OE ENERGY MARKET SNAPSHOT

Midwest States Version – January 2009 Data

- **Special Report**
- **Natural Gas and Fuel Markets**
- **Electricity Markets**

Office of Enforcement
Federal Energy Regulatory Commission
February 2009

Special Report:

- **Financial Transmission Rights (FTR) Primer**

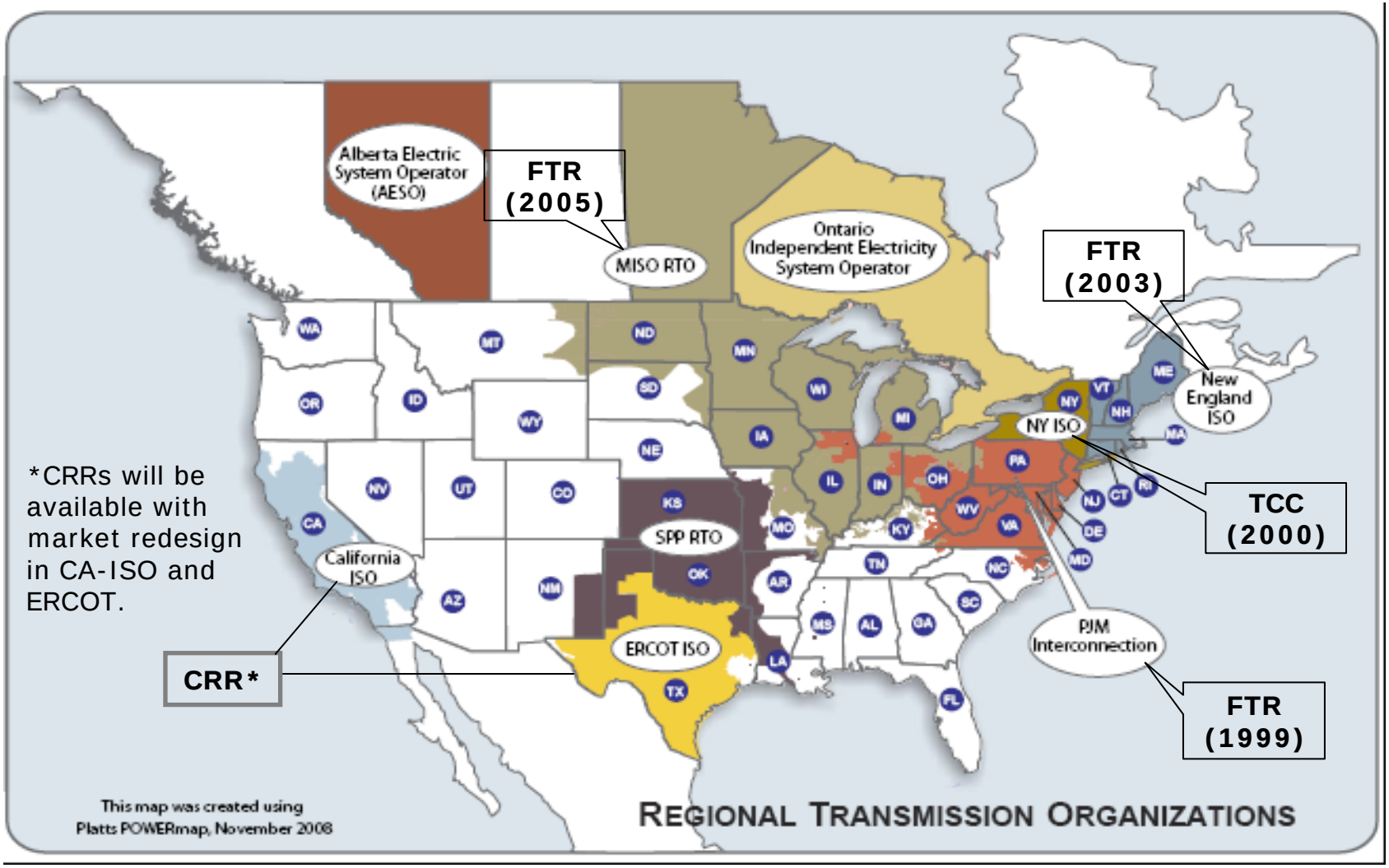
What is an FTR?

- **F**inancial **T**ransmission **R**ight
- Important tool for managing congestion risk
  - Settles on congestion price differentials between specific zones and/or nodes
  - A financial right (not a physical right)
  - Applicable to the Day-Ahead market only
- Formally available in RTO markets with Day-Ahead Settlements

What is an ARR?

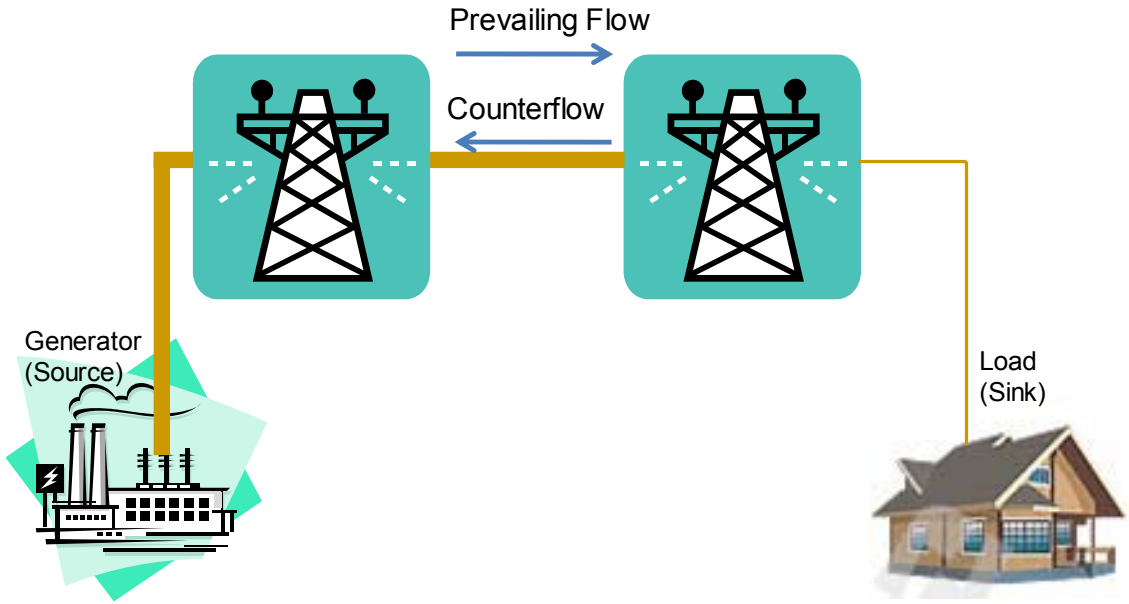
- **A**uction **R**evenue **R**ight
- Allocations to MPs with firm historical usage of the transmission system, e.g.,
  - PJM, MISO – NIS or FPPS customers (ARRs)
  - ISO-NE – Congestion-paying LSEs (ARRs)
  - CA-ISO – Congestion-paying LSEs (CRRs)
  - NYISO – Transmission owners (ETCNL/RCRRs)
- Entitlements (not financial instruments)
  - Can be converted to financial instruments
- Entitles the holder to receive a Right to the Revenue (or Charge) from the FTR Auction
- PJM Annual Auction 2008-9 results: 209 GW (65%) FTR bids and offers, 112 GW (35%) ARR allocation

FTR Auction Market History

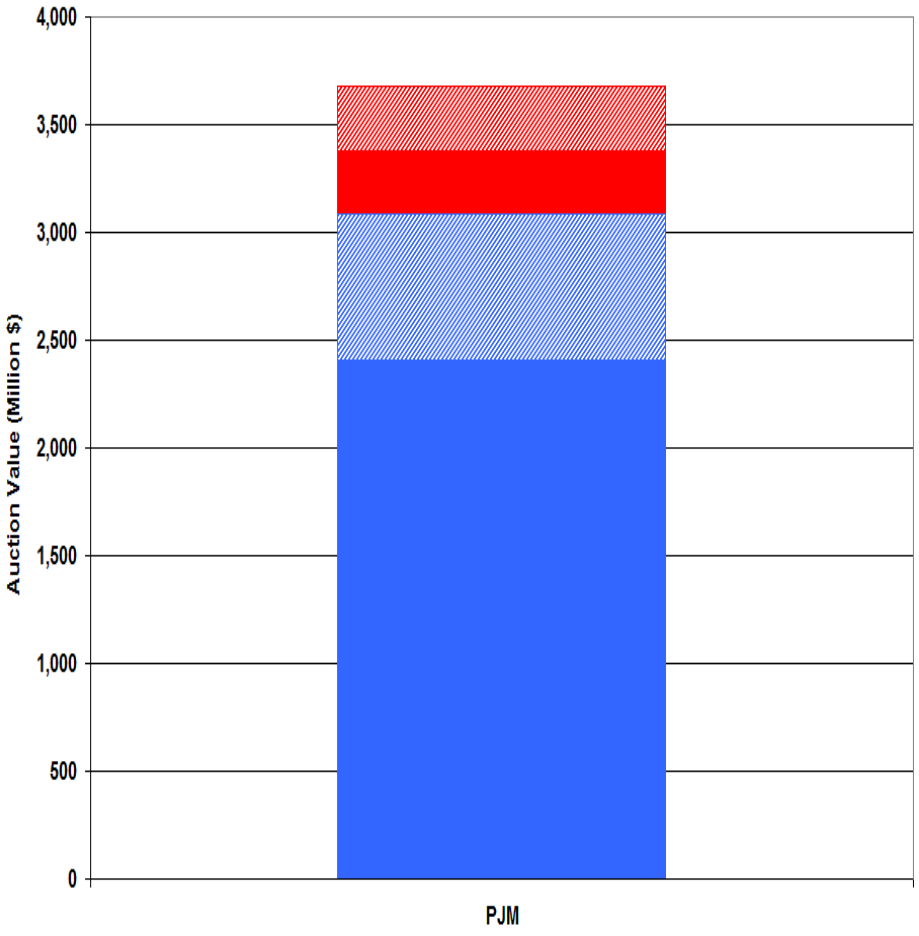


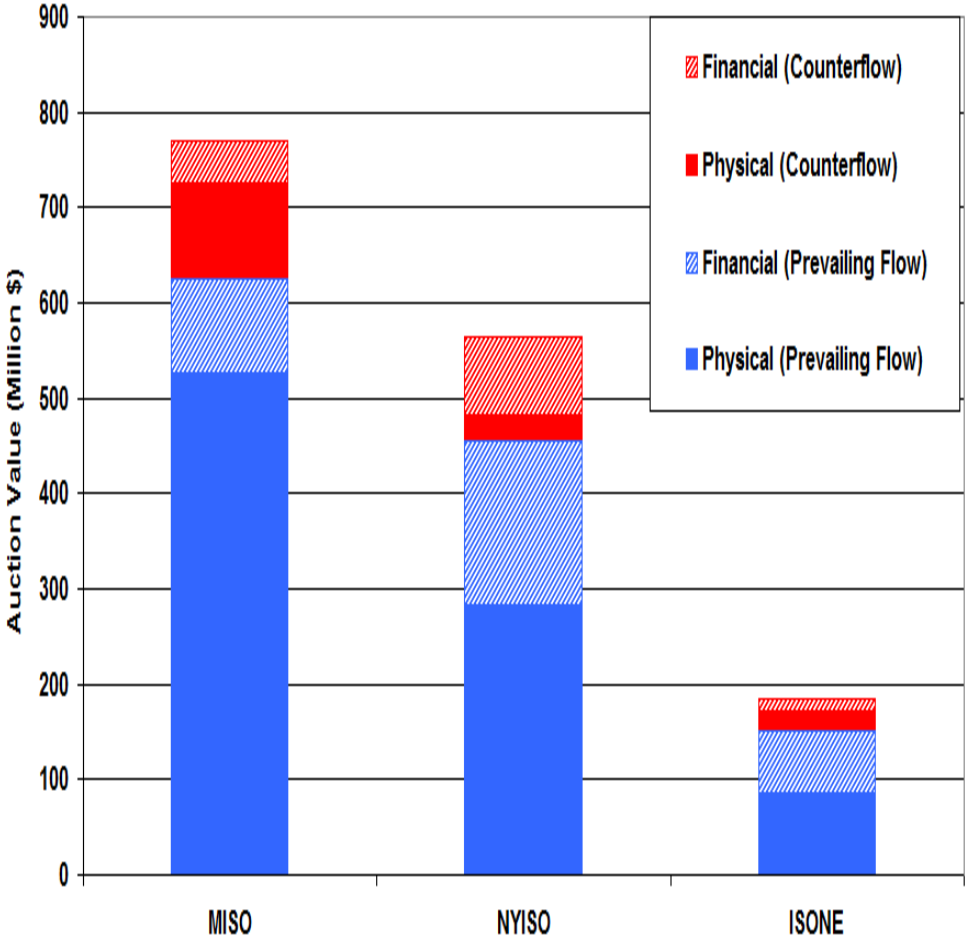
What are Counterflow FTRs?

- Hedge funds are the largest holders of counterflow FTRs.
- A counterflow FTR holder speculates that power will flow from the higher-priced load to the lower-priced generator in the DA market.
  - Counterflow FTR holder is paid in the auction to take congestion risks.
  - Counterflow FTR position is profitable when the amount the holder receives for the auction-clearing price exceeds the DA hourly congestion cost during the FTR term.



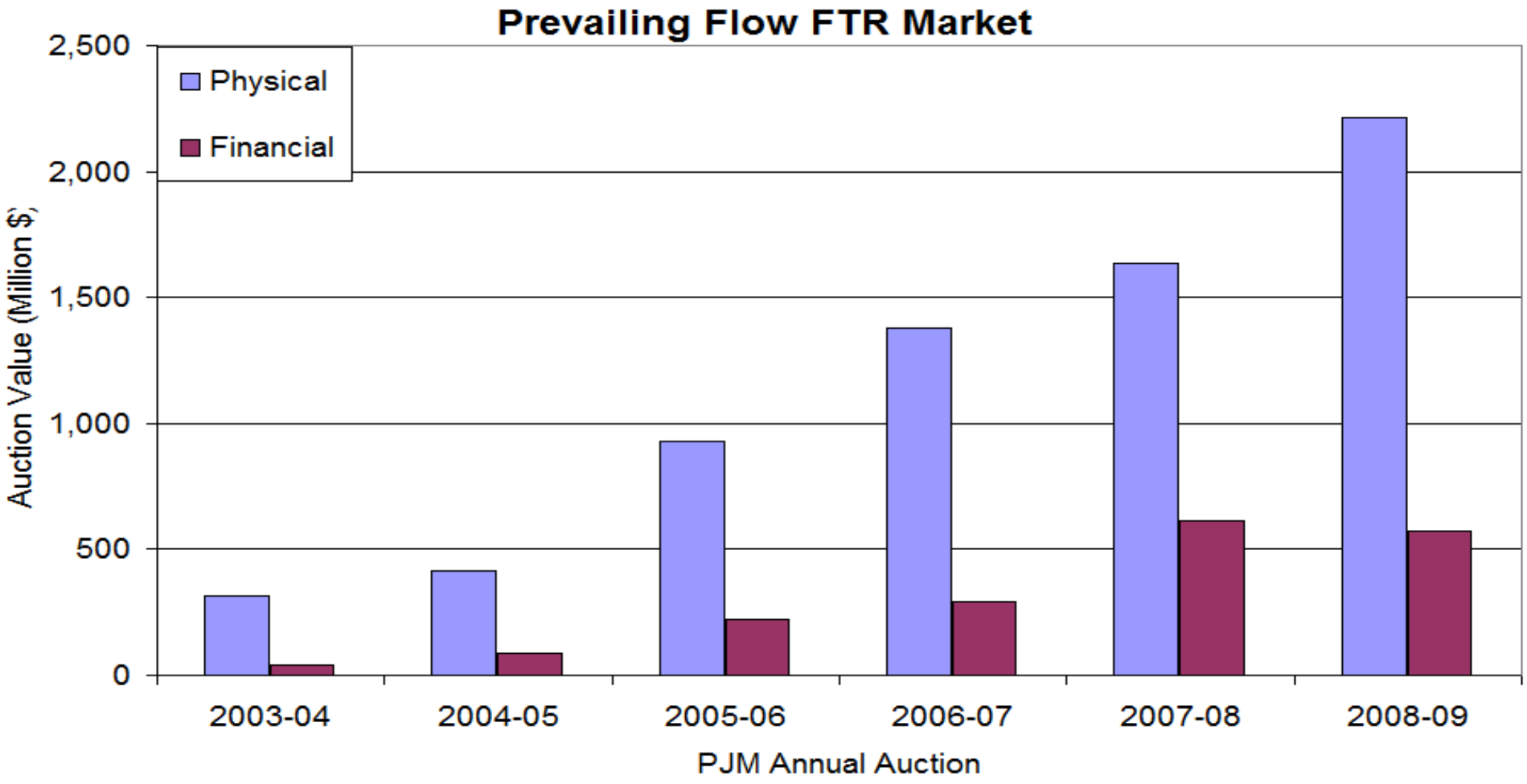
FTR Market Size and Participants





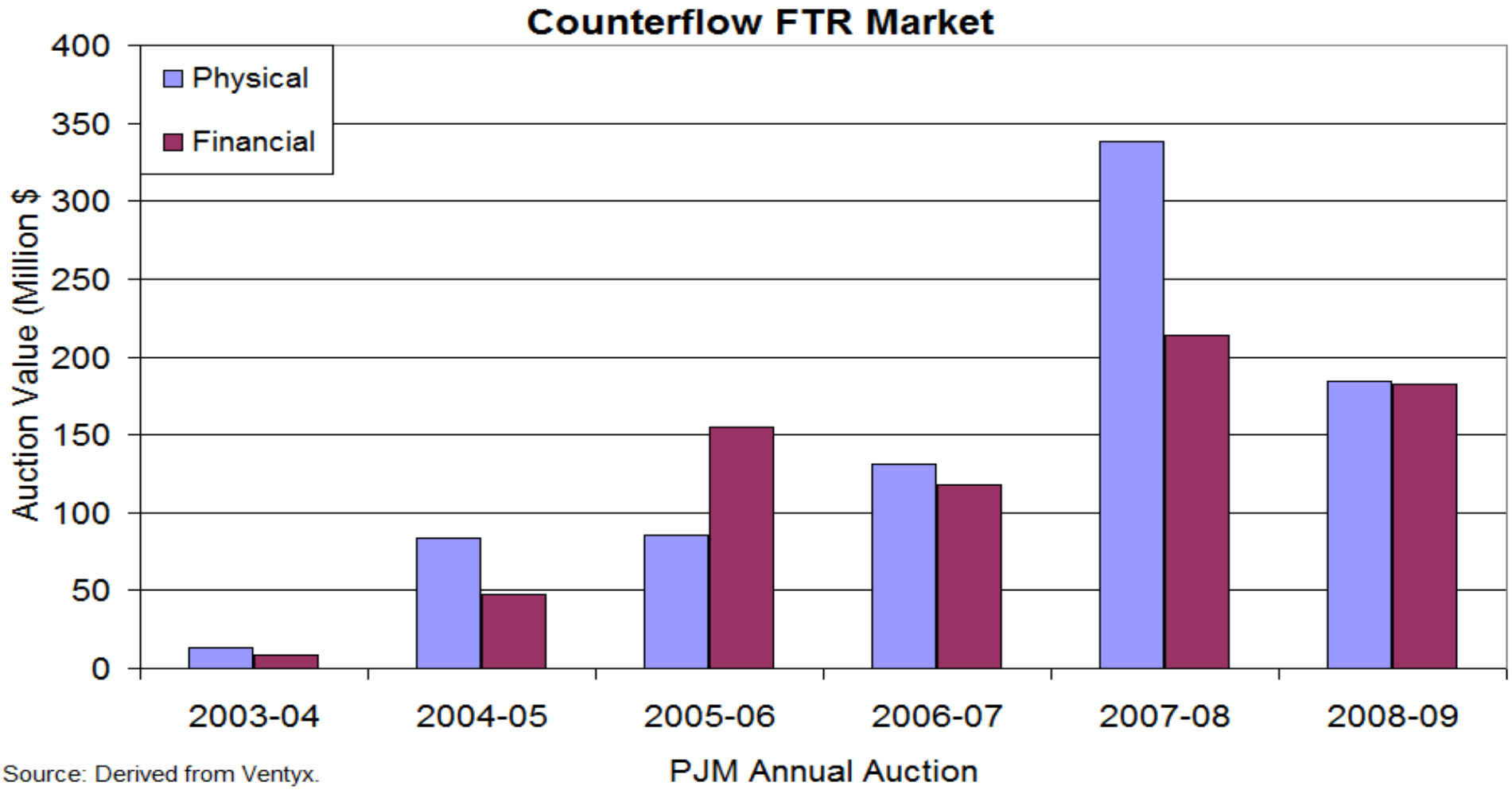
Source: Derived from Ventyx.
(1) Data reflects calendar year 2008 year auctions (long- and -short terms) through December 30.
(2) Categorization of market participants is based on staff's estimates. Physical players include IOUs, IPPs, Municipals and Cooperatives. Financial players include banks and hedge funds.
(3) Counterflow FTR auction values are negative since these are payments to market participants. For the purposes of the graph, these auction values are shown as positive values.

