OE ENERGY MARKET SNAPSHOT

Western States Version – November 2009 Data

- **Special Report: Form 552**
- **Natural Gas and Fuel Markets**
- **Electricity Markets**

Office of Enforcement
Federal Energy Regulatory Commission
December 2009

Special Report:

Lessons Learned from the First Form 552 Submissions

The Road Map to Form 552

- California energy crisis.
- False reporting of indices and ensuing criminal prosecutions by the Department of Justice and the Commodities Futures Trading Commission.
- Establishment of the Office of Market Oversight and Investigations (now the Office of Enforcement).
- Issuance of the Policy Statement of 2003.
- Transparency provisions of EPAct 2005.
- OE research on "size of market" and physical basis use.

What Form 552 is

- Provide guidance on the size of the physical natural gas market.
- Inform market participants about the extent of index use in price formation.
- Detail how much fixed price gas contributes to indices.
- Highlight potential changes needed for FERC policies.

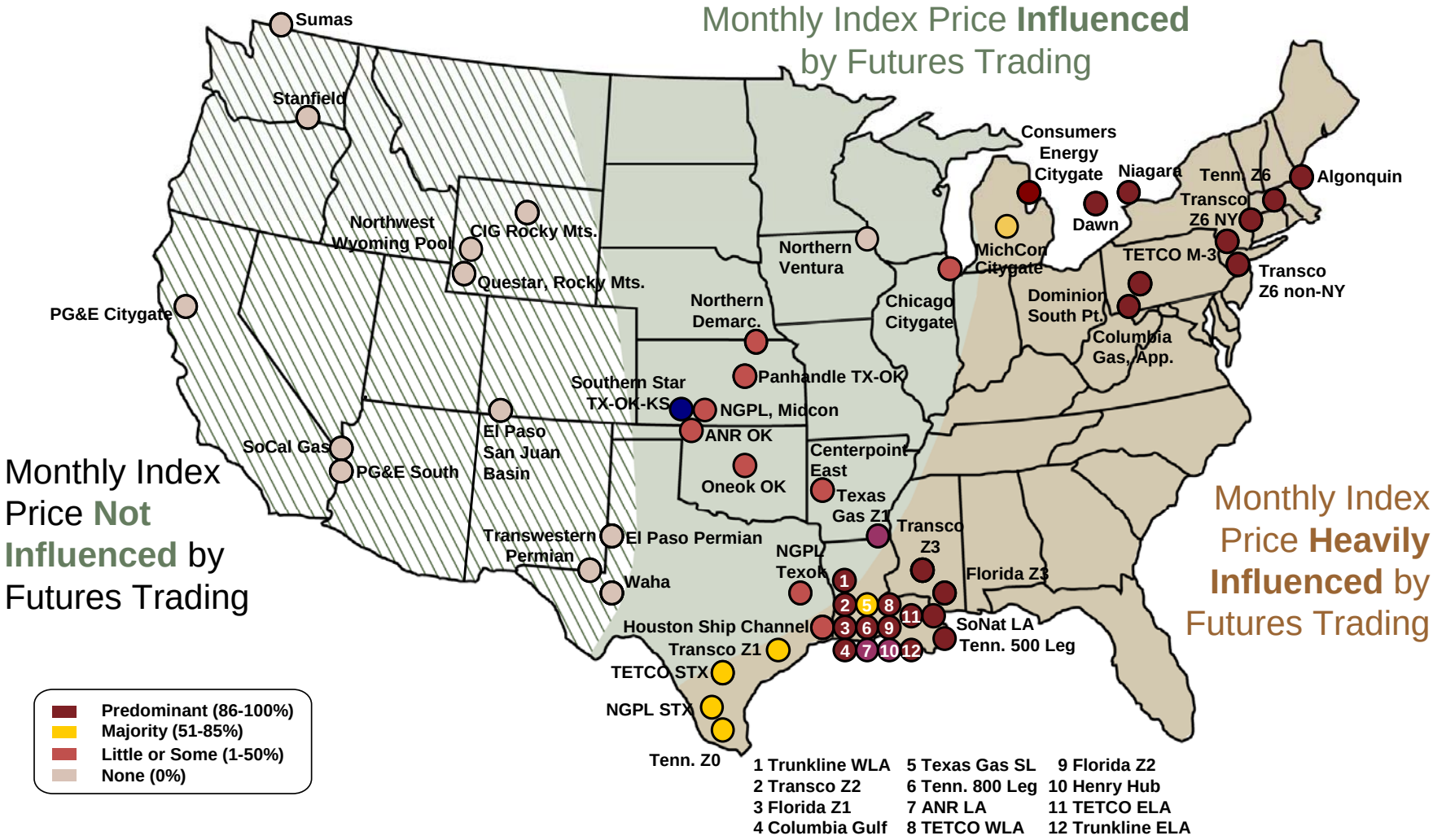
… and What Form 552 Isn't

- Attempt to catalog ALL possible kinds of physical market transactions.
- Way to gauge the size of the entire physical market for gas.
- Tool to uncover confidential commercial information.

Why We Care About Index?

- **Index use is the largest component of physical gas purchases.**
- **Link between physical index use and the financial market (NYMEX).**
- **Indices can be volatile and result in marked changes in consumer costs.**

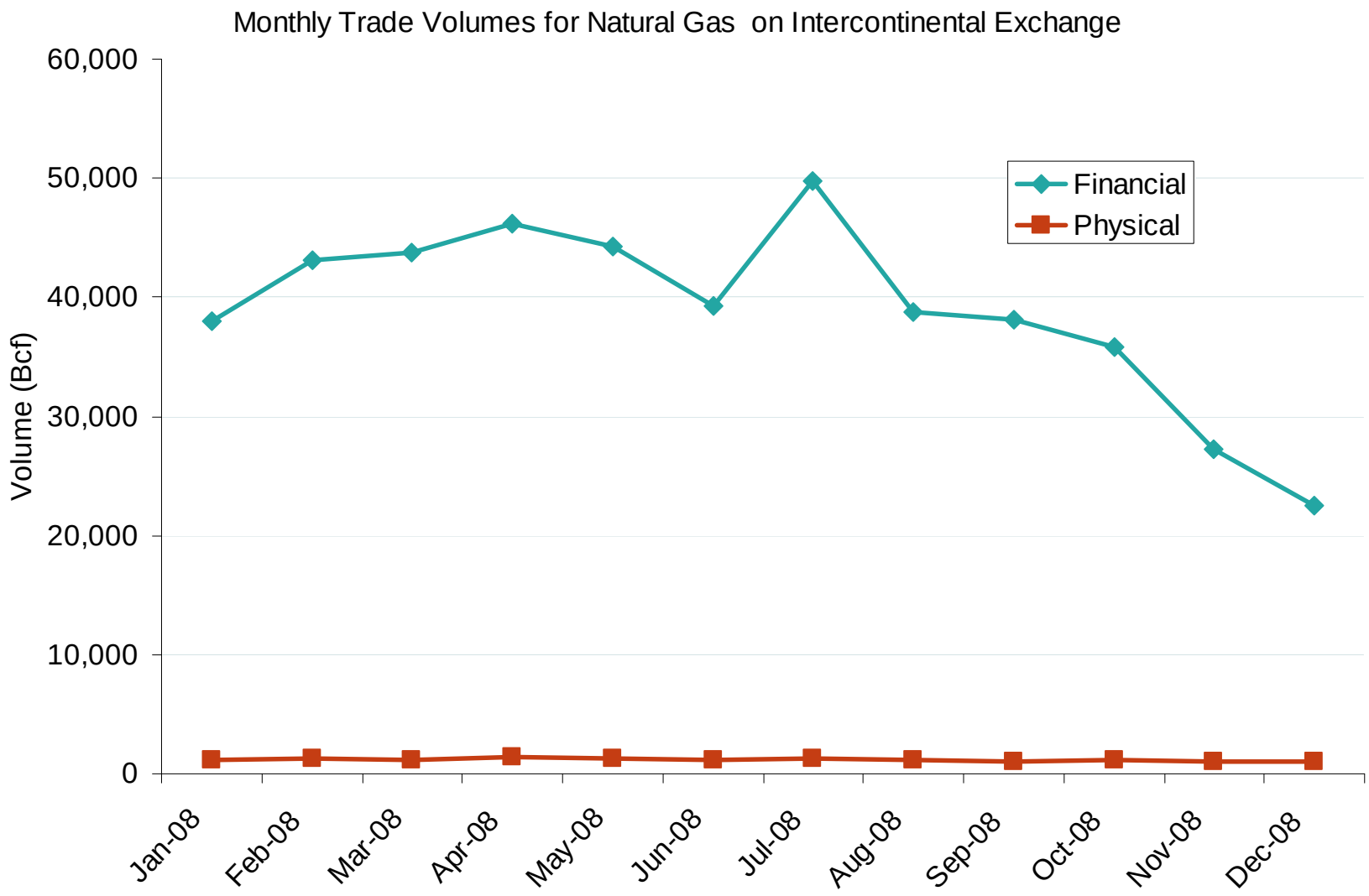
Use of Physical Basis in Natural Gas Price Indices at Major Trading Points, 2009



Source: Derived from *Platts* data for January through June 2009 indices.

Updated June 9, 2009

Natural Gas Financial Markets Dwarf Estimated Physical Market

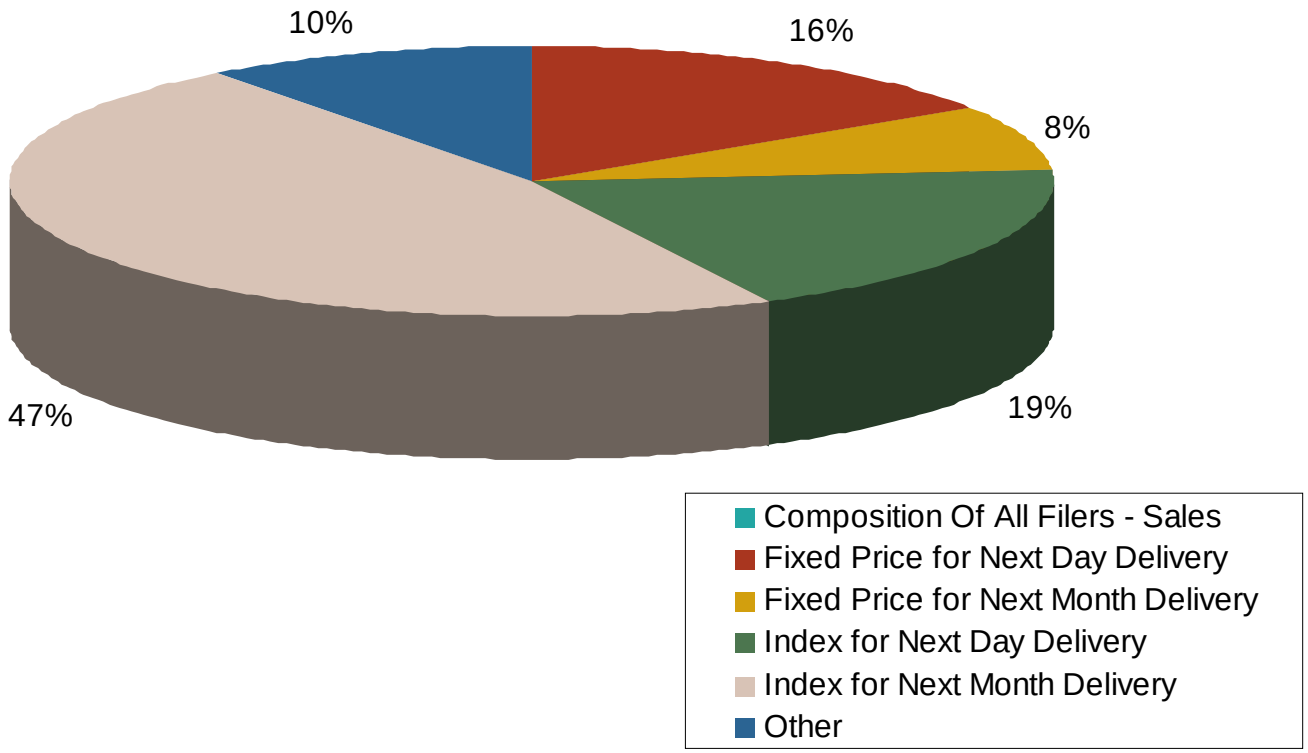


Source: ICE and FERC Staff

Updated April 2009

Results Underscore Reliance on Index Deals

Composition of All Filers (Sales)



•Fixed price deals for next-day and next-month gas, together, accounted for less than 24% of total sales or purchases.

