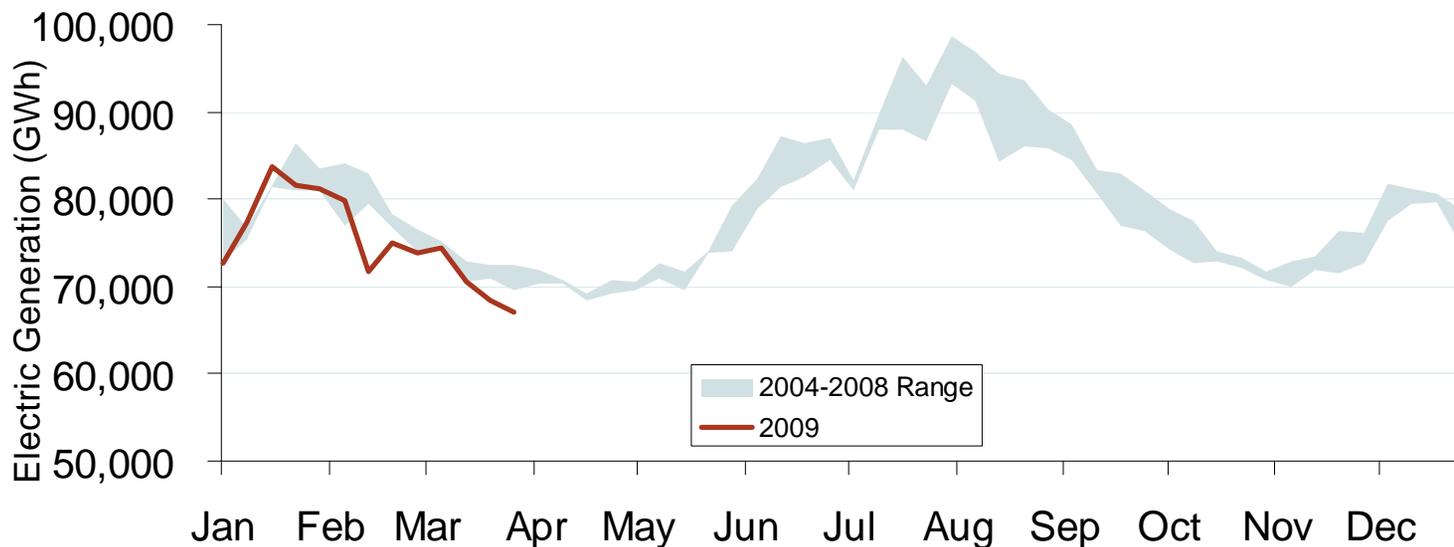
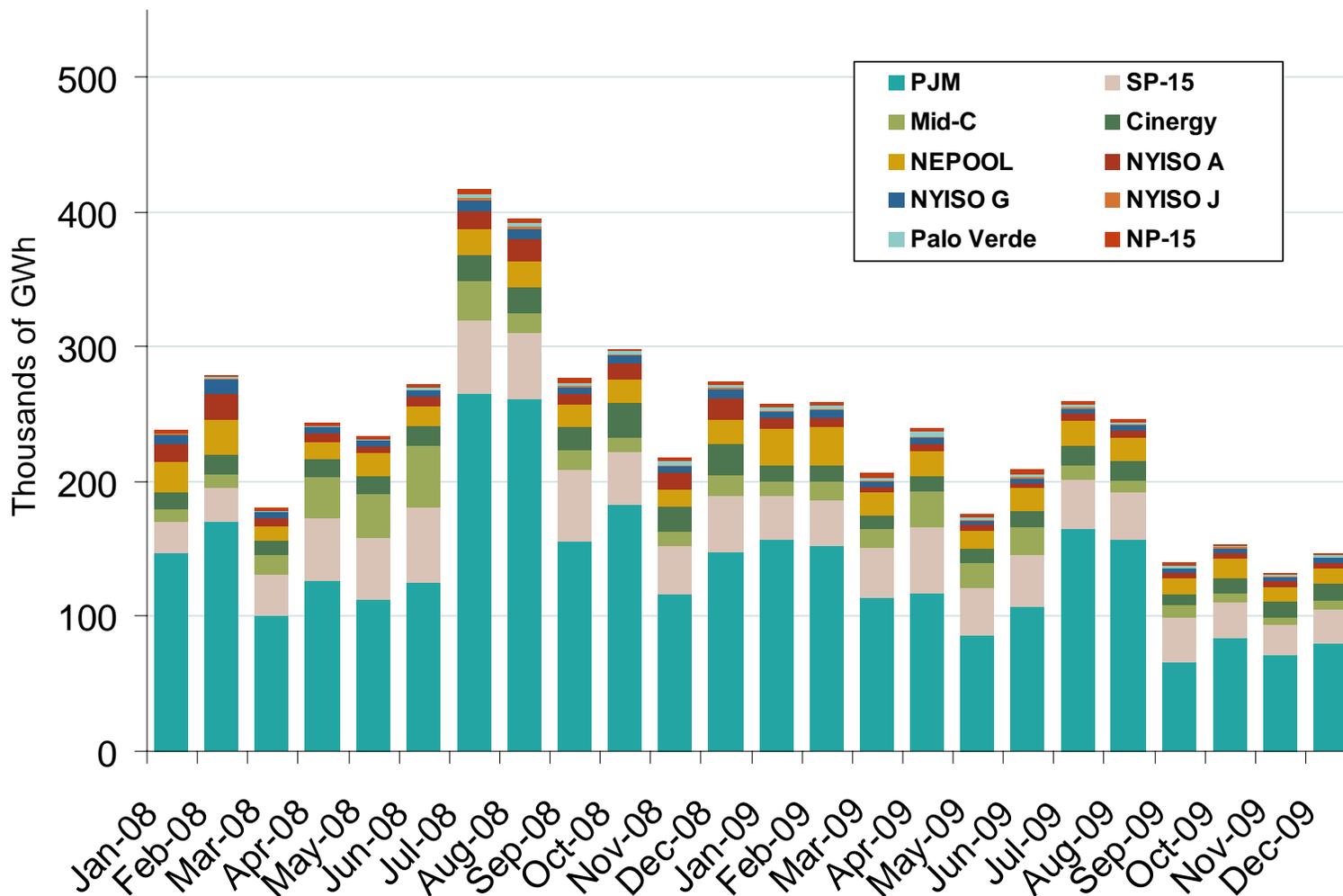


