors

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor													
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Values				
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price	
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	89	145	87	59	1	2	2	2	18.00	2312	1827	9.15	
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	91	117	76	43	2	1	1	1	17.45	2988	2090	12.98	
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	138	155	113	63	3	3	3	3	8.94	2133	1368	8.48	

VACAR

These constraints affect no corridors

Table 3. Top Constraints, Ranks and Most Affected Corridors

Constraint		Corridor													
Constraint Name	From Area	To Area	EI Rankings				Regional Ranking				Values				
			Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price	
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	103	113	107	66	1	1	1	1	14.39	3131	1415	7.95	

TVA

These constraints affect
no corridors

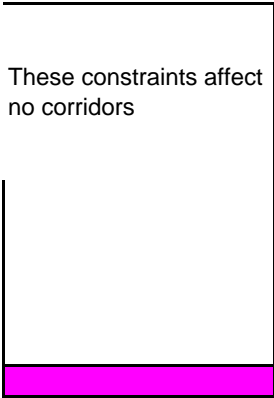
A diagram consisting of a large white rectangle with a black border. The bottom portion of this rectangle is filled with a solid pink color. The text "These constraints affect no corridors" is positioned in the upper left area of the white part of the rectangle.

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
1-TRIPS,8ELDEHV -3ELDEHV - 1	EES	EES	ENTERGY	ENTERGY	71	180	160	85	23.6	1764	687	6.00
NFG1314 - Little Gypsy-South	EES	EES	ENTERGY	ENTERGY	27	83	111	36	75.0	3863	1372	14.98
FG 1376 Coly-Vignes for the	LAGN	EES	ENTERGY	ENTERGY	16	20	30	22	107.2	6308	4408	26.42
SPP 93-WNE_WKS	NPPD	NPPD	MAPP	MAPP	17	4	7	15	107.1	7724	6821	30.09
1343 - Detroit Industrial-Wa	ITC	ITC	MISO	MISO	289	105	63	317	0.6	3238	2503	0.08
19BUNCE 230-SCOTT 220- 1	ITC	IESO	MISO	ONTARIO	345	28	17	348	0.1	6014	5637	0.02
884 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	36	37	64	13	55.7	5592	2483	33.21
249 - ATC Flow South	WEC	WPS	MISO	MISO	158	121	67	118	6.1	2849	2368	3.17
SPP 69-SPPSPSTIES	WEPL	SPS	MISO	SPP	46	48	23	48	44.8	5176	4915	10.48
2TRIP Norwalk H-Northport	NEPOOL	NEPOOL	NEPOOL	NEPOOL	104	10	10	92	14.1	6972	6423	5.58
North New England Scobie Low	NEPOOL	NEPOOL	NEPOOL	NEPOOL	32	18	16	88	59.9	6647	5840	5.93
W Rutland Tap - Blissvile 11	NEPOOL	NEPOOL	NEPOOL	NEPOOL	234	13	8	196	1.7	6732	6555	1.02
14 I/F WEST CENTRAL OP LO	NYISO	NYISO	NYPP	NYPP	41	12	12	95	50.3	6791	6196	5.21
1TRIP Leeds-Pleasant Val HI	NYISO	NYISO	NYPP	NYPP	9	49	43	45	163.5	5160	3340	12.11
7 I/F CENTRAL EAST LO	NYISO	NYISO	NYPP	NYPP	43	57	56	145	47.8	4803	2742	2.07
7 I/F MOSES SOUTH CLOSE LO	NYISO	NYISO	NYPP	NYPP	25	27	18	71	81.0	6039	5343	7.09
7 I/F MOSES SOUTH OPEN HI	NYISO	NYISO	NYPP	NYPP	114	80	86	220	11.9	3967	1879	0.72
CP10_12_1-tips, ReacBus-Dvnp	NYISO	NYISO	NYPP	NYPP	79	2	2	127	21.9	8676	8533	2.63
CP10_20_E179St_Hg4_E179St_Hg	NYISO	NYISO	NYPP	NYPP	187	32	39	161	3.5	5737	3583	1.62
FARRGUT 1000MW WHEEL	NYISO	NYISO	NYPP	NYPP	112	53	6	134	12.1	5060	6903	1.37

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
NFG7010 - IMO - ADIRONDACK	NYISO	IESO	NYPP	ONTARIO	88	7	5	76	18.3	7200	6966	6.21
1130 - Wylie Ridge 345/500 X	AP	AP	PJM	PJM	26	95	81	49	80.7	3604	1911	10.47
78 - Black Oak-Bedington 500	AP	AP	PJM	PJM	68	99	223	193	25.3	3452	209	1.03
INTERFACE= PJM - WESTERN	AP	PJM500	PJM	PJM	3	60	101	100	263.3	4681	1535	4.93
11 I/F UPNY - SENY OPEN LO	NYISO	NYISO	NYPP	NYPP	34	54	54	169	58.8	4952	2919	1.50
RAMAPO 1000MW WHEEL	PSEG	PSEG	PJM	PJM	144	70	13	167	8.1	4300	6166	0.92
148 - Cloverdale-Lexington 5	VAP	AEP	PJM	PJM	4	84	74	34	256.9	3856	2147	16.58
APS South Interface	VAP	AP	PJM	PJM	1	50	98	38	403.1	5140	1625	13.87
SPP 59-REDARCREDARC	OKGE	OKGE	SPP	SPP	5	38	35	32	194.3	5505	4107	18.51
SPP 76-SUNXFRPITSEM	OKGE	OKGE	SPP	SPP	12	78	61	5	139.3	4050	2568	48.04
FG 5196 SPS North - South	SPS	SPS	SPP	SPP	11	8	15	18	149.0	7167	5965	28.27
SPP111-SUMHE_BULSLD	SWPA	EES	SPP	ENTERGY	58	110	62	23	30.1	3178	2528	25.80
SOUTHERN - GRIDFLORIDA	FPL	SOCO	FRCC	SOUTHERN	15	102	70	111	113.35	3355	2300	3.58
1-TRIPS,7THOMHL -5THMHIL - 1	AECI	AECI	ENTERGY	ENTERGY	20	6	4	28	99.0	7354	7326	20.24
1-TRIPS,3BVRCK -3STAND -99	EES	EES	ENTERGY	ENTERGY	281	76	58	195	0.7	4088	2653	1.03
1-TRIPS,3CAMDMG -3MCNEIL -99	EES	EES	ENTERGY	ENTERGY	228	101	83	140	1.8	3385	1884	2.14
1-TRIPS,4ALCAEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	111	22	24	81	12.1	6239	4894	6.11
1-TRIPS,4ALCBEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	110	21	22	79	12.2	6288	4934	6.16
1-TRIPS,4ALCCEM -4MONOCM1- 1	EES	EES	ENTERGY	ENTERGY	115	26	27	87	11.8	6083	4784	5.95
FG 1308 Dodson-Danville_Hart	EES	EES	ENTERGY	ENTERGY	154	31	26	83	6.4	5742	4790	6.06
FG 1324 WhiteBluff-Sheridan	EES	EES	ENTERGY	ENTERGY	59	164	144	149	30.1	1977	858	1.98