Growth of the FTR Auction Market - The PJM Example



Source: Derived from Ventyx.
(1) Categorization of market participants is based on staff's estimates. Physical players include IOUs, IPPs, Municipals and Cooperatives. Financial players include banks and hedge funds.

Growth of the FTR Auction Market - The PJM Example (...continued)



Source: Derived from Ventyx.
(1) Categorization of market participants is based on staff's estimates. Physical players include IOUs, IPPs, Municipals and Cooperatives. Financial players include banks and hedge funds.
(2) Counterflow FTR auction values are negative since these are payments to market participants. For the purposes of the graph, these auction values are shown as positive values.

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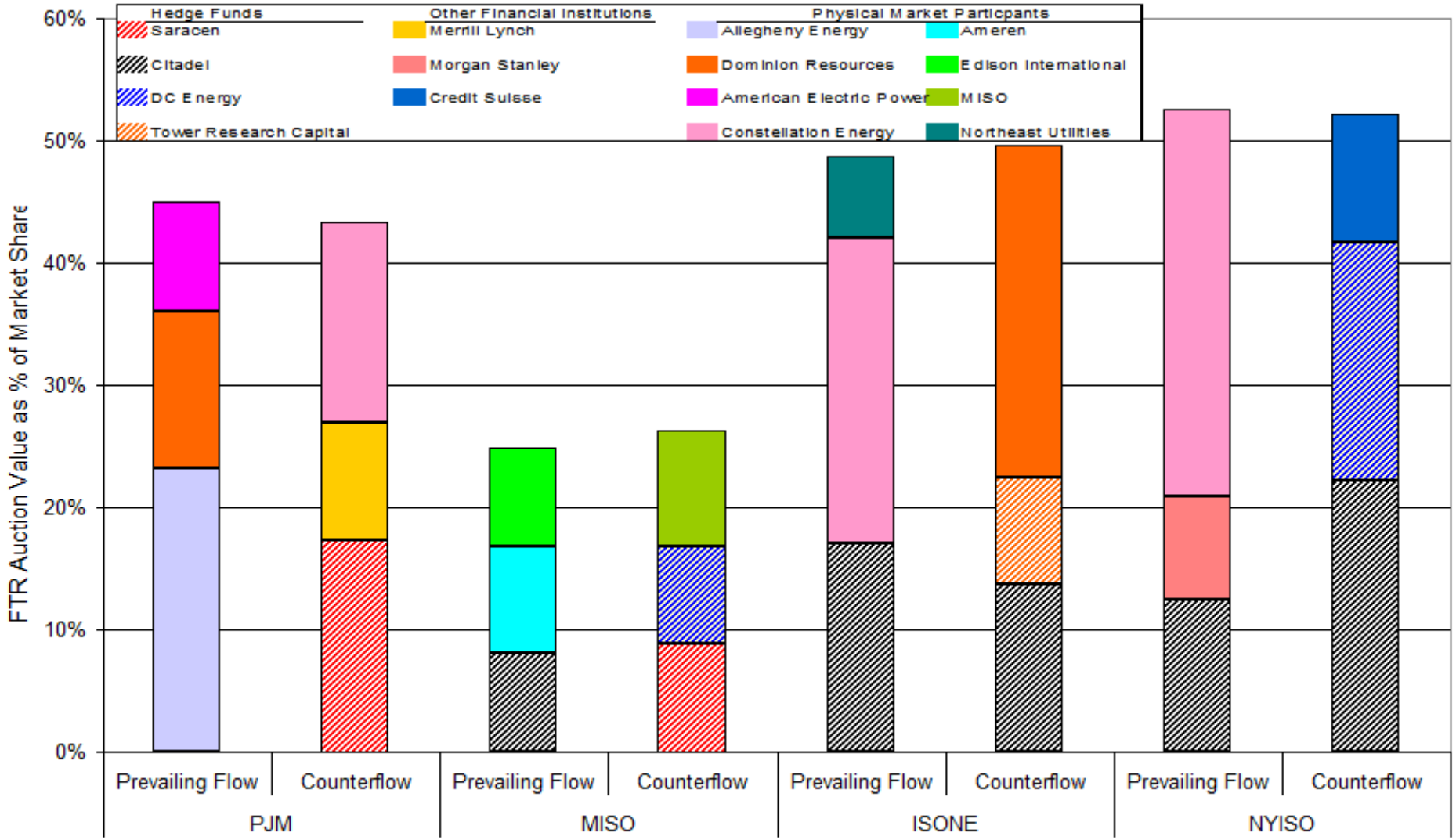
Top 3 Market Participants By Market and Flow Type



Source: Derived from Ventyx.

(1) Data reflect calendar year 2008 auctions (long- and -short term).

(2) Market share is calculated as the FTR auction clearing price multiplied by FTR quantities for each market participant relative to the market as a whole for prevailing and counter flow positions.

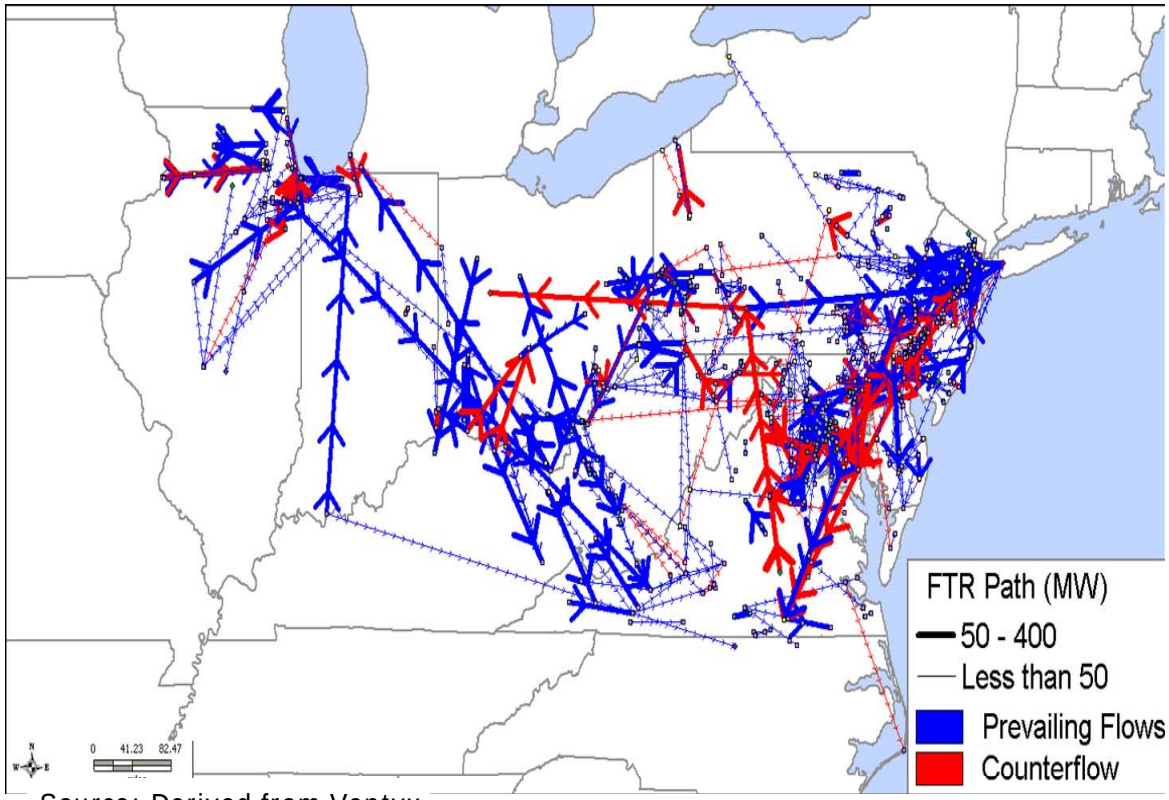
FTR Markets Are Complex

Example of a Financial Participant's Positions in PJM's FTR Market

<u>FTR Positions as of Dec. '08</u>

- 2,300 FTR Positions totaling 78 GW
  - Monthly, Quarterly and Annual terms
  - On-peak and off-peak periods.

As a result, each of the 2,300 FTR paths has a set of unique risk characteristics and pay-outs.

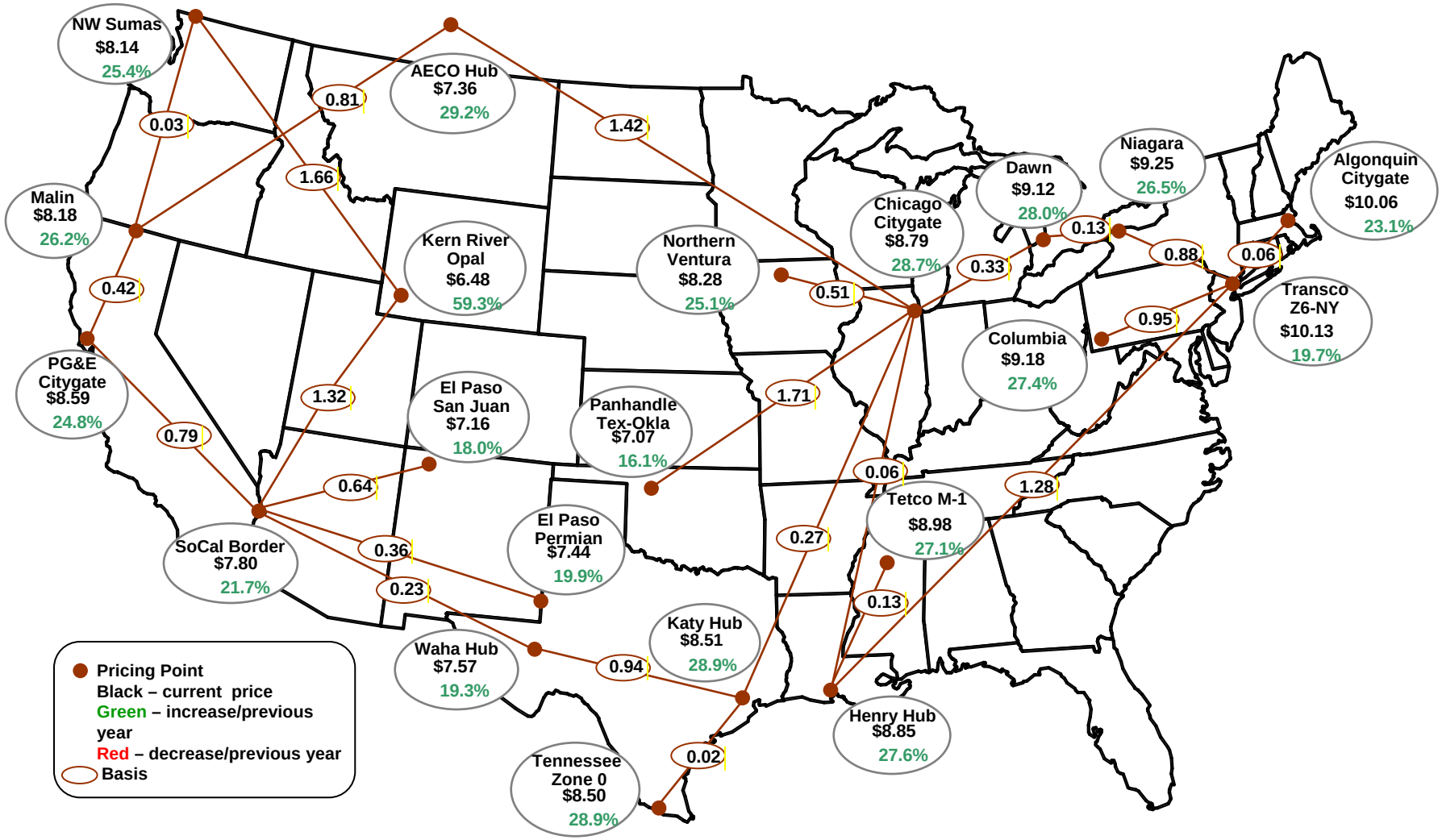


Source: Derived from Ventyx

Natural Gas and Fuel Markets

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

Average Spot Gas Prices, 2008



Source: Derived from *Platts* data.

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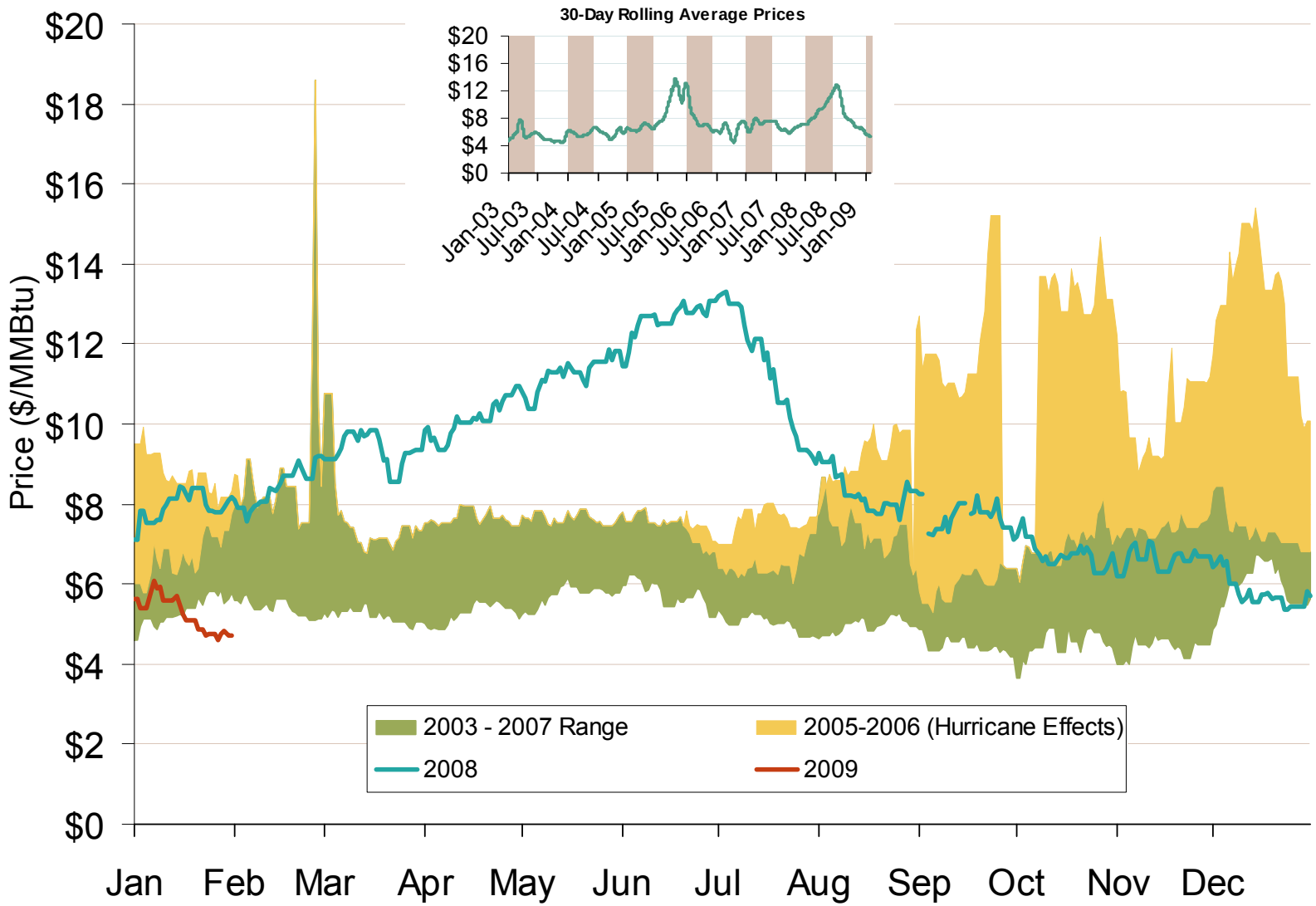
Natural Gas Market Overview: 5 Year Range of Henry Hub Spot Prices

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

Henry Hub Natural Gas Daily Spot Prices
2008, 2009 and 2003-2007 Year Range



Source: Derived from *Platts* data.