REGIONAL TRANSMISSION ORGANIZATIONS

Weekly U.S. Electric Generation Output and Temperatures

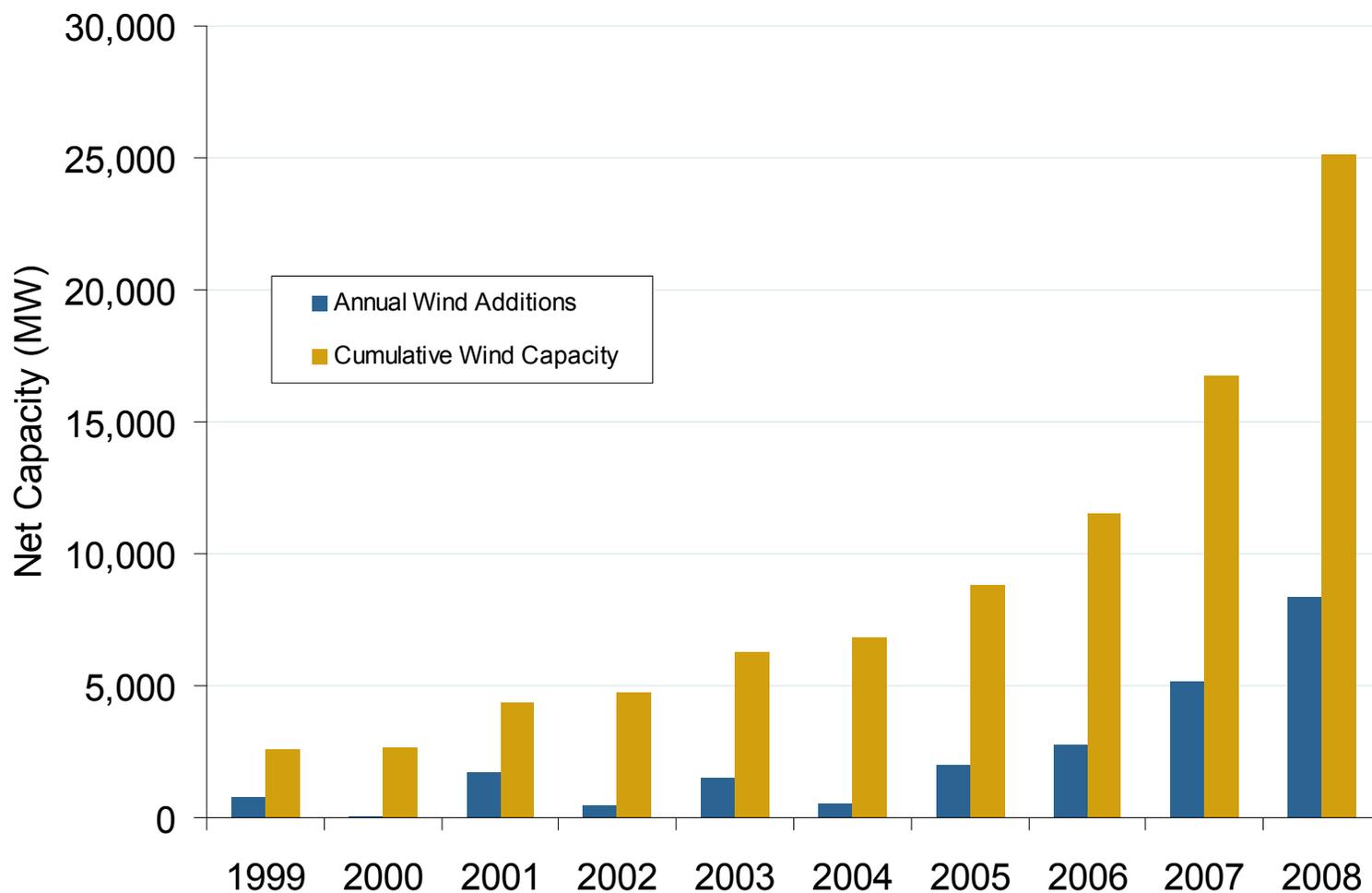


Financial Trading on ICE by Contract Month

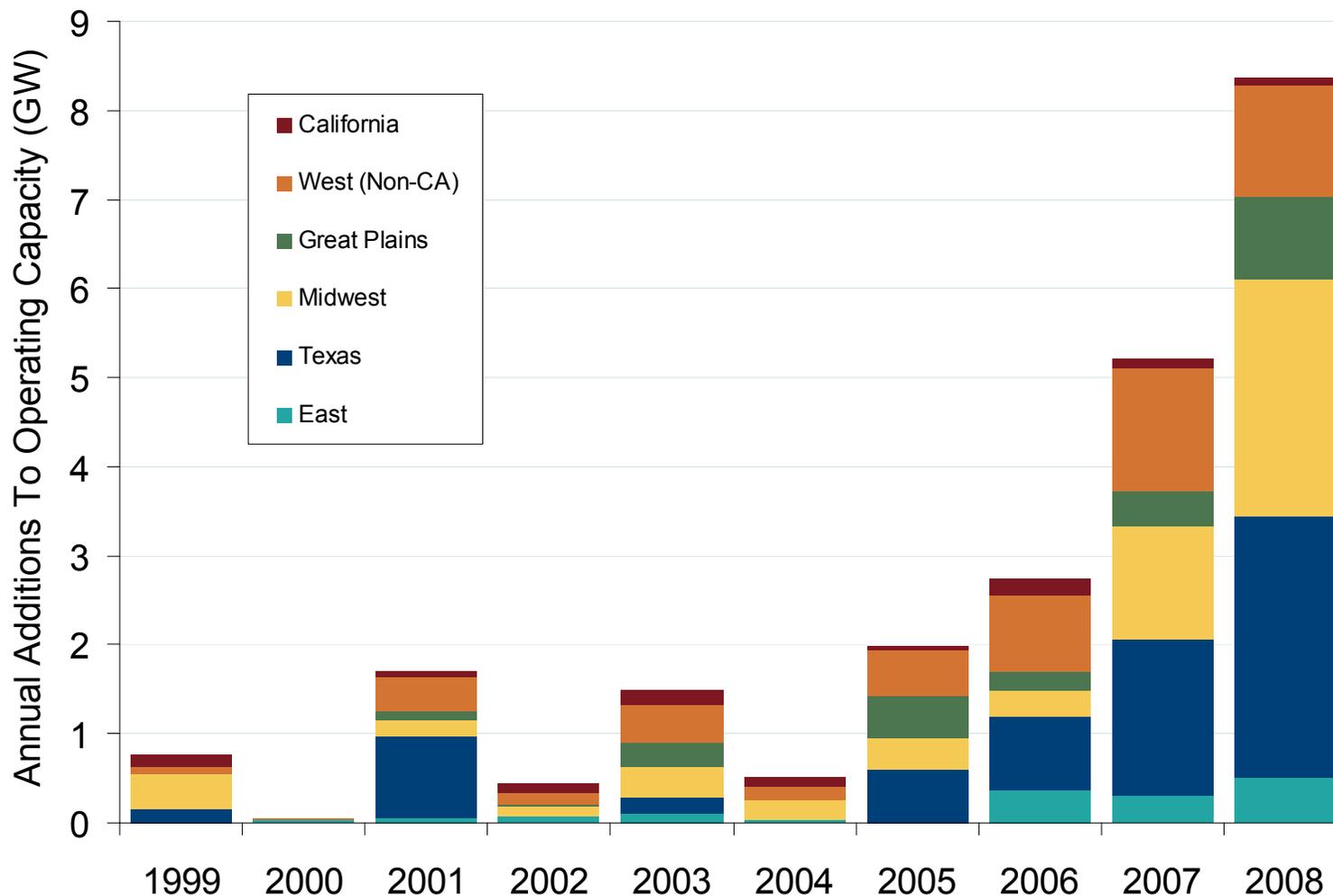


Source: Derived from ICE data. ICE on-peak swaps (financial) volume include monthly, dual monthly, quarterly, and calendar year contracts traded for each month.
April 2009

U.S. Wind Capacity Growth, 1999 – 2008



Regional Wind Capacity Growth



West w/o CA: CO, HI, ID, MT, NM, OR, UT, WA, WY

Great Plains: KS, NE, ND, OK, SD

Midwest: IL, IN, IA, MI, MN, MO, OH, WI

East: ME, MA, NH, NJ, NY, PA, RI, TN, VT

Source: Energy Velocity Generating Unit Capacity Dataset

April 2009

Updated April 7, 2009

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2008 Review of Wind Capacity and Generation

- Installed wind capacity grew 8,358 MW to 25,170 MW in 2008 from 16,818 MW in 2007, a 50% increase. Wind power was 43% of new U.S. new electric capacity in 2008, surpassing gas-fired generation.
- Installed capacity grew at a compound annual growth rate (CAGR) of 39% from 2004-08, compared to 28% for 2003-07

National wind policy and developments included:

- Congress extended the production tax credit (PTC) through Dec 2009. Indexed to inflation, it is now worth 2.1¢ per kWh for the first ten years a project operates.
- In Feb. 2009, Congress extended the credit through 2012, its longest renewal ever. This extension provides developers and equipment companies better long-term assurance to invest in projects and manufacturing facilities. The three times the PTC lapsed this decade were followed by declines in new capacity in subsequent years: 2000, 2002, and 2004 (see next chart, “Growth in Installed U.S. Capacity”).
- Foreign turbine, tower, and component manufacturers have opened U.S. facilities with the PTC’s steady renewal, lowering equipment transportation costs. In 2008, 30 facilities were announced, 10 opened, and 18 existing facilities expanded; 9 came online and 11 were announced in 2007.
- The economic turndown has led to some facility cutbacks, employee layoffs, project delays, and equipment order postponements.

