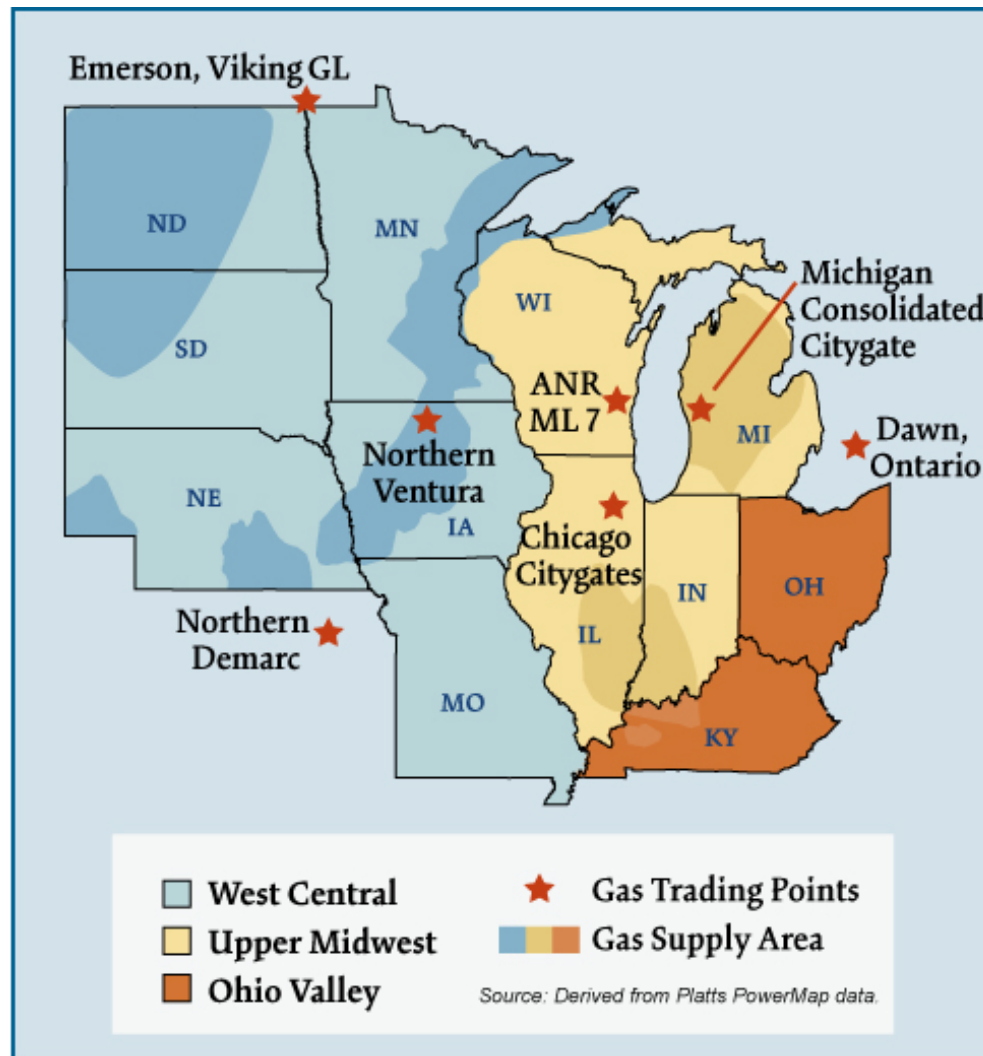


## Midwest Natural Gas Regions



## Overview:

### Market Description

Seasonal space heat requirements strongly influence the structure of the Midwest gas market. On an average annual basis, residential and commercial gas use accounts for about 60 percent of overall gas consumption. Its largest gas consumers are local distribution companies with an obligation to serve core customers in the winter. The region has over 100 gas storage facilities representing more than 3 Tcf of total storage capacity. Much of this capacity is located near key citygates to meet peak day needs. An extensive network of pipelines transports gas from nearly all major supply basins in North America to this region. Imports from Canada and growing supplies from the West serve as baseload volumes; swing gas comes from the Gulf. The power sector's annual share of gas use is less than 10 percent because natural gas is generally not the marginal fuel. Nevertheless, gas use by generators has been growing as in other regions of the U.S.

### Geography

**States covered:** Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

### Major Trading Hubs

Chicago Citygates, Dawn, Michigan Consolidated, Northern Natural Ventura, and Northern Natural Demarcation.

## Storage

**State Capacity:** Illinois, Michigan, and Ohio account for 79 percent of total Midwest storage capacity. The Midwest region contains the largest number of underground natural gas storage facilities (150) and the largest volume of natural gas storage capacity (3.3 Tcf) of any other region. Michigan accounts for 16 percent of total U.S. working gas capacity, the largest of any State in the country.

Aquifer Capacity: 39%

Depleted Field Capacity: 61%

Total Capacity: Midwest has 39 percent of total U.S. storage capacity.