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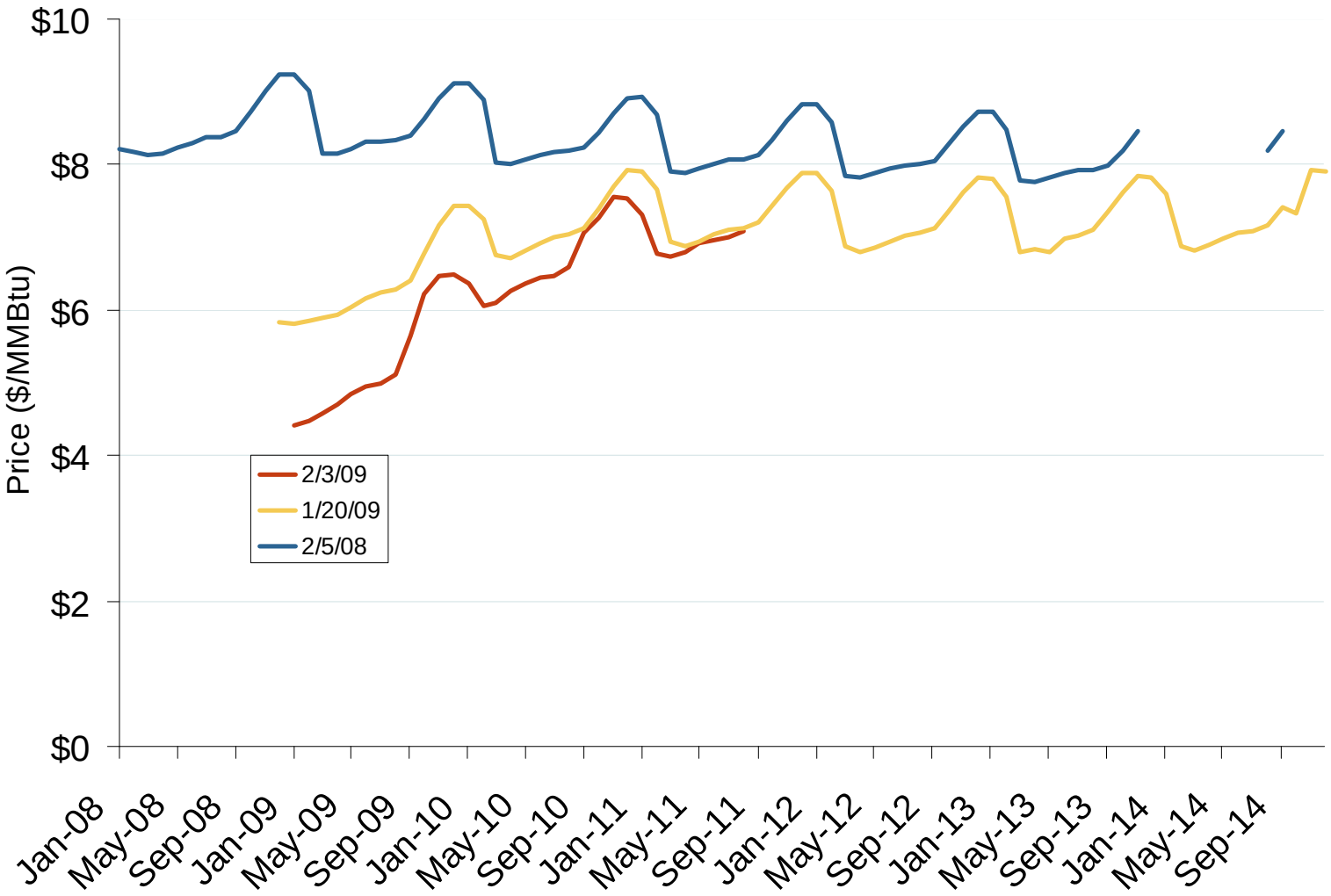
NYMEX Natural Gas Forward Price Curve



Source: Derived from *NYMEX* data.

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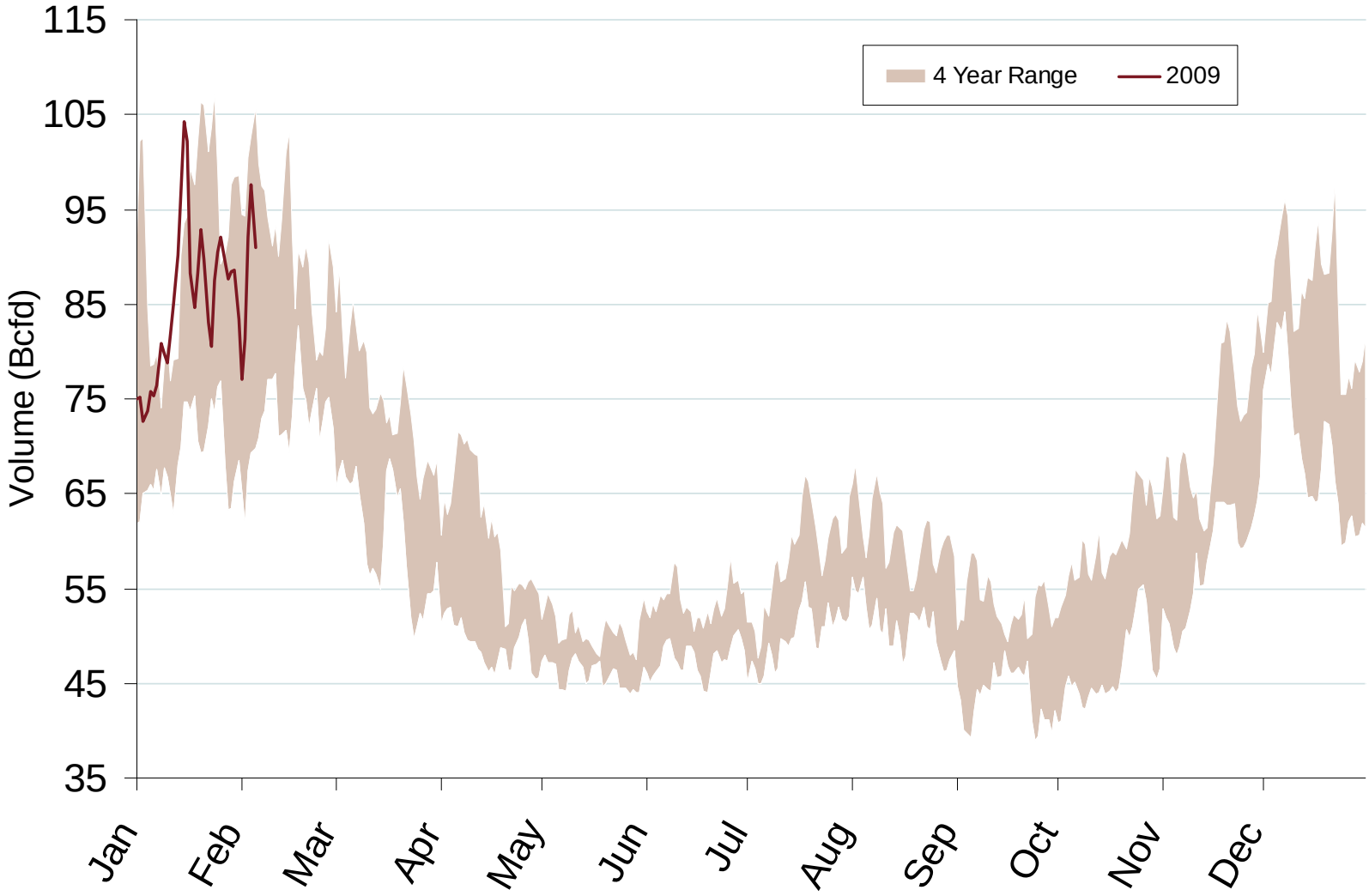
Total U.S. Natural Gas Demand (All Sectors)



Source: Derived from *Bentek Energy* data.

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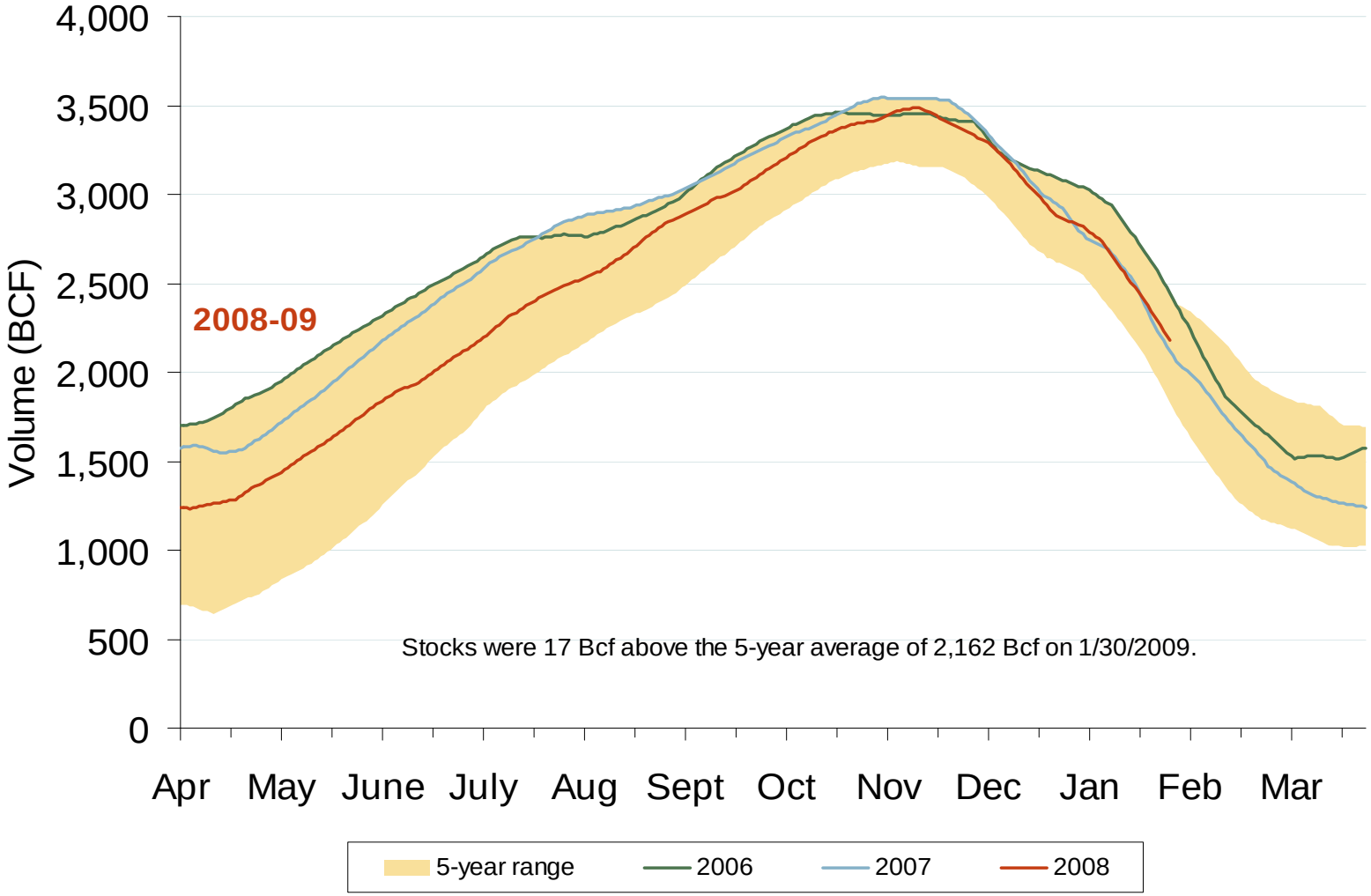
Total U.S. Working Gas in Storage



Source: Derived from *EIA* data.

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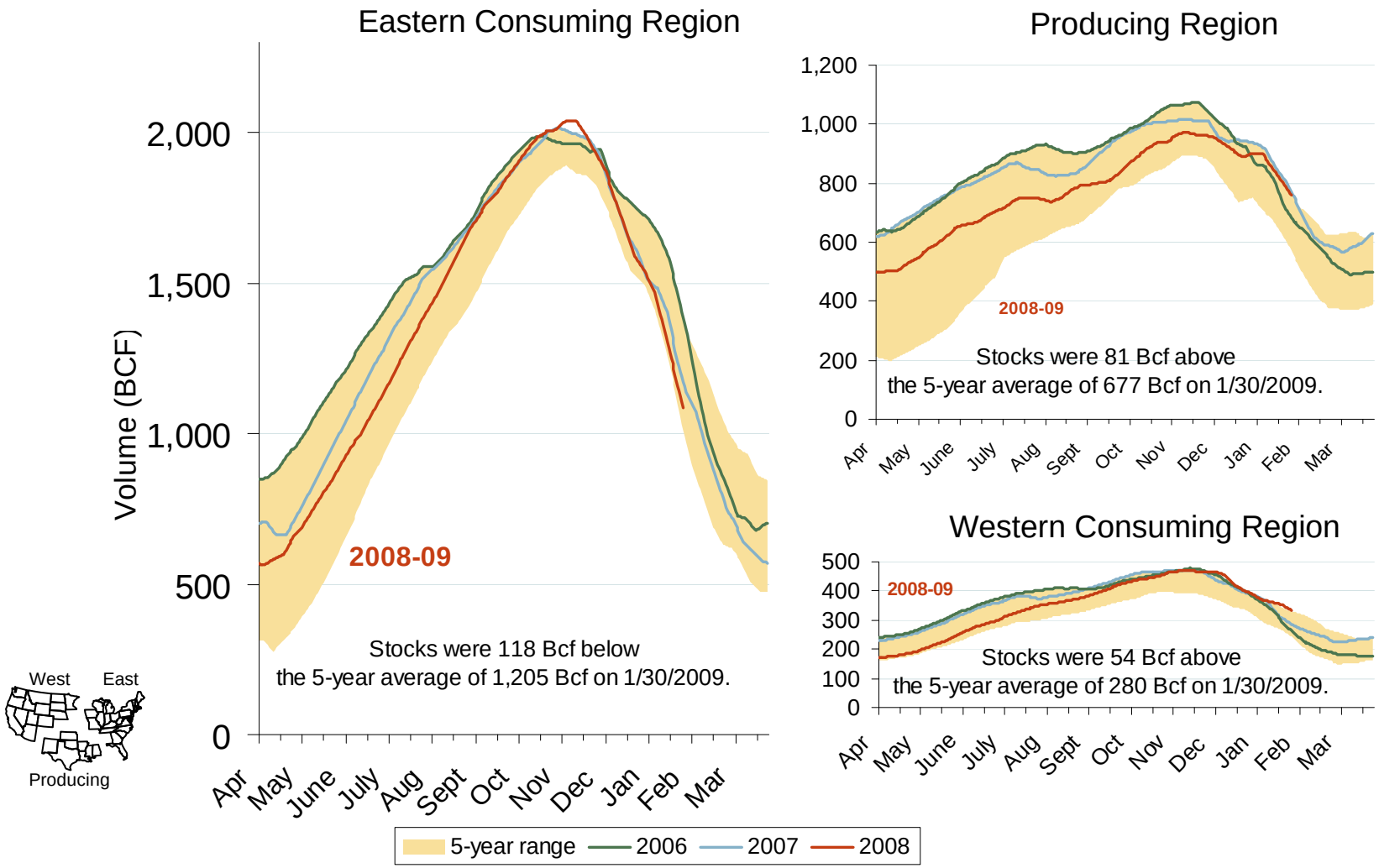
Regional Totals of Working Gas in Storage



Source: Derived from *EIA* data.

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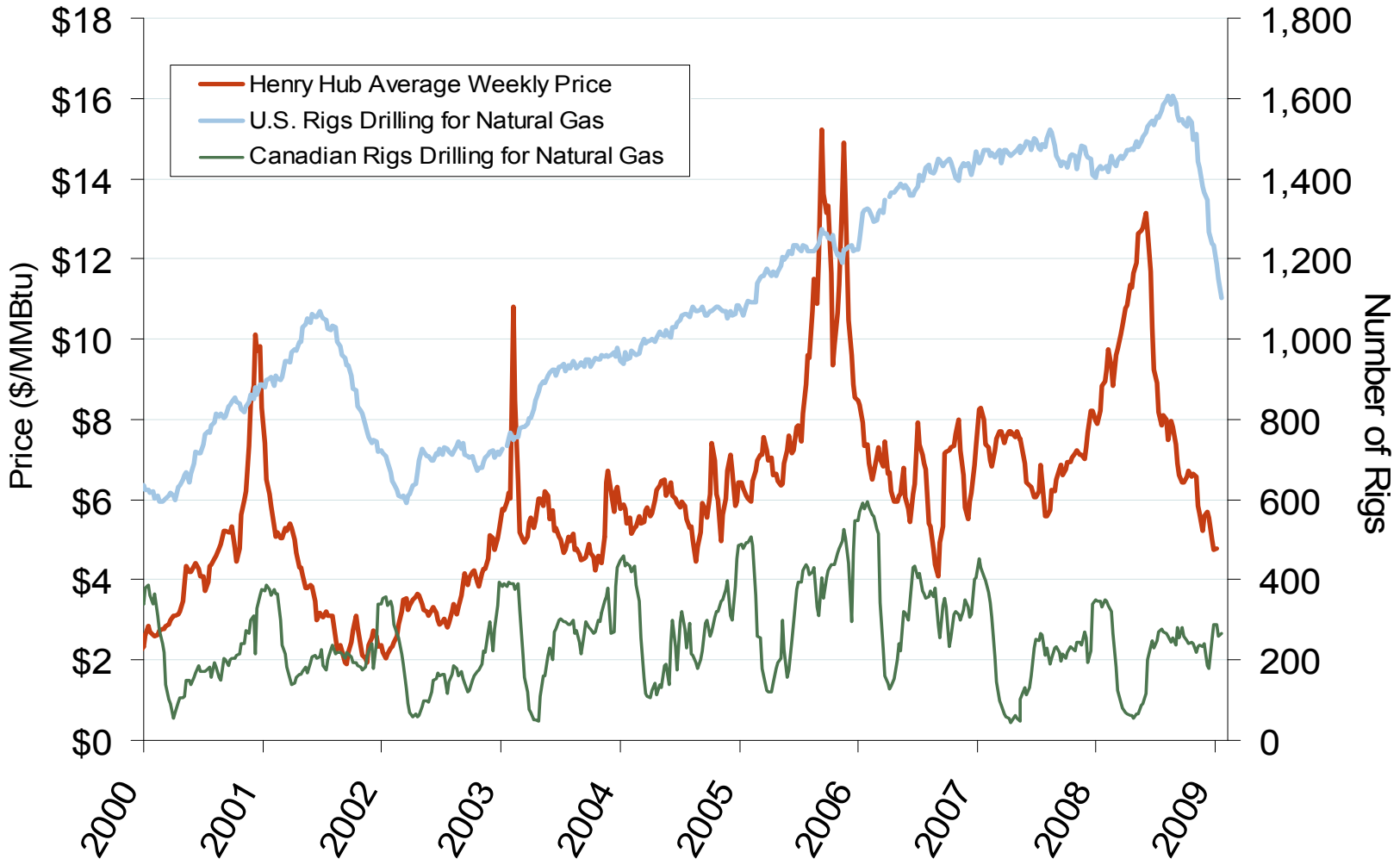
U.S. and Canadian Natural Gas Drilling Rig Count and Daily Spot Prices



Source: Derived from *Platts* and *Baker Hughes* data.