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
FG 1379 Grimes-Mt Zion for t	EES	EES	ENTERGY	ENTERGY	72	1	1	42	23.6	8719	8622	13.04
FG 1380 Batesville-Marks for	EES	EES	ENTERGY	ENTERGY	171	40	28	77	4.7	5417	4777	6.18
NFG1350 - North Crowley-Scot	LAGN	EES	ENTERGY	ENTERGY	45	98	106	26	46.3	3471	1437	24.41
1-TRIPS,FT MEADE-FT MEADE- 1	FPC	FPC	FRCC	FRCC	136	120	122	72	9.0	2853	1184	6.80
1-TRIPS,NORMBNDY-NORMAN_A- 2	JEA	JEA	FRCC	FRCC	106	161	114	70	12.5	2027	1327	7.12
901 - Galesburg 161/138 Xfm	MEC	IP	MAPP	MISO	65	108	88	14	26.5	3207	1813	30.14
1441 - Grand Island-Aurora 1	NPPD	NPPD	MAPP	MAPP	37	74	36	7	55.0	4125	3842	45.73
1-TRIPS,FTPECK 4-FTPECK 7- 1	WAPA	WAPA	MAPP	MAPP	159	109	49	51	6.1	3184	3183	10.37
519 - Northpoint-Dewey 115 (	ALTE	WPS	MISO	MISO	63	44	29	12	27.7	5212	4707	33.97
679 - Spencer-Triboji 161 (f	ALTW	WAPA	MISO	MAPP	61	159	120	33	29.5	2091	1192	17.24
553 - Pana 345/138 Xfm (flo)	AMRN	AMRN	MISO	MISO	47	122	119	44	44.2	2834	1265	12.57
GRANITF4 230-WILLMAR4 230- 1	GRE	WAPA	MISO	MAPP	33	206	147	19	59.1	1427	827	28.17
NFG2081 - 10NEWTNV69.0 07MID	HE	SIGE	MISO	MISO	235	316	294	91	1.7	329	71	5.59
1196 - Smith-Green River Ste	LGEE	LGEE	MISO	MISO	78	30	41	56	22.0	5799	3519	9.51
1204 - Farr RDJ-Tippy 138 (f	METC	METC	MISO	MISO	126	185	126	74	10.1	1742	1128	6.37
1-TRIPS,ARROWHD4-RUSH CY4- 1	MP	MP	MISO	MISO	42	69	50	35	48.1	4411	3151	16.48
1-TRIPS,RIVERTN4-BLCKBRY4- 1	MP	MP	MISO	MISO	57	61	71	54	30.5	4671	2299	9.64
SLVRBYH7 115 TWO HBR7 115	MP	MP	MISO	MISO	177	59	31	103	4.1	4745	4386	4.75
WNTR ST7 115 HIBBARD7 115	MP	MP	MISO	MISO	129	51	21	75	10.0	5112	5001	6.23
1162 - Dune Acres-Michigan C	NIPS	NIPS	MISO	MISO	14	62	66	4	116.7	4585	2434	69.57

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
1203 - Leesburg-Northeast 13	NIPS	NIPS	MISO	MISO	8	52	80	2	164.5	5109	1959	84.36
1-TRIPS,MORRIS 7-GRACEVT7- 1	OTP	WAPA	MISO	MAPP	216	77	184	128	2.1	4085	450	2.52
1-TRIPS,ORTONVL7-GRACEVT7- 1	OTP	OTP	MISO	MISO	80	47	32	24	21.8	5188	4250	25.80
1272 - Oak Creek 345/230 Xfm	WEC	WEC	MISO	MISO	66	39	52	53	26.0	5452	3126	9.86
1509 - Bain-Kenosha 138 (flo	WEC	WEC	MISO	MISO	28	66	51	17	72.7	4476	3130	28.82
Petersburg 345/138 Xfm E	IPL	IPL	MISO	MISO	87	247	187	37	18.4	862	438	13.93
876 - Cranberry Loop 115kV	WPS	WPS	MISO	MISO	52	209	215	31	34.8	1417	252	18.89
1253 - Genoa-Coulee 161 (flo	XEL	DPC	MISO	MISO	97	232	189	69	15.4	1092	432	7.30
MINVALY7 115-MINVALT4 230- 1	XEL	XEL	MISO	MISO	109	100	68	20	12.4	3440	2321	28.12
1-TRIPS,GRAND IS-S HERO - 1	NEPOOL	NEPOOL	NEPOOL	NEPOOL	223	96	48	205	1.9	3571	3186	0.91
Actual:HUDAVE E-JAMAICA	NYISO	NYISO	NYPP	NYPP	137	15	9	67	8.94272	6699	6503	7.89201
14 I/F WEST CENTRAL OP HI	NYISO	NYISO	NYPP	NYPP	31	19	53	82	62.7	6461	3056	6.08
1TRIP Dun-ShoreRd SpBrk-EGC	NYISO	NYISO	NYPP	NYPP	67	5	3	120	25.4	7721	7466	3.13
1TRIP Reynld-GBush NScot-Alp	NYISO	NYISO	NYPP	NYPP	70	25	20	40	23.7	6089	5246	13.69
1TSPBKTRMT:DUN NO1R-S CREEK	NYISO	NYISO	NYPP	NYPP	371	86	371	371	0.0	3799	0	0.00
1TSPBKTRMT:DUN NO2R-S CREEK	NYISO	NYISO	NYPP	NYPP	368	64	370	368	0.0	4487	0	0.00
7 I/F MOSES SOUTH CLOSE HI	NYISO	NYISO	NYPP	NYPP	2	73	44	30	282.3	4148	3259	18.91
Actual:DUN SO1R-E179 ST	NYISO	NYISO	NYPP	NYPP	357	3	180	356	0.0	7745	495	0.00
Actual:E179 ST-HG 6	NYISO	NYISO	NYPP	NYPP	130	136	92	97	9.9	2474	1765	5.07
Actual:FR-KILLS-WILOWBK2	NYISO	NYISO	NYPP	NYPP	85	58	38	41	19.8	4746	3678	13.32
Actual:GOWNUS1R-GRENWOOD	NYISO	NYISO	NYPP	NYPP	123	89	146	93	10.5	3731	837	5.27