Major Storage Pipelines and Capacity:

Natural Gas Pipeline of America: 256 Bcf

ANR: 192 Bcf

Northern Natural: 68 Bcf

## Demand by Sector (2005):

- Residential: 37%
- Commercial: 20%
- Industrial: 32%

**State:** Illinois, Michigan, and Ohio make up 54 percent of total Midwest demand and 12 percent of total U.S. demand.

**Midwest Total:** 4.8 Tcf annually (13.6 Bcfd), which makes up 22 percent of total U.S. annual demand.

**Consumer Total:** 20.5 million, which is approximately 30 percent of total consumers in the U.S.

**Key Consuming States:** Illinois, Michigan, and Ohio comprise 55 percent of the total number of consumers in the Midwest and about 16 percent of the total number of consumers in the U.S.

**Residential Consumers:** 92%

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**Production**

**State:** Kentucky, Michigan, Ohio, North Dakota and Missouri make up 99 percent of total Midwest production. They make up 2.9 percent of total U.S. production.

**Total:** Total Midwest production equals 522 Bcf annually (1.4 Bcfd) The Midwest offsets its relatively minor gas production profile - just 3 percent of total U.S. daily production - through its interconnectivity to other upstream supply areas throughout North America and access to market area storage.

**Yearly Change:** Production declined 16 percent in 2005. Production in Missouri was down 71 percent from the prior year.

**Prices**

<b>Chicago Citygates</b>	<b>2005</b>	<b>2006</b>
Average Price	\$8.41	\$6.52
Average Basis	-\$0.40	-\$0.21
Highest Daily Price	\$12.60	\$8.44
Lowest Daily Price	\$6.10	\$4.89

**Pipeline Flows**

**Average Daily Northwest Deliveries to the Midwest:** 2.2 Bcfd (2005) 2.4 Bcfd (2006)

**Major Pipelines:** Trailblazer, Cheyenne Plains, and Colorado Interstate Gas carry approximately 2.0 Bcfd of gas from the Rockies to the Midwest.

**Average Daily Midwest Deliveries to the Northeast:** 0.9 Bcfd (2005) 1.0 Bcfd (2006)

**Major Pipelines:** ANR and Panhandle carry most of the gas from the Midwest to the Northeast.

## Imports and Exports

### Average Daily Imports from Canada into the US:

2005: 4.9 Bcfd

2006: 4.7 Bcfd

**Major Importers:** Alliance and Northern Border pipelines flow the majority of the gas from Canada to the Midwest. They flow:

2005: 76%

2006: 78%

### Average Daily Exports from U.S. into Canada:

2005: 0.67 Bcfd

2006: 0.65 Bcfd

**Major Exporter:** Vector and Great Lakes are the principal pipelines that export gas from the Midwest to Canada. They flow:

2005: 93%

2006: 95%

## Focal Points

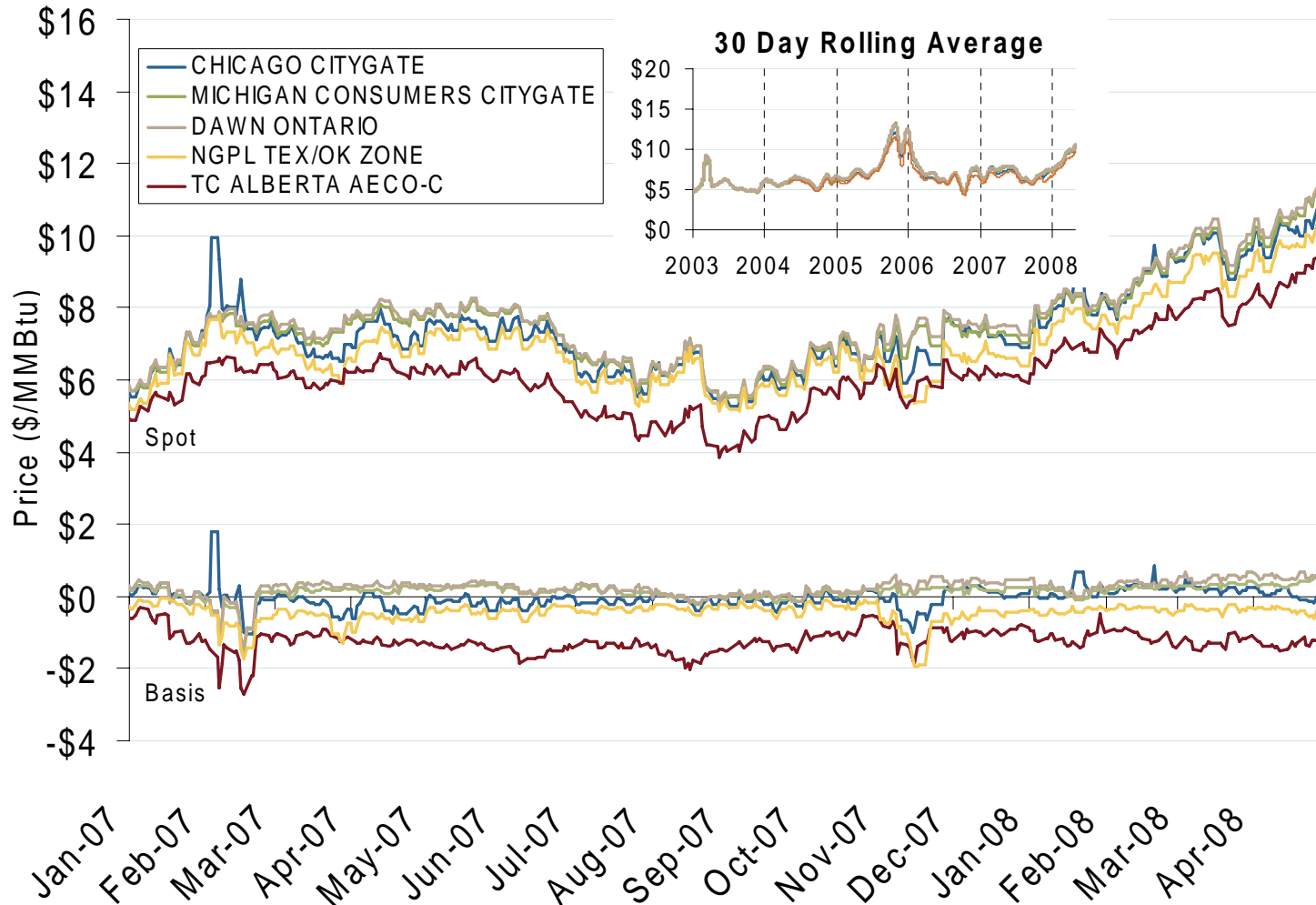
**Ethanol Production:** Production of ethanol for automobile use accounts for a growing share of natural gas consumption in the Midwest, where a majority of the facilities (existing, under construction, or planned) are located. Estimates show that natural gas demand for ethanol processing has tripled from 153 MMcfd in 2000 to 456 MMcfd on average through the first nine months of 2006, according to a recent CERA report. Pipeline survey results for about one-quarter of U.S. ethanol plants show that 2006 gas requirements to produce ethanol increased about 17 percent, or 120 Bcf, over 2005 levels.