State policies encouraged wind’s growth:

- 16 of the top 25 states by cumulative MW had an RPS (14 in 2007), 3 had renewable goals (3 in 2007) while 6 had neither.
- 34% of 2008 capacity additions – 7,454 MW – were in the 20 states with the highest wind potential; 86% of total U.S. wind capacity – 21,741 MW – is in those states.

State policies (continued):

- 80% of total U.S. wind is in the top ten states. The top 5 states by installed capacity (new 2008 MW) are:
 - Texas: 7,116 MW (2,670)
 - Iowa: 2,790 MW (1,519)
 - California: 2,517 MW (78)
 - Minnesota: 1,752 MW (454)
 - Washington: 1,375 MW (212)
- Texas kept its lead as the state with the most wind capacity; Iowa passed California for 2nd place. Oregon and Colorado each have more than 1,000 MW installed.

The Commission acted to improve wind interconnection:

- Wind’s rapid capacity growth created a backlog in many interconnection queues. FERC held a technical conference in December 2007 (AD08-2) to re-examine its Large Generator Interconnection Rule (Order 2003). ISOs and RTOs reported that queuing procedures specified in the Order impeded their timely interconnection of wind resources.
- In March 2008, FERC directed RTOs and ISOs to report on the status of their efforts to improve the processing of projects in their queues; it offered guidance on reforms including increased staffing, more efficient modeling, or clustering requests.** Queue reform Orders were subsequently approved for the Midwest ISO (2008), California (2008), and ISO-New England (2009).
- FERC accepted the tariff provisions NYISO proposed, which allowed it to implement a centralized program to incorporate wind output into its day-ahead and real-time energy markets. Ongoing costs are recovered from wind plant operators.***

* CAGR is a better indicator of growth rates over time than a straight percent.

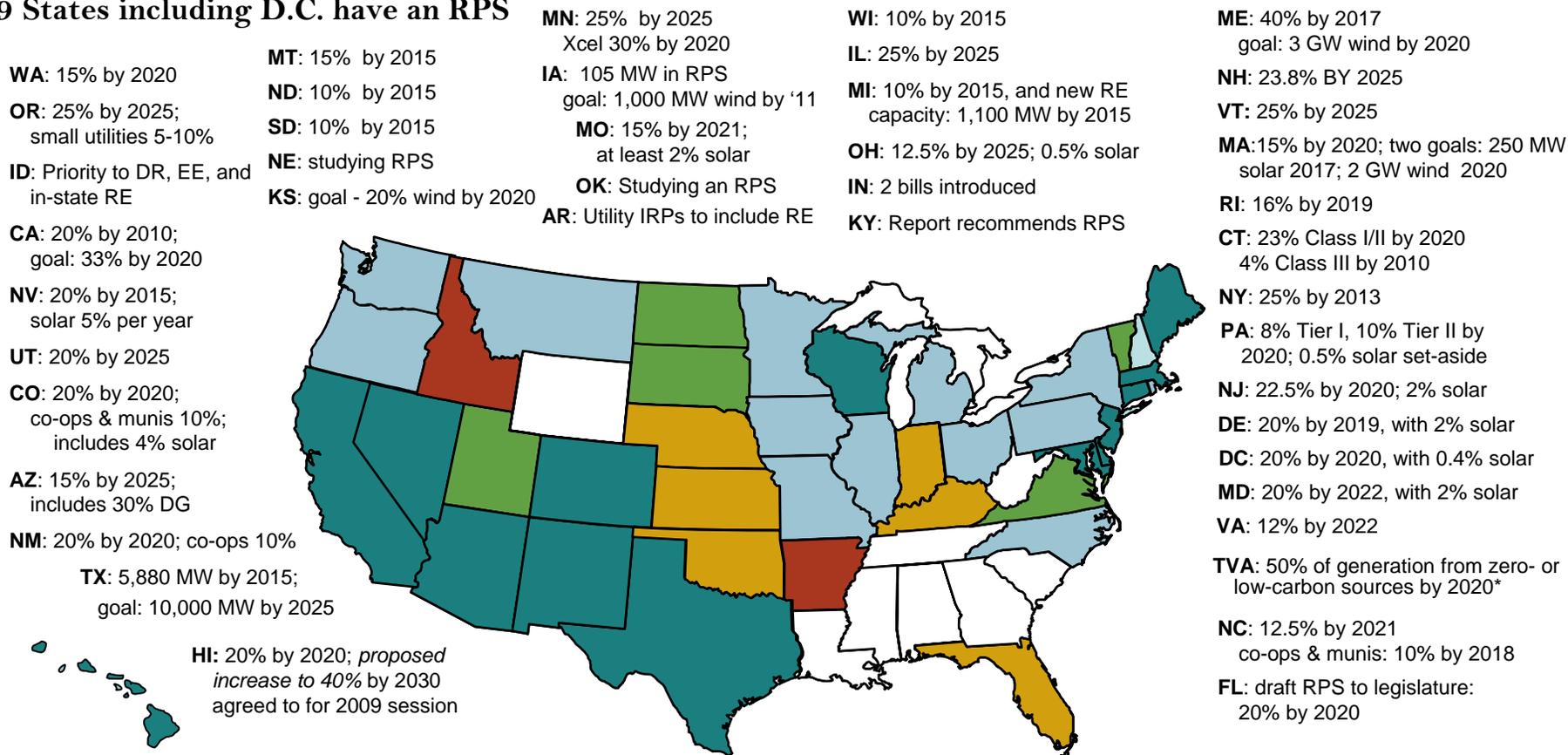
** *Interconnection Queuing Practices*, 122 FERC ¶ 61,252 (2008)

*** *New York Independent System Operator*, 123 FERC ¶ 61,267 (2008)

Source: OE analysis, derived from data in Commission filings; American Wind Energy Association (AWEA); DOE, *Annual Report on U.S. Wind Power*; Energy Velocity; Lawrence Berkeley National Laboratory; and trade press.

Renewable Energy Portfolio Standards (RPS)

29 States including D.C. have an RPS

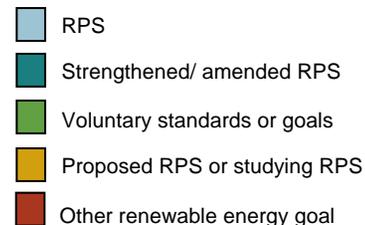


Updates at: <http://www.ferc.gov/market-oversight/mkt-electric/overview/elec-ovr-rps.pdf>

Notes: An RPS requires a percent of an electric provider's energy sales (MWh) or installed capacity (MW) to come from renewable resources. Most specify sales (MWh). Map percents are final years' targets. Details, including timelines, are in the Database of State Incentives for Renewables and Energy Efficiency: <http://www.dsireusa.org>. Alaska has no RPS; TVA's goal is not a state policy: the Public Power Authority called for 50% of generation from zero- or low-carbon sources by 2020.

Abbreviations: DG: distributed generation; DR: demand response; EE: energy efficiency; IRP: integrated resource plan, RE: renewable energy.

Sources: Derived from data in: EEI, EIA, LBNL, PUCs, State legislative tracking services, DSIREUSA, Pew Center, and the Union of Concerned Scientists.



Updated February 6, 2009

Renewable Energy Portfolio Standards

- **A Renewable Portfolio Standard (RPS)** requires a percent of energy sales (MWh) or installed capacity (MW) to come from renewable resources. Percents usually increase incrementally from a base year to an ultimate target. The percents on the map are ultimate targets.
- **29** states – including D.C. – have renewable mandates.
- **Six** have renewable goals without financial penalties: KS, ND, SD, UT, VT and VA.
- **Six** states proposed RPS bills or released studies that propose including more RE in state resources: FL, IN, KS (bills) and AK, KY, NE (state energy reports).
 - **Florida's PSC** sent its draft RPS to the legislature in response to an April 2008 legislative requirement. The legislature will decide how to proceed.
 - **Indiana's** House introduced two bills for an RPS in January. A traditional one has a 20% by 2020 target; the other creates two compliance tiers. An RPS bill did not pass last year.
 - **Kansas** introduced an RPS bill, with a 20% by 2020 target based on a utility's average peak load (in MW) for 2016-18. (Jan 14)
 - **Alaska** issued "Sustainable Energy for Alaskans" as a guide for communities to review local energy sources including in-river hydro, wind, solar, wave, tidal, biomass, and geothermal, in addition to traditional resources. It does not recommend state action or set a RE goal. (Jan 7)
 - **Nebraska's** "Interim 2009 Energy Plan" supports enacting an RPS and stresses EE, RE, and Nebraska's commitment to nuclear power. A final report will identify regulatory and statutory activities following the comment period, which closed Jan 23.