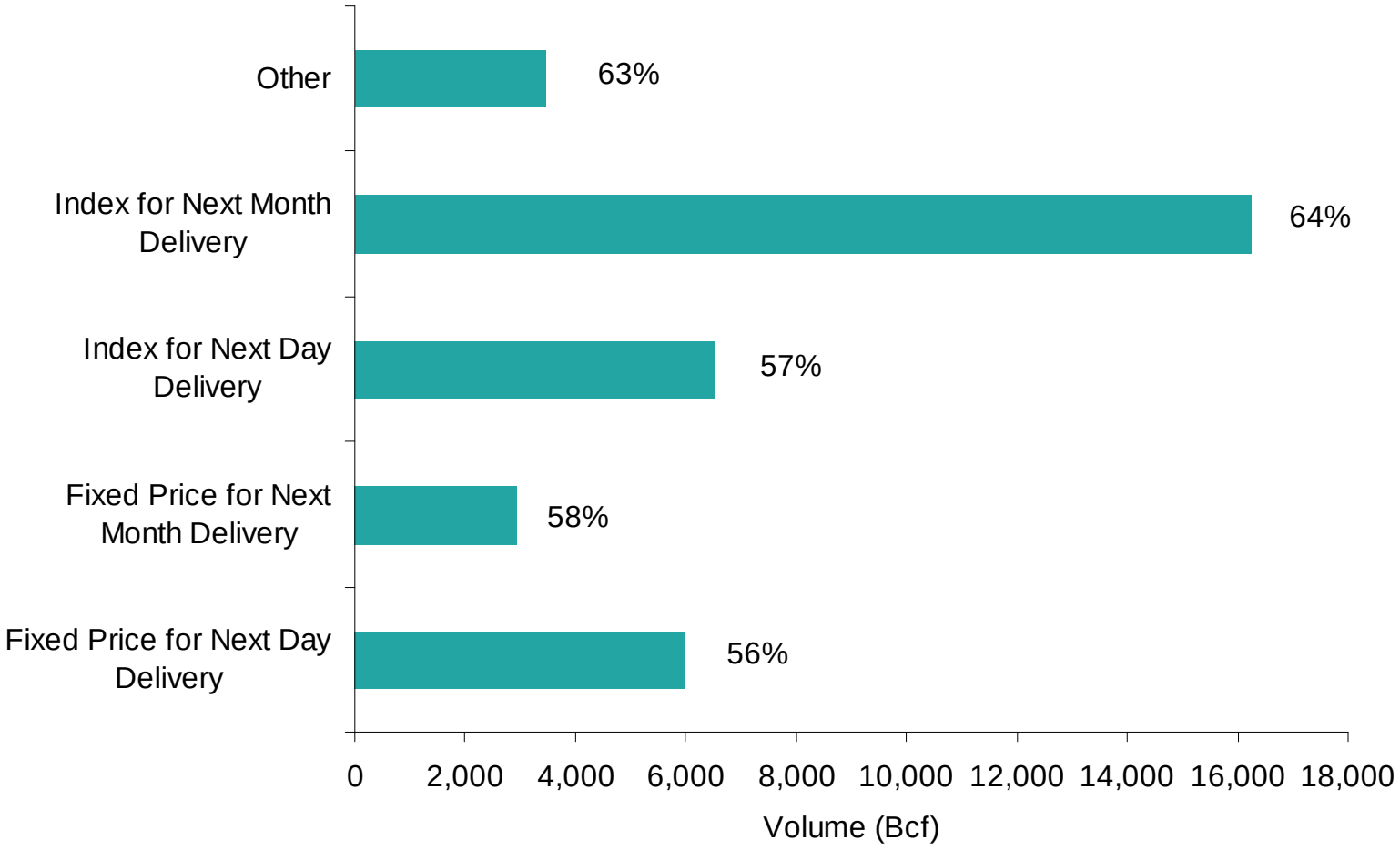
Source: Form No. 552 and FERC staff

Sample Size Observations

- The total physical gas market, as defined by Order Nos. 704-A and 704-B, in 2008 drawing upon queries from out 552 data base was nearly 62 Tcf or almost three times (21.4 Tcf) domestic marketed production in 2008.
- 1,097 respondents or holding companies filed as of October 10th, 2009.
- Respondents reflected entire spectrum of the gas industry.

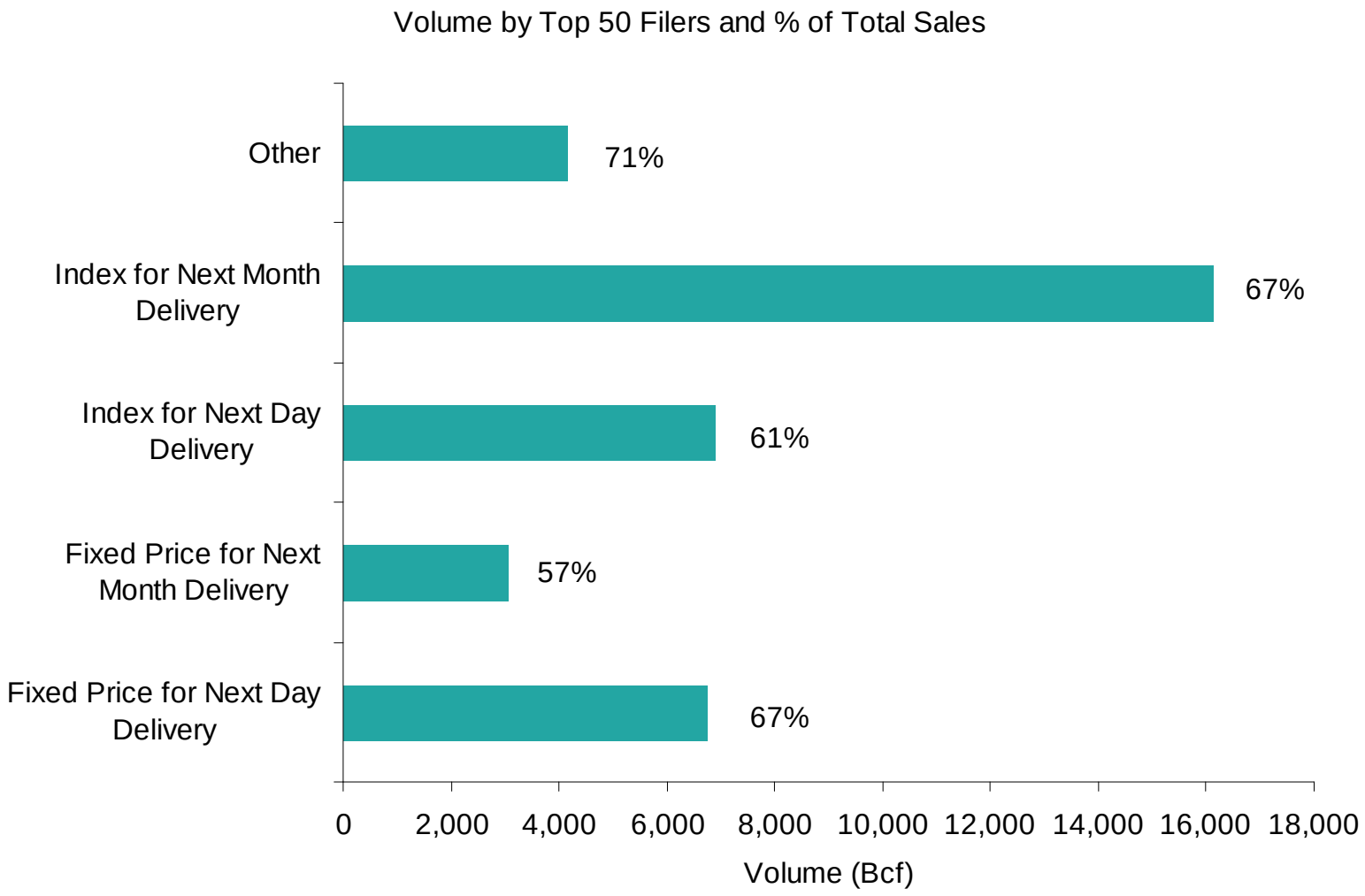
Reporting to Index Publishers

Volume by Filers Who Reported Transactions to Publishers and % of Total Sales



Source: Form No. 552 and FERC staff

Top 50 Dominate the Physical Gas Market



Source: Form No. 552 and FERC staff

December 2009 Western Snapshot Report

Updated December 7, 2009

Comparative Results

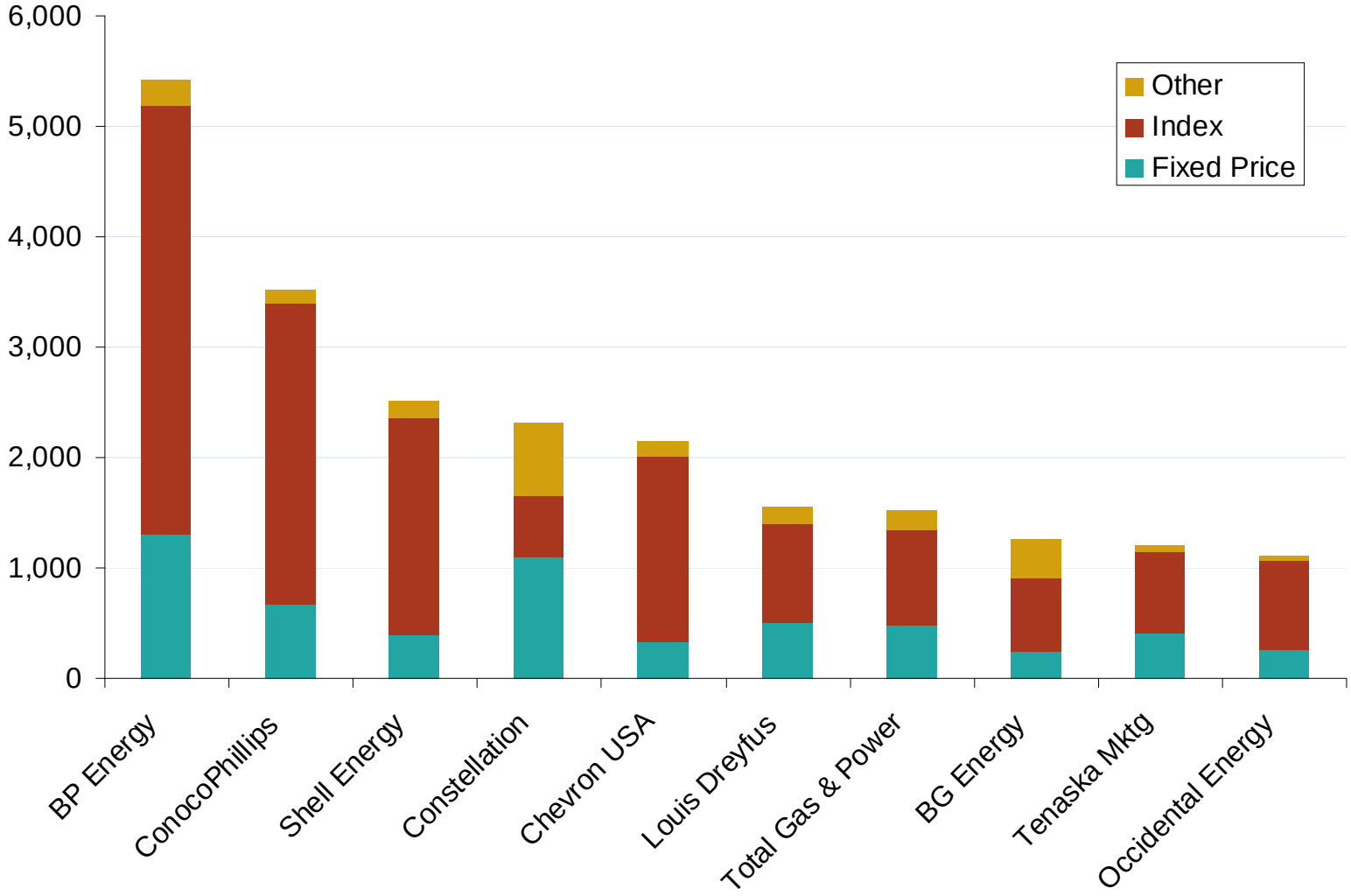
Ordinal Ranking of Top Gas Sellers: Gas Daily vs Form No. 552

Ordinal Rank	Gas Daily Marketer Survey	Ordinal Rank	Form 552
1	BP	1	BP
2	ConocoPhillips	2	ConocoPhillips
3	Shell Energy	3	Shell Energy
4	Macquarie Cook Energy	4	Macquarie Cook Energy
5	Louis Dreyfus Energy Services	5	Chevron
6	Chevron	6	Louis Dreyfus Energy Services
7	RBS Sempra	7	Total Gas & Power
8	Tenaska	8	BG
9	Nexen	9	Tenaska
10	EnCana	10	Occidental Energy

Sources: Derived from Gas Daily on September 9, 2009 and FERC Form No. 552.