**Michigan Demand:** Michigan LDC demand declined by 14 percent in 2006 due mainly to lower average gas needs by Michigan Consolidated, in response to warmer weather. Pipeline data show that average daily gas deliveries on its system dropped to 116 MMcfd in 2006 from 313 MMcfd a year earlier.

## Yearly Average of Spot Hub Prices

<b>Annual Average Day Ahead Prices (\$/MMBtu)</b>				
	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>5 Years</b>
Chicago Citygate	\$8.43	\$6.55	\$6.83	\$6.64
Dawn	\$8.75	\$6.84	\$7.12	\$6.91
MichCon Citygate	\$8.72	\$6.77	\$7.02	\$6.84
AECO	\$6.92	\$5.48	\$5.70	\$5.48
Northern Ventura	\$7.92	\$6.31	\$6.62	\$6.35

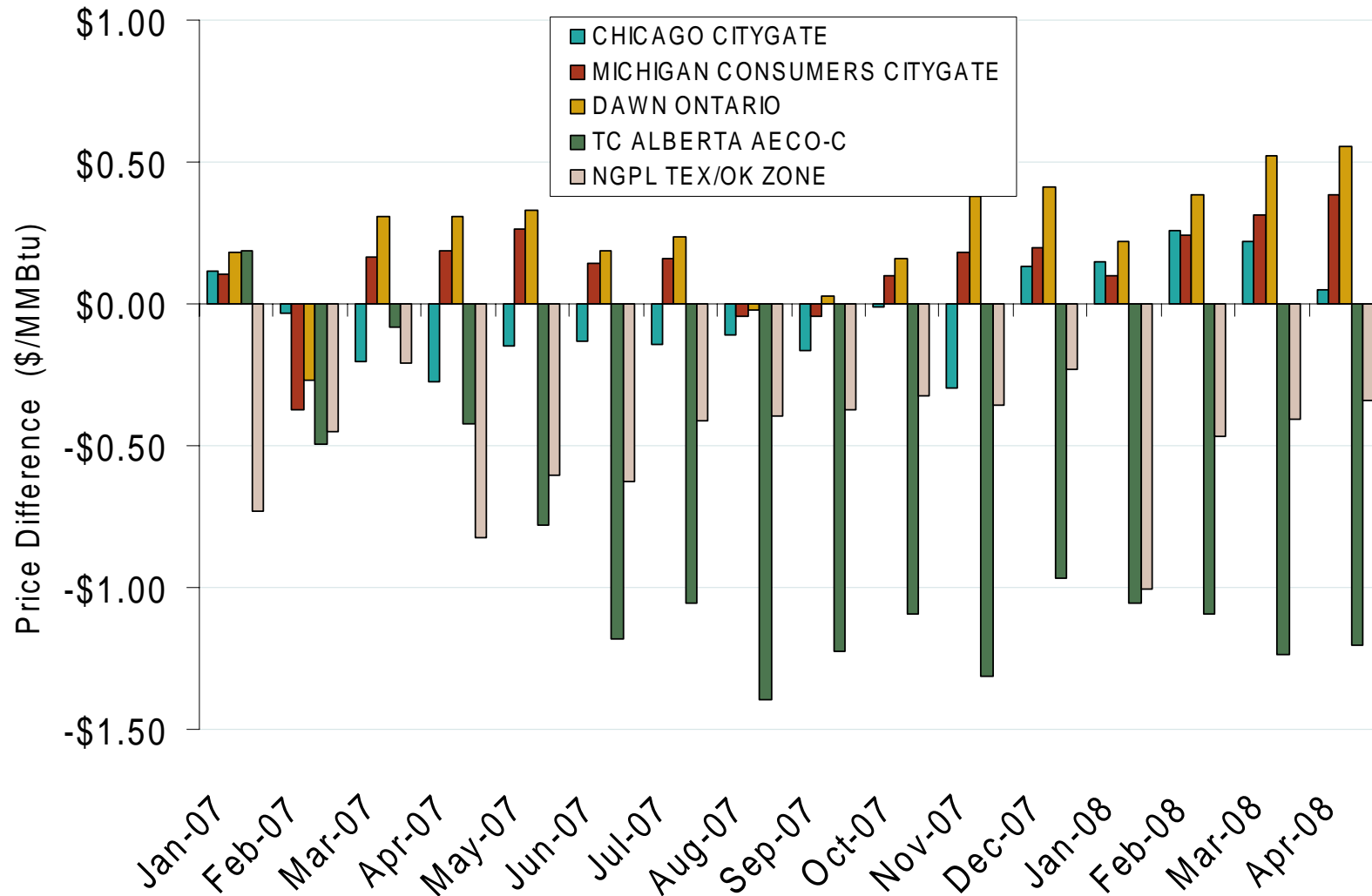
## Midwestern Day-Ahead Hub Spot Prices and Basis