OVERVIEW OF 2008 RPS DEVELOPMENTS:

- **Three states passed a new RPS:** Ohio, Michigan, and Missouri. Ohio's and Michigan's were by state legislation; Missouri's was the third RPS to pass by ballot (after Colorado and Washington state).
- **Five jurisdictions amended or strengthened** existing standards: Washington, D.C.; Maryland; Massachusetts; Minnesota; and New Hampshire.
- **Four states** with an existing goal or RPS strengthened them: ME, VT, CA, HI. Maine enacted an installed wind goal. Vermont increased its goal to 25% RE by 2025. California's goal, set by Executive Order, is to increase RE to 33% by 2020. Hawaii set a goal of 40% of energy from renewable sources by 2030.
- **Four states** adopted a voluntary RPS or renewable goal: SD, UT, KS, and FL. South Dakota (Feb) and Utah (April) enacted goals without non-compliance penalties. An MOU between the Governor and Kansas utilities created its goal. Florida's goal, via Executive Order, is for utilities to produce 20% from RE; the PSC sent a draft RPS to the legislature on Jan 30.
- Kentucky and Oklahoma are working to establishing a renewable standard by legislation in 2009. In 2008, OK passed a bill allowing recovery of wind-related transmission costs.
- **Sixteen** states include energy efficiency in their RPS or renewable goals. Several issued major energy plans or draft plans with goals encompassing renewable energy, energy efficiency, and greenhouse gas reduction, including Kentucky, New Jersey, New York, and Vermont.

Electric Market Overview: Energy Efficiency Resource Standards (EERS) and Goals

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

18 States have Energy Efficiency Resource Standards

NE: Energy Plan stresses multi-sector EE improvements

KS: Advocates voluntary utility programs, not mandate

OK: PSC approved quick-start DR programs, including EE

MN: 1.5% annual savings based on prior-3 years average, to 2015

IA: utilities to submit EE goals to achieve 1.5% annual savings; awaiting approval

MI: 1% annual savings from prior year's sales to 2012

WI: EE in RPS

IL: reduce energy 2% by 2015 (EE) and 0.1% from prior year (DR)

OH: reduce peak 8% by 2018; 22% energy savings by '25, starting 2009

KY: proposed RPS-EE to offset 18% of projected 2025 demand

ME: 10% EE by 2017 – new since 2005; DR & EE as SOS priority resources

VT: 2009 – 2011 goals of 2% annual savings; administered by Efficiency VT

MA: 25% of electric load from DSR, EE by 2020: capacity and energy

NY: 15% electric use reduction by 2015 from levels projected in 2008

CT: 1.5% annual savings 2009-19, from 2007, using all cost-effective EE

RI: reduce 10% of 2006 sales by 2022

NJ: BPU proceeding on EERS to reduce consumption, peak demand

DE: creating a Sustainable Energy Utility; EE, RE, DG, DR as SOS priorities

PA: reduce energy consumption 3% and peak 4.5% by 2013 as percent of 2009-10 sales

MD: reduce per cap electricity use & peak 15% by 2015 from 2007

VA: reduce 10% of 2006 sales by 2022

NC: EE to meet up to 25% of RPS to 2011; later to 40%

TVA: reduce peak demand 1,400 MW by 2012 with EE, DR *

FL: PSC to adopt new goals to reduce electric consumption, peak demand

WA: must pursue all cost-effective conservation

OR: IOU 2008 goals 34 MW; administered by Energy Trust OR

CA: 1% annual energy savings 2004 – 2013 ~23,183 GWh, 4,885 peak MW by 2013

ID: Energy Plan sets conservation, DR, EE as priority resources

MT: Governor's initiative – 20% state agencies energy savings by 2010

NV: EE up to 25% of RPS by 2015

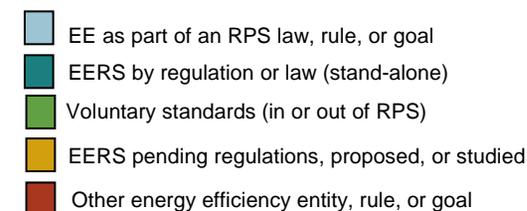
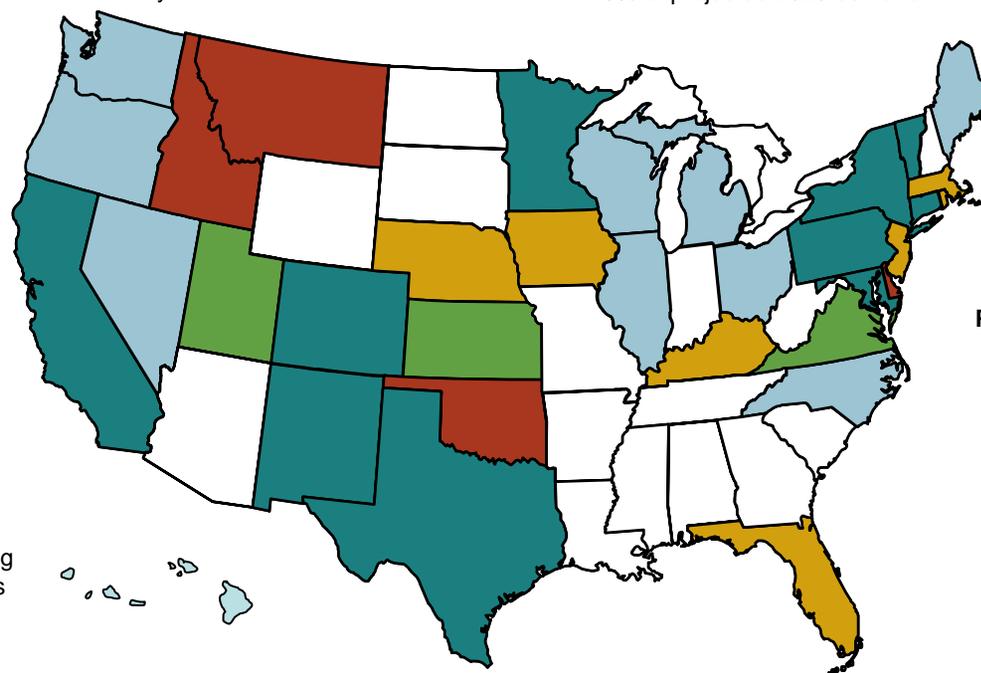
UT: EE incentives in RPS goal

CO: 11.5% energy savings 2009 – 2020 ~ 3,669 GWh

NM: use EE and DR to save 10% of 2005 retail electric sales by 2020

TX: 20% of load growth by 2010, using average growth rate of prior 5 years

HI: 20% savings of net electric sales by 2020; up to 50% of RPS



Updates at: <http://www.ferc.gov/market-oversight/mkt-electric/overview/elec-ovr-eeps.pdf>

* TVA's "EE and DR Plan" is from the Public Power Authority, and is not a state policy.

Abbreviations: DG – distributed generation; DR - demand response; DSR – demand-side resources; EE - energy efficiency; E&G: electric and gas utilities; IRP – integrated resource plan; RPS: Renewable Portfolio Standard; SOS: Standard Offer Service

Sources: ACEEE, EPA, Regulatory Assistance Project, Union of Concerned Scientists, State regulatory and legislative sites; State Efficiency Agency reports; trade press

Energy Efficiency Resource Standards (EERS)

- An **EERS** – Energy Efficiency Resource (or portfolio) Standard – aims to reduce or flatten electric load growth through energy efficiency (EE) measures. Goals may specify reductions in energy (MWh), demand (MW), or both. Many specify both overall energy reductions and peak-load reductions.
- **Energy Efficiency** (EE) is using less fuel to produce the same or greater amount of *usable* energy from a given energy source. EE actions usually have a multiple-year effect. EE is different from conservation, which can be temporary energy *use* reductions.