Note: draws upon Gas Daily's second quarter 2008 survey results for top North American gas marketers.

Top Ten Sellers of Physical Gas Comprise 61% of Overall Physical Gas Sales of which 2/3 is at Index

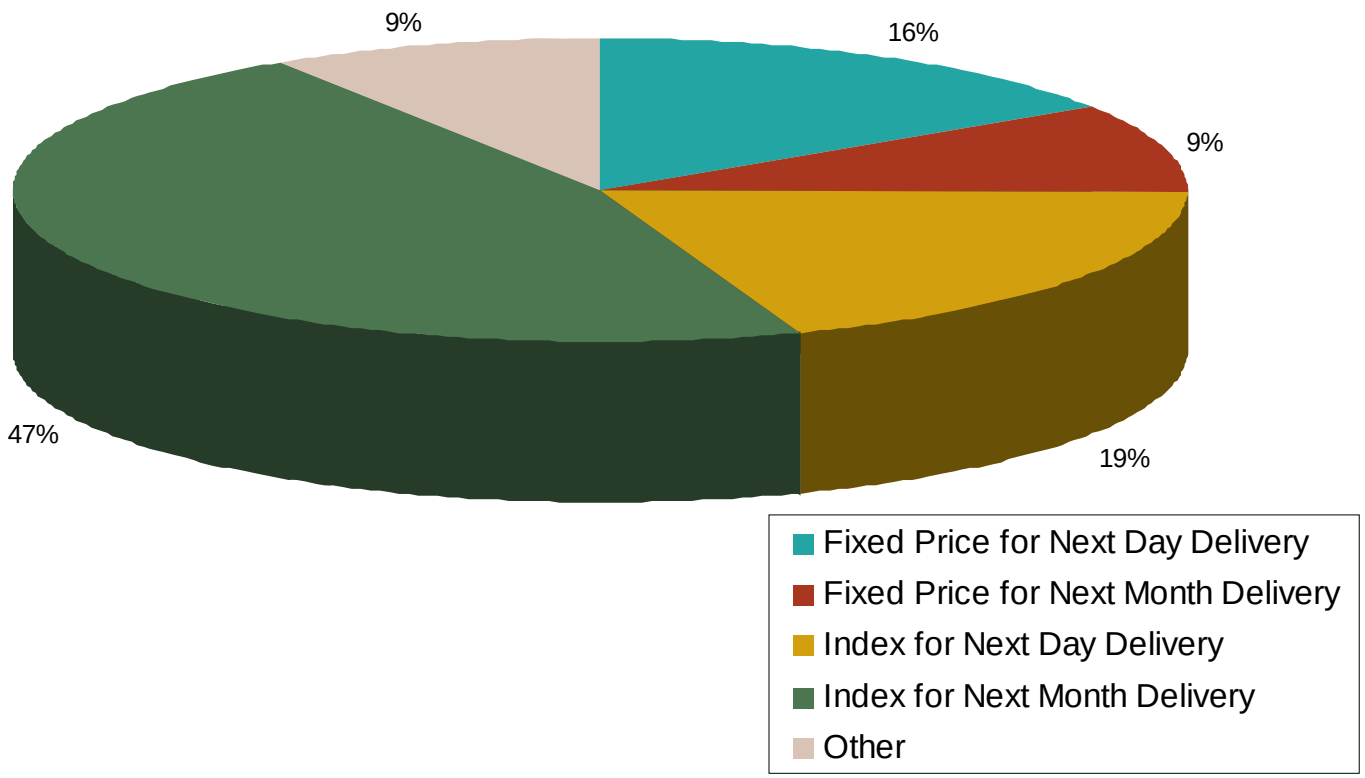


Source: Form No. 552 and FERC Staff

Updated October 29, 2009

Monthly and Next-day Index Sales Predominate Amongst Biggest Sellers of Gas

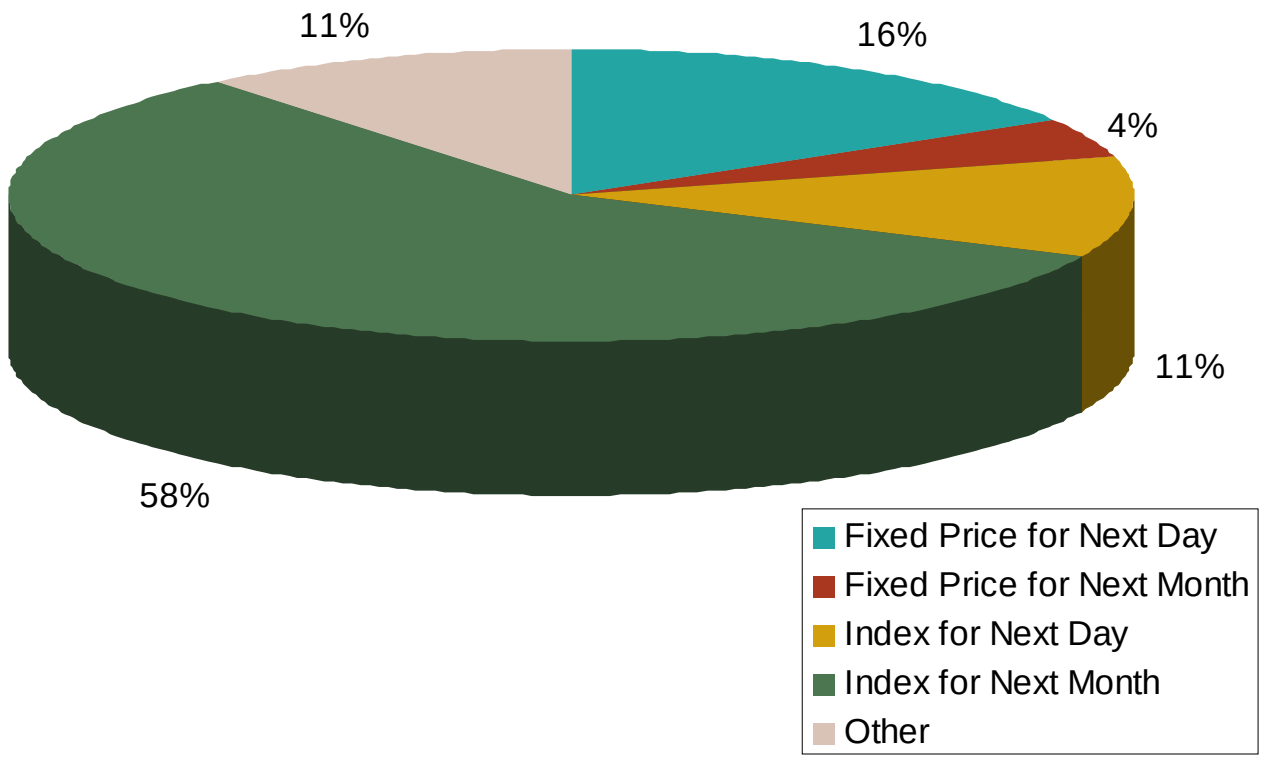
Composition of Transactions Amongst Top Ten Filers by Volume (Sales)



Source: Form No. 552 and FERC staff

Leading Gas-Only Investor-Owned LDCs are Somewhat More Dependent on Index Deals

Composition of Transactions Amongst Largest Natural Gas-only Consuming Investor-owned LDCS (Purchases)

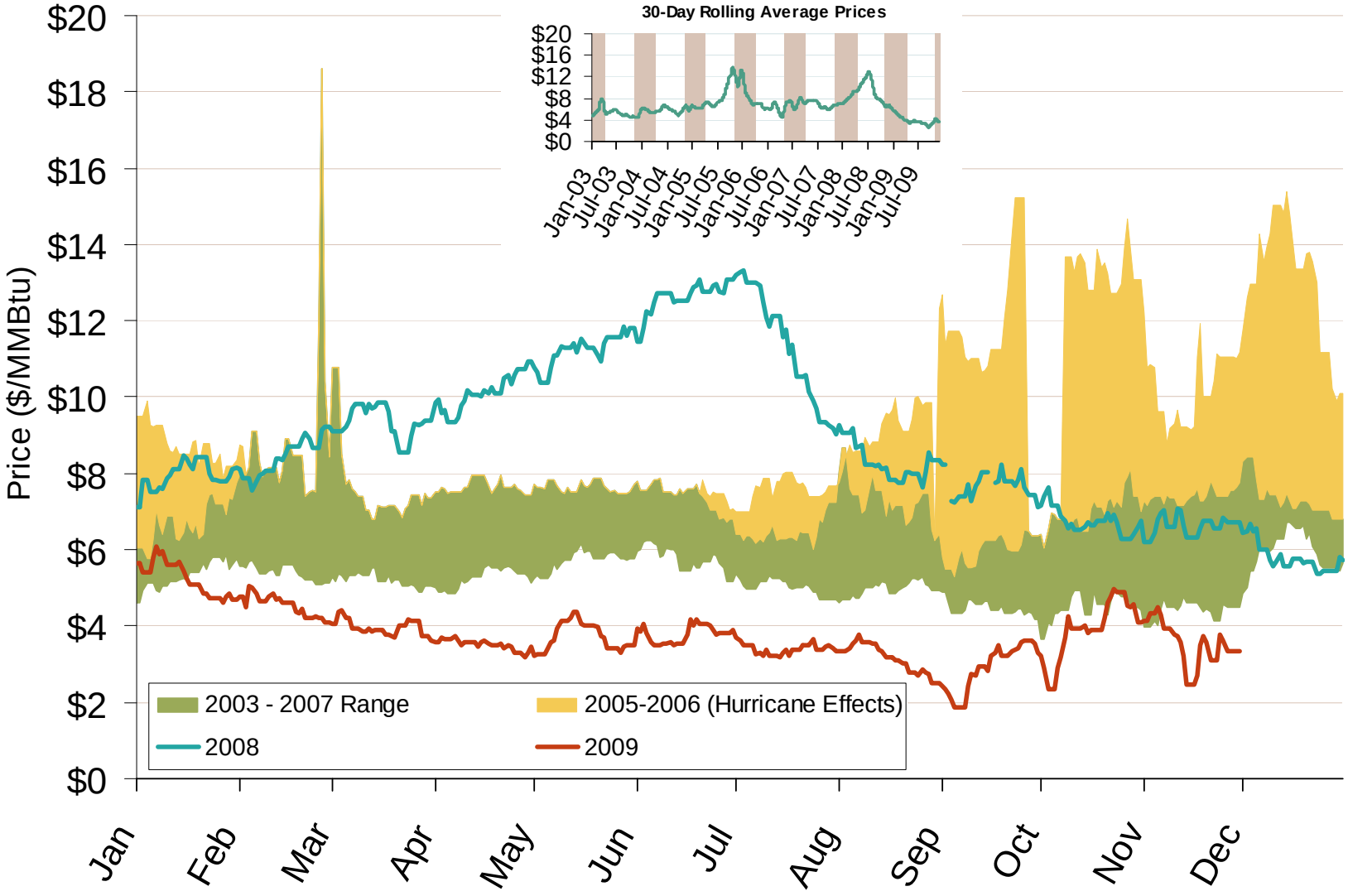


Source: Form No. 552 and FERC staff

Natural Gas and Fuel Markets

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

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



Source: Derived from *Platts* data.