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
Actual:GRENWOOD-VERNON-E	NYISO	NYISO	NYPP	NYPP	100	124	73	52	14.8	2803	2194	9.94
1-TRIPS,HMP HRBR-DVNPNT NK- 1	NYISO	NYISO	NYPP	NYPP	372	94	373	372	0.0	3616	0	0.00
Actual:V STRM P-JAMAICA	NYISO	NYISO	NYPP	NYPP	360	65	34	358	0.0	4480	4166	0.00
NFG7105 - ADIRONDACK - IMO	NYISO	IESO	NYPP	ONTARIO	117	17	11	98	11.5	6670	6359	5.05
East West Transfer West	IESO	IESO	ONTARIO	ONTARIO	69	67	47	64	23.9	4461	3190	8.37
FN/FS INT	IESO	IESO	ONTARIO	ONTARIO	62	225	169	133	28.6	1265	612	2.33
ONTARIO-NEW YORK ST LAW INT	IESO	NYISO	ONTARIO	NYPP	365	23	366	365	0.0	6232	0	0.00
1530 - Elrama-Mitchell 138 (	DLCO	AP	PJM	PJM	30	43	45	39	67.7	5241	3256	13.71
1386 - Oglesby-Mazon 138	NI	NI	PJM	PJM	82	127	124	21	20.5	2708	1177	27.11
11 I/F UPNY - SENY CLOSE LO	NYISO	NYISO	NYPP	NYPP	44	116	117	191	46.3	3078	1294	1.04
INTERFACE= PJM - CENTRAL	PJM500	PJM500	PJM	PJM	22	126	149	138	86.4	2731	772	2.17
130 - Cedar Grove-Clifton 23	PSEG	PSEG	PJM	PJM	322	131	69	342	0.2	2651	2319	0.02
NFG 23 - Roseland-Cedar Gro	PSEG	PSEG	PJM	PJM	203	114	60	258	2.5	3119	2569	0.32
1-TRIPS,8MT STM -01PRNTY - 1	VAP	AP	PJM	PJM	6	92	130	78	180.3	3643	1087	6.17
461 - Mt. Storm-Doubs 500 (f	VAP	AP	PJM	PJM	7	153	168	62	171.0	2141	621	8.57
SPP 13-CORCORSWSANA	AEPW	WFEC	SPP	SPP	38	56	77	9	53.4	4860	2035	42.55
SPP 52-OKMHENOKMKEL	AEPW	AEPW	SPP	SPP	48	82	72	6	43.9	3867	2255	47.64
SPP 65-SABSEMPIRDIA	AEPW	AEPW	SPP	SPP	76	184	108	60	22.3	1743	1391	8.85
1-TRIPS,BC PST 4-3BVRCK - 1	CELE	EES	SPP	ENTERGY	253	55	42	168	1.2	4860	3430	1.52
1-TRIPS,DOLHILL6-DOLHILL7- 1	CELE	CELE	SPP	SPP	364	9	364	364	0.0	7162	0	0.00

Table 3. Top Constraints, Ranks and Values

Constraints					Corridors							
Constraint Name	From Area	To Area	From Market	To Market	Rankings				Values			
					Cong Rent	U90	Bind Hrs	All-hrs Price	Cong Rent (M\$)	U90	Bind Hrs	All-hrs Price
733 - Toledo Bend-Leesville	CELE	EES	SPP	ENTERGY	50	104	85	16	37.6	3270	1879	28.89
1292 - Lake Road-Nashua 161	KACP	MIPU	SPP	MISO	19	45	33	3	100.6	5201	4204	74.82
SPP109-SCOBONCOCVIL	LAFA	EES	SPP	ENTERGY	74	130	131	46	23.4	2656	1078	11.83
SPP 15-CREKILWICWOO	OKGE	WERE	SPP	SPP	10	68	40	1	149.3	4429	3561	101.15
SPP 27-EUFXFRWELXFR	SWPA	SWPA	SPP	SPP	141	233	211	58	8.5	1065	297	9.21
SPP118-STOMORLACNEO	SWPA	AECI	SPP	ENTERGY	40	93	82	25	51.1	3630	1895	25.60
1-TRIPS,166TH 3-JARBALO3- 1	WERE	WERE	SPP	SPP	215	118	75	129	2.1	2929	2115	2.48
567 - Philips-S. Philips Jct	WERE	WERE	SPP	SPP	35	14	19	10	57.2	6717	5306	40.72
FG 5204 SphWmcSumEmc	WERE	WERE	SPP	SPP	366	35	365	366	0.0	5713	0	0.00
1-TRIPS,5OGLETHR-5WIDCRK2- 1	TVA	TVA	TVAUTHOR	TVAUTHOR	103	113	107	66	14.4	3131	1415	7.95
1-TRIPS,6GRANITE-3GRANITE- 2	SCEG	SCEG	VACAR	VACAR	89	145	87	59	18.0	2312	1827	9.15
NFG1801 - 3Lyles-3Lexngt 115	SCEG	SCPSA	VACAR	VACAR	91	117	76	43	17.4	2988	2090	12.98
1-TRIPS,6BLUFFTN-3BLUFFTN- 2	SCPSA	SCPSA	VACAR	VACAR	138	155	113	63	8.9	2133	1368	8.48



INTERNATIONAL

Memorandum

To: Poonum Agrawal, David Meyer, U.S. Department of Energy CRA No. D08554-00
 From: Prashant Murti, Alex Rudkevich, CRA International
 Date: Finalized March 13, 2006
 Subject: **GE MAPS INPUT ASSUMPTIONS: EASTERN INTERCONNECT**

This memorandum summarizes salient inputs to the CRA locational price forecasting model (GE MAPS). The model geographic footprint encompasses the US portion of the Eastern Interconnect and the Canadian province of Ontario. The analyses simulate the years 2008 and 2011.

Primary data sources for the CRA GE MAPS model include the NERC MMWG, the General Electric generation and transmission databases for the Eastern Interconnect, various publications by NERC regions and Independent System Operators, FERC submissions by generation and transmission owners, and CRA in-house analysis of plant operations and market data. Major data components are listed below.

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1. TRANSMISSION

The CRA model is based on load flow cases provided by the NERC Multiregional Modeling Working Group (MMWG). This analysis uses the MMWG 2005 series load flow cases for the summer of 2007 and the summer of 2010. The load flow cases encompass the entire Eastern Interconnect system, including lines, transformers, phase shifters, and DC ties. The Cross-Sound and Neptune high voltage DC cables are added to these cases. Apart from these DC cables, no transmission upgrades are added apart from those included in the MMWG cases. Monitored constraints originate in the following sources:

- The NERC flowgate book.
- The list of flowgates published by the Midwest ISO on their website.
- A list of flowgates provided by the Southwest Power Pool.
- FERC Form 715 filings, seasonal transmission assessment reports, and studies published by NERC regions and Independent System Operators.
- Regional Transmission Expansion Plan (RTEP) reports published by various ISO.
- The 2004 Intermediate Area Transmission Review published by the New York ISO.
- The CP-10 Working Group report (2004) by the Northeast Power Coordinating Council.
- Contingency analyses performed by General Electric and by CRA.
- Historically binding constraints monitored by CRA.