Source: Derived from *Platts* data.



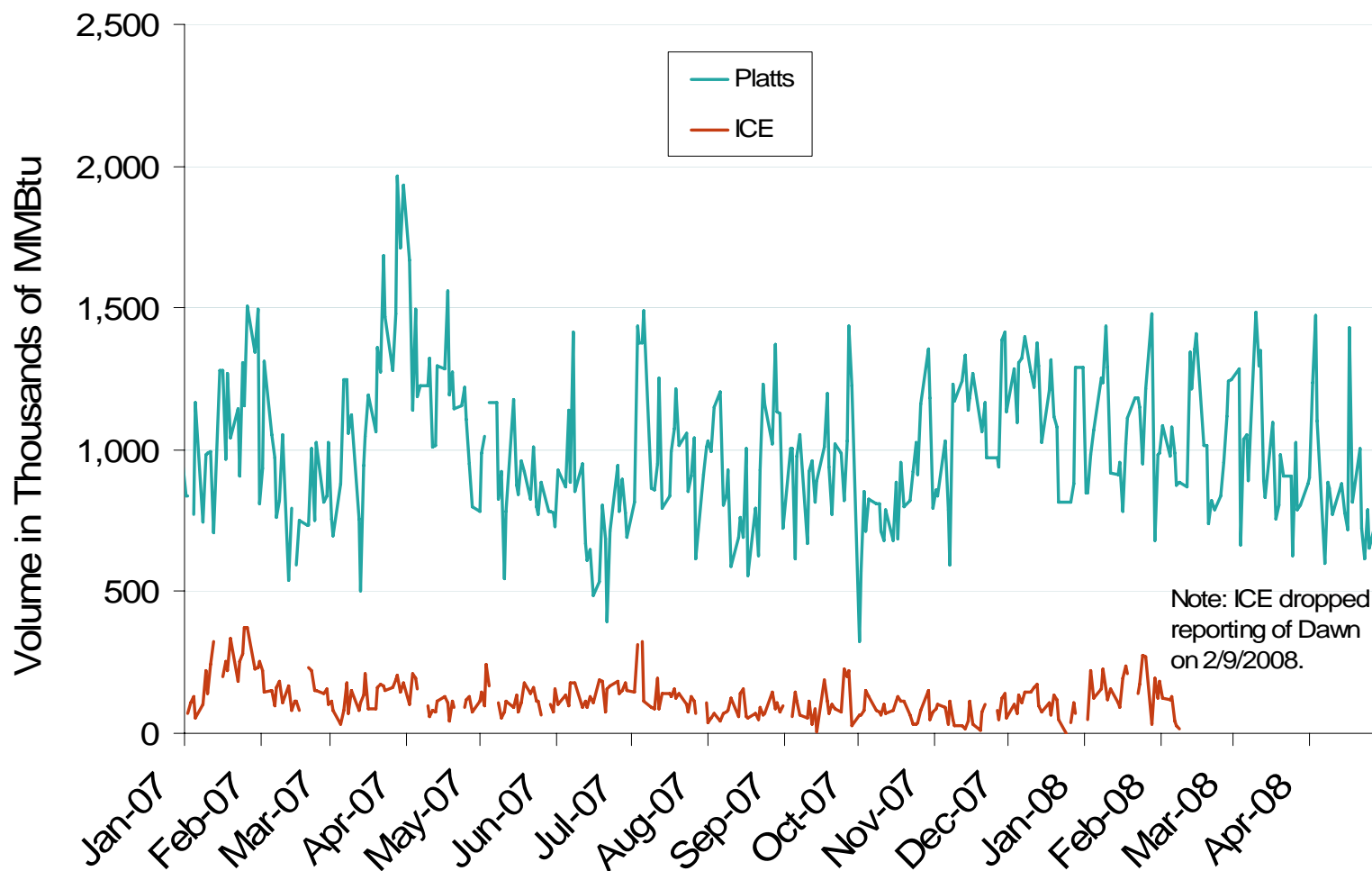
## Midwestern Monthly Average Basis Value to Henry Hub



Source: Derived from Platts data.