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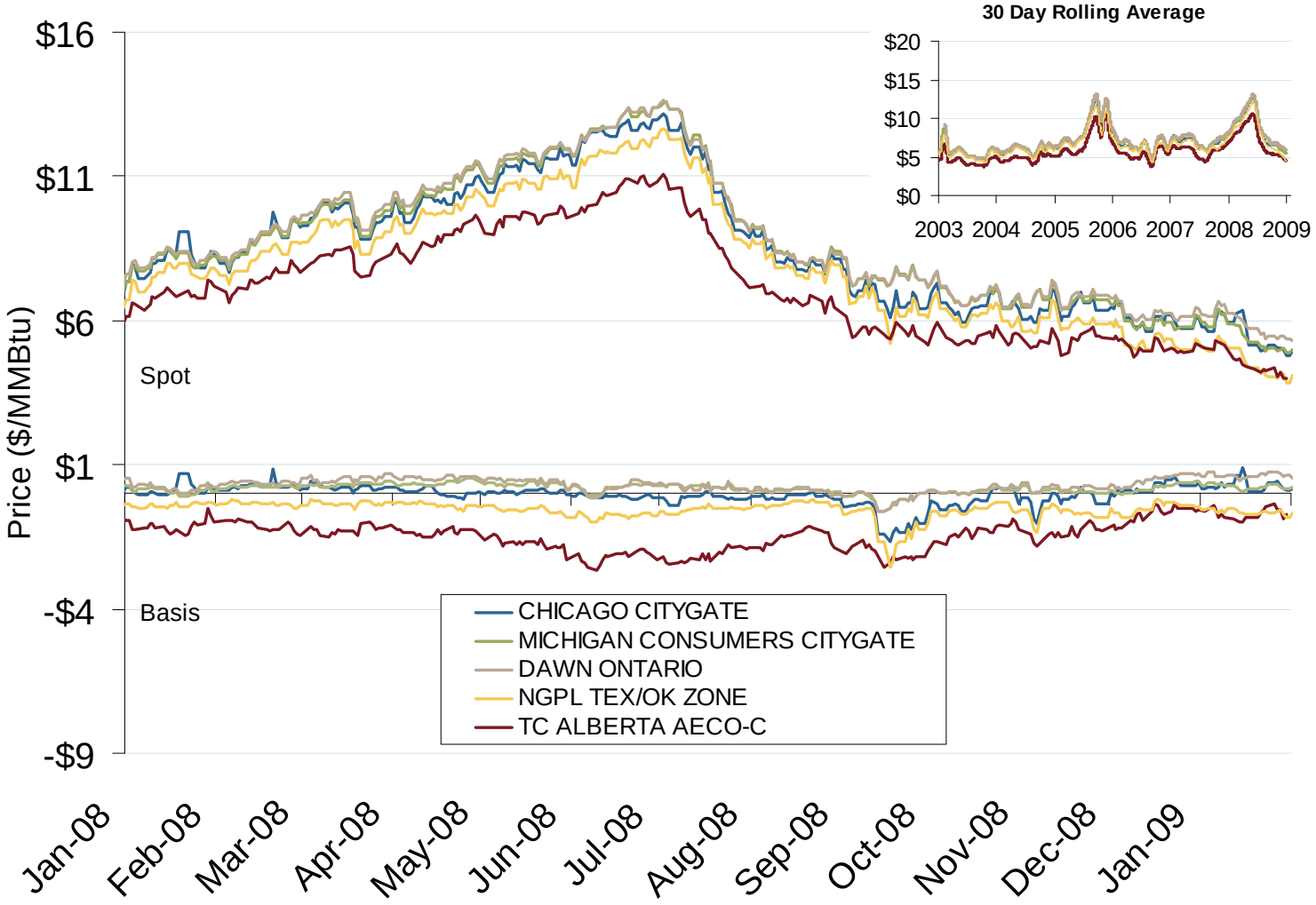
Midwestern Day-Ahead Hub Spot Prices and Basis



Source: Derived from *Platts* data.

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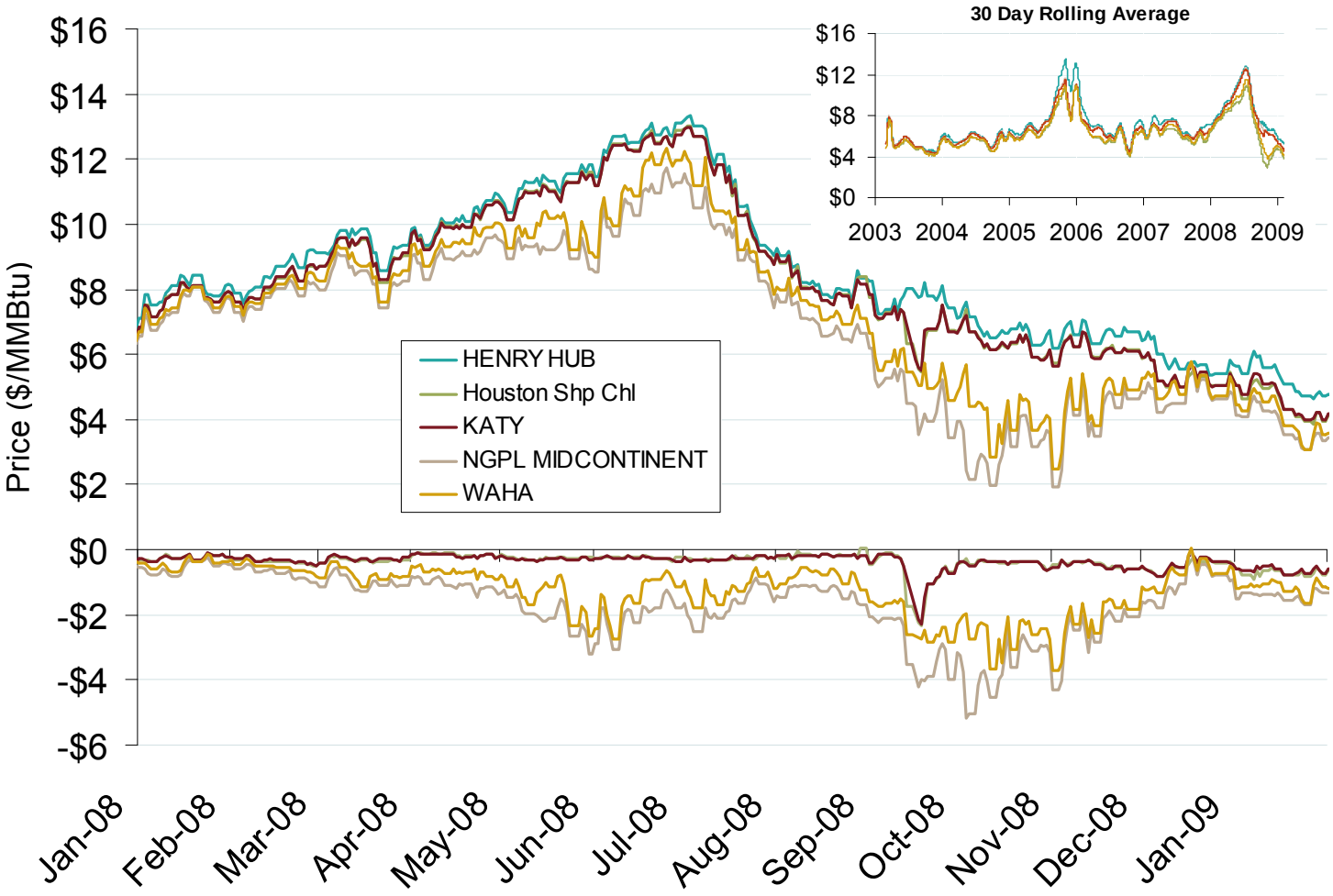
South Central Day-Ahead Hub Spot Prices and Basis



Source: Derived from *Platts* data.

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Henry Hub and AECO Prompt-Month Futures Prices

Source: Derived from *ICE* data.

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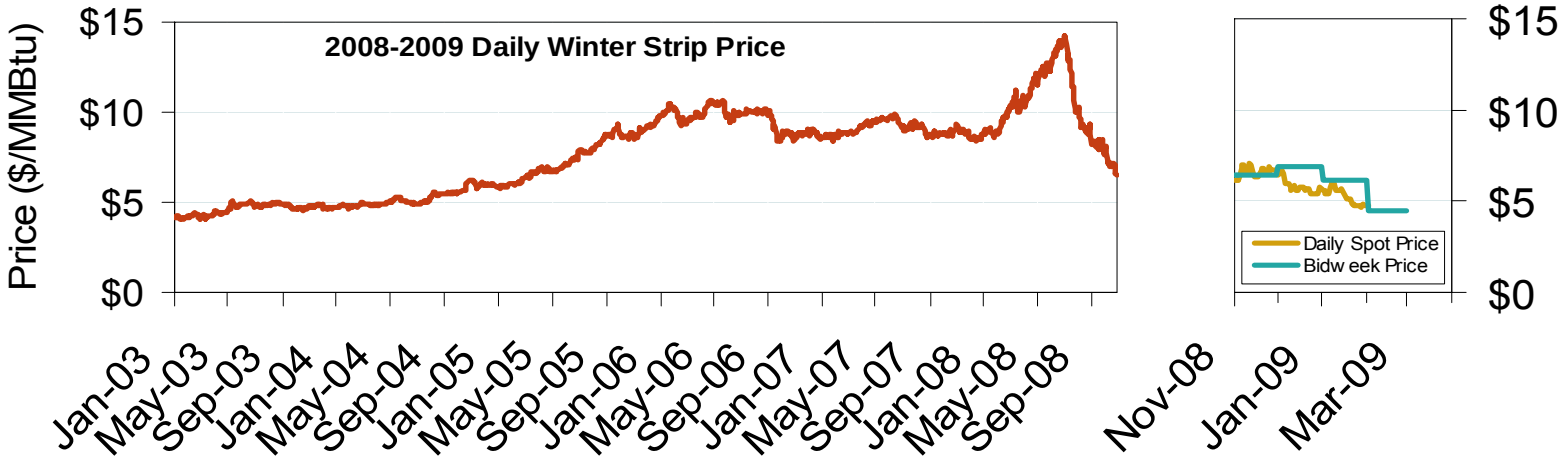
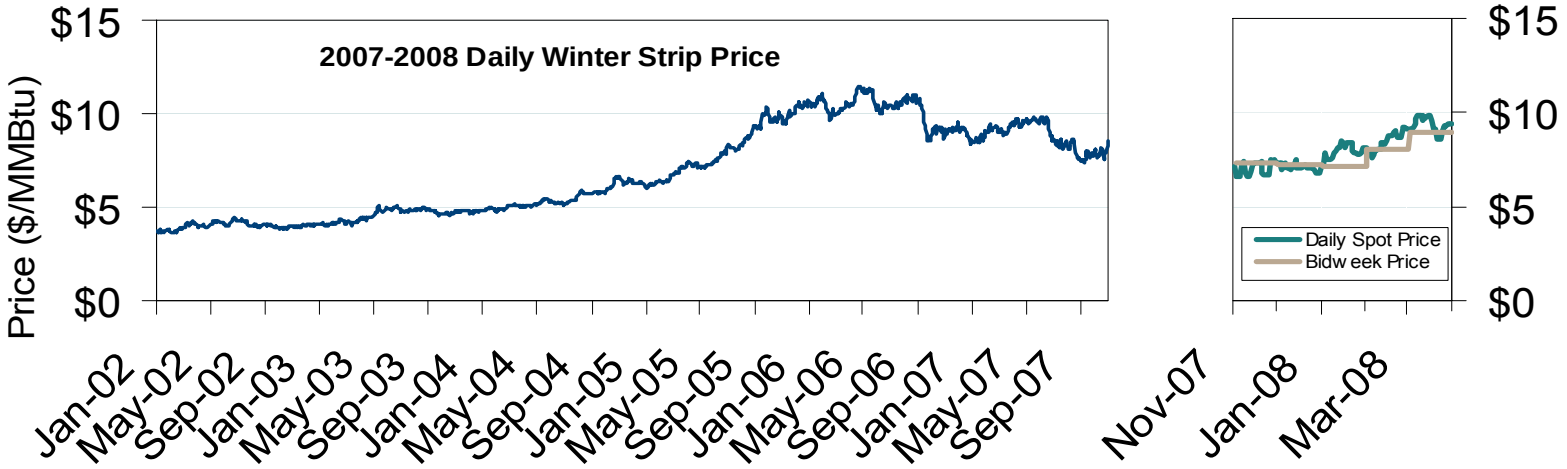
Natural Gas Winter Futures Strip and Daily Henry Hub Spot and Bidweek Prices





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

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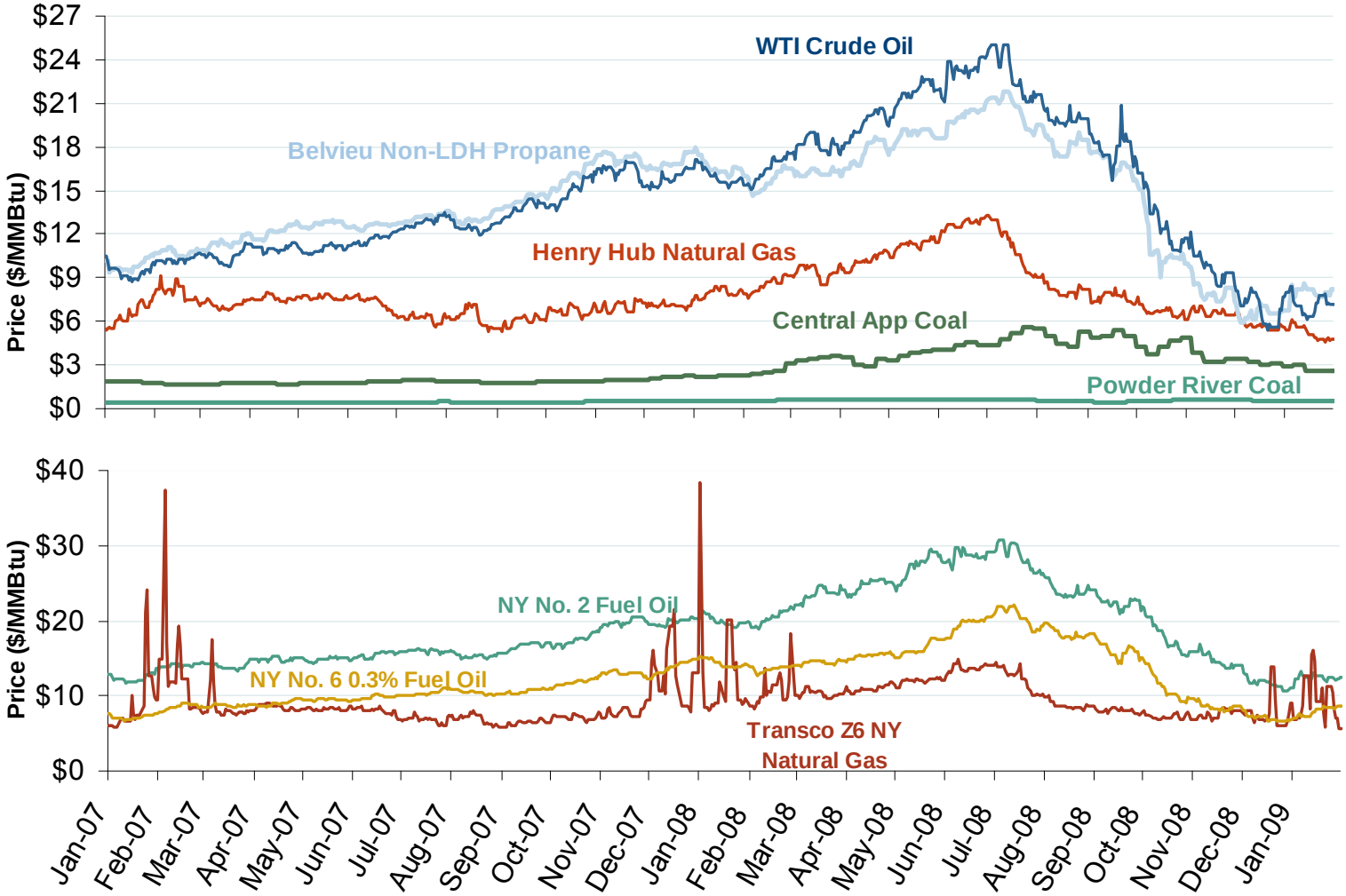
Oil, Coal, Natural Gas and Propane Daily Spot Prices



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

Note: Coal prices are quoted in $/ton. Conversion factors to $/MMBtu are based on contract specifications of 12,000 btus/pound for Central Appalachian coal and 8800 btus/pound for Powder River Basin coal.

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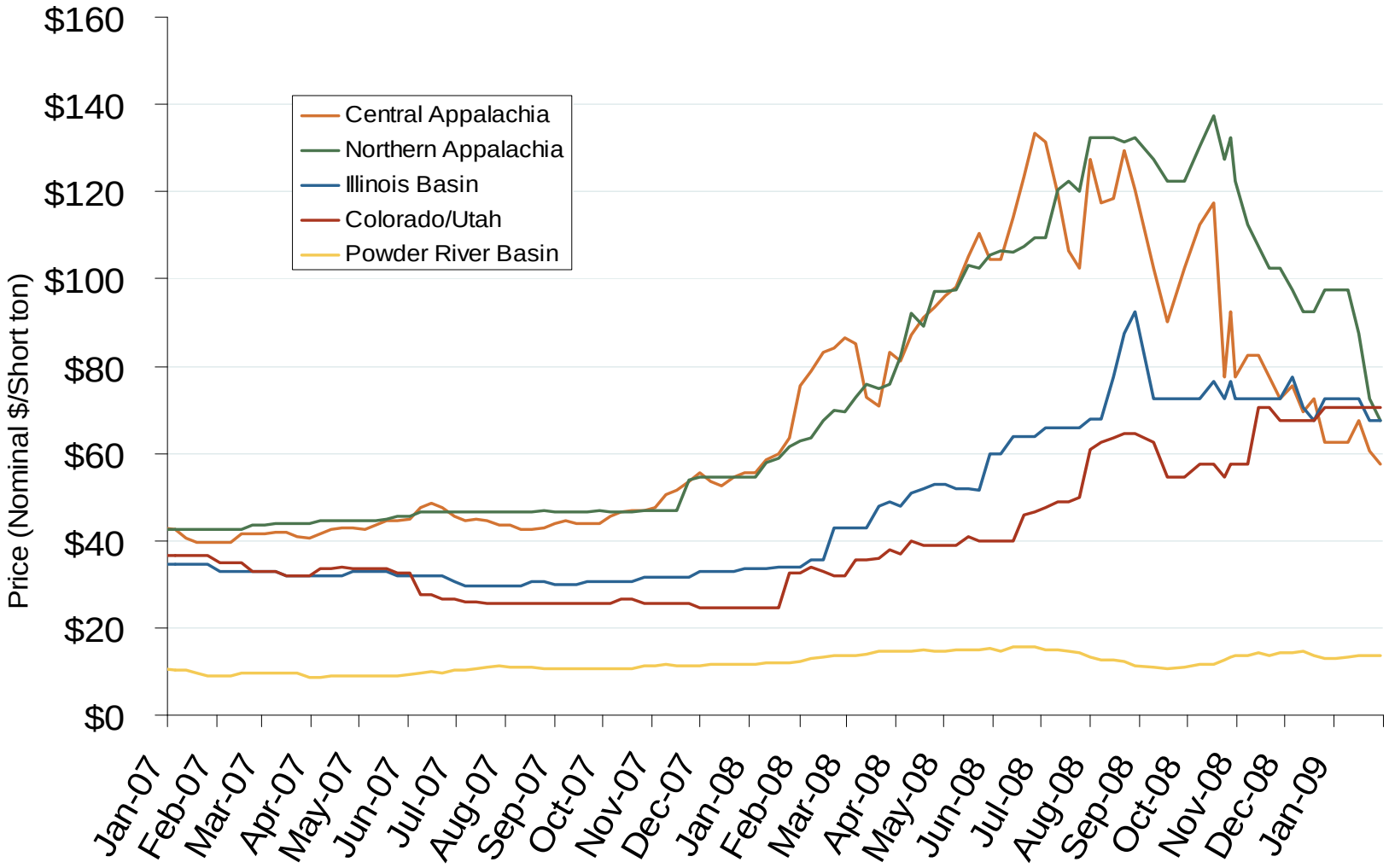
Regional Coal Spot Prices



Note: Does not reflect the delivered price of coal; excludes incremental cost of emissions allowances.

Source: Derived from *Bloomberg* data.