Updated December 8, 2009

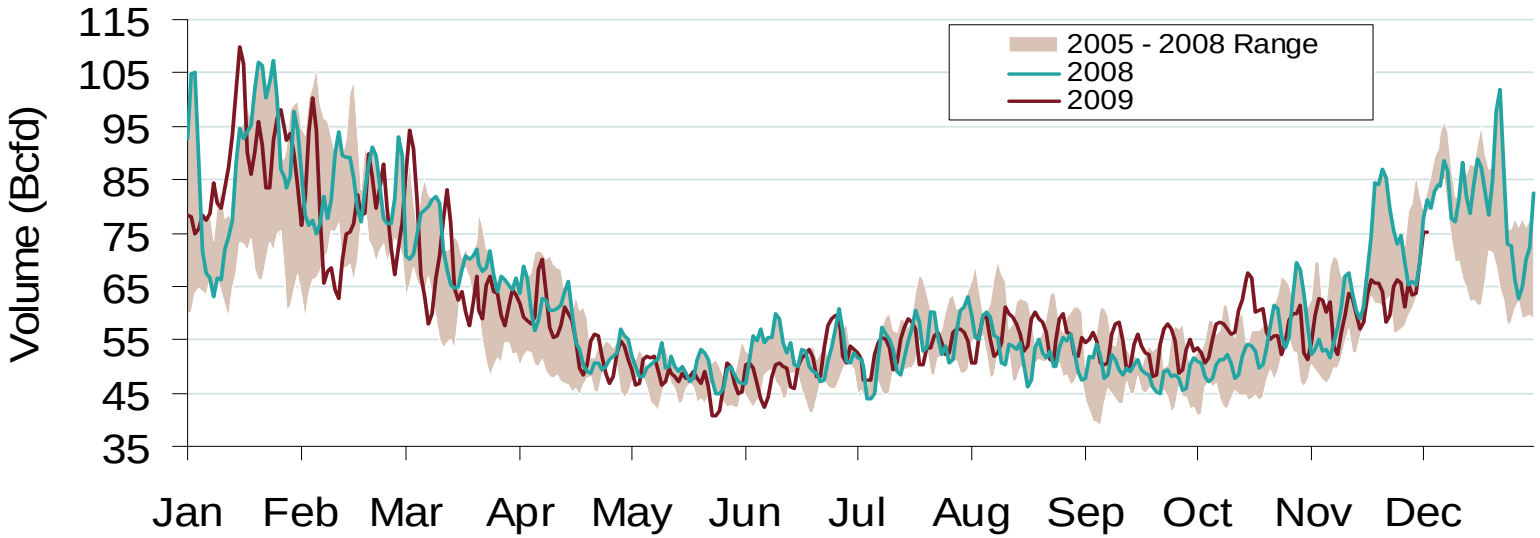
Position Limits on Contracts & Swaps

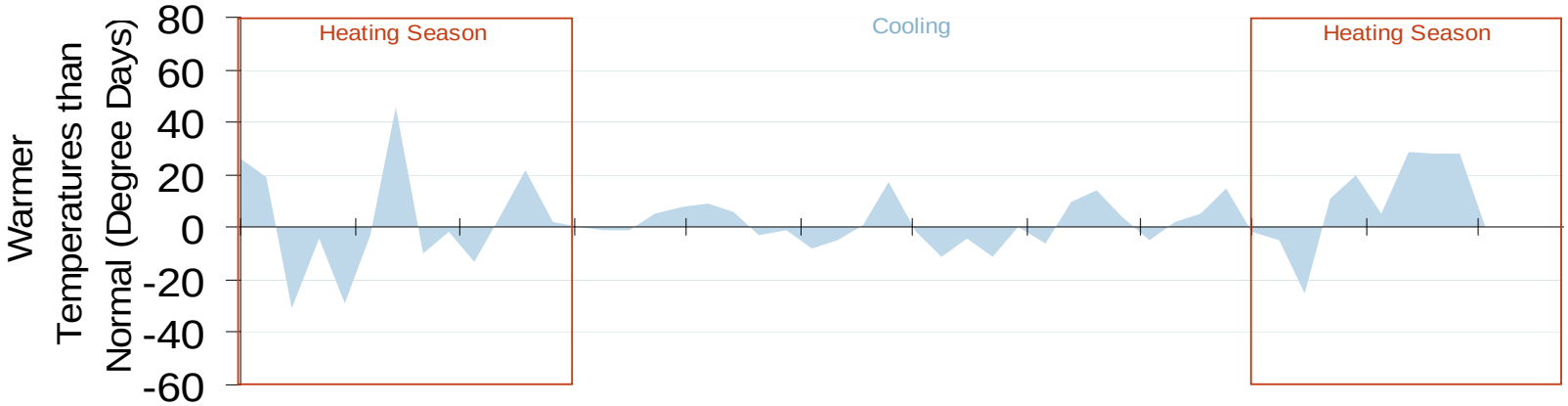
- ICE position limit of 1,000 NG equivalent contracts per firm is applicable to trading the last three days before the close of the Feb 2010 LD1 contract and those LD1 contracts traded thereafter.
- CME-NYMEX position limits of 1,000 NG (4,000 NN) contracts were set on November 19 and also apply to the Feb 2010 contract (and all thereafter).
- Both ICE and CME-NYMEX may grant exemptions to these limits upon showing by the market participant that the position represents:
  (1) Bona fide hedging;
  (2) Risk management;
  (3) Spread/arbitrage positions;
  (4) Aggregation of independently controlled positions, or
  (5) A purely financial position wherein the participant has no physical position in the physical NG contract (NYMEX requires records for a compliance review; position limit is then set to 5,000 NG equivalents)
- CME-NYMEX also set equivalent position limits on Last Day Futures (HH) and Last Day Financial Options (E7)

December Bidweek Results Portend Higher Natural Gas Prices Nationwide

- Bidweek prices at **12 hubs topped $5/MMBtu**, with the highest prices in the nation **in NYC at $6.02/MMBtu** and Northwest prices of **$5.52/MMBtu surpassing the previous months most expensive point, PG&E, by 40 cents.**
- Last month, **only two points exceeded $5**.
- Only **55 cents** separated prices between **Wyoming and Pennsylvania**.
- In unusual activity, **Houston Ship Channel and Texas Gas Zone SL saw 62% and 79%** of their respective purchases made on the **fourth day of Bidweek**. This was the **3rd largest** amount of gas purchased at Houston Ship Channel and the largest at Texas Gas Zone SL to occur at that point **on the fourth day of** bidweek. This moved their respective prices up by **11 and 18 cents** from day 3 to day 4.

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

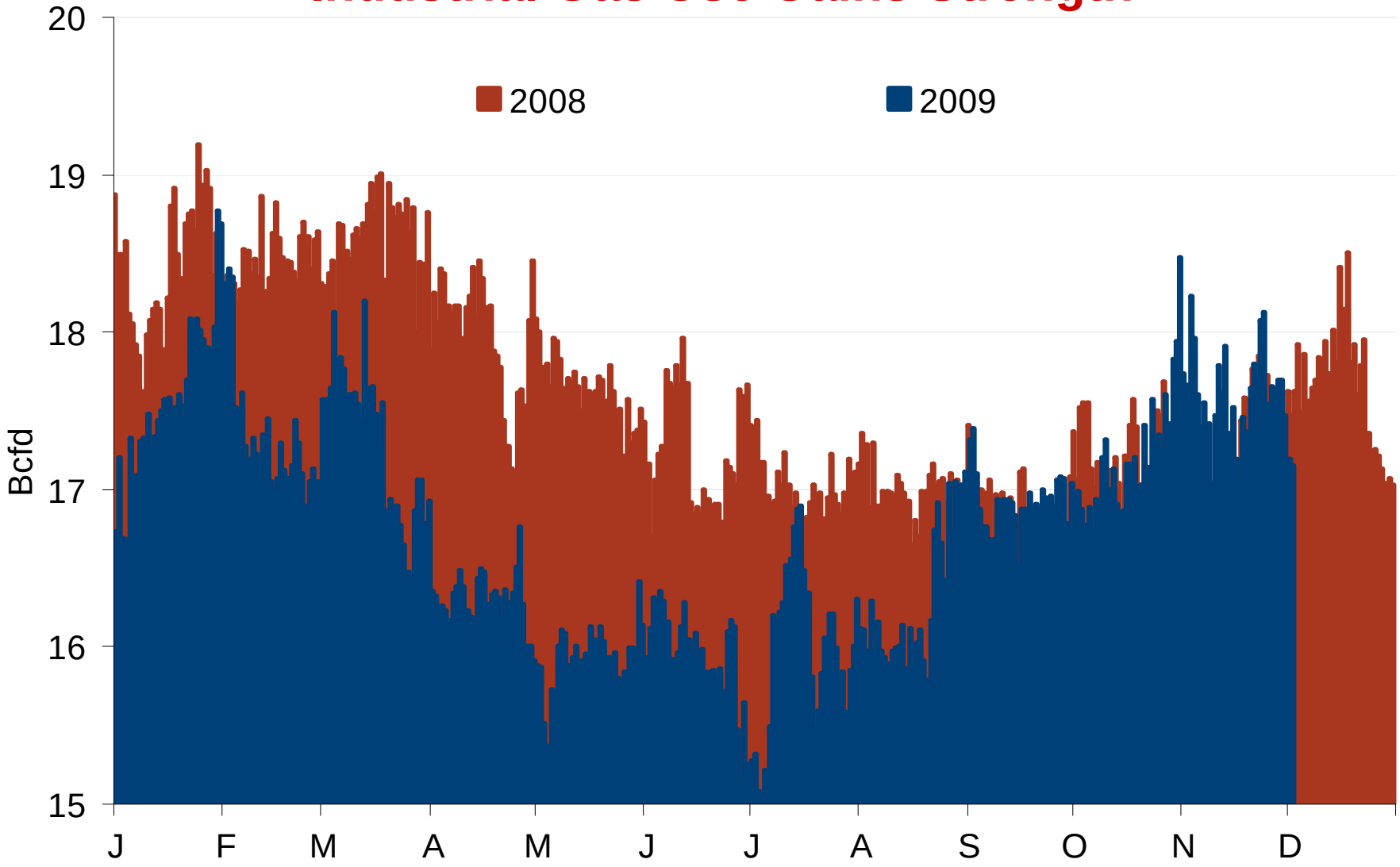




Source: Derived from *Bentek Energy* data.

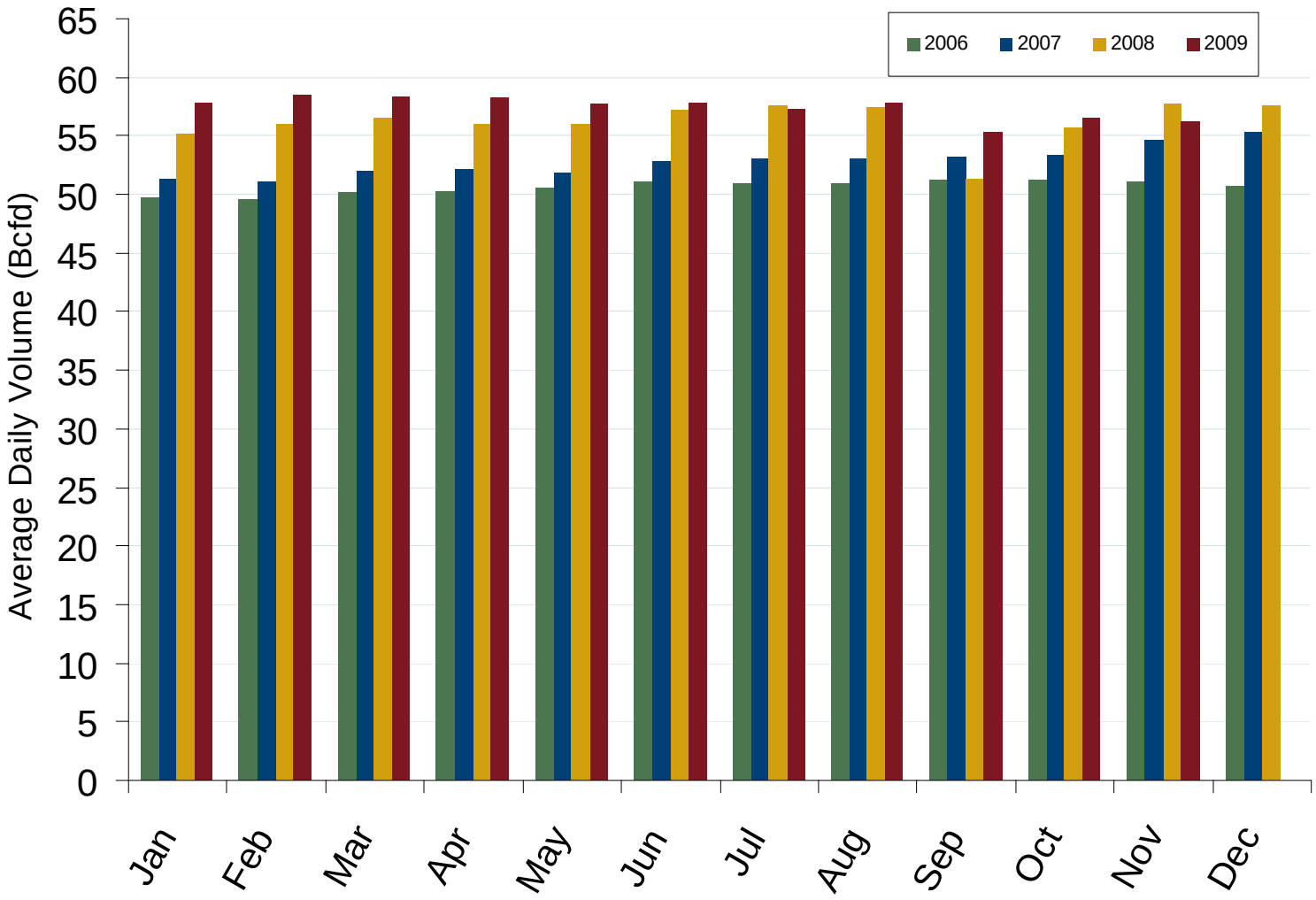
Updated December 8, 2009

Industrial Gas Use Gains Strength



Source: Derived from Bentek data.