Updated May 6, 2008

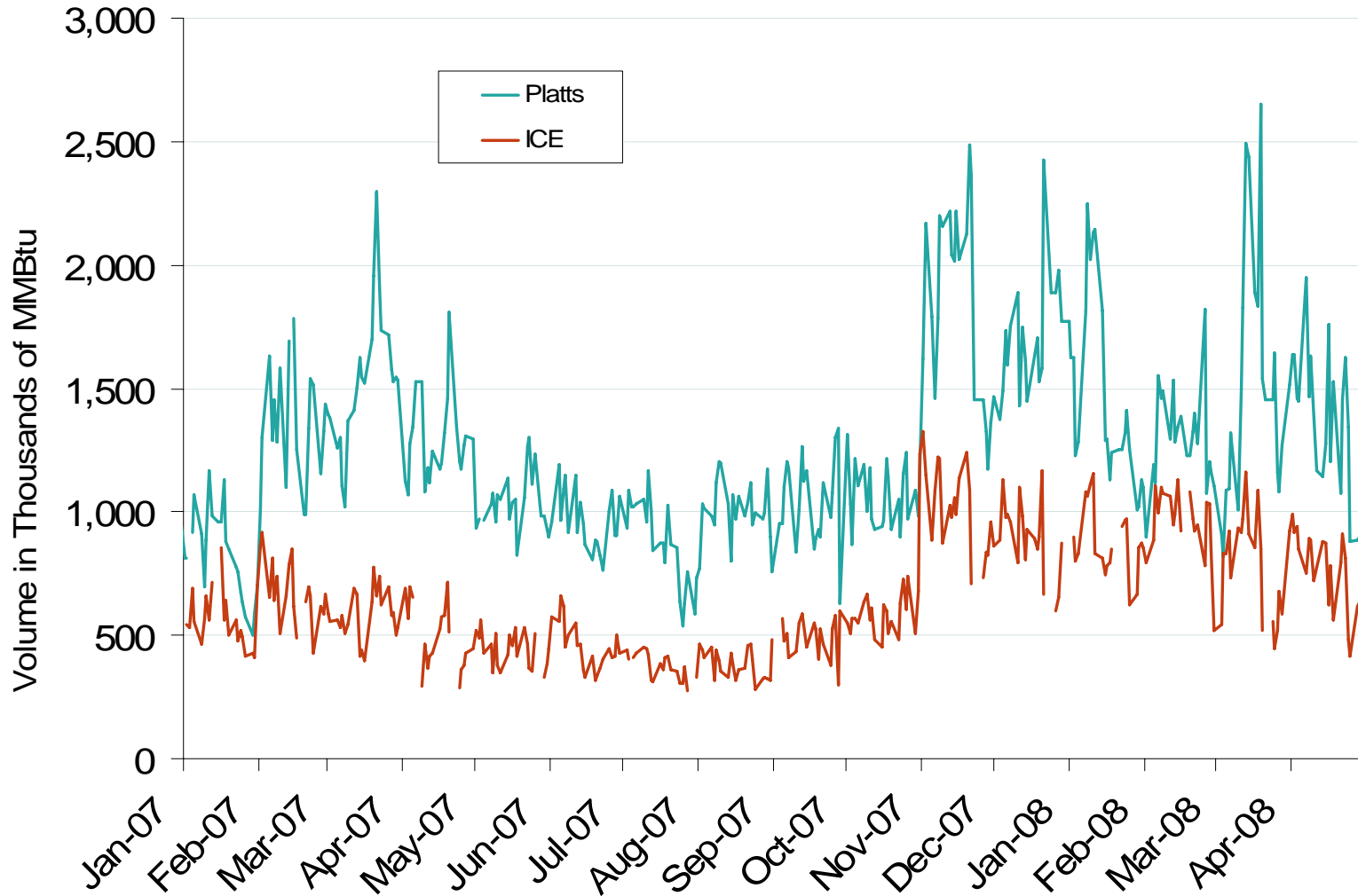
## Published and Traded Daily Spot Volumes at Dawn



Source: Derived from *Platts* and *ICE* data.