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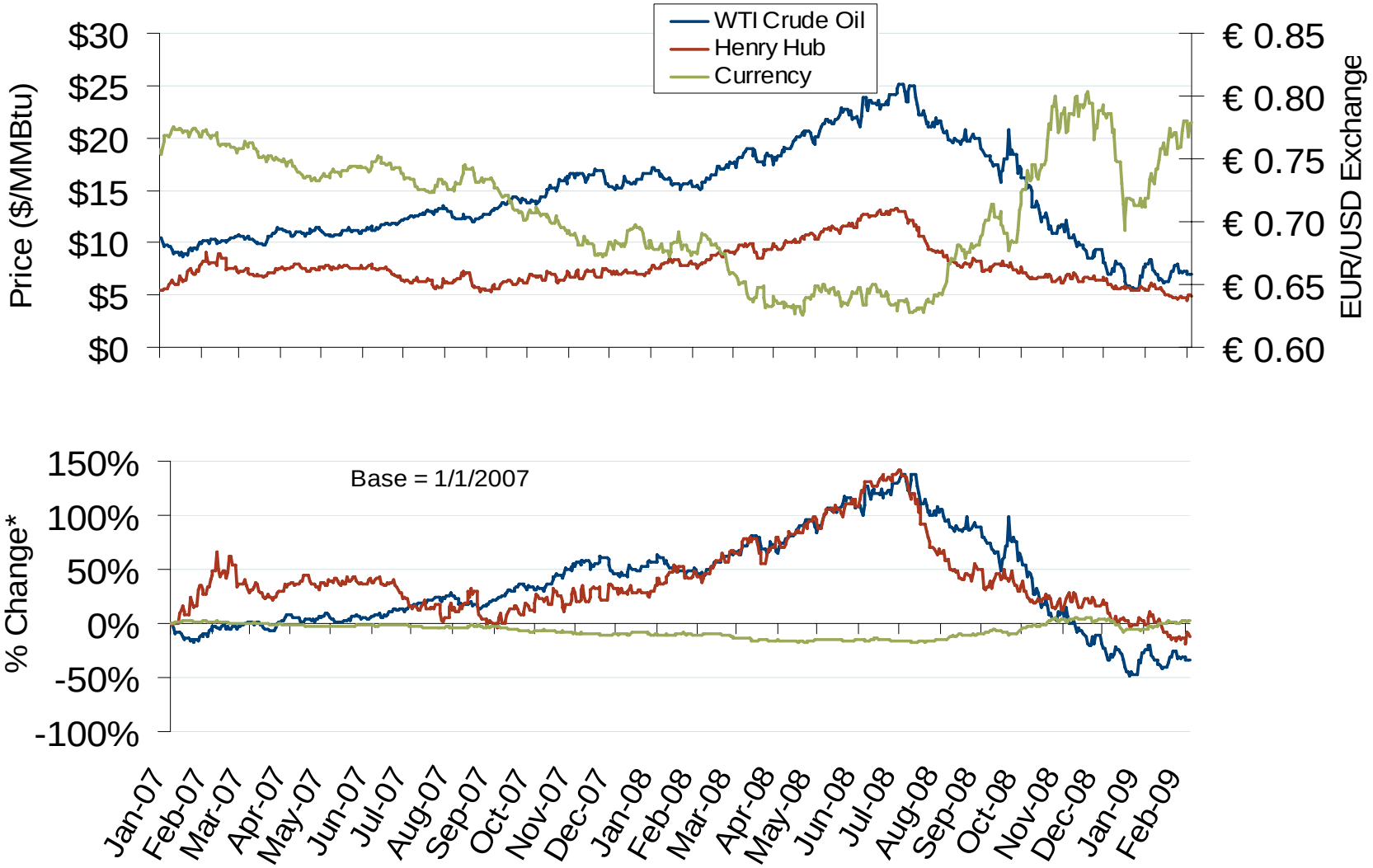
Oil, Natural Gas and Currency Spot Prices



Source: Derived from *Bloomberg* data.

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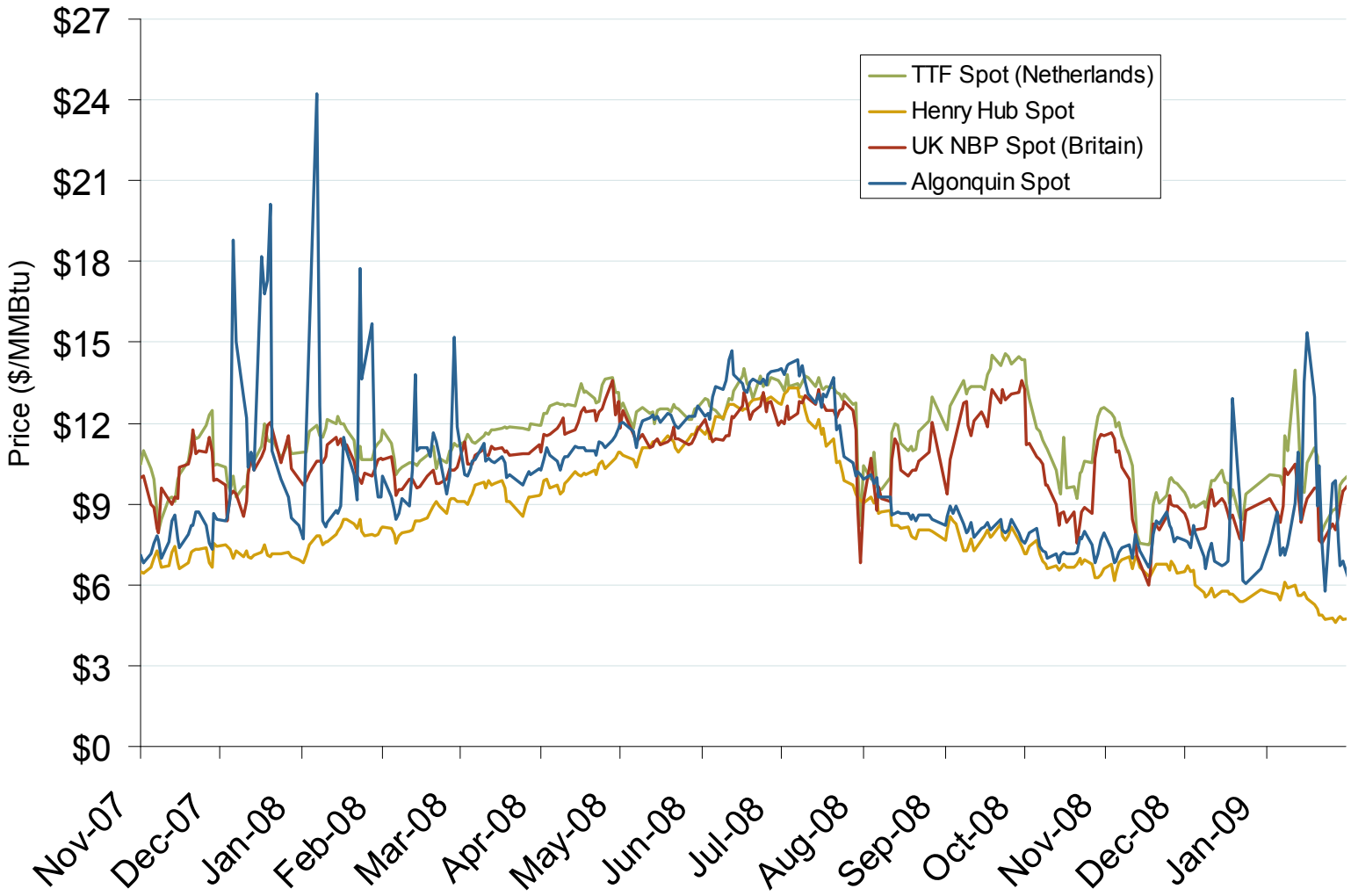
Atlantic Basin European and US Spot Natural Gas Prices



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

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World LNG Estimated February 2009 Landed Prices

Source: *Waterborne Energy, Inc.* Data in $US/MMBtu.
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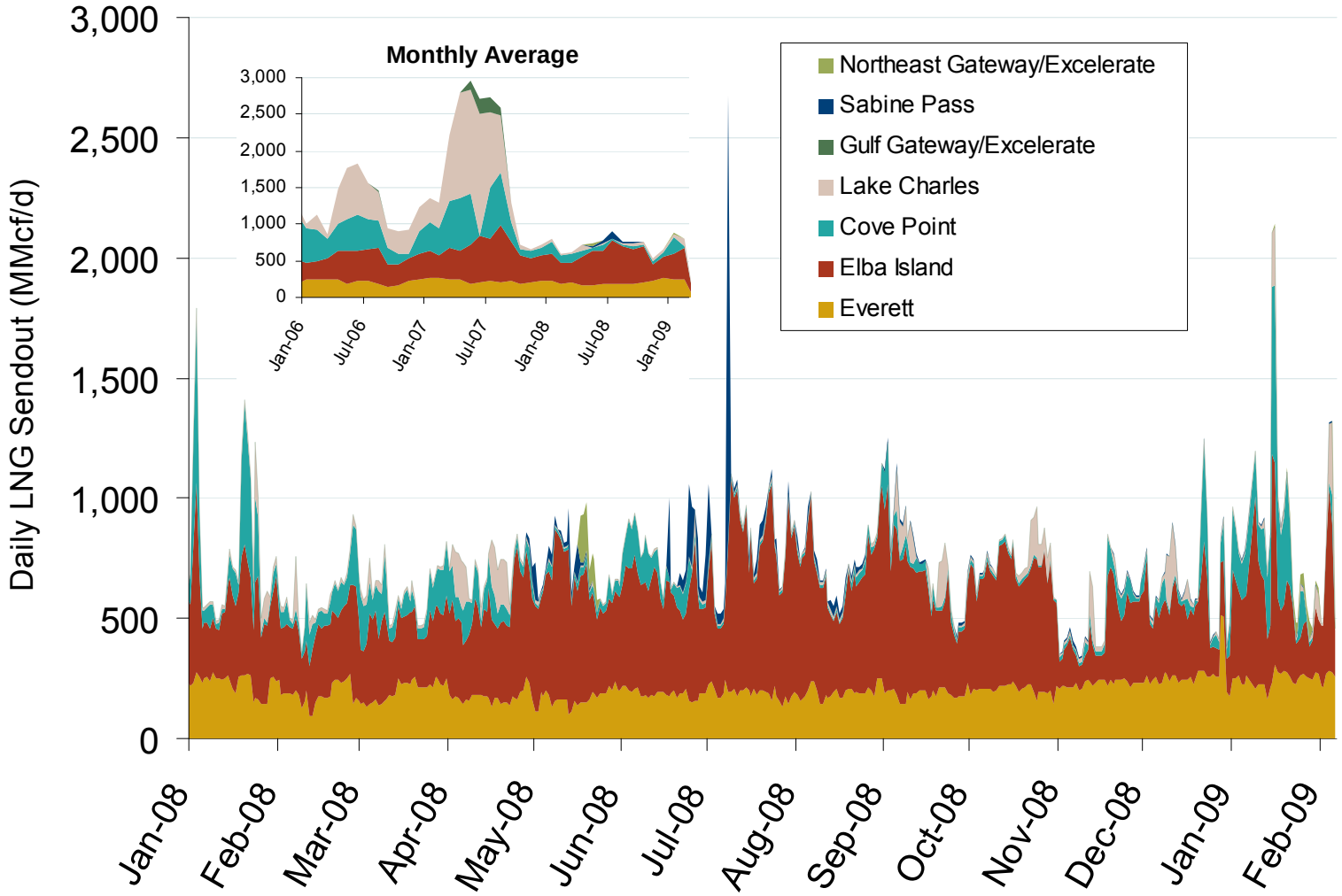
Daily Gas Sendout from Existing U.S. LNG Facilities



Source: Derived from *Bentek* data. Excludes Everett LNG delivered via truck and consumed by the Mystic plant as well as Freeport LNG which flows via intrastate pipelines.

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Electricity Markets

Electric Market Overview: On-Peak Spot Electric Prices

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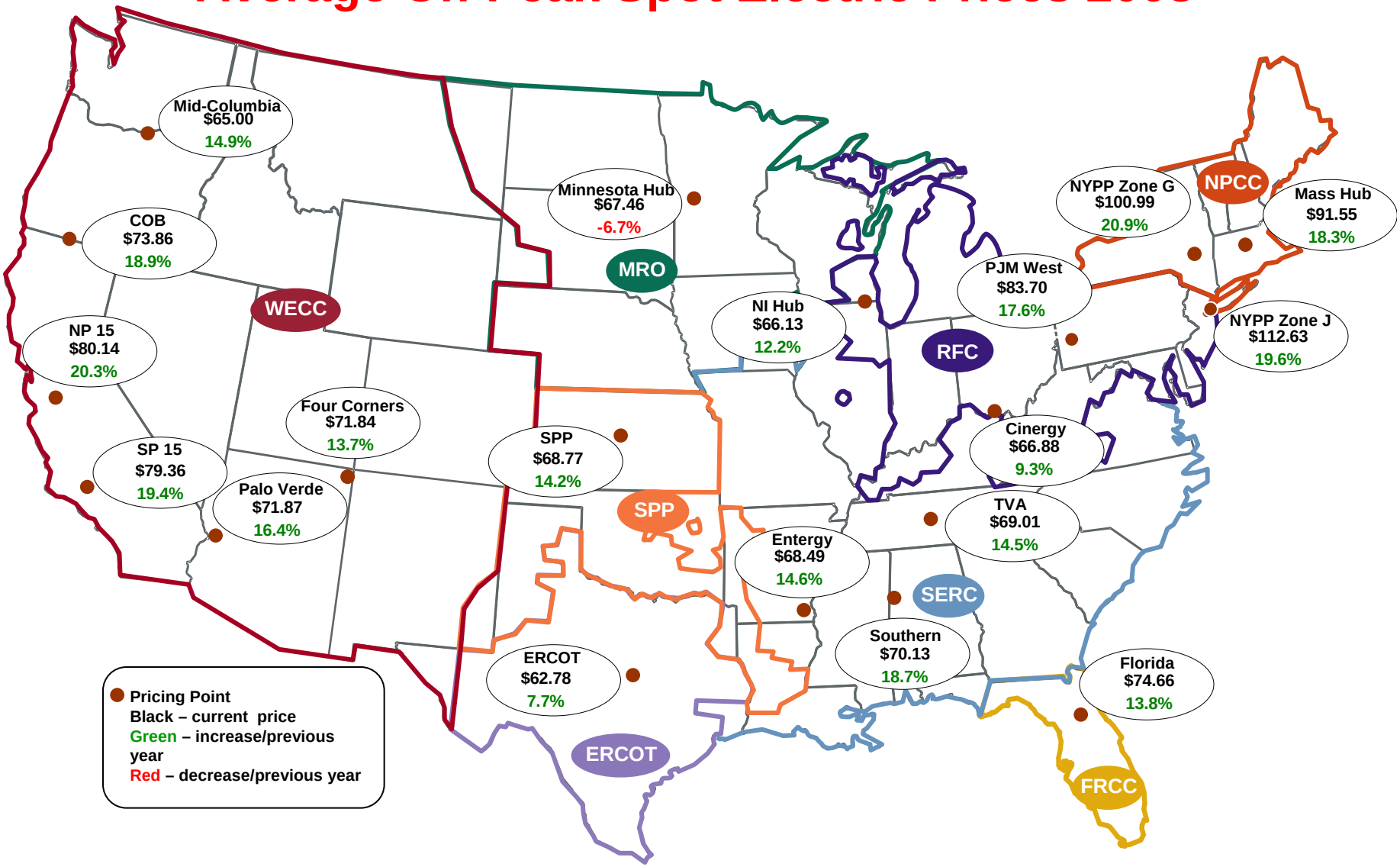
Average On-Peak Spot Electric Prices 2008



Source: Derived from *Platts* data.

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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.

Source: Derived from *Platts* data.

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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

Source: Derived from *Platts* & *Bloomberg* data.

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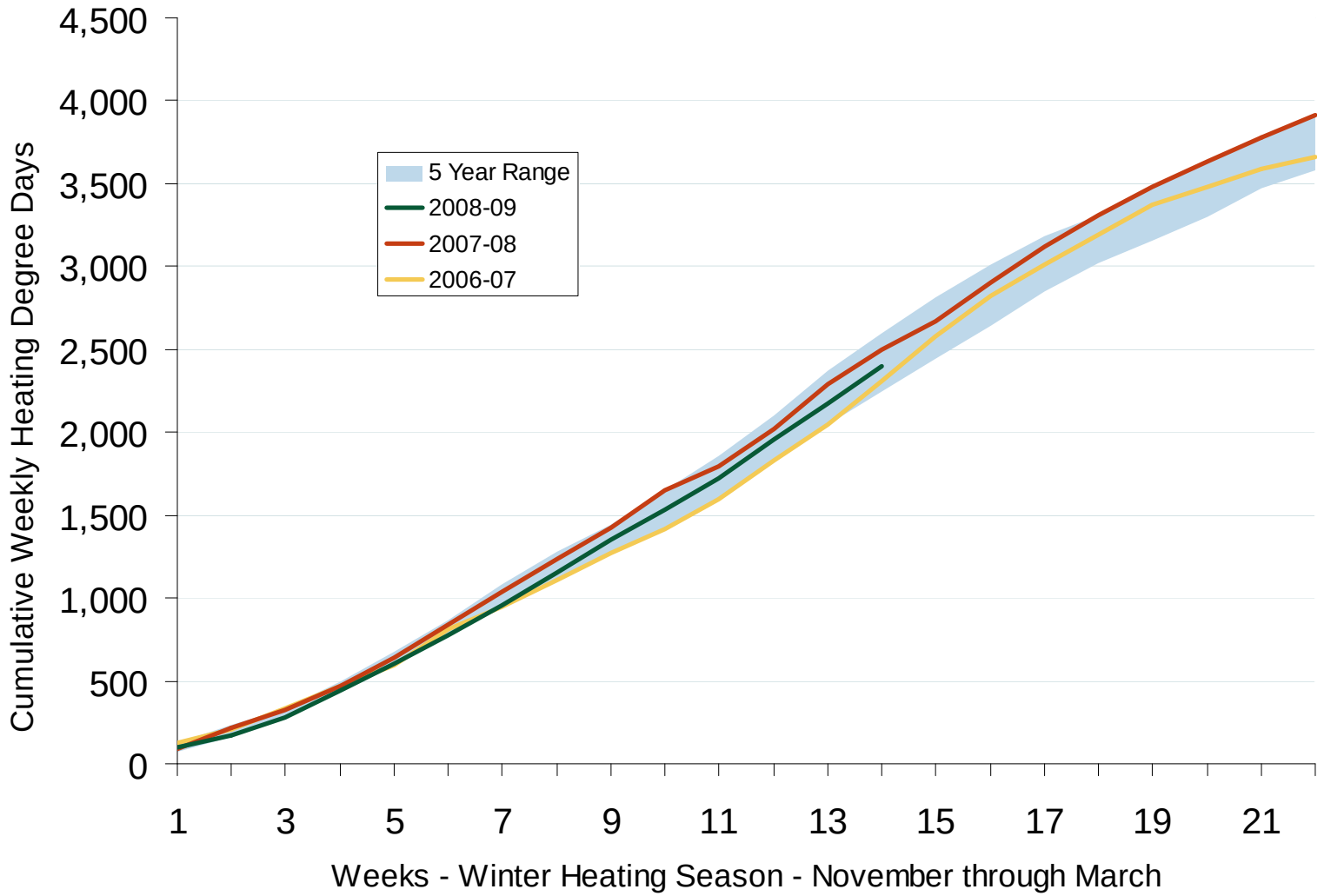
U. S. Winter Cumulative Heating Degree Days



Source: Derived from *NOAA* data.