ENERGY EFFICIENCY IN THE STATES:

- **Eighteen** states have an EERS. Twenty-eight have EE standards or goals as an EERS, a utility goal, or as part of a proceeding. At least 18 include EE as part of a renewable standard or goal.
 - **Three** states have a pending EERS while they develop details to implement legislation: FL, MA, and NJ. Utilities in IA and RI must file plans showing EE reduction goals or plans. KY and NE Energy Reports published in late 2008 suggested an EERS.
 - **14 states** passed significant energy efficiency legislation or regulations in 2008, including: DC, FL, HI, IA, MA, MD, MI, NJ, NM, NY, PA, OH, OK, UT, and VT.
 - Many states use special-purpose agencies to administer EE programs and goals, including CT's Energy Conservation Management Board; NJ's Clean Energy Board, NYSERDA; Efficiency Maine; Energy Trust of Oregon; and Efficiency Vermont. D.C. and Delaware are creating Sustainable Energy Utilities. Hawaii will use a third – party coordinator.
- ACEEE named 5 states in its *2008 State Energy Efficiency Scorecard* as EE leaders: California, Oregon, Connecticut, Vermont, and New York.
 - Energy savings in some states with long-standing programs recently reported results:
 - CA: utilities met 1.5% of the state's electric needs in 2007 – over their annual 1% goals.
 - Energy Trust Oregon anticipates 2008 electricity savings of “a34 MW”* (297,840 MWh equivalent), nearly the “a35MW” saved in 2007.
 - CT: utilities filed plans to average 1.5% of annual needs in response to a requirement to acquire “all cost-effective efficiency.” The ECMB reported 368,000 MWh savings across all sectors for 2008.
 - VT: EV met 1.75% of the state's electric needs in 2007; preliminary 2008 data anticipate 1.8% savings.

NATIONAL ENERGY EFFICIENCY LEGISLATION:

- Reps. Henry Waxman and Edward Markey introduced the “American Clean Energy and Security Act of 2009” March 31. Title II, Energy Efficiency, proposes national minimum levels of electric and natural gas savings from 2012 – 2020, measured by average annual sales during the two preceding calendar years. Cumulative electric savings would begin in 2012 at 1% and ramp to 15% in 2020. Cumulative gas savings would begin at 0.75% and reach 10%. The bill specifies that states should consider EE as a resource in utility planning and procurement and seek to procure all EE that is available at lower cost than energy supply options.

* “aMW” is average MW without a time factor; MWh equivalent is: MW saved times the number of hours in a year.

Abbreviations: ACEEE: American Council for an Energy Efficient Economy; ECMB (CT) - Energy Conservation Management Board; EE - energy efficiency; EERS – Energy Efficiency Resource Standard; NYSERDA: New York State Energy Research & Development Authority; EV – Efficiency Vermont

Collaborative Greenhouse Gas (GHG) Programs

Collaborative Regional GHG Programs:

- Three North American groups with goals to lower regional GHG emissions were initiated by state Governors.
- 32 U.S. states, D.C., eight Canadian provinces, and six Mexican states are Participants or Observers.
- Observer jurisdictions do not commit to group GHG reduction goals, but participate in proceedings should they opt to join later. RGGI Observers are not on its Board.

Western Climate Initiative (WCI):

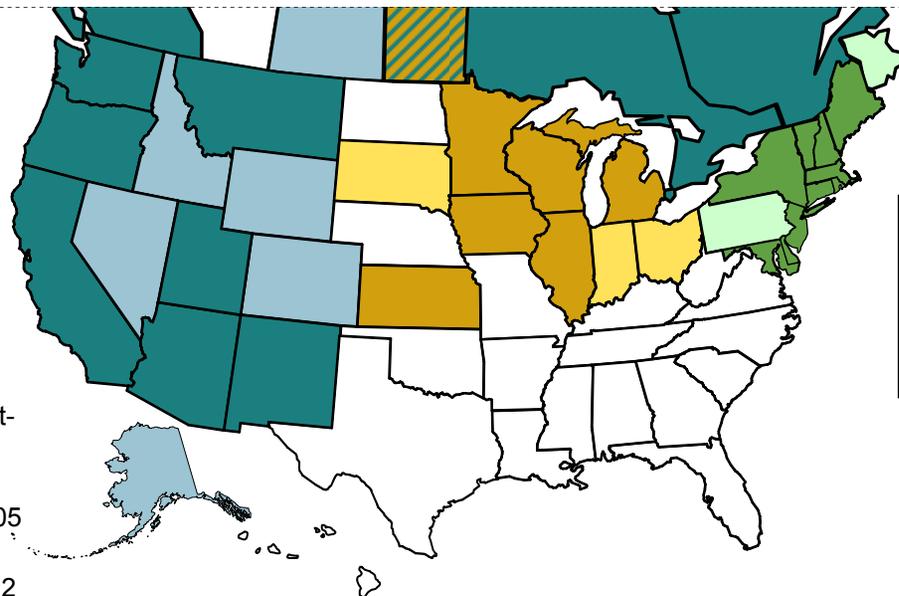
- Created February 2007
- Partners: 7 states, 4 provinces; Observers: 5 states, 1 province
- Announced its design for a market-based, *multi-sector* cap-and-trade program, Sept 2008:
 - 15% CO₂ reduction below 2005 levels by 2020
 - Phase I to take effect Jan 2012

Midwest Greenhouse Gas Reduction Accord:

- Established November 2007
- Participants: 6 states, 1 province; Observers: 3 states, 1 province
- Preliminary design recommendations issued Dec 2008: 15 - 25% reductions by 2020, 60 - 80% by 2050

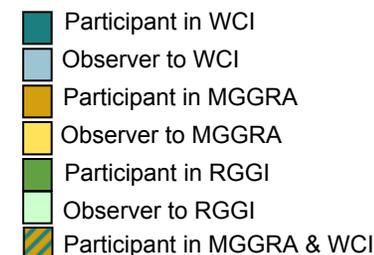
Regional Greenhouse Gas Initiative (RGGI):

- Compliance period began Jan 1, 2009
- Participants: 10 states; Observers: 1 state, D.C., 3 provinces
- Market-based cap-and-trade effort to reduce *power-sector* CO₂ emissions.
- 10% CO₂ reduction by 2018 covers over 200 plants
- One allowance is the right to emit 1 ton of CO₂
- Annual RGGI cap is 188 million tons



RGGI Auction Data

Auction Date	Allocation Year	Allowances Sold (000s)	Clearing Price
9/25/08	2009	12,565	\$3.07
12/17/08	2009	31,506	\$3.38
3/18/09	2009	31,514	\$3.51
3/18/09	2012	2,176	\$3.05



Updates at: <http://www.ferc.gov/market-oversight/mkt-electric/overview/elec-ovr-ghg.pdf>

Notes: Kansas is a MGGRA participant and WCI observer. Ontario and Quebec are Partners to WCI and Observers to RGGI; Ontario is also an observer to RGGI.

Sources: regional initiatives - www.rggi.org, www.midwesternaccord.org, www.westernclimateinitiative.org, Point Carbon, analyst reports, trade press

Collaborative Greenhouse Gas Programs

National Energy and Environment Update:

- President Obama's proposed budget includes cap-and-trade revenue beginning in 2012.
- Congressmen Waxman and Markey released a draft Energy and Emissions bill March 31, which includes:
 - a GHG cap-and-trade plan to reduce emissions 20% below 2005 levels by 2020 through a multi-sector emissions trading program beginning in 2012
 - limits on the carbon content of motor fuel

RGGI's Auction 3 held on March 18, 2009:

- RGGI states auctioned 2009 vintage allowances and the first 2012 control-period allowances, raising \$117 million for energy efficiency, renewable energy, and other consumer-benefit programs in participating states.
- Participant states are: CT, DE, ME, MD, MA, NH, NJ, NY, RI, VT.
- Demand outstripped supply for both vintages. 50 entities bid 2.5 times the offered 31.5 million 2009 allowances, and 20 entities bid 2.3 times the available 2.2 million 2012 allowances.
- Compliance entities or affiliates (generators) were awarded the bulk of allowances:
 - 78% of 42 winners for 2009 allowances
 - 93% of 12 winners for 2012 allowances
- 2009 allowances cleared at \$3.51 per allowance, 13¢ higher than Auction 2. Analysts posited that the expectation that RGGI allowances might have grandfathered value in a national cap-and-trade system may underpin the increased prices in each auction for 2009 allowances.
- 2012 allowances cleared at \$3.05 per allowance. The 2.2 million allowances are 1.5% of the 2012 cap.
- The 4th and 5th RGGI auctions are scheduled for June 17th and September 9th.