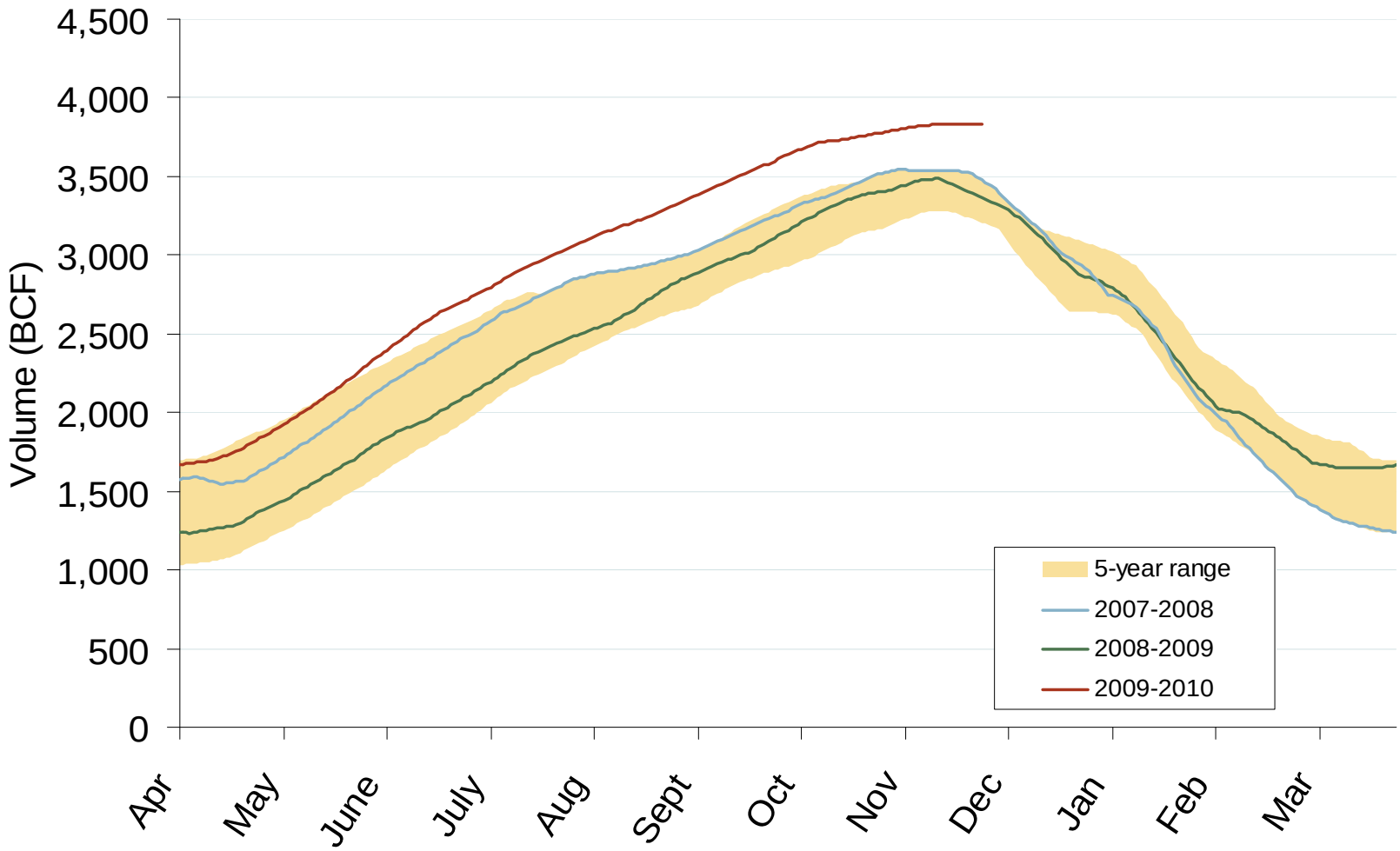
U.S. Dry Gas Production



Source: Derived from *EIA and Bentek data.*

Updated December 8, 2009

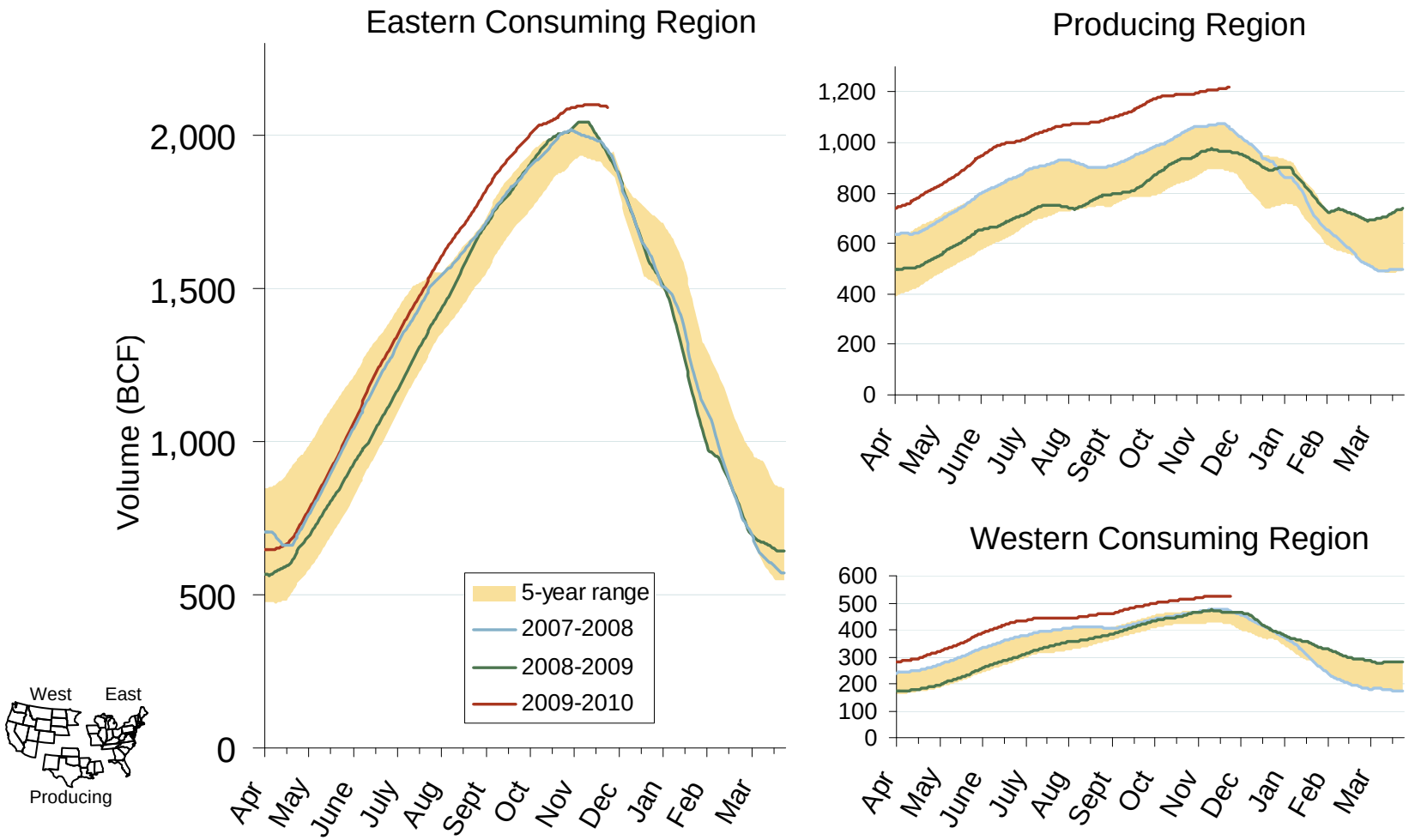
Total U.S. Working Gas in Storage



Source: Derived from *EIA* data.

Updated December 8, 2009

Regional Totals of Working Gas in Storage



Source: Derived from *EIA* data.

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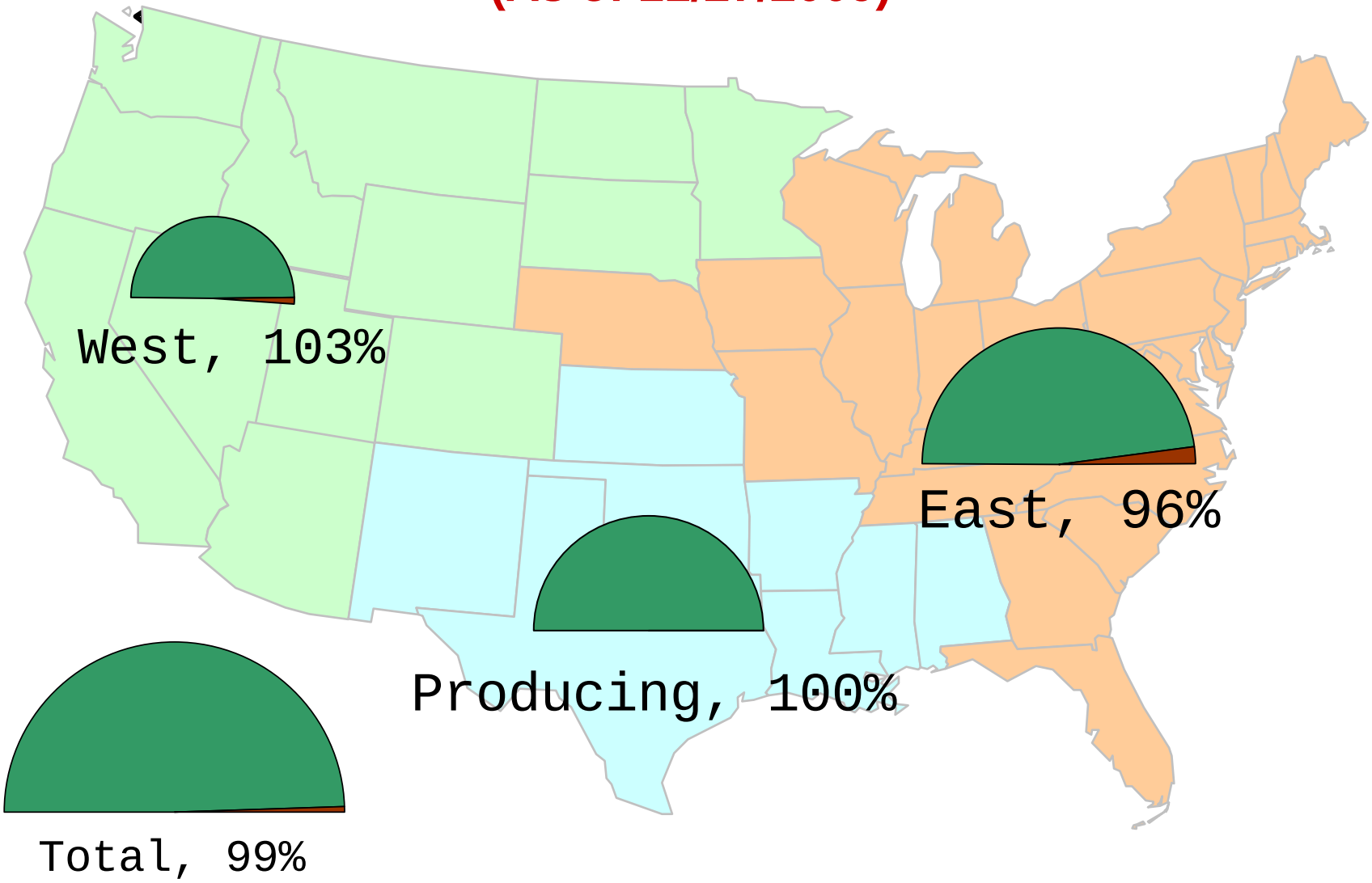
Unprecedented Natural Gas Storage Inventories (As of 11/27/2009)



Source: Derived from EIA data.