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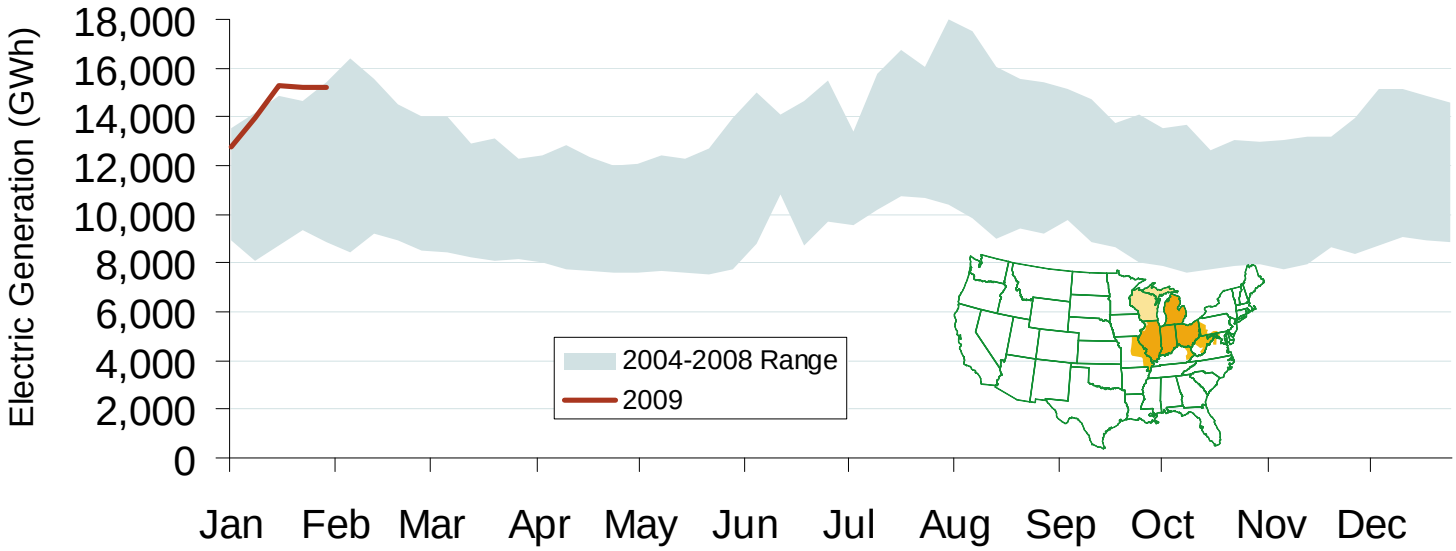
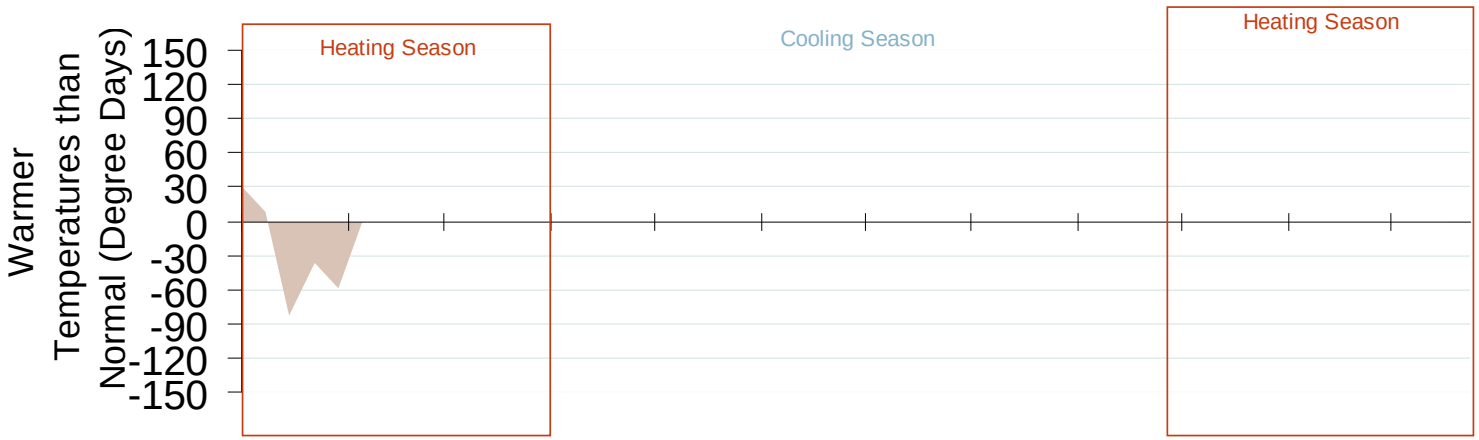
Weekly Electric Generation Output and Temperatures Central Industrial Region





Source: Derived from *EEI* and *NOAA* data.

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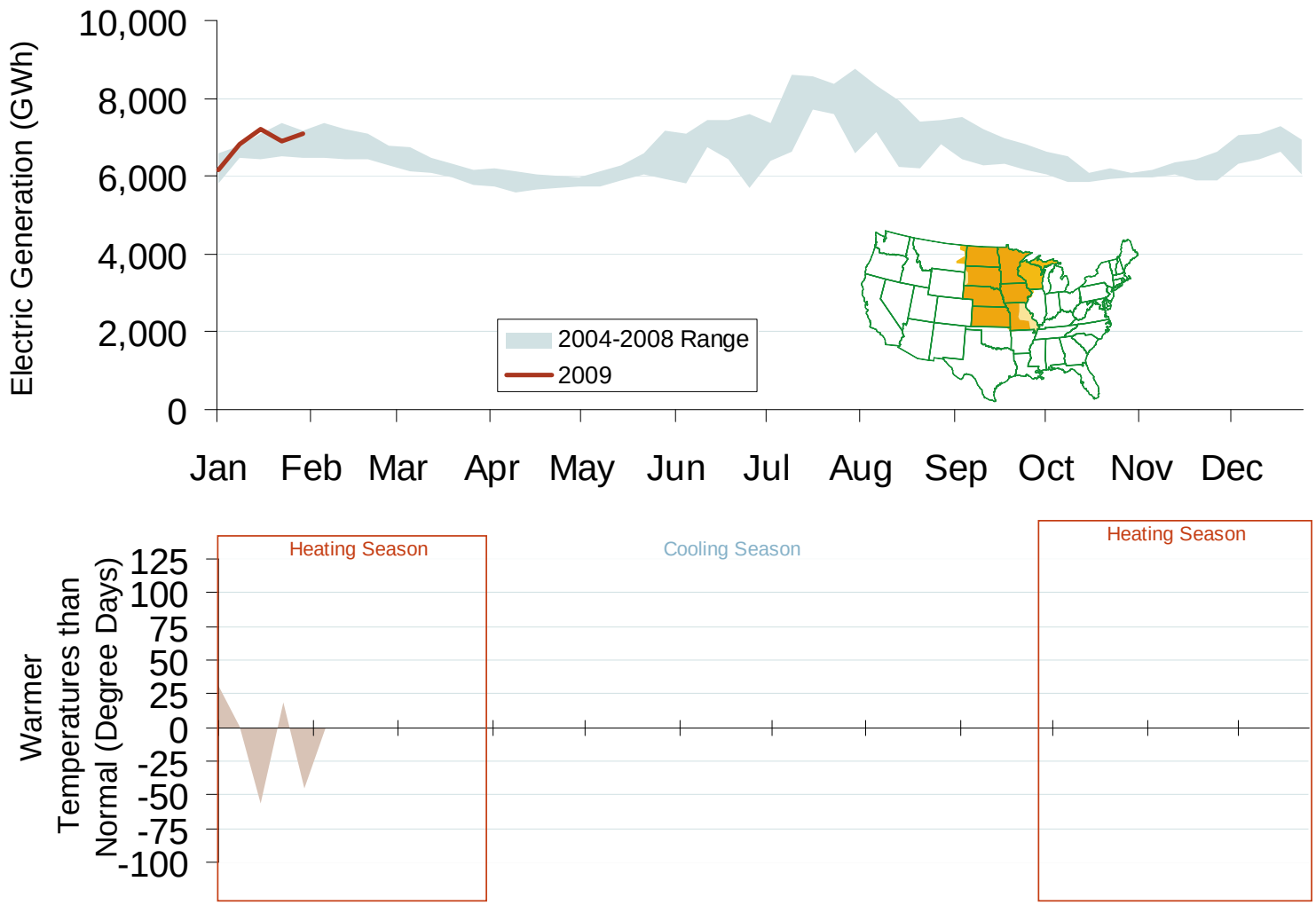
Weekly Electric Generation Output and Temperatures West Central Region



Source: Derived from *EEI* and *NOAA* data.

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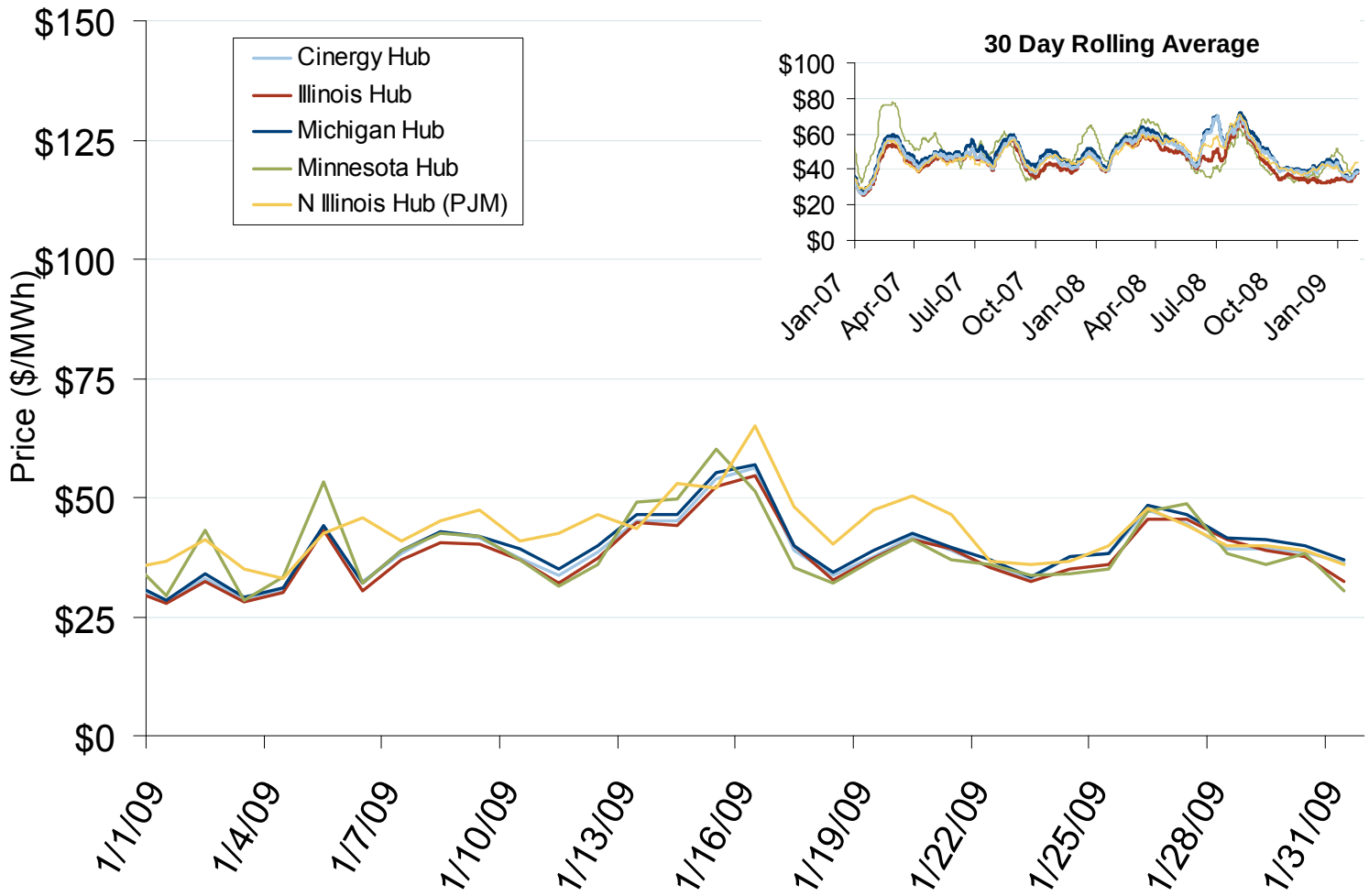
Daily Average of MISO Day-Ahead Prices - All Hours



Source: Derived by *Bloomberg* from *MISO and PJM* data as reported by *Bloomberg*.

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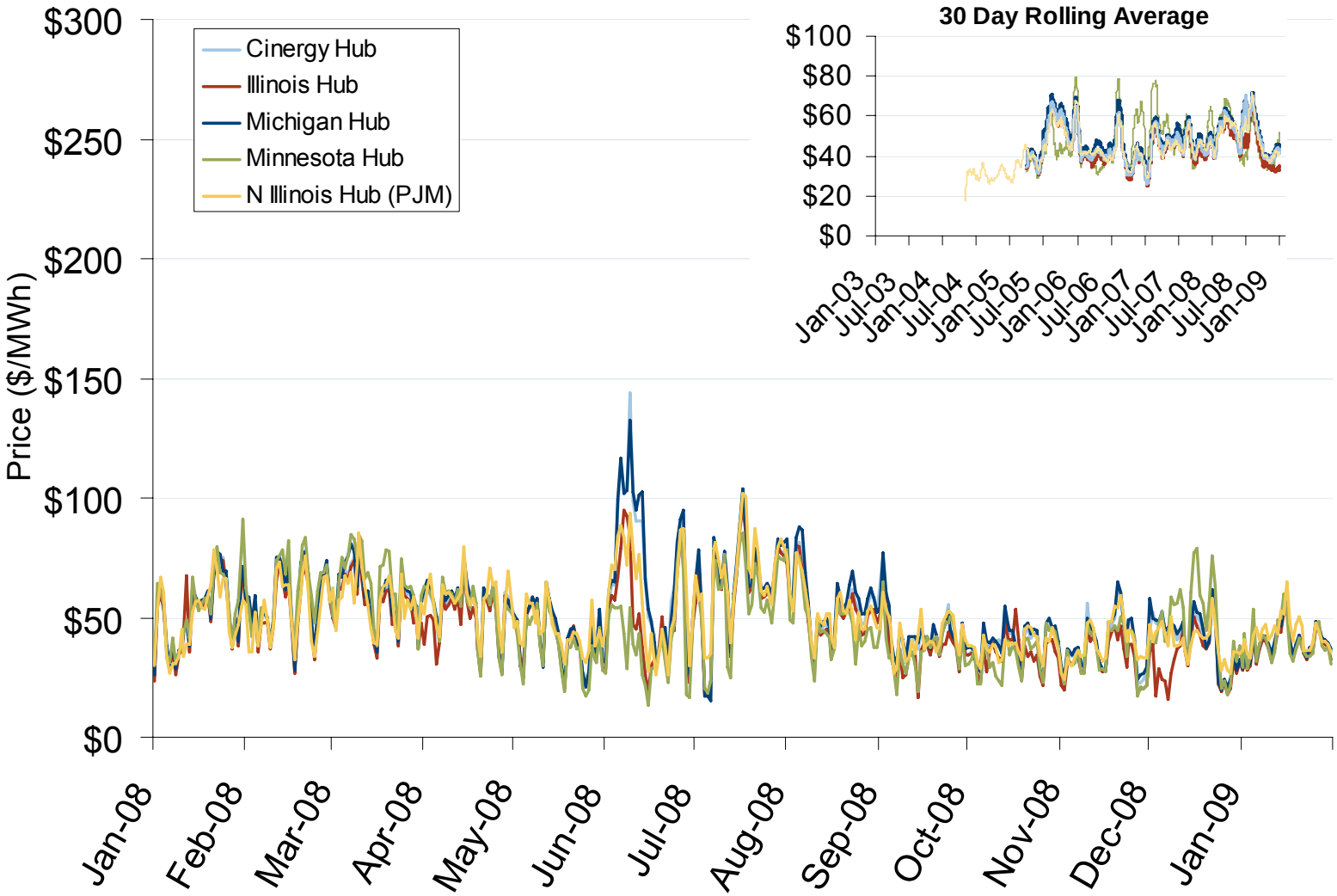
Daily Average of MISO Day-Ahead Prices - All Hours



Source: Derived by *Bloomberg* from *MISO and PJM* data as reported by *Bloomberg*.

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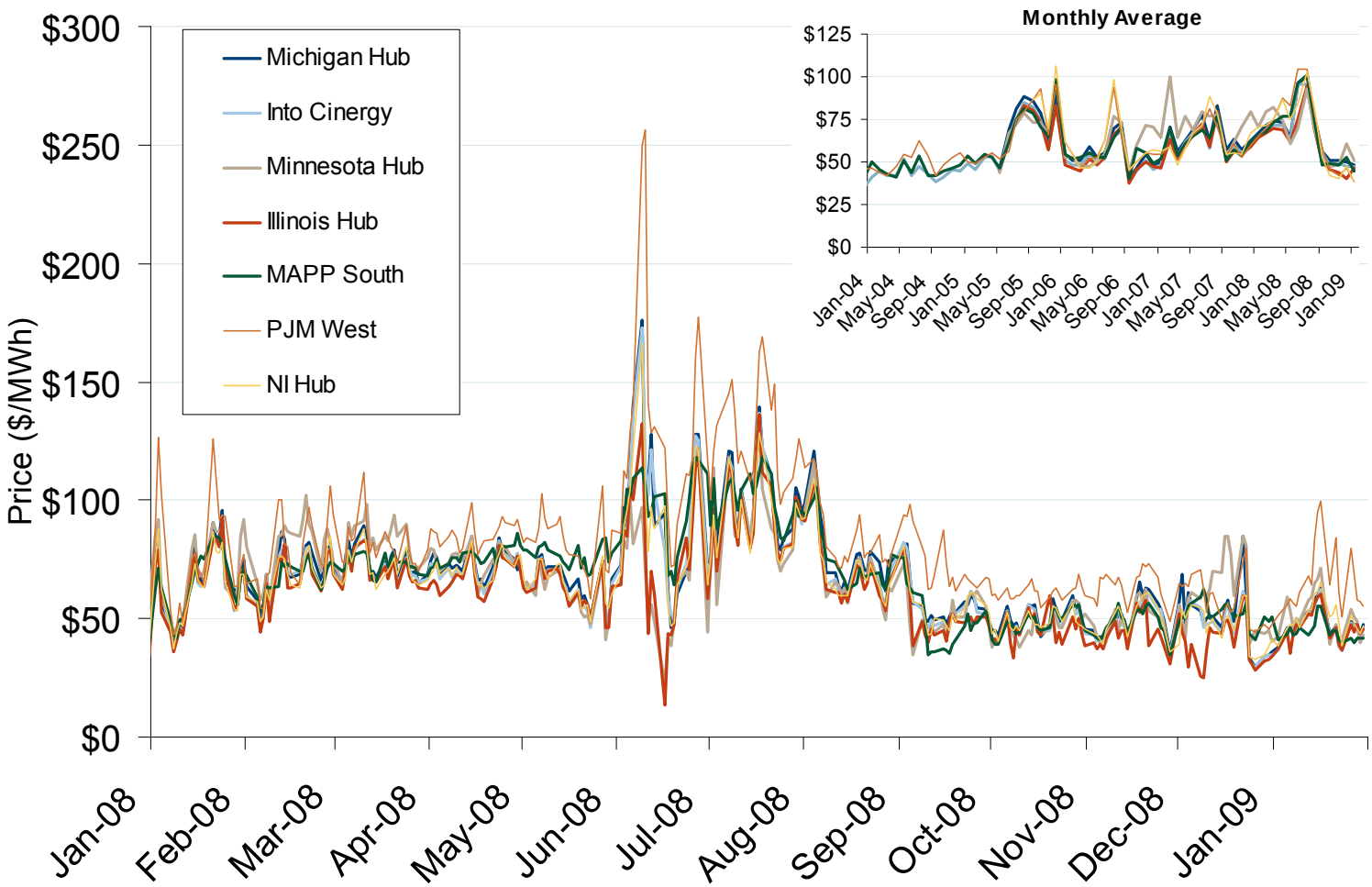
MISO/PJM Bilateral Day-Ahead On-Peak Prices



Source: Derived from *Platts* data.