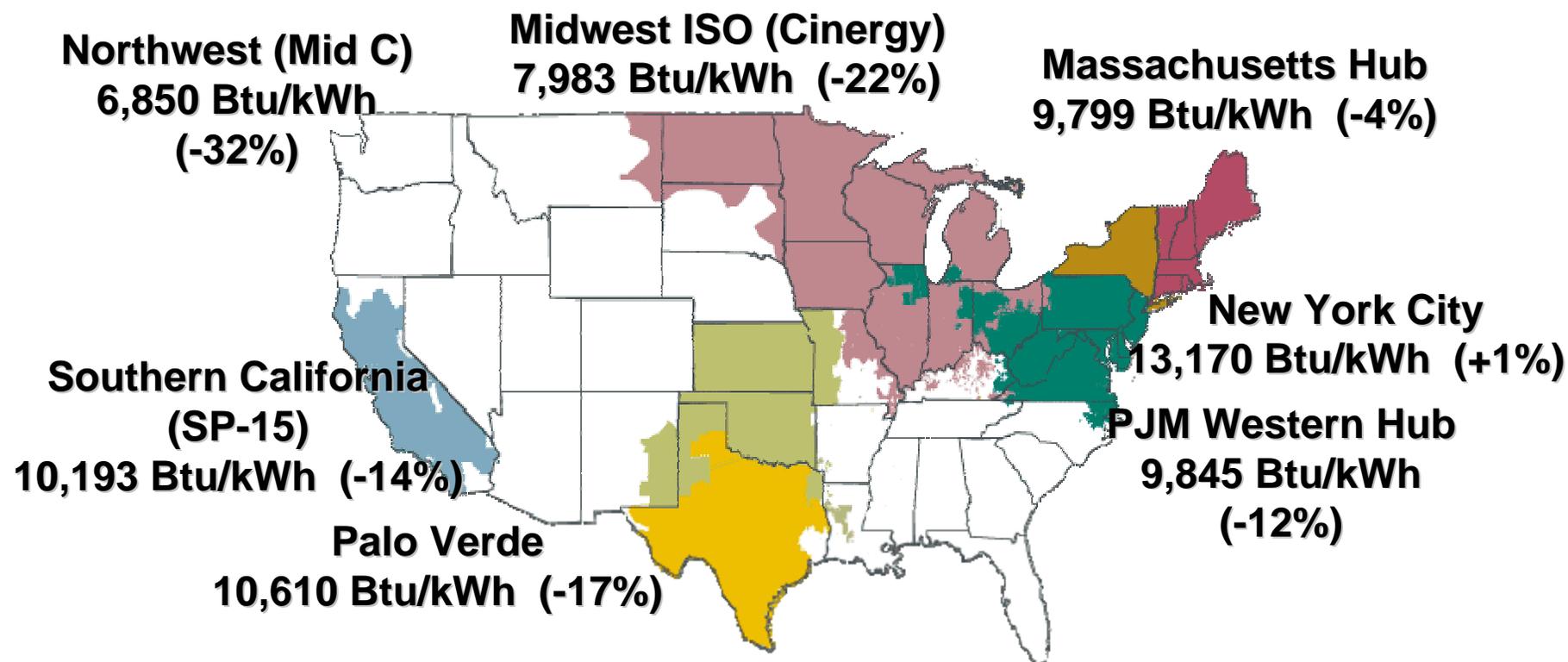
Midwest Greenhouse Gas Regional Accord:

- Signed at Midwestern Governors Association Energy Summit to establish GHG reduction targets, Nov 2007:
 - Participants: IA, IL, KS, Manitoba, MI, MN, WI
 - Observers: IN, OH, Ontario, SD
- Preliminary Design Recommendations issued Dec 2008
 - Target reductions from 2005 levels: 15% - 25% reductions by 2020; 60% - 80% by 2050
 - Cap-and-trade should cover multiple sectors
 - Each jurisdiction to control allowance distribution methods
 - Final design pending results of further ICF modeling
- Model Rule anticipated by August 2009

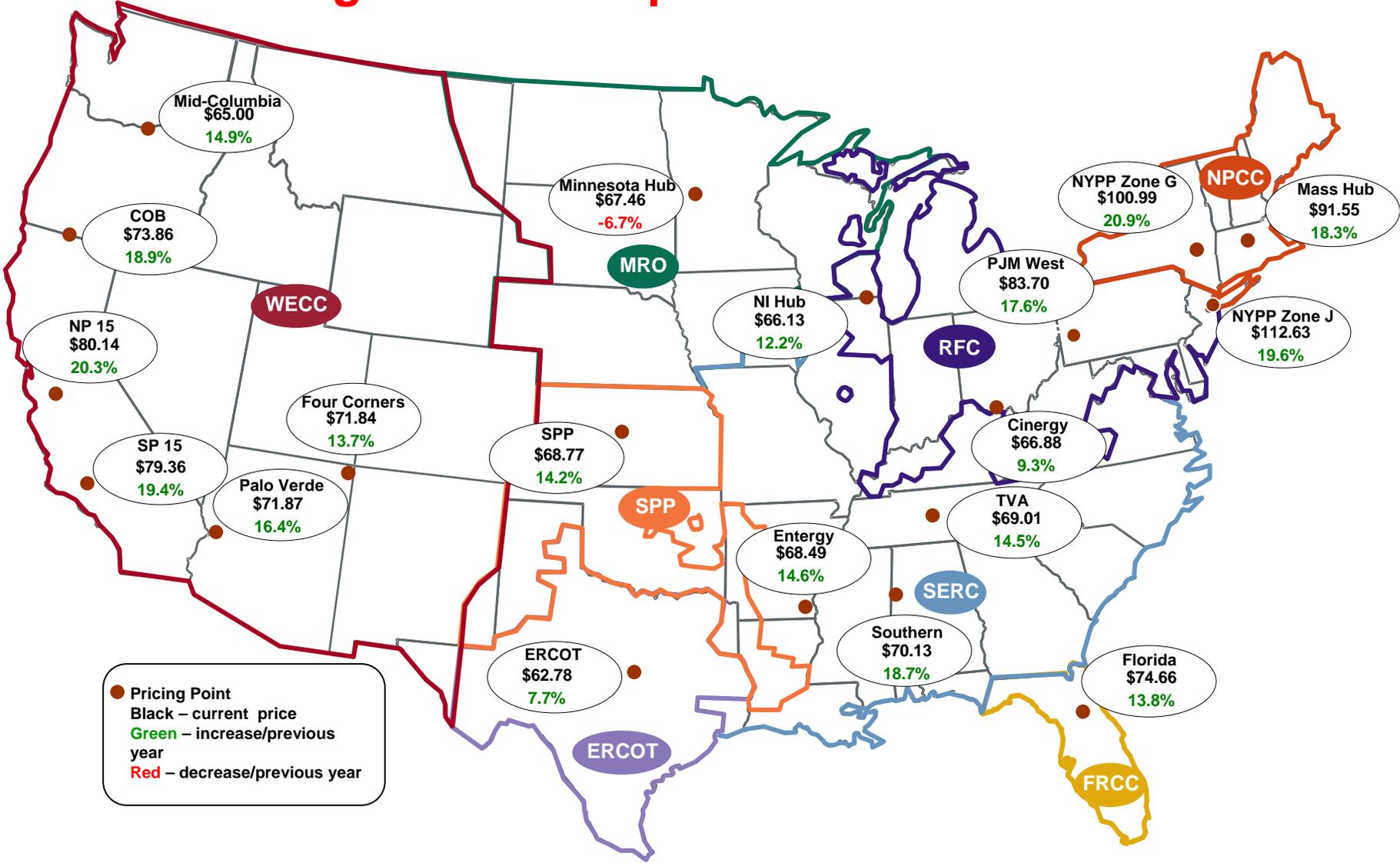
Western Climate Initiative (WCI):