Updated May 6, 2008  
2151

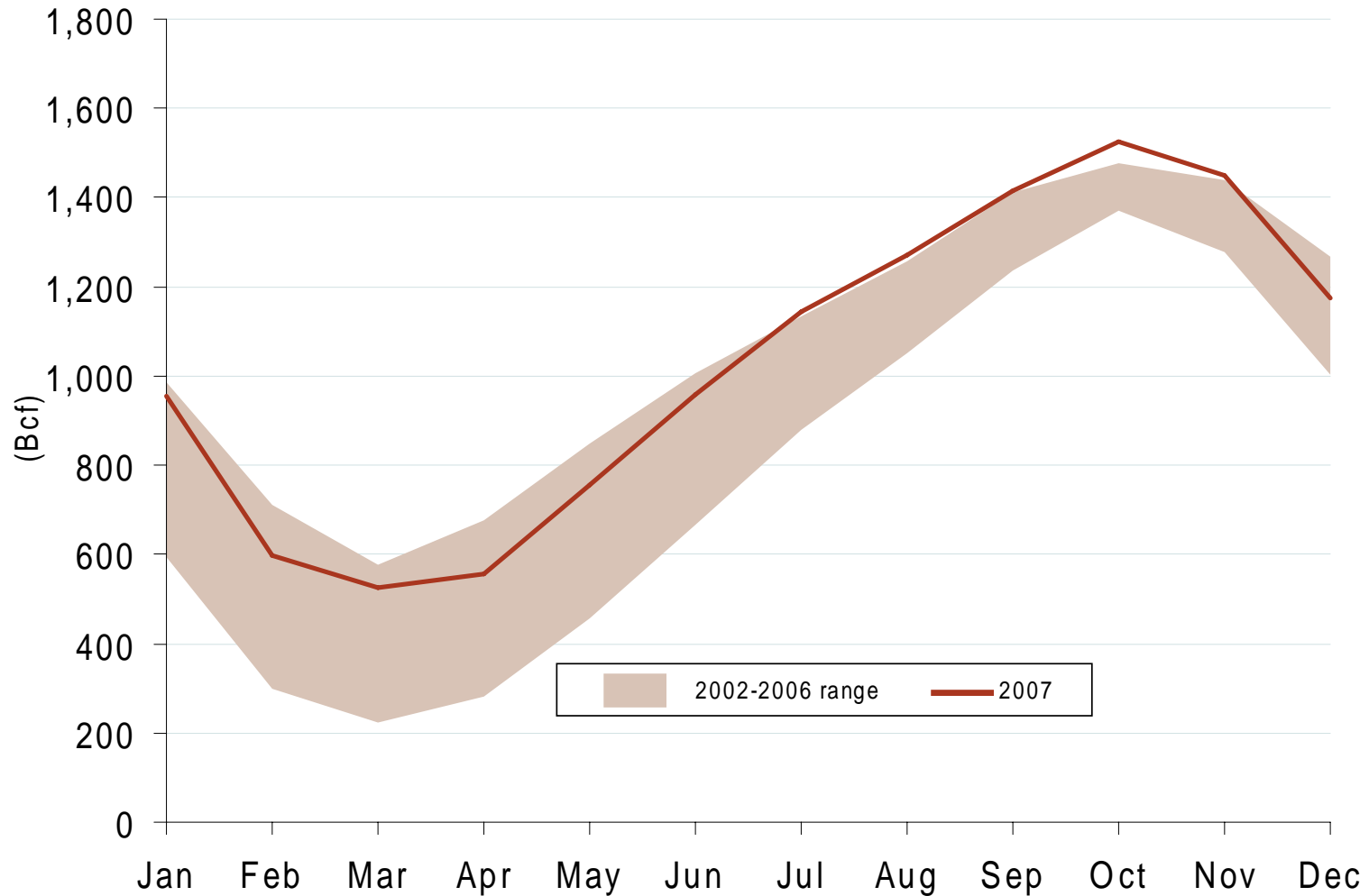
## Published and Traded Daily Spot Volumes at Chicago Citygates



Source: Derived from *Platts* and *ICE* data.

Updated May 6, 2008  
2151

## Midwest Regional Storage Inventory Levels



Source: Derived from EIA.

Updated April 18, 2008

2023

## Pipeline Projects in the Midwest

Pipeline Projects						
Company	Project Name	Capacity (MMcf/d)	Capital Cost (Millions)	Status	Year Certificated	From-To State
1 ANR Pipeline Company	EastLeg Project	143	\$18.7	In-Service 09/05	2004	WI-WI
2 ANR Pipeline Company	NorthLeg Project	107	\$13.5	In-Service 12/05	2004	WI-WI
3 ANR Pipeline Company	Wisconsin 2006 Expansion	168	\$48.1	Under Construction; In Service 5/06	2005	WI-WI
4 Northern Border Pipeline Company	Chicago Expansion III Project	130	\$20.7	Under Construction; In Service 8/06	2005	IA-IL
5 Equitrans	Big Sandy Pipeline	130	\$154.0	Approved	2006	KY-KY
6 Southern Star Central Pipeline, Inc.	Ozark Trails Expansion	25	\$9.4	Under Construction	2006	KS-MO
7 Vector Pipeline LP	2007 Expansion Project	245	\$70.4	Approved	2006	IL-MO
<b>Total</b>		<b>948</b>	<b>\$334.8</b>			

Source: FERC Office of Energy Projects. Data as of Dec. 2005.

Updated January 10, 2007

2020

## Storage Projects in the Midwest

Storage Projects							
Company	Project Name	Capacity (Bcf)	Deliverability (MMcf/d)	Capital Cost (Millions)	Status	Year Certificated	State
1 Texas Gas Transmission, LLC	Texas Gas Storage Expansion	8.2	82	\$20.7	In-Service 10/05	2005	KY
2 Bluewater Gas Storage		29.2	826	N/A	Approved	2006	MI
3 Northern Natural Gas Company	Cunningham Field Project	0	70	\$6.2	Under Construction	2006	KS
<b>Total</b>		<b>37.4</b>	<b>978</b>	<b>\$26.9</b>			

Source: FERC Office of Energy Projects. Data as of Dec. 2005.