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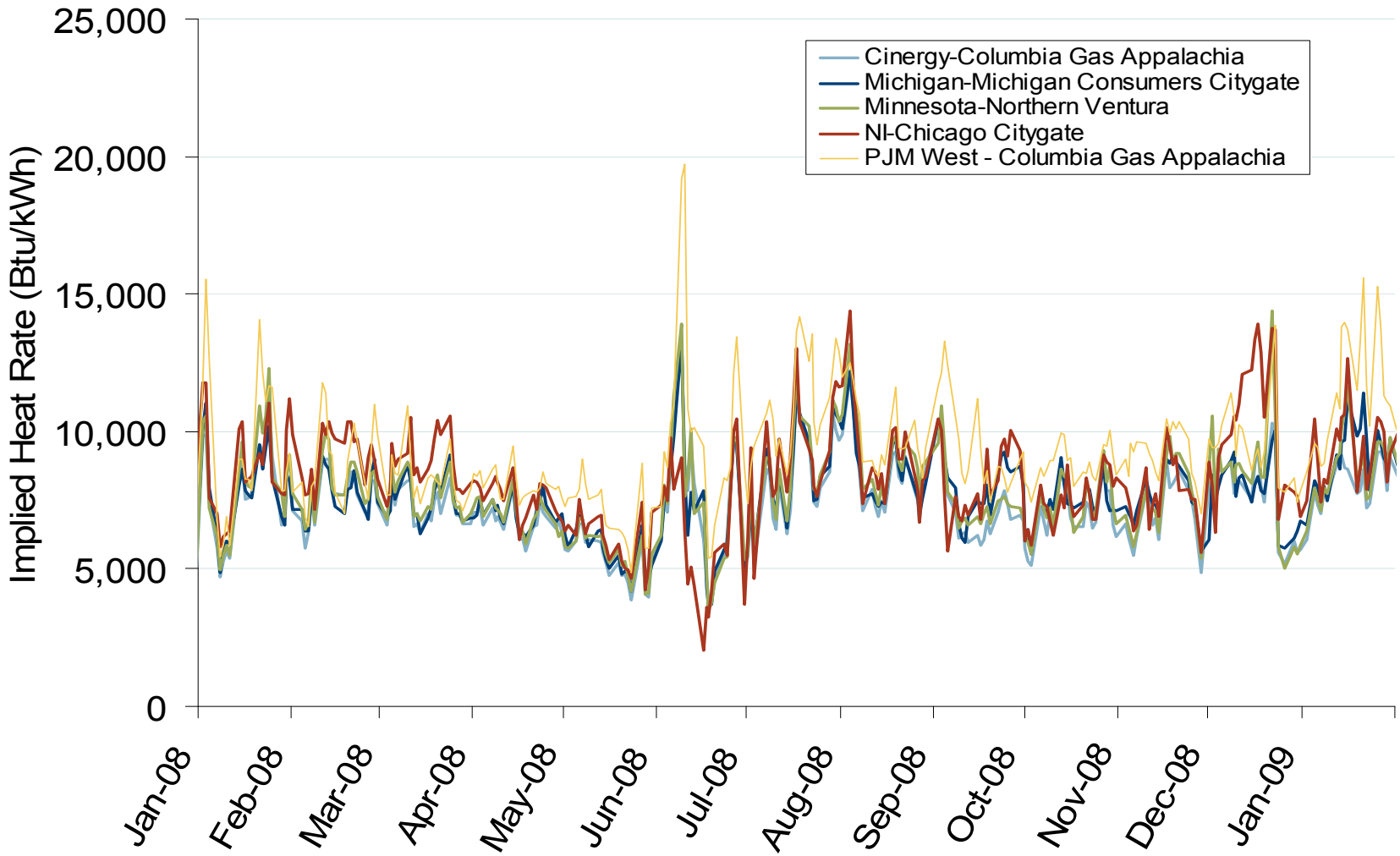
Implied Heat Rates at MISO and PJM Hubs



Source: Derived from *Platts* data

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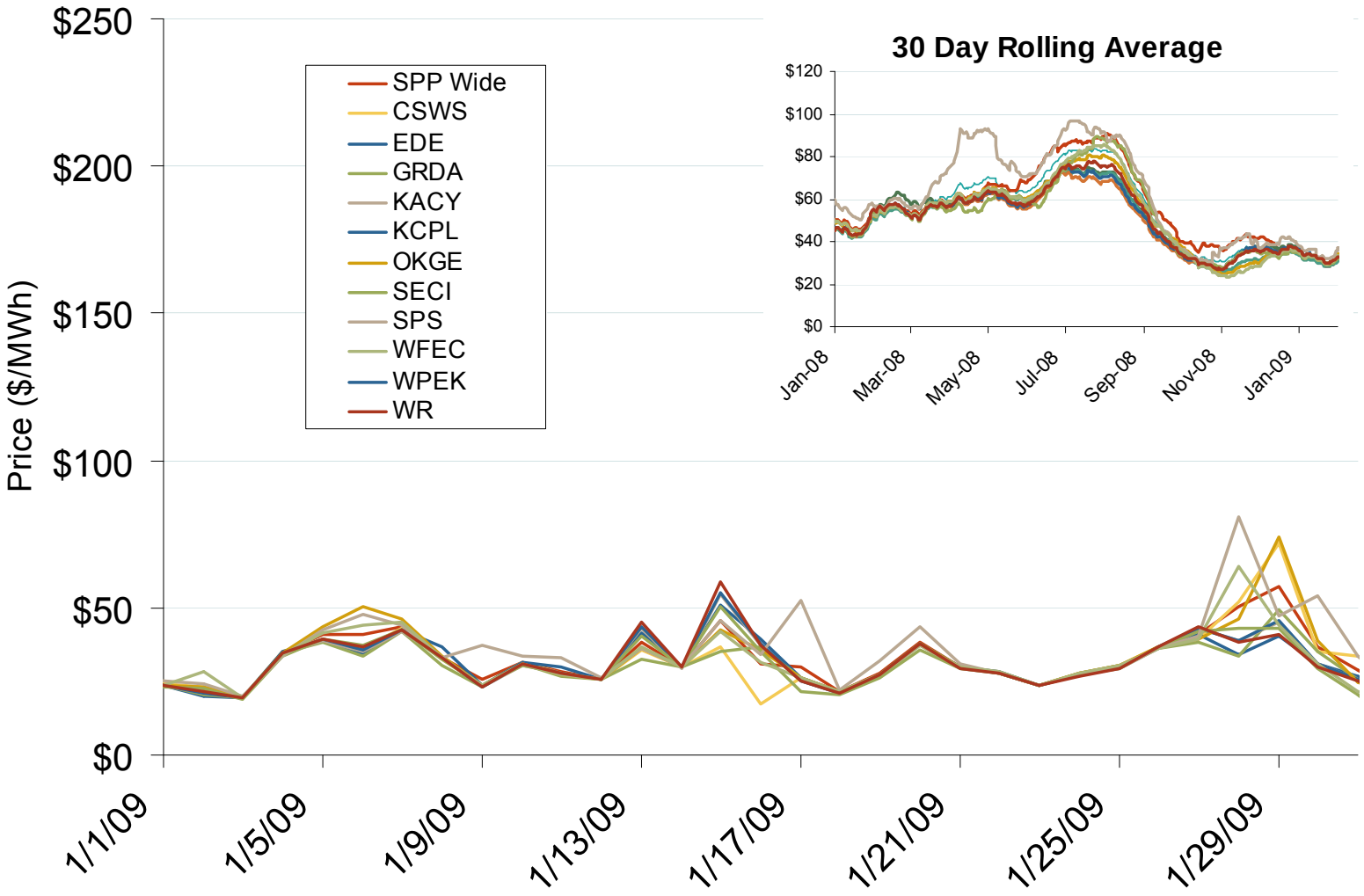
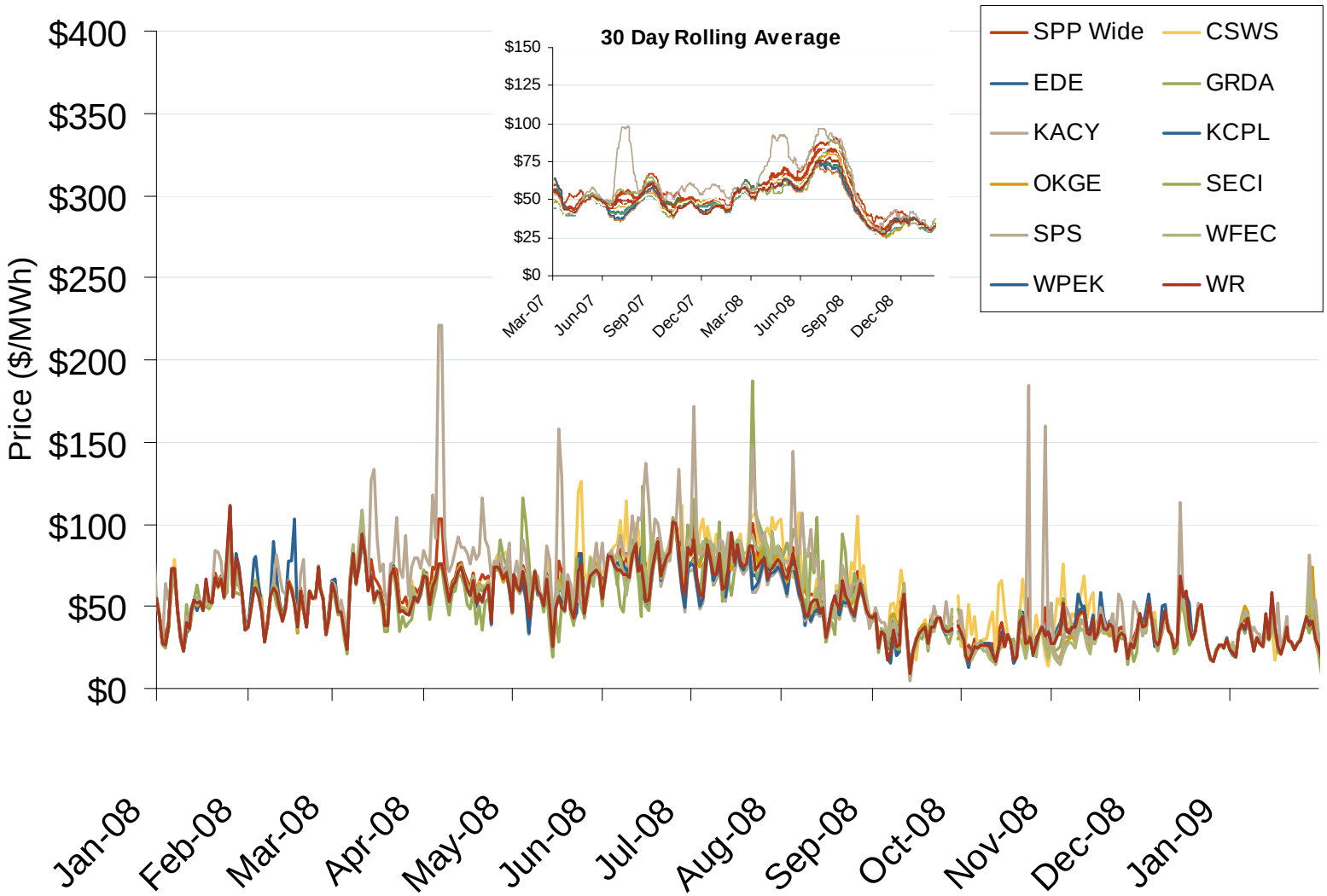
Daily Average of SPP Real Time Prices - All Hours



Source: Derived from *SPP* data.

Updated February 6, 2009

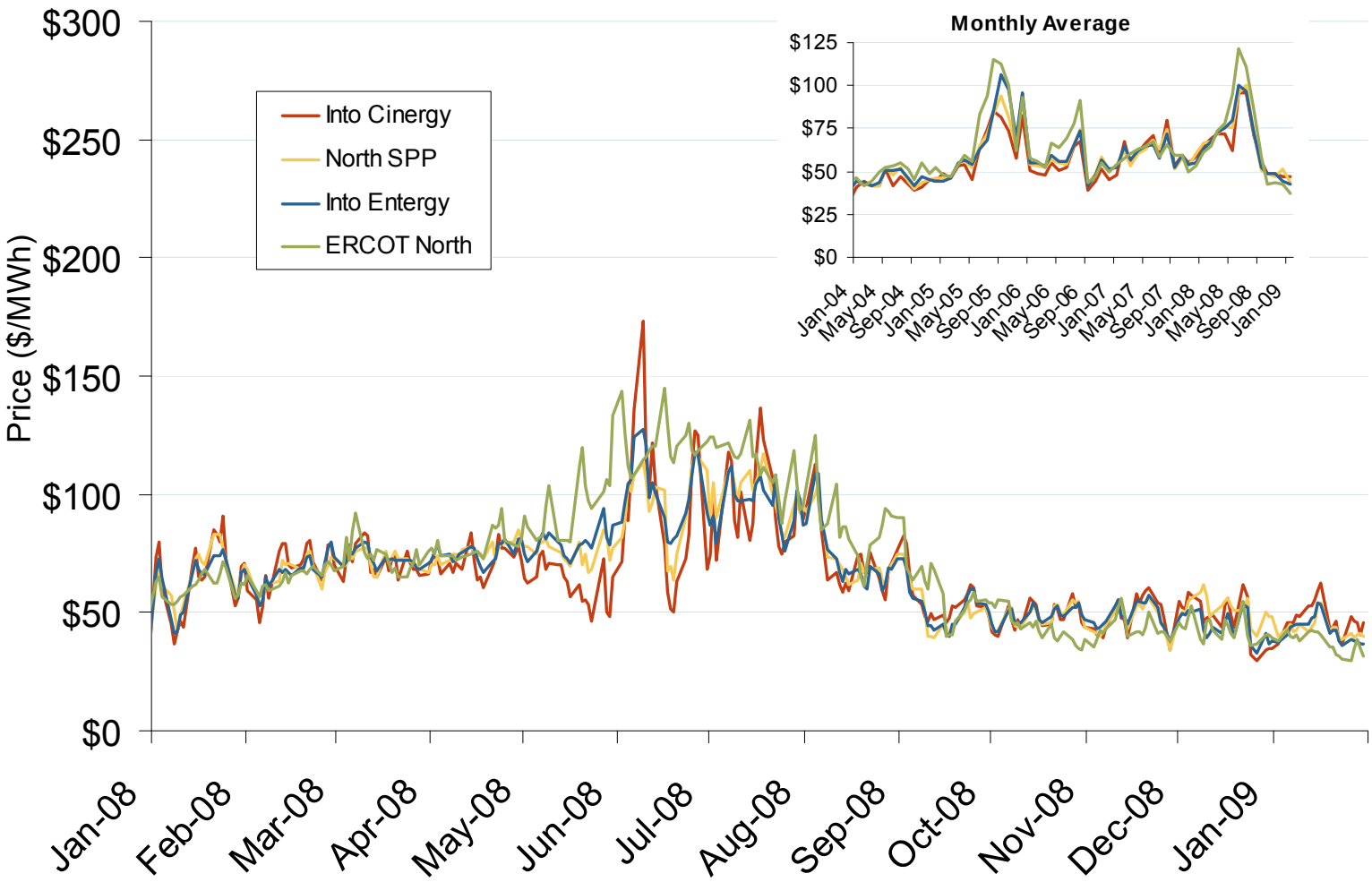
Daily Average of SPP Real Time Prices - All Hours



Source: Derived from *SPP* data.

Updated February 6, 2009

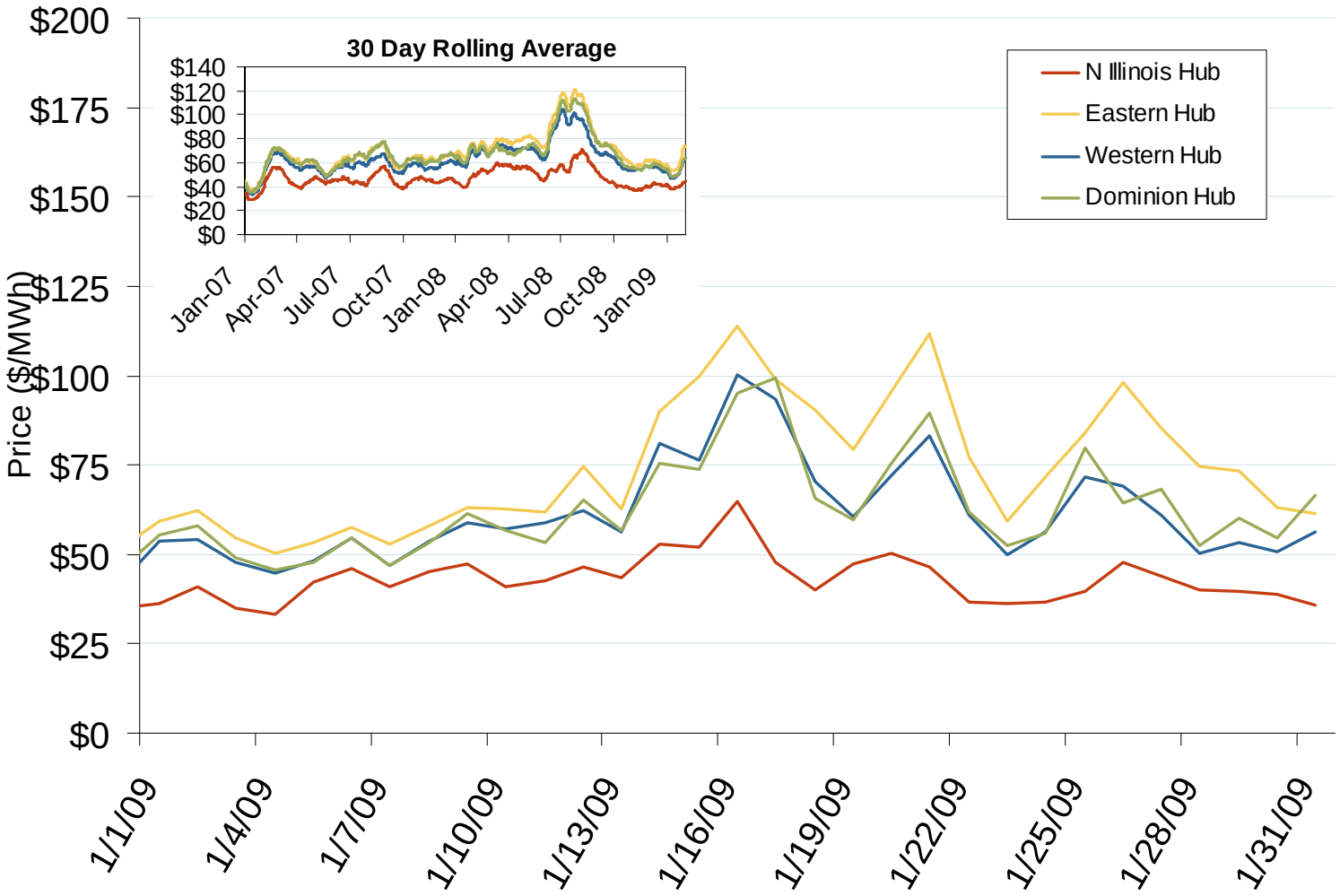
Central Daily Bilateral Day-Ahead On-Peak Prices



Source: Derived from *Platts* data.