2. LOAD AND ENERGY

For each load serving entity GE MAPS requires an hourly load shape and an annual forecast of peak load and total energy. Loads for forecast years are scaled based on these parameters. Load shapes are drawn from hourly actual demand for 2002, as published in FERC Form 714 submissions and on the websites of various Independent System Operators (ISOs) and NERC reliability regions. Peak load and annual energy forecasts are taken from the most recent data available in FERC Form 714 submissions (2004) and from forecast reports published by ISOs and NERC regions (2005), including:

- Forecast of Capacity Energy Load and Transmission (CELT), 2005 by the ISO New England.
- 2005 Load and Capacity Data report (Gold Book) published by the NYISO.
- 2005 PJM Load Forecast Report published by PJM.

Ontario data is drawn from the 10-Year Outlook: Ontario Demand Report published by the Independent Electricity Market Operator of Ontario

3. THERMAL UNITS

GE MAPS includes a detailed model of thermal generation, in order to accurately simulate operational characteristics, and project realistic hourly dispatch and prices. Modeled characteristics include unit type, unit fuel type, heat rate values and shape (based on unit technology), summer and winter capacities, fixed and variable non-fuel operation and maintenance costs, startup fuel usage, forced and planned outage rates, minimum up and down times, and quick start and spinning reserve capabilities.

The CRA generation database reflects unit-specific data for each generating unit based on a wide variety of sources. In cases where unit-specific data is not available, representative values based on unit type, fuel, and size are used. Table 1 and Table 2 document these generic assumptions. Note that all costs and prices are shown in real 2005 dollars.

Table 1: Generic Unit Characteristics

Unit Type & Size	Variable O&M (\$/MWh)	Fixed O&M (\$/kW-yr)	Minimum Downtime (Hrs)	Minimum Uptime (Hrs)	Heat Rate Shape
Combined Cycle	\$ 2.50	\$ 21.00	8	6	2 Blocks, each 50% at FLHR
Combustion Turbine <100 MW	\$ 7.00	\$ 15.00	1	1	One block
Combustion Turbine >100 MW	\$ 7.00	\$ 15.00	1	1	One block
Steam Turbine [coal] >200 MW	\$ 1.00	\$ 35.00	12	24	4 blocks, 50% @ 106%FLHR, 15% @ 90%, 30% @ 95%, 5% @ 100%
Steam Turbine [coal] <100 MW	\$ 3.00	\$ 45.00	6	8	
Steam Turbine [coal] <200 MW	\$ 3.00	\$ 35.00	8	8	
Steam Turbine [gas] >200 MW	\$ 3.00	\$ 30.00	8	16	4 blocks, 25% @ 118%FLHR, 30% @ 90%, 35% @ 95%, 5% @ 103%
Steam Turbine [gas] <100 MW	\$ 5.00	\$ 34.00	6	10	
Steam Turbine [gas] <200 MW	\$ 4.00	\$ 30.00	6	10	
Steam Turbine [oil] >200 MW	\$ 3.00	\$ 30.00	8	16	4 blocks, 25% @ 118%FLHR, 30% @ 90%, 35% @ 95%, 5% @ 103%
Steam Turbine [oil] <100 MW	\$ 5.00	\$ 34.00	6	10	
Steam Turbine [oil] <200 MW	\$ 4.00	\$ 30.00	6	10	

The primary data source for generation units and characteristics is the NERC Electricity, Supply and Demand (ES&D) 2003 database, which contains unit type, fuel type (primary and secondary), and capacity data for existing units. Heat rate data is drawn from prior ES&D databases where available. For newer plants, heat rates are based on industry averages for the technology of the unit. The NERC Generation Availability Data System (GADS) 2003 database, released January 2005, is the source for forced and planned outage rates, based on plant type, size, and vintage. Fixed and variable operation and maintenance costs are estimates based on plant size, technology, and age. These estimates are supplemented by FERC Form 1 submissions where available. The FOM values include an estimate of \$1.50/kW-yr for insurance and 10% of base FOM (before insurance) for capital improvements.

Plants that are known to be cogeneration facilities are either modeled with a low heat rate (6000 Btu/kWh), or set as must-run units in the dispatch, to reflect the fact that steam demand requires operation of the plant even when uneconomical in the electricity market.

Table 2: Generic Unit Characteristics

Unit Type & Size	Quick Start (% of Capacity)	Spinning Reserve (% of Capacity)	Forced Outage Rate (%)	Planned Outage Rate (%)	Typical Outage Length (Days)
Combined Cycle	-	30%	1.81%	7.40%	3
Combustion Turbine <100 MW	100%	90%	2.81%	5.28%	1
Combustion Turbine >100 MW	100%	90%	2.60%	6.94%	1
Steam Turbine [coal] >200 MW	-	10%	3.07%	9.10%	7
Steam Turbine [coal] <100 MW	-	10%	3.78%	8.32%	3
Steam Turbine [coal] <200 MW	-	10%	4.57%	9.43%	3
Steam Turbine [gas] >200 MW	-	10%	3.50%	14.11%	7
Steam Turbine [gas] <100 MW	-	10%	2.62%	6.81%	2
Steam Turbine [gas] <200 MW	-	10%	3.23%	11.11%	2
Steam Turbine [oil] >200 MW	-	10%	2.79%	13.51%	7
Steam Turbine [oil] <100 MW	-	10%	1.46%	8.33%	2
Steam Turbine [oil] <200 MW	-	10%	3.01%	12.16%	2

4. NUCLEAR UNITS

CRA assumes that nuclear plants run when available, and that they have minimum up and down times of one week. Forced outage rates for each unit are drawn from the Energy Central database of unit outages. Nuclear plants do not contribute to quick-start or spinning reserves. The model includes refueling and maintenance outages for each nuclear plant. In the near future, outages posted on the NRC website or announced in the trade press are included. For later years, refueling outages are projected on the basis of the refueling cycle, typical outage length, and last known outage dates of each plant. Since these facilities are treated as must run units, CRA does not specifically model their cost structure. Within the timeframe of this study, no nuclear retirements are applied.

5. HYDRO UNITS

GE MAPS has special provisions for modeling hydro units. For conventional or pondage units, a monthly pattern of water flow, i.e. the minimum and maximum generating capability and the total energy for each plant in each month is specified. For pumped storage units, the maximum generating & pumping capability of the plant is specified. For both types of hydro resource, CRA assumes that the plant is able to provide spinning reserves of up to 50% of plant capacity. Plant capacity data is drawn from the NERC ES&D database and the General Electric generating unit database. Plant monthly energy data is drawn from an average of Form EIA-860 submissions for 1992-1998.

6. RENEWABLE RESOURCES

It is difficult to predict exact operational patterns of wind and solar generators, since these are dependent on weather and ambient conditions. Therefore they are modeled as non-dispatchable resources with a specified annual capacity factor. Wind resources are modeled at 30% annual capacity factor, while solar generators are run at 24% annual capacity factor, and restricted to daytime hours.