Updated January 10, 2007

2021

## Natural Gas Consumers by State (2005)

Sector	Residential	Commercial	Industrial	State Total	% of US	% of Region
Illinois	3,975,783	276,755	29,887	4,282,425	6%	21%
Indiana	1,701,577	158,887	5,799	1,866,263	3%	9%
Iowa	850,095	97,767	1,744	949,606	1%	5%
Kentucky	770,080	85,243	1,698	857,021	1%	4%
Michigan	3,187,756	253,347	10,067	3,451,170	5%	17%
Minnesota	1,364,237	126,310	1,432	1,491,979	2%	7%
Missouri	1,348,743	142,148	3,545	1,494,436	2%	7%
Nebraska	501,279	57,389	7,974	566,642	1%	3%
North Dakota	114,152	16,518	239	130,909	0%	1%
Ohio	3,272,307	277,774	8,321	3,558,402	5%	17%
South Dakota	157,457	20,771	542	178,770	0%	1%
Wisconsin	1,592,621	155,109	8,484	1,756,214	3%	9%
<b>Regional Total</b>	<b>18,836,087</b>	<b>1,668,018</b>	<b>79,732</b>	<b>20,583,837</b>	<b>30%</b>	<b>100%</b>
<b>US Total</b>	<b>63,573,466</b>	<b>5,196,428</b>	<b>205,217</b>	<b>68,975,111</b>		
<b>% of US</b>	<b>27%</b>	<b>2%</b>	<b>0%</b>			
<b>% of Region</b>	<b>30%</b>	<b>32%</b>	<b>39%</b>	<b>30%</b>		

Source: Derived from EIA data.

Note: Units equal millions of cubic feet.

Updated January 11, 2007

2089

## Natural Gas Demand by State (2005)

Sector				Vehicle	Electric			% of	
	Residential	Commerical	Industrial	Fuel	Power	Other Fuel	State Total	% of US	Region
<b>Illinois</b>	437,565	201,881	260,536	444	58,418	10,939	969,783	4%	19%
<b>Indiana</b>	148,178	75,958	263,112	529	35,376	6,696	529,849	2%	11%
<b>Iowa</b>	67,271	45,141	96,007	61	21,285	11,622	241,387	1%	5%
<b>Kentucky</b>	56,142	36,894	112,004	119	17,181	11,831	234,171	1%	5%
<b>Michigan</b>	358,658	174,421	211,706	385	130,601	38,336	914,107	4%	18%
<b>Minnesota</b>	128,625	95,916	94,991	105	26,024	22,309	367,970	2%	7%
<b>Missouri</b>	106,856	60,369	66,350	171	31,831	2,556	268,133	1%	5%
<b>Nebraska</b>	37,963	27,401	40,957	65	8,066	4,668	119,120	1%	2%
<b>North Dakota</b>	10,692	9,903	11,850	101		20,701	53,247	0%	1%
<b>Ohio</b>	322,697	166,821	293,857	803	27,941	14,201	826,320	4%	17%
<b>South Dakota</b>	12,212	9,819	10,661	20	3,567	6,296	42,575	0%	1%
<b>Wisconsin</b>	131,215	86,086	130,570	307	58,618	3,700	410,496	2%	8%
<b>Regional Total</b>	<b>1,818,074</b>	<b>990,610</b>	<b>1,592,601</b>	<b>3,110</b>	<b>418,908</b>	<b>153,855</b>	<b>4,977,158</b>	<b>22%</b>	<b>100%</b>
<b>US Total</b>	<b>4,806,136</b>	<b>3,101,526</b>	<b>6,745,835</b>	<b>22,265</b>	<b>5,869,145</b>	<b>1,696,296</b>	<b>22,241,203</b>		
<b>% of US</b>	<b>38%</b>	<b>32%</b>	<b>24%</b>	<b>14%</b>	<b>7%</b>	<b>9%</b>	<b>22%</b>		
<b>% of Region</b>	<b>37%</b>	<b>20%</b>	<b>32%</b>	<b>0%</b>	<b>8%</b>	<b>3%</b>	<b>100%</b>		

Source: Derived from *EIA* data.

Note: Units equal millions of cubic feet. Other Fuel consists of Lease Fuel, Plant Fuel, and Pipeline & Distribution use.

Updated January 11, 2007

2090



## Average Daily Midwestern Imports of Canadian Gas

Pipeline	2004	2005	2006
Alliance	1,732,396	1,758,949	1,738,377
Great Lakes	599,916	718,224	662,052
Northern Border	2,099,473	1,966,521	1,948,748
PEPL	(71,708)	(46,478)	(36,353)
Vector	(832,840)	(631,137)	(619,414)
Viking	397,808	420,723	360,350
<b>Imports</b>	<b>4,829,593</b>	<b>4,864,417</b>	<b>4,709,526</b>
<b>Exports</b>	<b>(904,548)</b>	<b>(677,615)</b>	<b>(655,767)</b>
<b>Net Imports</b>	<b>3,925,046</b>	<b>4,186,802</b>	<b>4,053,760</b>

Source: Derived from *Bentek* data.