Updated February 6, 2009

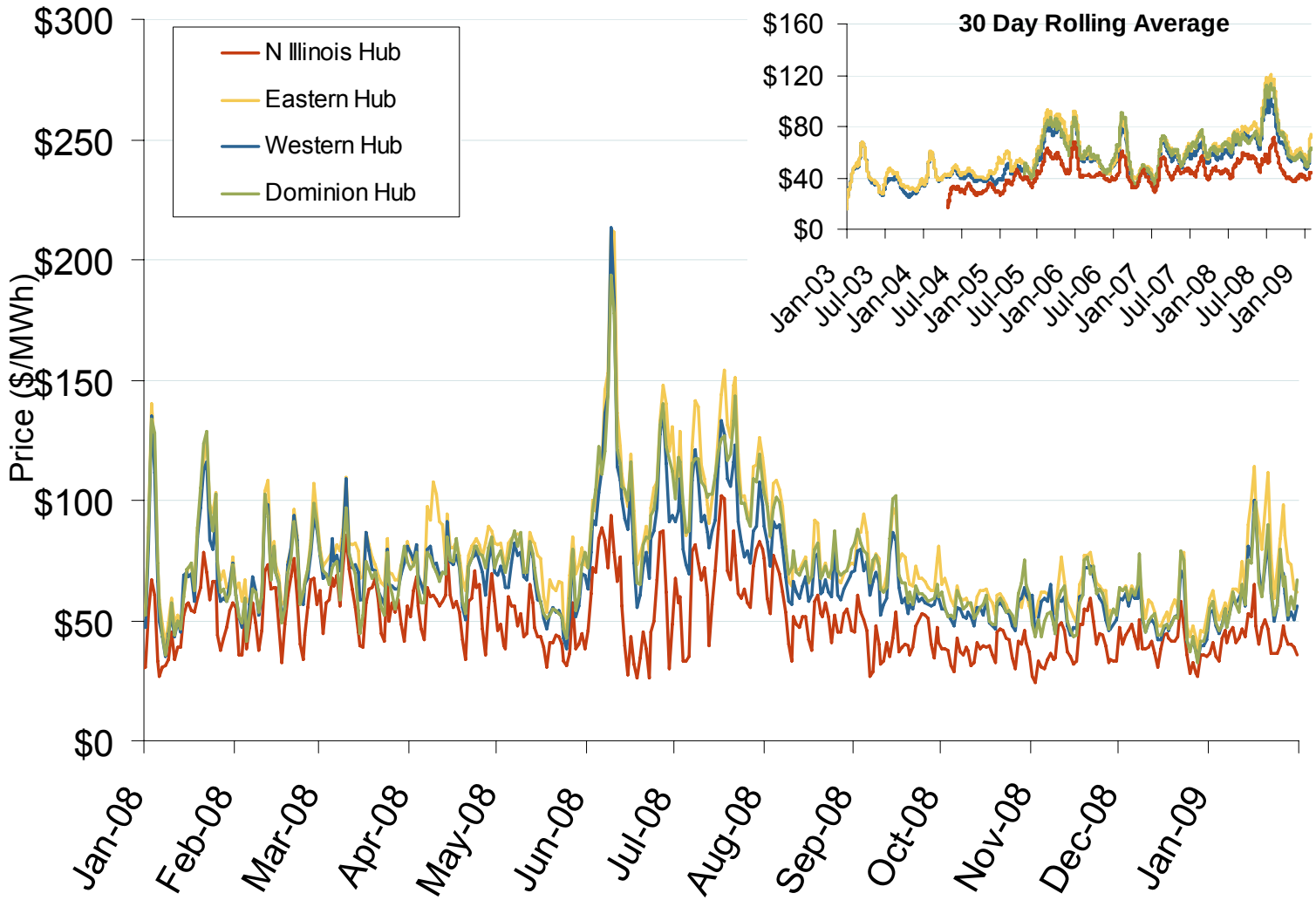
Daily Average of PJM Day-Ahead Prices - All Hours



Source: Derived by *Bloomberg* from *PJM* data as reported by *Bloomberg*.

Updated February 6, 2009

Daily Average of PJM Day-Ahead Prices - All Hours



Source: Derived by *Bloomberg* from *PJM* data as reported by *Bloomberg*.

Updated February 6, 2009

Collaborative Greenhouse Gas (GHG) Programs

Collaborative Regional GHG Programs:

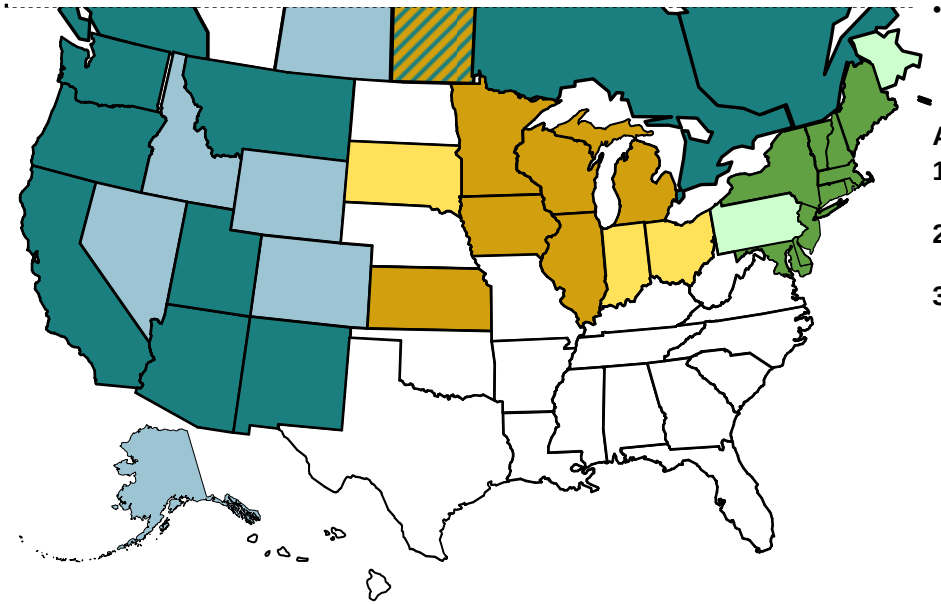
- Three North American groups with goals to lower regional GHG emissions were initiated by state Governors.
- 32 U.S. states, D.C., eight Canadian provinces, and six Mexican states are Participants or Observers.
- Observer jurisdictions do not commit to group GHG reduction goals, but participate in proceedings 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*
- WCI announced its design for a market-based, *multi-sector* cap-and-trade program, Sept 2008:
  - 15% CO_2 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; 3 Observer 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
- 10 Participant states; 5 Observers jurisdictions
- Market-based cap-and-trade effort to reduce *power-sector* CO_2 emissions.
- 10% CO_2 reduction by 2018 covers over 200 plants
- 188 million allowances (to be) sold in 2 pre-compliance auctions (2008) and 4 compliance auctions (2009)

Auctions:

1. **9/25/08:** 12.5 million allowances sold by 6 states cleared at $3.07/allowance
2. **12/17/08**: 31.5 million allowances sold by all 10 states cleared at $3.38/allowance
3. **3/18/09:** 1st compliance auction, 10 states to sell 31.5 million 2009 allowances and 2.2 million 2012 vintage allowances

- Participant in WCI
- Observer to WCI
- Participant in MGGRA
- Observer to MGGRA
- Participant in RGGI
- Observer to RGGI
- Participant in MGGRA & WCI

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, trade press, Pew Center, White House - www.whitehouse.gov/agenda/energy_and_environment

Updated January 27, 2009

Collaborative Greenhouse Gas Programs

White House Energy & Environment Agenda:

- President Obama has called for an economy-wide cap-and-trade program to reduce emissions to 1990 levels by 2020 and to reduce them an additional 80% by 2050.

RGGI's Auction 2 held on December 17, 2008:

- Six states from 1st auction sell 1/6 of 2008-09 allowances in Auctions 1-6: CT, MA, ME, MD, RI, VT.
- DE, NH, NJ, and NY passed legislation necessary to participate in auctions; they sell 20% of allowances in each of Auctions 2-6.
- 69 entities bid for 3.5 times the available 31.5 million allowances in Auction 2, raising $106.5 million.
- Of 46 winning entities, 85% were compliance entities (generators), and 12% were financial institutions or traders.
- Shares cleared at $3.38/allowance, 31¢ higher than Auction 1, although the base price remained at $1.86/allowance.

RGGI Updates:

- The 1st compliance auction is scheduled for March 18.
- Ten states will sell 31.5 million 2009 vintage allowances and 2.2 million 2012 vintage allowances.
- Ten participating RGGI states and Pennsylvania signed a Letter of Intent that commits them to develop a regional Low-Carbon Fuel Standard (LCFS) they describe as a market-based, technology-neutral policy (Dec 31). It requires reductions in the average lifecycle GHG emissions per unit of energy. Signatories from environment and energy agencies committed to a draft MOU on a regional program to be forwarded to the 11 governors by December 31, 2009.

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% reductions by 2050
  - Cap-and-trade should cover multiple sectors:
    - electric generation and imports (power plants)
    - Industrial combustion sources (factories)
    - Industrial processes, if measurable and verifiable
    - Transportation fuels, subject to modeling results
  - Each jurisdiction to control allowance distribution methods.
  - Final design pending results of further ICF modeling.
- MGGRA anticipates Model Rule by August 2009.

Western Climate Initiative (WCI):

- Launched by WGA to reduce regional GHG collectively and cooperatively (Feb 2007).
  - Partners: AZ, British Columbia, CA, Manitoba, MT, NM, Ontario, OR, Quebec, UT, WA
  - Observers: AK, CO, ID, KS, NV, Sask., WY
- WCI announced design for a market-based, *multi-sector* cap-and-trade program (Sept 2008):
  - 15% CO_2 reduction below 2005 levels by 2020
  - Covers 90% of regional emissions
  - Phase I to take effect Jan 2012
  - Phase II will begin 2015

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

Renewable Energy Portfolio Standards (RPS)

29 States including D.C. have an RPS

WA: 15% by 2020

OR: 25% by 2025; small utilities 5-10%

ID: Priority to DR, EE, and in-state RE

CA: 20% by 2010; goal: 33% by 2020

NV: 20% by 2015; solar 5% per year

UT: 20% by 2025

CO: 20% by 2020; co-ops & munis 10%; includes 4% solar

AZ: 15% by 2025; includes 30% DG

NM: 20% by 2020; co-ops 10%

TX: 5,880 MW by 2015; goal: 10,000 MW by 2025

HI: 20% by 2020; *proposed increase to 40%* by 2030 agreed to for 2009 session

MT: 15% by 2015

ND: 10% by 2015

SD: 10% by 2015

NE: studying RPS

KS: goal - 20% wind by 2020

MN: 25% by 2025 Xcel 30% by 2020

IA: 105 MW in RPS goal: 1,000 MW wind by '11

MO: 15% by 2021; at least 2% solar

OK: Studying an RPS

AR: Utility IRPs to include RE

WI: 10% by 2015

IL: 25% by 2025

MI: 10% by 2015, and new RE capacity: 1,100 MW by 2015

OH: 12.5% by 2025; 0.5% solar

IN: 2 bills introduced

KY: Report recommends RPS

ME: 40% by 2017 goal: 3 GW wind by 2020

NH: 23.8% BY 2025

VT: 25% by 2025

MA:15% by 2020; two goals: 250 MW solar 2017; 2 GW wind 2020

RI: 16% by 2019

CT: 23% Class I/II by 2020 4% Class III by 2010

NY: 25% by 2013

PA: 8% Tier I, 10% Tier II by 2020; 0.5% solar set-aside

NJ: 22.5% by 2020; 2% solar

DE: 20% by 2019, with 2% solar

DC: 20% by 2020, with 0.4% solar

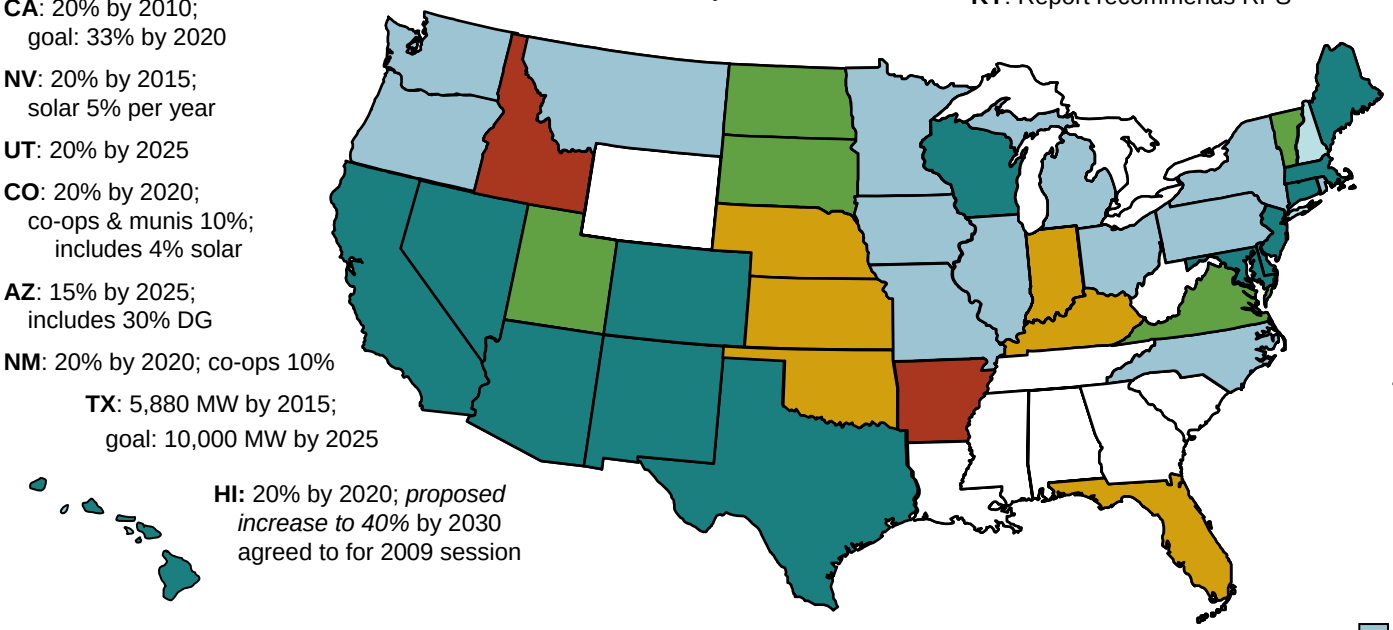
MD: 20% by 2022, with 2% solar

VA: 12% by 2022

TVA: 50% of generation from zero- or low-carbon sources by 2020*

NC: 12.5% by 2021 co-ops & munis: 10% by 2018

FL: draft RPS to legislature: 20% by 2020



- RPS
- Strengthened/ amended RPS
- Voluntary standards or goals
- Proposed RPS or studying RPS
- Other renewable energy goal

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.

Abbreviations: EE: Energy Efficiency; MOU: Memorandum of Understanding; PSC: Public Service Commission; RE: renewable energy; RPS: Renewable Portfolio Standard

Updated February 6, 2009

Financial Markets: Comparative Bond Yields

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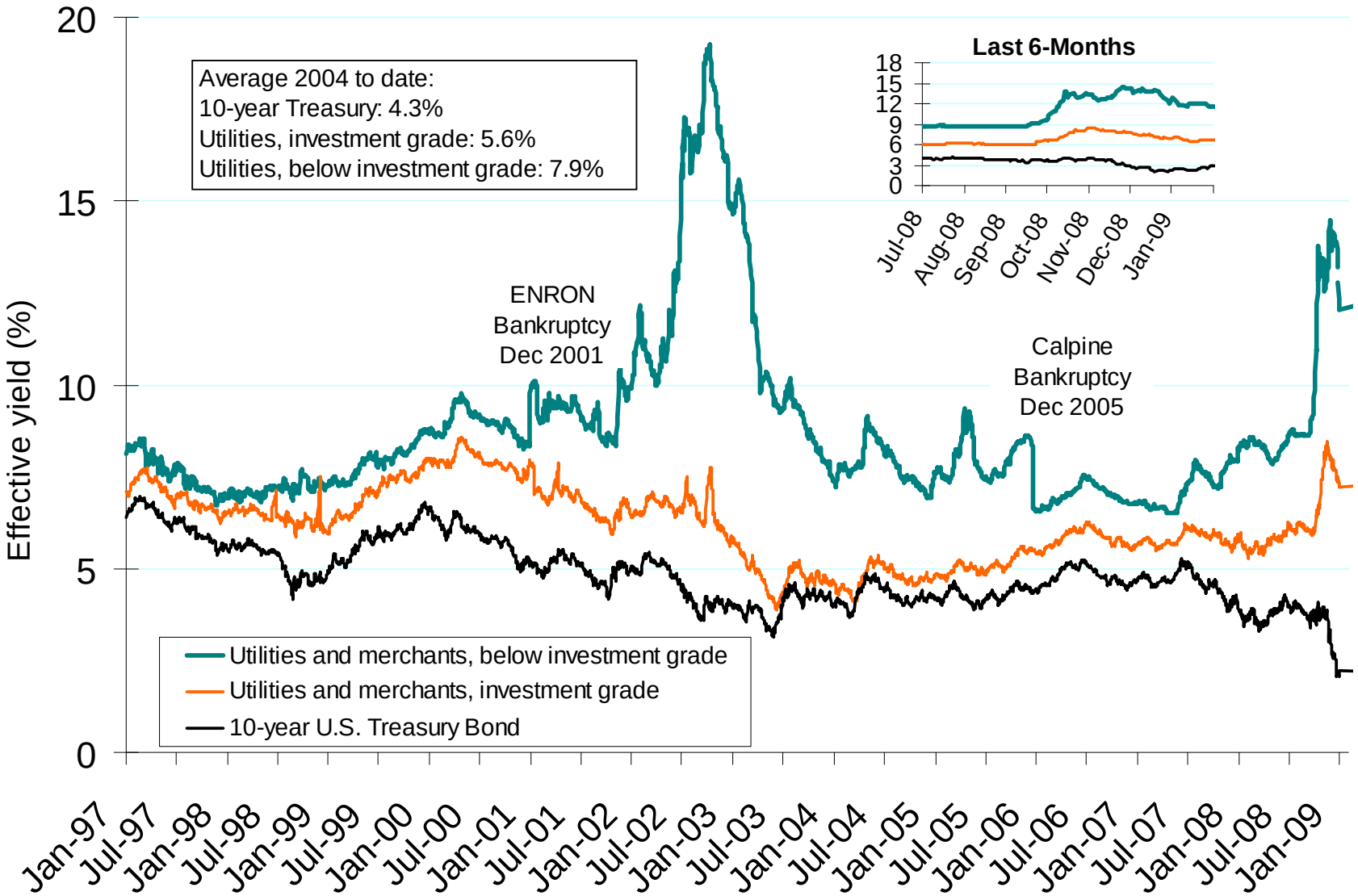
Yields of Utilities, Merchants and Ten Year Treasury Bonds



Source: Derived from Merrill Lynch Index U.S Corporates, Gas and Electric Utilities and Bloomberg data.

Updated February 6, 2009