December 2009 Western Snapshot Report

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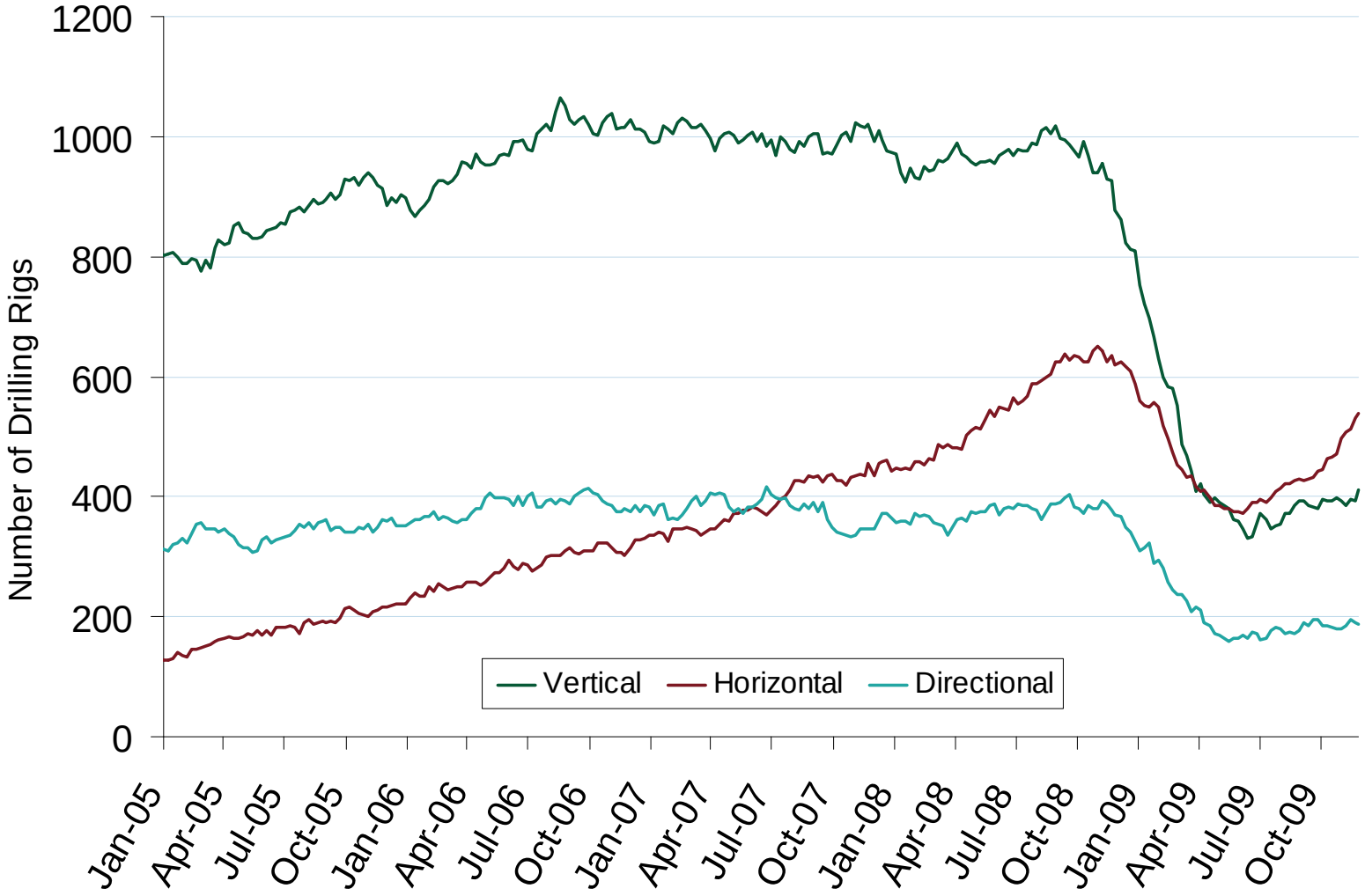
U.S. Oil and Natural Gas Drilling Rig Count by Type



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

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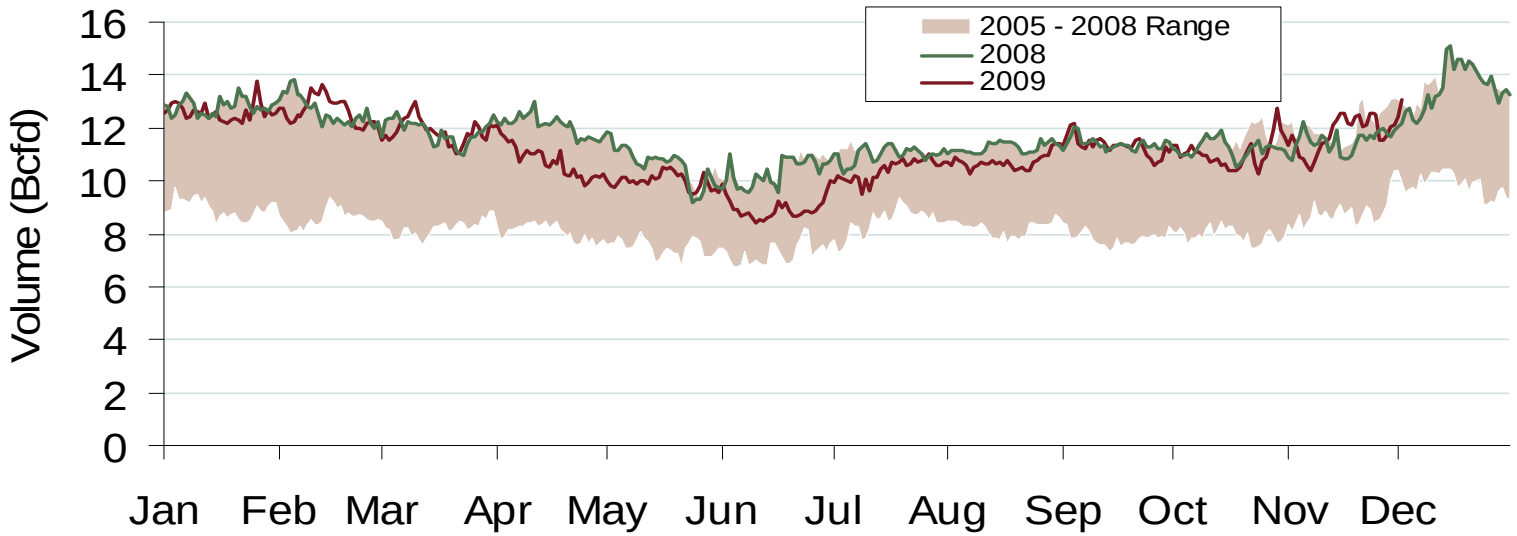
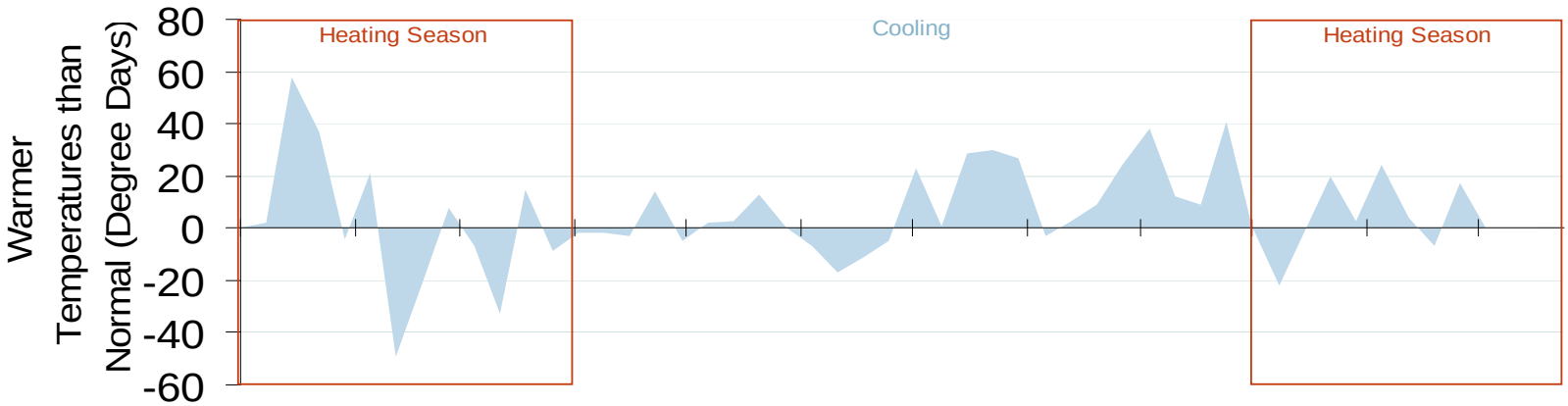
Daily Western Natural Gas Demand
All Sectors

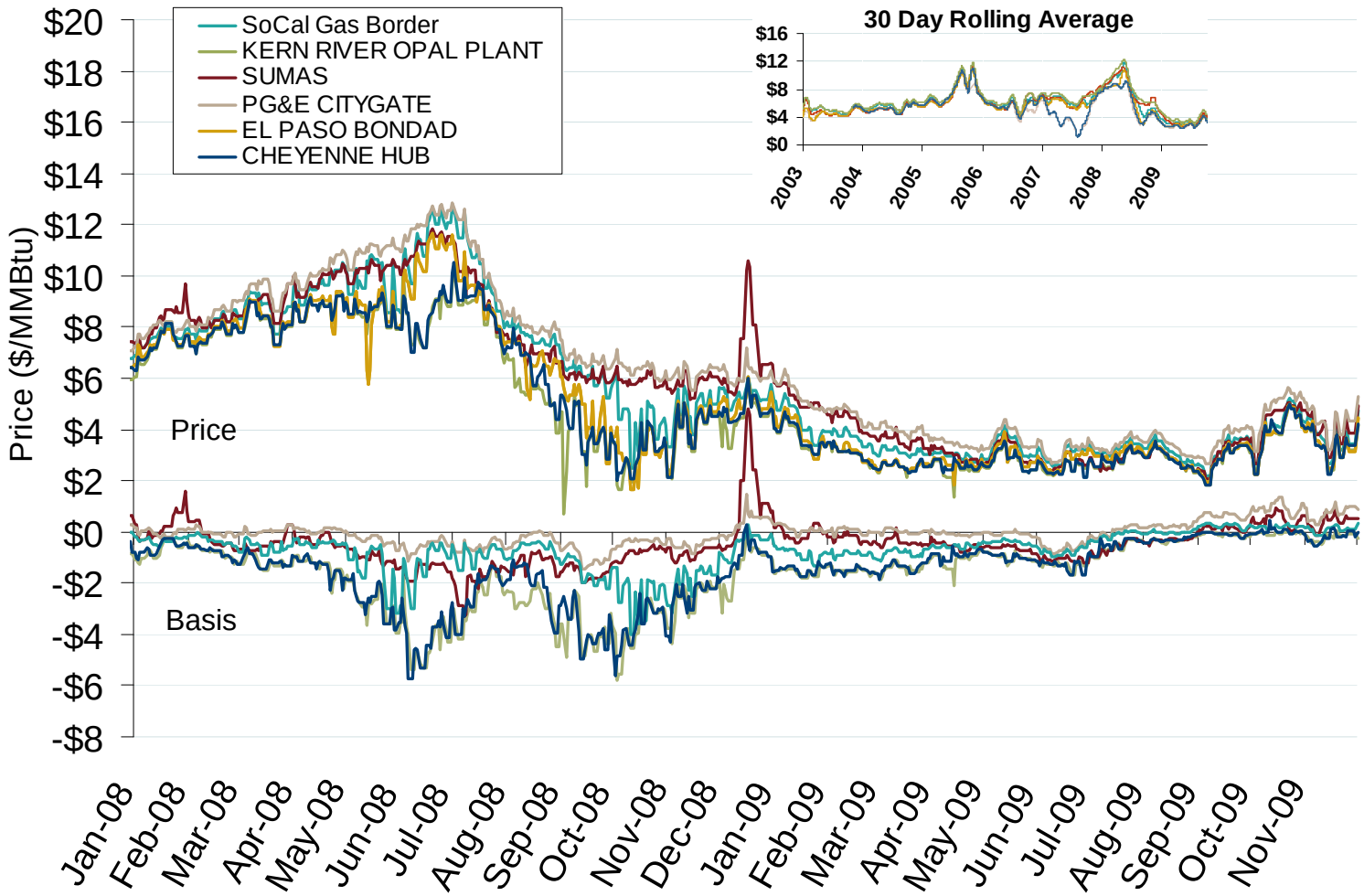




Source: Derived from *Bentek* data.