- Launched at Western Governors' Association meeting to reduce regional GHG collectively, Feb 2007:
 - Partners: AZ, British Columbia, CA, Manitoba, MT, NM, Ontario, OR, Quebec, UT, WA
 - Observers: AK, CO, ID, KS, NV, Saskatchewan, WY
- Initial design released for a market-based, *multi-sector* cap-and-trade program (Sept 2008):
 - Phase I to take effect Jan 2012
 - Phase II to begin 2015; will cover 90% of regional emissions
- Released its [2009 - 2010 Work Plan](#), Feb 2009. Key WCI Committee tasks include:
 - develop emissions reporting database & allowance tracking system
 - develop rules for robust and transparent allowance and offset credit trading market
 - examine role of RECs in GHG accounting and treatment of voluntary renewable energy
 - update policy modeling; revise energy efficiency assumptions

June-August Implied Heat Rates, 2008 vs. 2007



Average On-Peak Spot Electric Prices 2008



Source: Derived from *Platts* data. April 2009

Electric Market Overview: Regional Spot Prices

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

Regional Spot Prices: 2006-2008

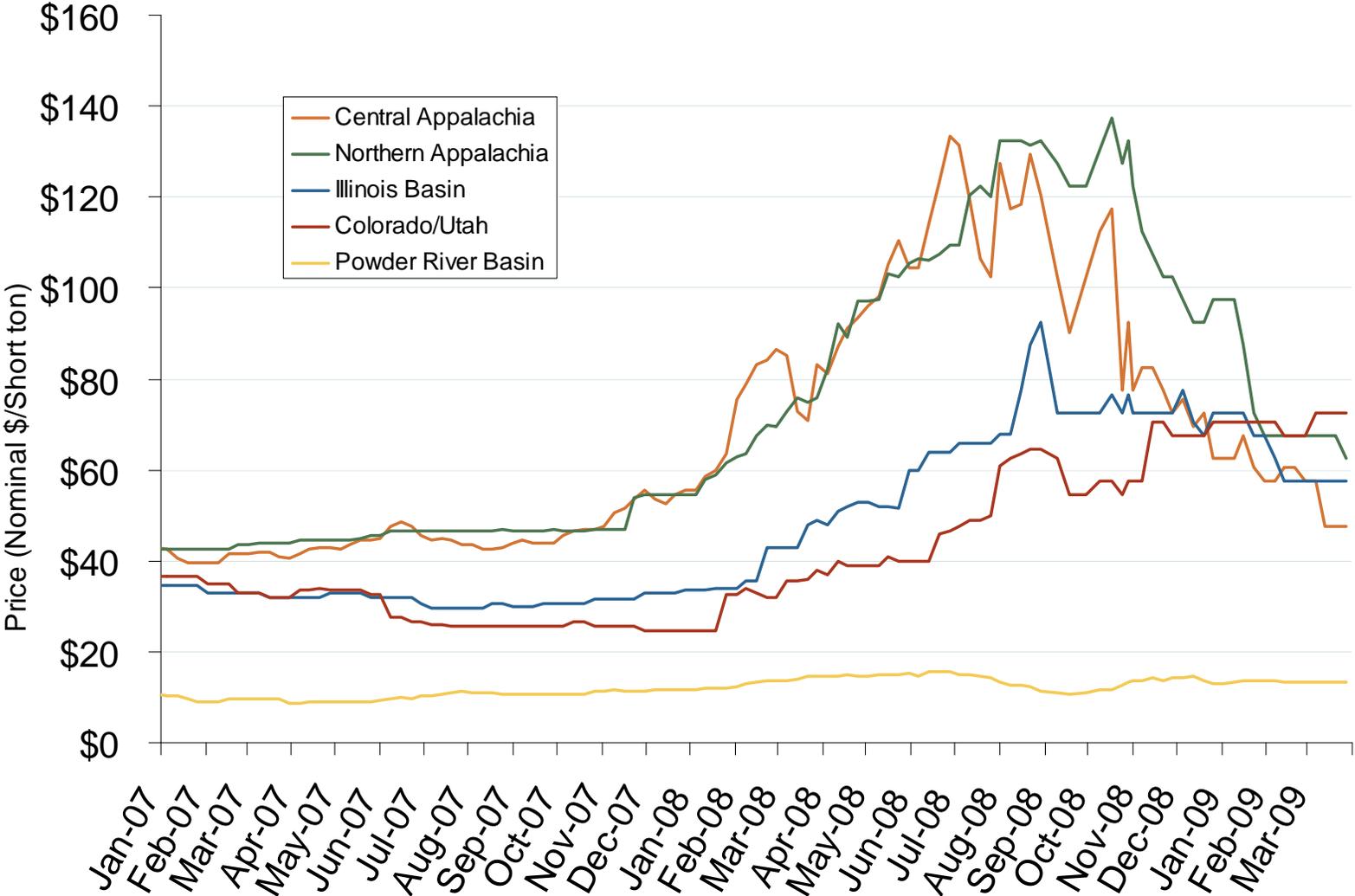
	On-peak Spot Prices					Off-peak Spot Prices				
	2006	2007	2008	% Change 06-07	% Change 07-08	2006	2007	2008	% Change 06-07	% Change 07-08
Northeast										
Mass Hub	69.85	77.39	91.55	10.8%	18.3%	47.93	54.73	66.50	14.2%	17.7%
Ny Zone G*	75.95	83.51	100.99	10.0%	20.9%		48.86	67.32		27.4%
NY Zone J*	85.96	94.15	112.63	9.5%	19.6%		53.66	70.29		23.7%
NY Zone A*	58.70	64.02	68.34	9.1%	6.7%		41.26	50.68		18.6%
PJM West	61.90	71.15	83.70	14.9%	17.6%	37.45	42.23	51.21	12.8%	17.5%
Southeast										
VACAR	56.34	60.52	70.86	7.4%	17.1%	34.98	33.67	39.36	-3.7%	14.4%
Southern	55.50	59.10	70.13	6.5%	18.7%	34.02	33.03	39.82	-2.9%	17.1%
TVA	53.48	60.28	69.01	12.7%	14.5%	33.08	33.56	38.61	1.5%	13.1%
Florida	64.02	65.59	74.66	2.5%	13.8%	39.79	35.80	41.35	-10.0%	13.4%
Entergy	56.28	59.74	68.49	6.2%	14.6%	34.20	31.88	35.26	-6.8%	9.6%
Midwest										
Cinergy	51.81	61.20	66.88	18.1%	9.3%	27.66	28.94	31.14	4.6%	7.1%
Michigan Hub	55.29	64.43	69.15	16.5%	7.3%	30.20	31.04	31.81	2.8%	2.4%
Minnesota Hub	59.47	72.32	67.46	21.6%	-6.7%	27.57	29.32	25.76	6.4%	-13.8%
NI Hub	52.52	58.93	66.13	12.2%	12.2%	29.09	29.32	31.24	0.8%	6.1%
Illinois Hub	51.32	59.88	62.52	16.7%	4.4%	26.41	27.40	26.29	3.8%	-4.3%
MAPP South	55.11	61.18	69.18	11.0%	13.1%	32.73	30.80	34.00	-5.9%	9.4%
South Central										
SPP North	55.84	60.21	68.77	7.8%	14.2%	33.96	31.24	33.66	-8.0%	7.2%
ERCOT	57.83	58.27	62.78	0.8%	7.7%	39.03	38.83	38.36	-0.5%	-1.2%
Southwest										
Four Corners	58.52	63.21	71.84	8.0%	13.7%	37.91	40.19	49.40	6.0%	18.7%
Palo Verde	57.59	61.74	71.87	7.2%	16.4%	38.21	41.94	52.16	9.8%	19.6%
Mead	59.93	64.49	75.63	7.6%	17.3%	39.92	44.15	54.90	10.6%	19.6%
Northwest										
Mid-C	50.18	56.57	65.00	12.7%	14.9%	38.71	44.00	53.70	13.7%	18.1%
COB	55.58	62.14	73.86	11.8%	18.9%	40.71	46.38	55.81	13.9%	16.9%
California										
NP15	61.08	66.59	80.14	9.0%	20.3%	40.77	47.10	59.22	15.5%	20.5%
SP15	61.95	66.48	79.36	7.3%	19.4%	41.62	46.76	57.86	12.4%	19.2%

Note: * Off Peak as of April 2, 2007.