7. CAPACITY ADDITIONS AND RETIREMENTS

CRA adds new generation based on projects in development or advanced stages of permitting, as indicated by trade press announcements, trade publications, environmental permit applications, and internal knowledge. CRA also adds generic capacity where economically justified, or as required to maintain resource adequacy per installed capacity reserve margins published by various ISOs and NERC regions.

Future new entry is likely to be in the form of gas-fired simple cycle (SCGT) or combined cycle (CCGT) units, depending on local needs and price patterns. In 2011, coal-fired steam turbine units may also be a viable option. Table 3 shows financing assumptions for each of these categories. The associated annual carrying cost amounts to approximately 94 \$/kW-yr for CCGT units, 65 \$/kW-yr for SCGT units, and 180 \$/kW-yr for coal-fired units.

Table 3: New Entry Financing

Cost Component	CCGT	SCGT	ST Coal
All-In Capital Cost (\$/kW)	650	400	1,500
Debt-Equity Ratio	55:45	50:50	50:50
Return on Equity	18%	18%	12%
Cost of Debt	8%	8%	8%
Term of Debt (years)	30	20	30
Fixed O&M (\$/kW-yr)	20	10	25
Variable O&M (\$/MWh)	2.5	5.0	1.0
Full Load Heat Rate (Btu/kWh)	6,900	10,000	9,000
Forced Outage Rate	3%	4%	4%
Planned Outage Rate	5%	5%	9%

CRA tracks planned and announced retirements from power pool load and capacity reports, as well as trade press announcements. A capacity balance for each NERC region is shown in Appendix I.

8. FUEL PRICE FORECASTS

GE-MAPS uses a monthly fuel price for each thermal unit. The fundamental assumption of behavior in competitive markets is that generators will bid their marginal cost into the energy market. The marginal cost for a gas plant is the opportunity cost of fuel purchased (in addition to non-fuel variable O&M and environmental adders), or the spot price of gas at the location closest to the plant. CRA therefore uses forecasts of spot prices at regional hubs, and refines these on the basis of historical differentials between price points and their associated hubs. For fuel oil CRA uses estimates of the price delivered to generators on a regional basis.

A number of generators can utilize a secondary fuel type. This possibility is simulated as follows:

- **Natural Gas Primary:** Units that primarily burn natural gas typically face stringent restrictions on the fraction of time that they may burn fuel oil. CRA makes the assumption that each unit is allowed to switch to fuel oil for the one month in each year in which the gas prices are highest.
- **Fuel Oil Primary:** Units that primarily burn oil may switch to gas whenever it is economically justified. However CRA assumes that natural gas shortages prevent this from happening in winter (November through March). A heat rate degradation of 3% is modeled when the unit switches to natural gas. Thus, the fuel type is switched between April and October, whenever the price of natural gas plus 3% is less than the price of fuel oil.

Coal prices are drawn from the Platts CoalDat database of January 2005, which forecasts delivered coal prices, including transportation and handling, for each major coal plant in the United States.

CRA has sent you a separate memorandum with a detailed description of natural gas and oil forecasts.

9. ENVIRONMENTAL REGULATIONS

CRA models NO_x and SO₂ emission rates for all units where such data is available. In addition, CRA models compliance with various allowance trading programs, and attempts to capture the effect of future environmental regulations. All plant emission rates are drawn from the Emissions Scorecard published by the US Environmental Protection Agency. Emission rates for NO_x and SO₂ are obtained from industry futures, in particular those published by the Cantor Environmental Brokerage. In this analysis CRA uses allowance trading prices based on futures for the 2008 simulations. For the 2011 simulations, CRA uses the allowance price forecast applied by the Energy Information Administration in developing the 2006 Annual Energy Outlook. CRA does not include the impacts of Carbon or Mercury emissions in these simulations.

10. EXTERNAL REGION SUPPLY

CRA explicitly models the US portion of the Eastern Interconnect, and the Canadian province of Ontario. Regions outside this study area are modeled as either supply profiles or scheduled interchanges. CRA

uses historic flows, combined with expectations of future conditions in these areas to project quantities and prices of power exchanged with the model footprint. In this analysis, flows from New Brunswick to New England, and from Hydro Quebec to New England, New York, and Ontario are modeled as scheduled flows, based on 12 months of historical data.

The DC ties with the WECC and ERCOT interconnections are modeled as price sensitive supply curves. CRA uses historical electricity prices and gas prices near these DC ties to calculate market heat rates for on-peak and off-peak periods, and for summer and winter. These heat rates are multiplied by the appropriate forecast gas price in each scenario, to arrive at a price points for each DC tie. The tie is then modeled as follows:

- When the locational price at the DC tie is within \pm \$2.50/MWh of the corresponding price point, zero flow is assumed on the tie.
- At locational prices that are between \$2.50/MWh and \$7.50/MWh above the price point, the tie is modeled as importing power into the Eastern Interconnect at half its capacity.
- At locational prices that are greater than \$7.50/MWh above the price point, the tie is modeled as importing power into the Eastern Interconnect at full capacity.
- At locational prices that are between \$2.50/MWh and \$7.50/MWh below the price point, the tie is modeled as exporting power from the Eastern Interconnect at half its capacity.
- At locational prices that are greater than \$7.50/MWh below the price point, the tie is modeled as exporting power from the Eastern Interconnect at full capacity.

11. INTERRUPTIBLE LOAD

The presence of demand response is important to energy and installed capacity prices. The value of energy to interruptible loads caps the energy prices, and the capacity of interruptible load effectively replaces installed reserves and lowers the capacity value. CRA uses values for interruptible load, and demand side management reduction in peak, as reported by the various Independent System Operators and reliability regions in the EIA-411 and other equivalent annual forecasts. This dispatchable demand is spread among load areas based on their load share of the total system load (unless there is more detailed data available). The dispatchable demand is implemented as generators with a dispatch price of \$600/MWh for the first block (50% of area dispatchable demand) and \$800/Mwh for the second block. These units rarely run, as the high prices they require indicate a supply shortfall and prompt economic new entry. Thus dispatchable demand plays an insignificant direct role in the energy market.

12. MARKET MODEL ASSUMPTIONS

- A. **Marginal Cost Bidding:** All generation units are assumed to bid marginal cost (opportunity cost of fuel plus non-fuel VOM plus opportunity cost of tradable permits). It is reasonable to assume that the real markets are not perfectly competitive and thus the model tends to underestimate the prices in the real markets.

- B. **Installed Capacity:** Installed capacity reserve requirements are set at a percentage of forecast peak load for each NERC region or sub-region, as shown in Table 4. CRA adds capacity to ensure that each region meets the installed capacity target indicated by these requirements.

Table 4: Installed Capacity (% of Peak Load)

Pool	Fraction
NEPOOL	115%
NYPP	118%
Long Island	99%
New York City	80%
MAAC	116%
ECAR	115%
MAIN	117%
MAPP	115%
SPP	115%
Entergy	115%
Southern	115%
TVA	115%
VACAR	115%
FRCC	118%
Ontario	118%

- C. **ISO Boundaries:** CRA uses hurdle rates for all flows (transactions) between various ISOs. These hurdle rates simulate both existing wheeling rates and market inefficiencies associated with inter-ISO transactions. All hurdle rates are set at \$2/MWh in each direction in both commitment and dispatch, except as documented in Table 5.