Updated December 8, 2009

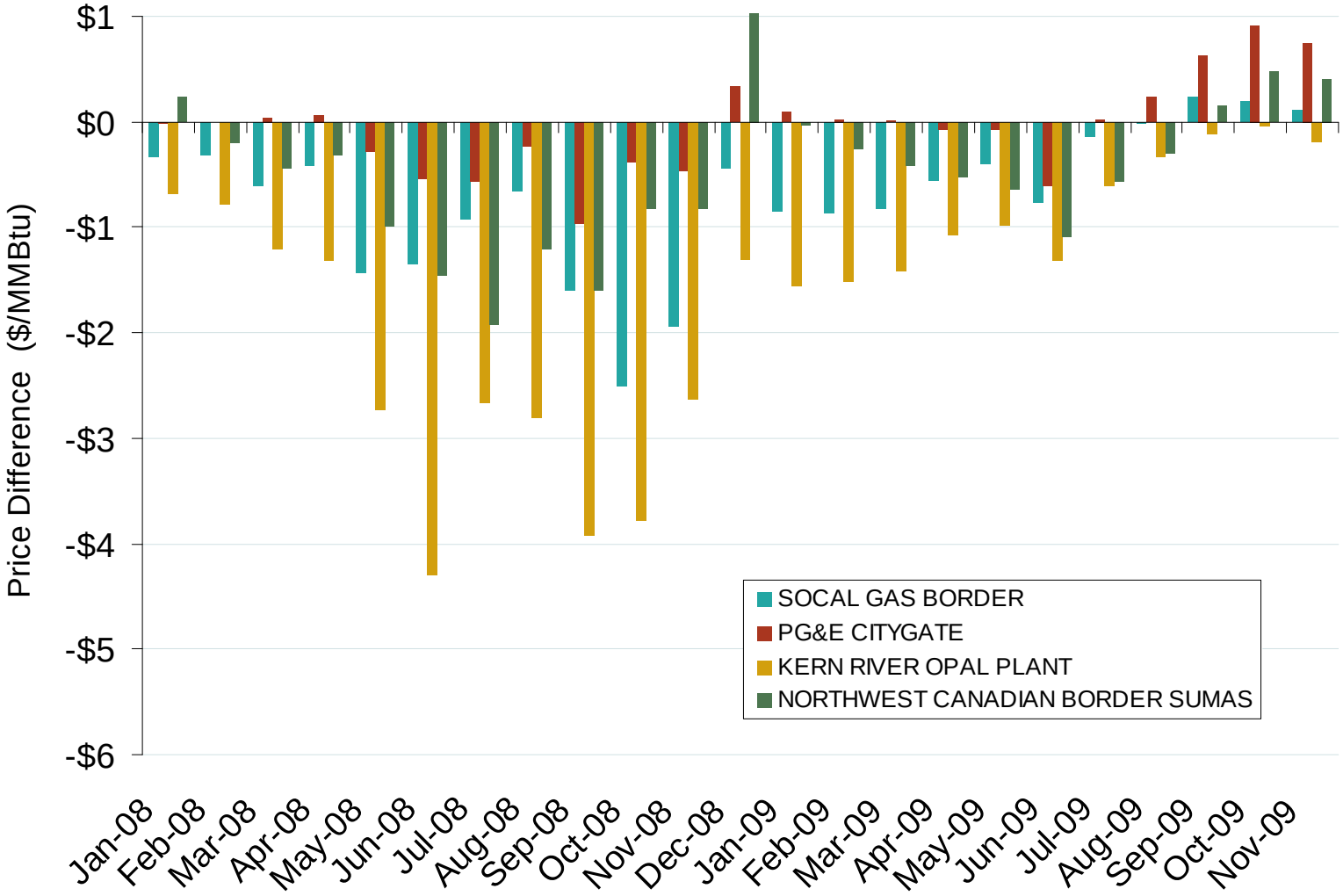
Western Day-Ahead Hub Spot Prices and Basis



Source: Derived from *Platts* data.

Updated December 8, 2009

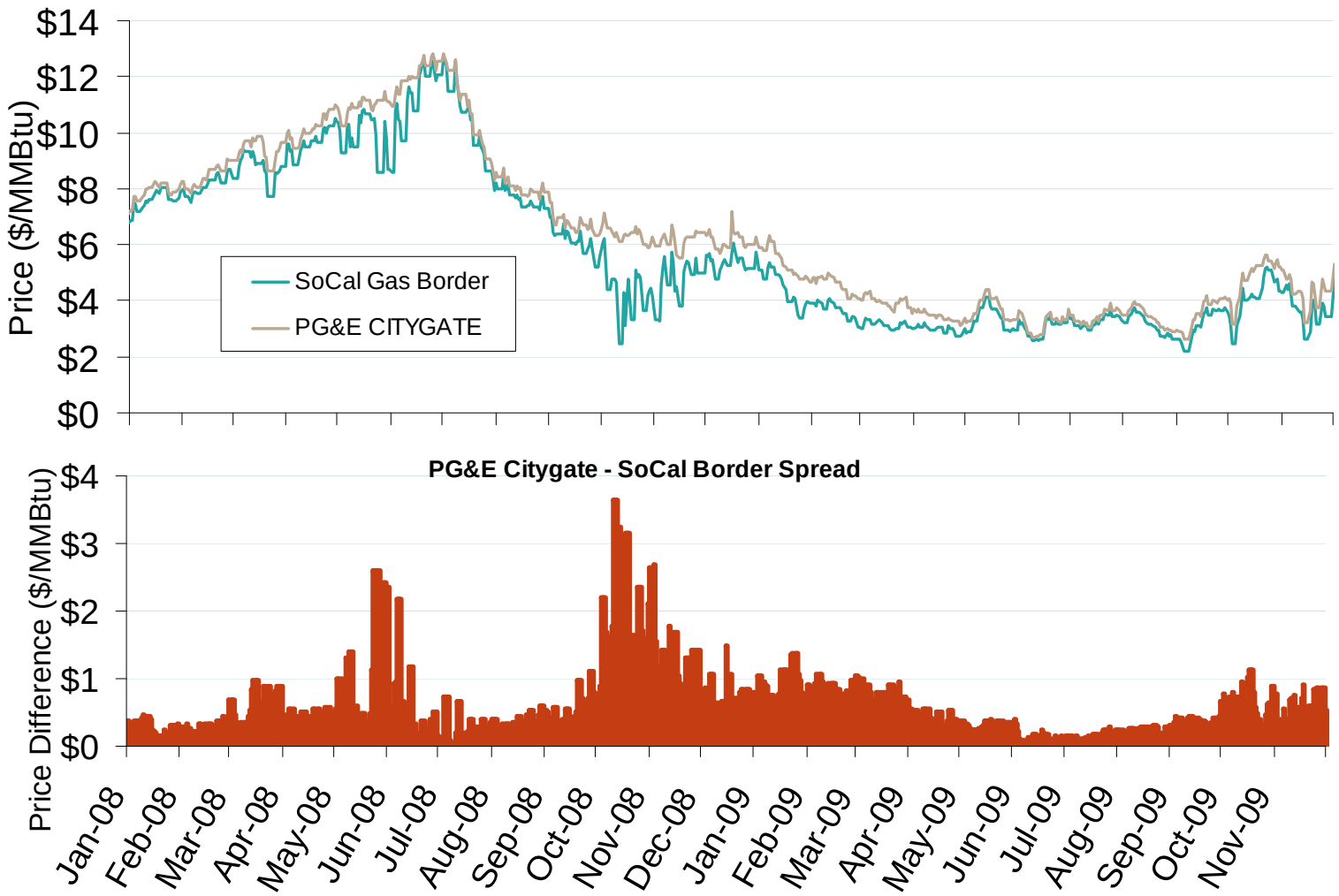
Western Monthly Average Basis Value to Henry Hub



Source: Derived from *Platts* data.

Updated December 8, 2009

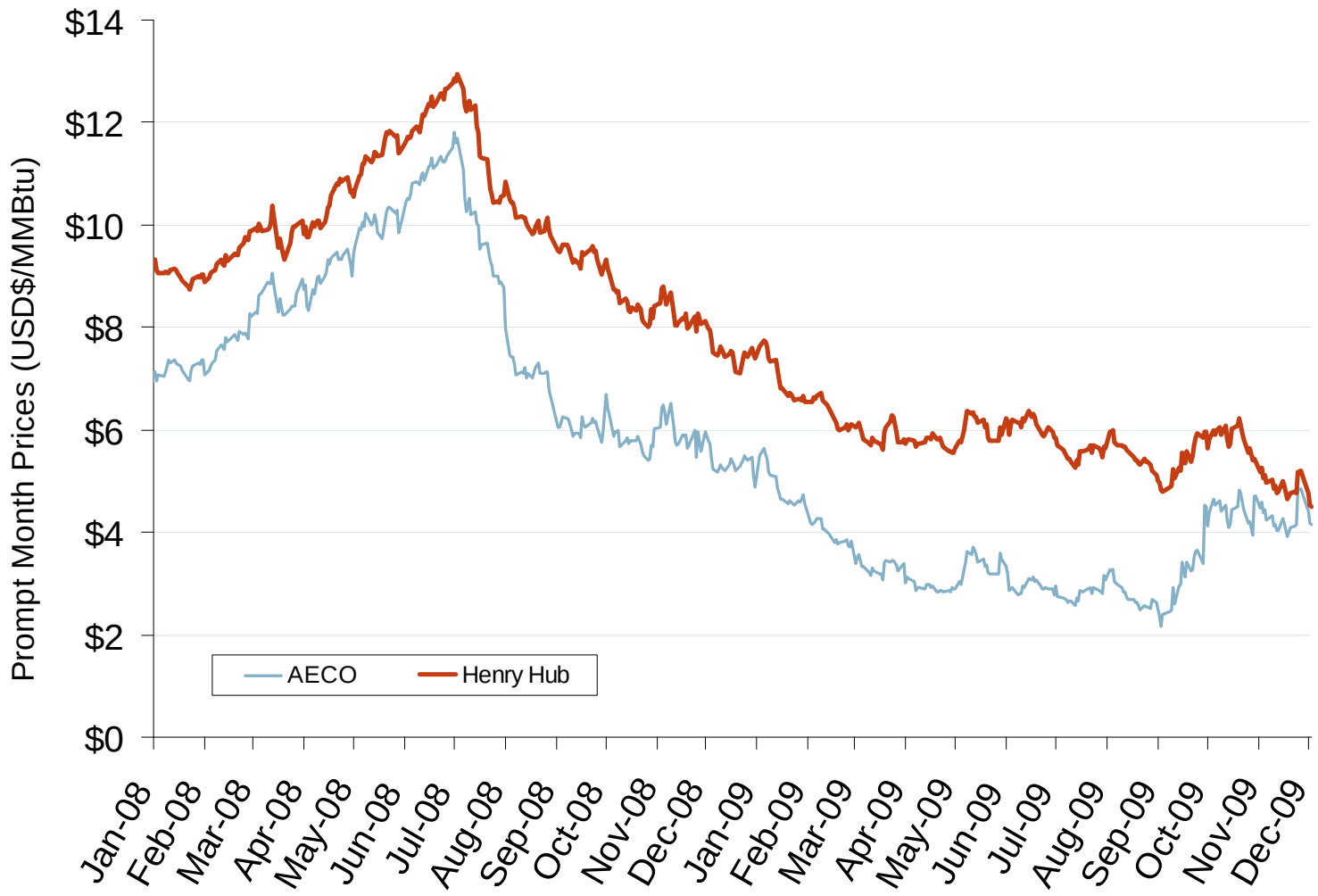
Difference in Northern and Southern California Daily Spot Prices



Updated December 8, 2009

Source: Derived from *Platts* data.