Regional Electric and Input Prices: 2006-2008

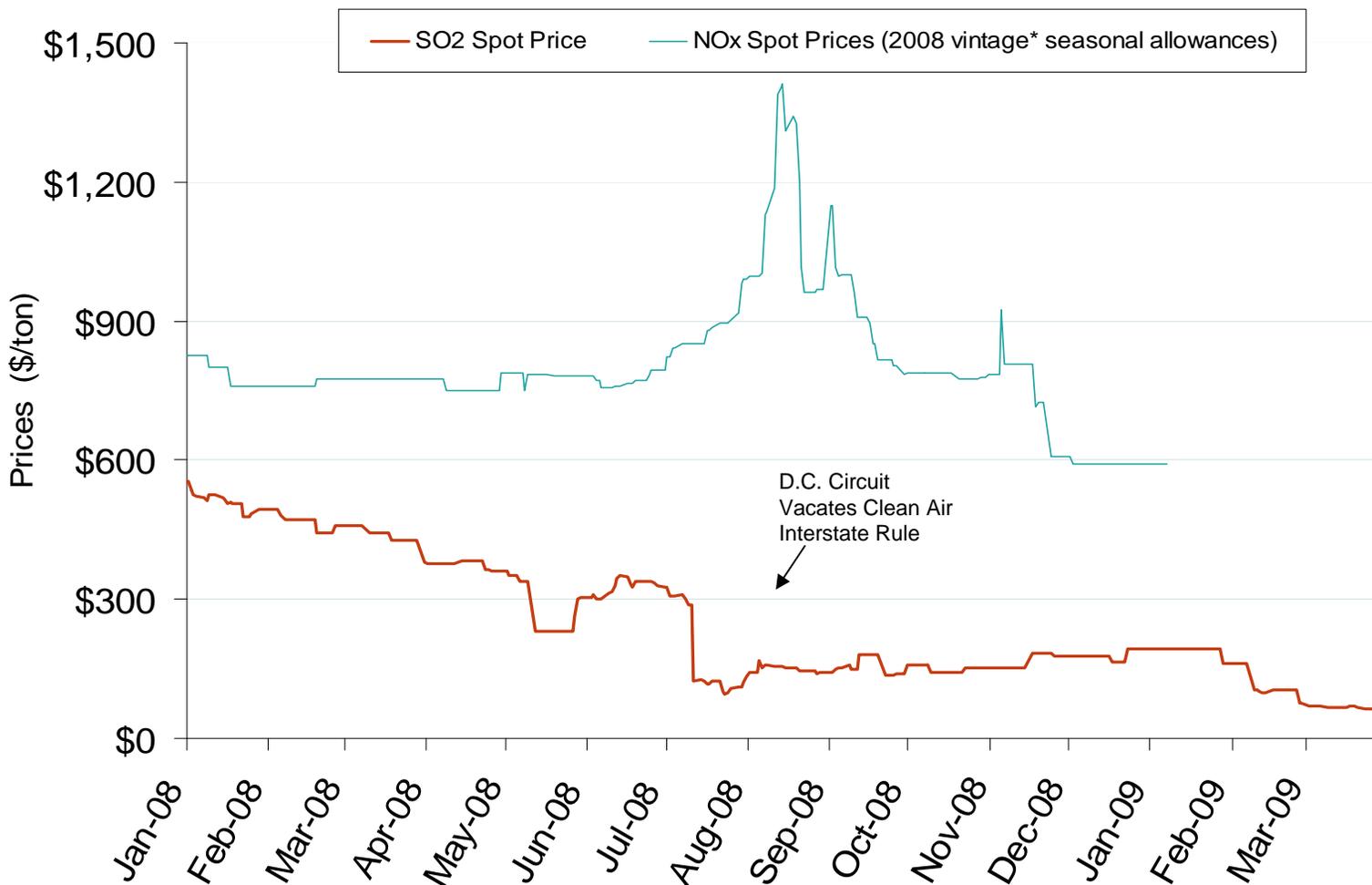
Electricity and Input Prices, 2006-08			
	2006	2007	2008
Electric Spot Prices (On-Peak \$ per MWh)			
Mass Hub	\$69.85	\$77.39	\$91.55
Cinergy	\$51.81	\$61.20	\$66.88
SP-15	\$61.95	\$66.48	\$79.36
Input Prices			
Natural Gas (\$ per MMBtu)			
Henry Hub	\$6.74	\$6.94	\$8.85
New York	\$7.37	\$8.46	\$10.13
Southern California	\$6.10	\$6.41	\$7.80
Coal (\$ per ton)			
Central Appalachian (Eastern)	\$51.64	\$45.00	\$92.37
Powder River Basin (Western)	\$13.21	\$10.24	\$13.62
Emissions (\$ per ton)			
SO ₂ Allowances	\$738.12	\$527.58	\$280.43
NO _x allowances	\$1,862.03	\$815.87	\$786.64
Oil			
WTI (Crude - \$ per barrel)	\$66.12	\$72.45	\$99.63
Residual Fuel, New York (\$ per barrel)	\$55.07	\$64.35	\$91.94
Distillate Fuel, New York (\$ per gallon)	\$2.04	\$2.22	\$3.08

Central Appalachian and Powder River Basin Coal Prices



Source: Derived from Bloomberg data.

SO₂ Allowance Spot Prices and NOx Seasonal Allowance Spot Prices



Source: Derived from *Cantor Fitzgerald* data.

* Earliest year an allowance may be applied against emissions.

April 2009

Updated April 7, 2009

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Brief Overview of the SO₂ and NO_x Emissions Markets

The electric power industry is a major source of sulfur dioxide emissions (SO₂) and nitrogen dioxide emissions (NO_x) – both precursors of acid rain and smog. According to the Environmental Protection Agency's (EPA) 2006 Acid Rain Progress Report, the power sector is responsible for 70% of SO₂ emissions and 20% of NO_x emissions.

Currently US policy encourages reduction in SO₂ and NO_x emissions which can be achieved through a cap and trade program. This market based model also allows for relative flexibility in compliance options. An emitting source may choose pollution control technology such as add-on controls like flue gas desulfurization (FGD) for SO₂ and selective catalytic reduction (SCR) for NO_x, fuel switching, and/or participation in the respective cap and trade markets. The decision is primarily driven by the regulatory environment, fuel input type, the level of emission output, and compliance costs, the latter of which affects wholesale and retail prices.

The Acid Rain Program

<http://www.epa.gov/airmarkets/progsregs/arp/index.html>

EPA's Acid Rain Program (ARP), established under the 1990 Clean Air Act Amendments, requires reductions of SO₂ and NO_x emissions from the electric power industry. The Acid Rain Program was the first cap and trade program implemented nationwide to reduce SO₂ emissions.^[1] The SO₂ program set a permanent cap on the total amount of SO₂ that can be emitted by fossil fuel-fired generating units and allows allowance trading so affected sources have some flexibility in their compliance method. Currently, SO₂ sources must surrender one allowance to emit one ton of SO₂. If a source falls short on the number of allowances it needs to comply with its individual cap, it can purchase allowances from another source that has a surplus of allowances. An emitting source may have a surplus of allowances for several reasons. For example, if it chose to install and/or run scrubbers, it can "bank" those unused allowances for future use or sell the leftover allowances to other emitting sources.

The NO_x Budget Trading Program

<http://www.epa.gov/airmarkets/cap-trade/docs/nox.pdf>

In 2003, the cap-and-trade method was also implemented to reduce seasonal (primarily summer) NO_x emissions from fossil fuel-fired plants. While the EPA administers the program, states are required to share the responsibility for allowance allocation and enforcement. Currently, NO_x sources must surrender one allowance to emit one ton of NO_x.

[1] The Acid Rain Program also required NO_x emission reductions by select coal units but under a rate-based regulatory program [<http://www.epa.gov/airmarkets/progsregs/arp/nox.html>].