Table 5: Hurdle Rates (\$/MWh Flow)

From	To	Commitment	Dispatch
ISO-NE	NYISO	\$6	\$4
NYISO	ISO-NE	\$8	\$6
PJM	NYISO	\$4	\$1
NYISO	PJM	\$6	\$6
ONTARIO	NYISO	\$3	\$1
NYISO	ONTARIO	\$6	\$3
PJM	MISO	\$0	\$0
MISO	PJM	\$0	\$0

- D. **Operating Reserves:** Operating reserves are based on requirements instituted by each reliability region. These requirements are based on the loss of the largest single generator, or the largest single generator and half the second largest generator, or a percentage of peak demand. The spinning reserves market affects energy prices, since units that spin cannot produce electricity under normal conditions. Energy prices are higher when reserves markets are modeled. Table 6 shows a list of operating reserves by reliability region, and the fraction met by spinning reserves. The remainder is assumed to be met by quick start reserves.

Table 6: Operating Reserve Requirements

ISO/Region	Operating Reserve	% Met by Spin
ISO-NE	1,900 MW	67%
NYISO	1,200 MW	50%
Eastern NY	1,200 MW	25%
Long Island	120 MW	50%
PJM	4,500 MW	67%
Midwest ISO	4% of load	65%
MAPP	871 MW	65%
SPP	1,746 MW	65%
Entergy	4% of load	65%
Southern	4% of load	65%
TVA	4% of load	65%
VACAR	4% of load	65%
FRCC	853 MW	65%
Ontario	1,600 MW	55%

- E. **Marginal transmission Losses:** GE MAPS has the capability of simulating marginal losses and their impact on locational energy prices. However these analyses do not include marginal losses in any calculations.

APPENDIX I: CAPACITY BALANCE

ISO-NE	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	28,583	29,016	29,449	29,850	30,230	30,624
Interruptible Load (MW)	1,485	1,534	1,566	1,571	1,534	1,450
Net Demand (MW)	27,098	27,482	27,883	28,279	28,696	29,174
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	31,163	31,604	32,065	32,521	33,000	33,550
Firm Transfers (MW)	463	463	463	463	456	456
Installed Capacity (MW)	31,267	30,917	31,433	31,433	31,433	32,933
Capacity Surplus (MW)	567	-224	-169	-625	-1,111	-161
NYISO						
Forecast Peak (MW)	15,739	15,913	16,061	16,243	16,430	16,632
Interruptible Load (MW)	137	137	137	142	142	147
Net Demand (MW)	15,602	15,776	15,924	16,101	16,288	16,485
Reserve Margin (%)	18	18	18	18	18	18
Load + Reserve (MW)	18,410	18,616	18,790	18,999	19,220	19,452
Firm Transfers (MW)	-225	-225	-305	-305	-298	-298
Installed Capacity (MW)	24,058	23,735	23,247	23,247	23,247	23,247
Capacity Surplus (MW)	5,423	4,894	4,152	3,943	3,729	3,497
New York City						
Forecast Peak (MW)	11,505	11,660	11,805	11,965	12,090	12,217
Interruptible Load (MW)	71	71	71	74	74	76
Net Demand (MW)	11,434	11,589	11,734	11,891	12,016	12,141
Reserve Margin (%)	-20	-20	-20	-20	-20	-20
Load + Reserve (MW)	9,147	9,271	9,387	9,513	9,613	9,713
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	10,325	10,550	9,695	9,695	9,530	10,030
Capacity Surplus (MW)	1,178	1,279	308	182	-83	317
Long Island						
Forecast Peak (MW)	5,320	5,410	5,500	5,580	5,680	5,779
Interruptible Load (MW)	71	71	71	74	74	76
Net Demand (MW)	5,249	5,339	5,429	5,506	5,606	5,703
Reserve Margin (%)	-1	-1	-1	-1	-1	-1
Load + Reserve (MW)	5,197	5,286	5,375	5,451	5,550	5,646
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	5,175	5,175	5,405	5,405	5,405	5,655
Capacity Surplus (MW)	-22	-111	30	-46	-145	9

MAAC	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	58,784	59,909	61,025	62,136	63,244	64,368
Interruptible Load (MW)	803	793	793	793	793	793
Net Demand (MW)	57,981	59,116	60,232	61,343	62,451	63,575
Reserve Margin (%)	16	16	16	16	16	16
Load + Reserve (MW)	67,258	68,575	69,869	71,158	72,443	73,747
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	69,249	68,801	69,591	69,591	69,591	73,591
Capacity Surplus (MW)	1,991	226	-278	-1,567	-2,852	-156
ECAR						
ECAR	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	106,753	108,749	110,942	112,867	114,598	116,432
Interruptible Load (MW)	2,523	2,499	2,519	2,520	2,475	2,395
Net Demand (MW)	104,230	106,250	108,423	110,347	112,123	114,037
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	119,865	122,188	124,686	126,899	128,941	131,143
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	128,202	129,835	130,593	130,871	130,871	132,411
Capacity Surplus (MW)	8,338	7,648	5,907	3,972	1,930	1,268
MAIN						
MAIN	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	60,184	61,518	62,608	63,645	64,641	65,644
Interruptible Load (MW)	3,453	3,466	3,471	3,476	3,479	3,483
Net Demand (MW)	56,731	58,052	59,137	60,169	61,162	62,161
Reserve Margin (%)	17	17	17	17	17	17
Load + Reserve (MW)	66,375	67,921	69,190	70,398	71,560	72,728
Firm Transfers (MW)	-61	-69	-141	-143	-54	-56
Installed Capacity (MW)	68,486	68,546	69,506	70,973	72,364	72,614
Capacity Surplus (MW)	2,050	556	175	432	750	-170
MAPP						
MAPP	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	30,712	31,288	31,939	32,492	33,070	33,722
Interruptible Load (MW)	270	271	272	273	274	275
Net Demand (MW)	30,442	31,017	31,667	32,219	32,796	33,447
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	35,008	35,670	36,417	37,052	37,715	38,464
Firm Transfers (MW)	1,151	1,132	1,203	1,198	1,210	1,222
Installed Capacity (MW)	34,309	34,592	36,352	37,043	37,043	37,643
Capacity Surplus (MW)	452	54	1,138	1,189	538	401