Note: Units equal MMBtus.

Updated January 11, 2007

2091

## Natural Gas Production by State

Dry Production	2004	2005	Yearly Change	2005 % of US	2005 % of Region
Illinois	121	120	-1%	0.0%	0%
Indiana	3,401	3,135	-8%	0.0%	1%
Kentucky	91,846	91,079	-1%	0.5%	17%
Michigan	255,482	257,404	1%	1.4%	49%
Missouri	131,995	38,615	-71%	0.2%	7%
Nebraska	1,476	1,172	-21%	0.0%	0%
North Dakota	48,776	45,699	-6%	0.3%	9%
Ohio	90,418	83,494	-8%	0.5%	16%
South Dakota	1,093	992	-9%	0.0%	0%
<b>Regional Total</b>	<b>624,608</b>	<b>521,710</b>	<b>-16%</b>	<b>2.9%</b>	<b>100%</b>
<b>US Total</b>	<b>18,757,477</b>	<b>18,074,237</b>	<b>-4%</b>		
<b>% of US</b>	<b>3%</b>	<b>3%</b>			

Source: Derived from EIA data.

Note: Units equal millions of cubic feet.

Updated January 11, 2007

2092

## Natural Gas Storage by Field Type (2005)

Field Type	Salt Dome Fields	Salt Dome Capacity	Aquifers Aquifers Capacity	Aquifers Capacity	Depleted Fields	Depleted Fields Capacity	Total Fields	Total Fields Capacity	Total Capacity	% of US	% of Region	Dry Reserves	Proved Reserves
Illinois	0	0	18	878,265	11	103,731	29	981,995	12%	30%	0	0	
Indiana	0	0	12	81,641	10	32,439	22	114,080	1%	3%	0	0	
Iowa	0	0	4	273,200	0	0	4	273,200	3%	8%	0	0	
Kentucky	0	0	3	9,567	20	209,360	23	218,927	3%	7%	2,151,000	0	
Michigan	2	3,832	0	0	43	1,017,791	45	1,021,622	12%	31%	2,910,000	0	
Minnesota	0	0	1	7,000	0	0	1	7,000	0%	0%	0	0	
Missouri	0	0	1	32,146	0	0	1	32,146	0%	1%	0	0	
Nebraska	0	0	0	0	1	39,469	1	39,469	0%	1%	0	0	
North Dakota	0	0	0	0	0	0	0	0	0%	0%	453,000	0	
Ohio	0	0	0	0	24	572,477	24	572,477	7%	18%	898,000	0	
<b>Midwest Total</b>	<b>2</b>	<b>3,832</b>	<b>39</b>	<b>1,281,819</b>	<b>109</b>	<b>1,975,267</b>	<b>150</b>	<b>3,260,916</b>	<b>39%</b>	<b>100%</b>	<b>6,412,000</b>	<b>0</b>	
<b>US Total</b>	<b>30</b>	<b>250,532</b>	<b>44</b>	<b>1,350,689</b>	<b>320</b>	<b>6,667,222</b>	<b>394</b>	<b>8,268,443</b>			<b>204,385,000</b>	<b>0</b>	
<b>% of US</b>	<b>7%</b>	<b>2%</b>	<b>89%</b>	<b>95%</b>	<b>34%</b>	<b>30%</b>	<b>38%</b>	<b>39%</b>			<b>3%</b>	<b>0%</b>	
<b>% of Region</b>	<b>1%</b>	<b>3%</b>	<b>26%</b>	<b>16%</b>	<b>73%</b>	<b>81%</b>	<b>100%</b>	<b>100%</b>				<b>0%</b>	

Source: Derived from EIA data.

Note: Capacity units equal millions of cubic feet.

Updated January 11, 2007

2094

## Average Daily Rockies Deliveries to the Midwest

Pipeline	2004	2005	2006
Cheyenne Plains	0	417,251	554,686
CIG	534,894	545,437	575,279
KMI	305,357	247,895	237,590
Northern Border	93,449	103,532	101,581
Southern Star	179,258	179,276	180,626
Trailblazer	848,343	839,261	841,569
Williston Basin	(94,276)	(104,633)	(102,654)
<b>Net Deliveries</b>	<b>1,867,025</b>	<b>2,228,020</b>	<b>2,388,678</b>

Source: Derived from *Bentek* data.

Note: Units equal MMBtus.

Updated January 11, 2007

2093

## Average Daily Midwestern Deliveries to the Northeast

Pipeline	2004	2005	2006
ANR	135,180	398,301	515,714
CrossRoads	17,349	25,805	21,095
Midwestern	78,244	129,822	132,917
Panhandle Eastern	255,703	304,978	316,424
<b>Net Deliveries</b>	<b>486,475</b>	<b>858,906</b>	<b>986,151</b>

Source: Derived from *Bentek* data.

Note: Units are in MMBtus.

Updated January 11, 2007

2095