SPP	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	42,196	42,893	43,465	44,312	45,274	45,579
Interruptible Load (MW)	934	943	967	1,007	1,004	1,005
Net Demand (MW)	41,262	41,950	42,498	43,305	44,270	44,574
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	47,451	48,243	48,873	49,801	50,911	51,260
Firm Transfers (MW)	450	485	442	319	49	-40
Installed Capacity (MW)	56,183	56,183	56,183	56,183	57,033	57,033
Capacity Surplus (MW)	9,182	8,426	7,752	6,701	6,172	5,733
Entergy						
Forecast Peak (MW)	28,360	28,858	29,422	29,654	30,090	30,742
Interruptible Load (MW)	465	460	469	472	464	471
Net Demand (MW)	27,895	28,398	28,953	29,182	29,626	30,271
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	32,079	32,658	33,296	33,559	34,070	34,812
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	46,467	47,066	47,866	47,866	47,866	47,866
Capacity Surplus (MW)	14,388	14,408	14,570	14,307	13,796	13,054
Southern						
Forecast Peak (MW)	48,312	49,629	50,857	52,066	53,240	54,448
Interruptible Load (MW)	138	138	138	138	138	138
Net Demand (MW)	48,174	49,491	50,719	51,928	53,102	54,310
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	55,400	56,915	58,327	59,717	61,067	62,457
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	65,102	65,105	65,105	65,105	65,105	65,105
Capacity Surplus (MW)	9,702	8,190	6,778	5,388	4,038	2,649
TVA						
Forecast Peak (MW)	31,757	32,411	32,848	33,641	34,176	35,035
Interruptible Load (MW)	2,155	1,987	1,981	1,992	2,002	2,013
Net Demand (MW)	29,602	30,424	30,867	31,649	32,174	33,022
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	34,042	34,988	35,497	36,396	37,000	37,975
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	36,901	38,151	38,151	38,151	38,151	38,151
Capacity Surplus (MW)	2,859	3,163	2,654	1,755	1,151	176

VACAR	2006	2007	2008	2009	2010	2011
Forecast Peak (MW)	61,224	62,512	63,735	64,944	66,141	67,402
Interruptible Load (MW)	2,228	2,223	2,216	2,208	2,199	2,190
Net Demand (MW)	58,996	60,289	61,519	62,736	63,942	65,212
Reserve Margin (%)	15	15	15	15	15	15
Load + Reserve (MW)	67,845	69,332	70,747	72,146	73,533	74,994
Firm Transfers (MW)	0	0	0	0	0	0
Installed Capacity (MW)	68,659	69,105	70,620	70,354	70,354	74,854
Capacity Surplus (MW)	814	-227	-127	-1,792	-3,179	-140
FRCC						
Forecast Peak (MW)	47,994	49,139	50,414	51,700	53,030	54,370
Interruptible Load (MW)	3,386	3,381	3,386	3,384	3,405	3,425
Net Demand (MW)	44,608	45,758	47,028	48,316	49,625	50,945
Reserve Margin (%)	18	18	18	18	18	18
Load + Reserve (MW)	52,637	53,994	55,493	57,013	58,558	60,115
Firm Transfers (MW)	1,752	1,752	1,752	1,752	1,555	1,555
Installed Capacity (MW)	50,127	51,893	53,619	53,619	57,619	58,469
Capacity Surplus (MW)	-758	-349	-122	-1,642	617	-91

Memorandum

To: Poonum Agrawal, David Meyer, Department of Energy CRA No.
From: Bruce Tsuchida, Alex Rudkevich CRA International
Date: Finalized: March 10, 2006
Subject: **FUEL PRICE FORECAST**

This memorandum documents the CRA fuel price forecast methodology used for the Department of Energy (DOE) Congestion Study and Designation of the National Interest Electric Transmission Corridors (NIETCs). The forecast includes prices for natural gas, distillate (#2) and residual (#6) fuel oil, and coal. Note that all prices are reported in real 2004 dollars.

Base Case Forecasts

1. COAL PRICE FORECAST

Coal prices are drawn entirely from the Platts CoalDat database of January 2005, which forecasts delivered coal prices, including transportation and handling, for each major coal plant on an annual basis.

2. FUEL OIL FORECAST

Principal Drivers: The principal drivers underlying this forecast are the projected price for light sweet crude oil at Cushing, Oklahoma.

Base Case Forecast: In the near term (through 2009), the Base Case forecast is derived from the NYMEX futures prices for light sweet crude oil as of the closing of November 3, 2005. For 2010 the forecast is an interpolation between the futures of 2009 and the 2011 Reference Case forecast from the EIA Annual Energy Outlook 2006 (AEO2006). Through 2030, CRA uses the AEO2006 Reference Case forecast. CRA Base Case forecast for light sweet crude oil is presented on Figure 1.

Regional Prices: CRA forecasts prices for fuel oil # 2 and #6 by US census region. This forecast is prepared in three steps. First CRA uses a regression model calibrated on historical data to derive prices for fuel oil #2 and #6 at New York Harbor from the forecast of crude oil prices. New York Harbor prices for the Base Case forecast are shown in Figure 5. Second, New York Harbor prices (both fuel oil #2 and fuel oil #6) are linked to the AEO Reference Case forecast of US average prices of each type of fuel oil used by electric utilities. This derivation is also based on historical regression. Finally, CRA uses AEO forecast

to develop yearly regional multipliers linking national average prices and prices by census region. Petroleum Business Tax of \$0.45/MMBtu for fuel oil #6 and \$0.63/MMBtu for fuel oil #2 is added to oil prices for New York State.

Seasonal Pattern: Both fuel oil #2 and fuel oil #6 prices are varied monthly based on NYMEX futures data in the near term, and based on historical monthly patterns in the longer term.

Figures 7 through 17 show the regional fuel oil prices along with corresponding gas prices.

3. NATURAL GAS FORECAST

Principal Drivers: The principal drivers are the projected prices for natural gas at Henry Hub.

Base Case Forecast: In the near term (through 2008), the Base Case forecast is set equal to NYMEX futures prices for natural gas at Henry Hub as of the closing of November 3, 2005. For 2009 the forecast is an interpolation between the 2008 futures and the 2010 Reference Case forecast from the AEO 2006¹. Through 2030, CRA uses the AEO2006 Reference Case forecast. CRA Base Case forecast for natural gas prices at Henry Hub is shown in Figure 2.

Regional Prices: CRA forecasts gas price by state, which are aggregated to the regions as shown in Table 1. Regional forecasts are derived by adding two factors, the basis differential by region and local delivery charge by state, to the Henry Hub gas price.

Basis Differentials by Region: CRA recognizes multiple pricing points within each census region, all of which are actual pipeline trading points surveyed and reported by Platt's Gas Daily. Some of these pricing points coincide with the NYMEX Clearport hubs, which include Henry Hub. For the other points, CRA uses a regression model to one or several NYMEX Clearport hubs, calibrated with historical data, to derive a forecast. Table 1 shows the region, states, relevant natural gas trading points within the regions, and the NYMEX Clearport hubs used as drivers for the prices, either as directly or through historical regression. In the near term (through 2010), the basis forecast is derived from NYMEX Clearport hub futures settlement as of November 3rd, 2005. The NYMEX Clearport hub futures settlement data are only available for a short period, typically between 12 and 24 months. Within this timeframe, CRA derives summer and winter differentials to these hubs using NYMEX data. Beyond this period, CRA scales the basis differentials in proportion to the Henry Hub forecast. Forecast prices at each hub are derived using the Henry Hub forecast and the scaled basis differential for that hub.

¹ AEO 2006 does not forecast Henry Hub Prices, but predicts prices at the wellhead instead. A historical multiplication factor of 1.129 is used to derive the Henry Hub price forecast.

Table 1: Natural Gas Pricing Points

Region	States	Natural Gas Trading Point	Weights	Deriving Source (Summer)
Eastern New York	NY (East)	Transco Zone 6 NYC	1	Direct NYMEX ClearPort Hub
Western New York	NY (West)	Dominion (Appalachia)	0.5	Direct NYMEX ClearPort Hub
		DAWN	0.5	Regressed to Michigan Basis
PJM	MD, NJ, PA (East)	Texas Eastern Zone M 3	0.5	Direct NYMEX ClearPort Hub
		Transco Zone 6 Non NYC	0.5	Regressed to Texas Eastern Zone M 3 and Transco Zone 6 NYC
APR	KY, OH, PA (West), WV	TCO Basis	0.25	Direct NYMEX ClearPort Hub
		Leidy Hub	0.25	Regressed to Transco Zone 6 NYC
		Dominion (Appalachia)	0.5	Direct NYMEX ClearPort Hub
Southern New England	CT, MA, RI	Algonquin City Gates	1	Regressed to Transco Zone 6 NYC
Northern New England	ME, NH, VT	Tennessee Zone 6	0.5	Regressed to Texas Eastern Zone M 3 and Transco Zone 6 NYC
		Dracut	0.5	Regressed to Dominion (Appalachia)
Iowa-Missouri-Nebraska	IA, MO, NE	Ventura	1	Direct NYMEX ClearPort Hub
Florida	FL	Florida CityGate	1	Regressed to Henry Hub
Mid-Continent	KS, OK	NGPL Mid-Continent Basis	1	Direct NYMEX ClearPort Hub
Midwest	IL, IN, MI, MN, ND, SD, WI	Chicago Basis	0.5	Direct NYMEX ClearPort Hub
		Michigan Basis	0.5	Direct NYMEX ClearPort Hub
Ontario East	ON (East)	Niagra	1	Regressed to Dominion (Appalachia) and Michigan Basis
Ontario West	ON (West)	DAWN	1	Regressed to Michigan Basis
South Atlantic East	DC, DE, GA, MD, NC, SC, VA	Texas Eastern Zone M 3	0.16667	Direct NYMEX ClearPort Hub
		Transco Zone 6 Non NYC	0.16667	Direct NYMEX ClearPort Hub
		TRS85	0.16667	Regressed to Transco Zone 3
		TETM1	0.16667	Regressed to East LA Basis
		FGTMB	0.33333	Regressed to Transco Zone 3
South Atlantic South	AL, AR, LA, MS, TN	Henry Hub	1	Direct NYMEX ClearPort Hub

Local Delivery Charges: Burner tip prices for natural gas are the sum of the basis differentials by region as derived above and a local component that captures pipeline lateral charges and/or charges to local distribution companies. CRA estimates this local component at \$0.07/MMBtu for all units.

Seasonal Pattern: Natural gas prices are varied seasonally based on NYMEX futures data in the near term (through 2010). Beyond 2010, the seasonal pattern shown in 2010 is repeated for each year.

Figure 6 compares the Base Case gas price forecast by region.

Figures 7 through 17 show the regional gas prices along with corresponding oil prices.

Sensitivity Case Forecasts

For both light sweet crude oil and natural gas, CRA has derived a High Case forecast and Low Case forecast using the methods discussed below. Table 2 shows the values for these two forecasts along with the Base Case forecast. The CRA approach to constructing High and Low Cases relies on the same source that used for developing the Base Case: the forward market data and the fundamentals driven AEO 2006 forecasts. Coal prices were assumed to remain constant in all three cases.

Forward Market Data: NYMEX futures do not explicitly provide sensitivity scenarios. However, implied volatility could be derived from futures and options prices. CRA used implied volatility to estimate a standard deviation of forward prices. Then the High Case was set as futures plus one standard deviation. Similarly, the Low Case could be defined as futures minus one standard deviation. The Low Case for near terms was set as futures minus one standard deviation.

AEO 2006 Forecasts: In the long term, the AEO 2006 LP Case forecast was used for the Low Case. The AEO 2006 HP Case forecast appeared to be too low and thus was not used.

CRA developed sensitivity scenarios for the year 2008 through 2015, consistent with the proposed timeframe for the Congestion Study.

High Case Forecast: For both, light sweet crude oil and natural gas, the “futures plus standard deviation” approach was applied for years 2008 through 2015. These forecasts are shown on Figures 4 and 5 for light sweet crude oil and natural gas, respectively.

Low Case Forecast: For crude oil, the AEO 2006 LP Case prices were used in all years, because the prices generated by the “futures minus standard deviation” approach appear to be too low. For natural gas, the “futures minus standard deviation” approach was applied for 2008, the AEO 2006 LP Case was applied for years 2010 and beyond, and the price for 2009 was derived as a midpoint between 2008 and 2010. These forecasts are shown on Figures 4 and 5 for light sweet crude oil and natural gas, respectively.

Regional Prices: For light sweet crude oil the regression coefficients used for the Base Case forecast was applied for both the High and Low Case forecasts. For natural gas basis differential by region is calculated using the same methodology as the Base Case forecast but because outer year differentials will be scaled proportional to the Henry Hub forecast, the values of the High and Low Case vary from the Base Case.

Table 2: Forecast Comparison

Year	Natural Gas Forecast (\$/MMBtu)			Light Sweet Crude Oil Forecast (\$/Bbl)		
	Base Case	High Case	Low Case	Base Case	High Case	Low Case
2008	\$ 7.46	\$ 9.53	\$ 5.39	\$ 55.68	\$ 82.42	\$ 45.48
2009	\$ 6.49	\$ 8.29	\$ 5.17	\$ 52.37	\$ 83.18	\$ 41.23
2010	\$ 5.52	\$ 7.68	\$ 4.94	\$ 48.08	\$ 80.73	\$ 37.00
2011	\$ 5.27	\$ 7.80	\$ 4.62	\$ 43.78	\$ 77.02	\$ 35.23
2012	\$ 5.20	\$ 8.09	\$ 4.42	\$ 43.59	\$ 79.84	\$ 33.55
2013	\$ 5.18	\$ 8.40	\$ 4.30	\$ 43.39	\$ 82.37	\$ 31.96
2014	\$ 5.20	\$ 8.73	\$ 4.21	\$ 43.20	\$ 84.68	\$ 30.44
2015	\$ 4.99	\$ 8.65	\$ 3.99	\$ 43.00	\$ 86.80	\$ 28.99