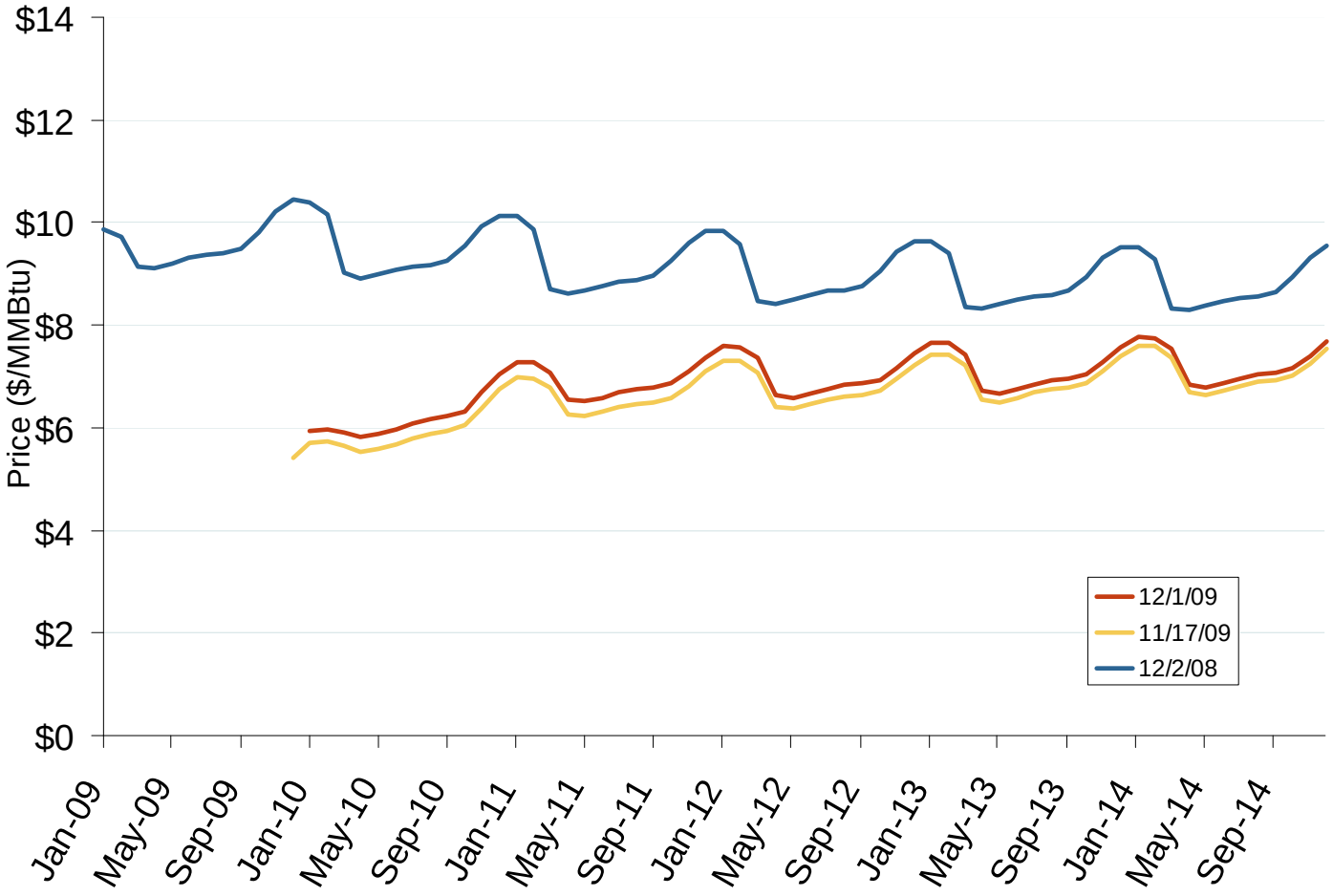
Henry Hub and AECO Prompt-Month Futures Prices



Source: Derived from *ICE* data.

Updated December 8, 2009

NYMEX Natural Gas Forward Price Curve

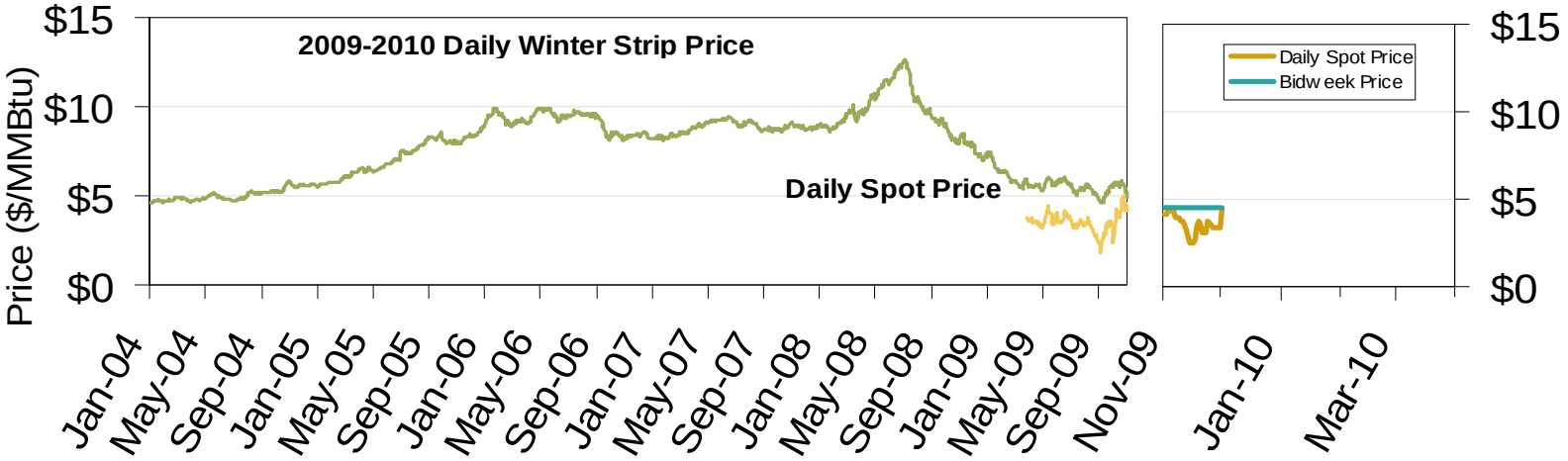


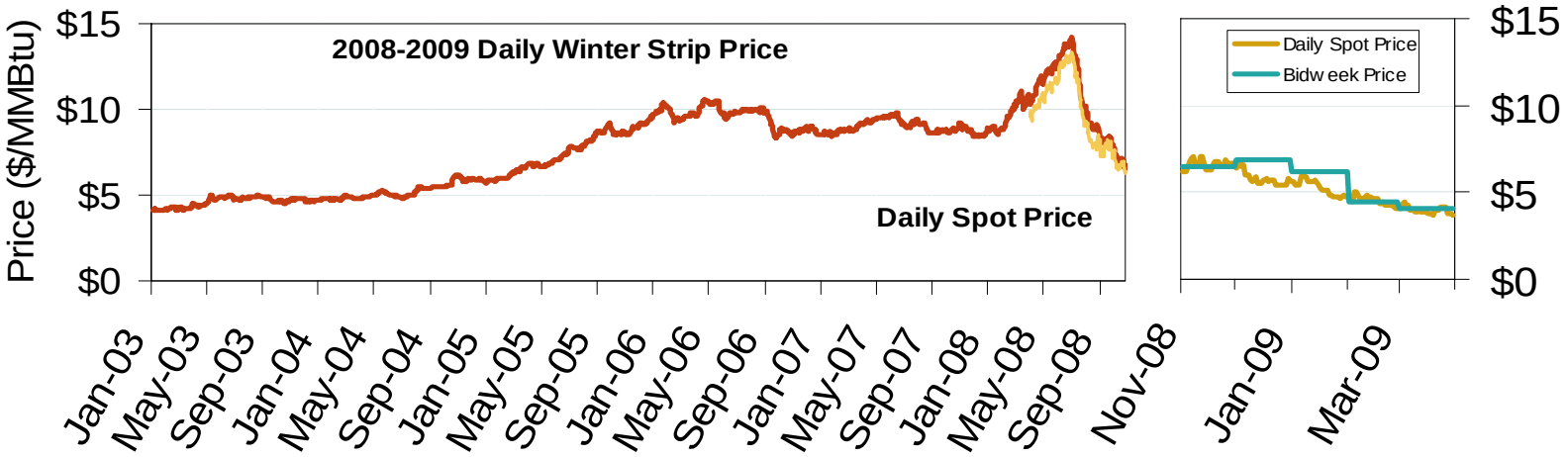
The NYMEX futures contract trades in 10,000 million Btu units. The blue series shows the forward price curve for these contracts 1-year ago. The red and yellow curves show prices for contracts traded on the current and previous months.

Source: Derived from *NYMEX* data.

Updated December 8, 2009

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

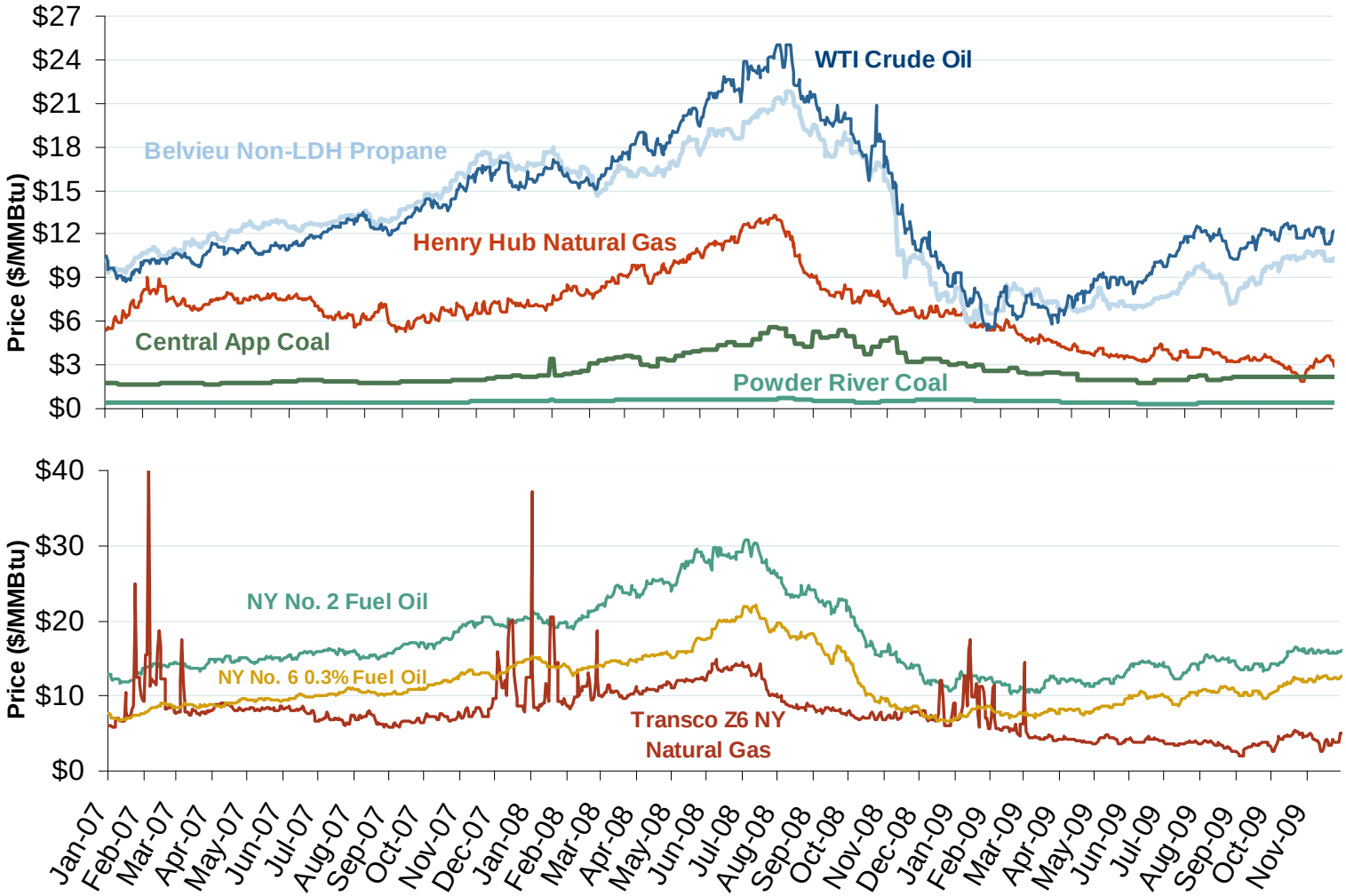




Source: Derived from *Platts* and *Nymex* data.

Updated December 8, 2009

Oil, Coal, Natural Gas and Propane Daily Spot Prices

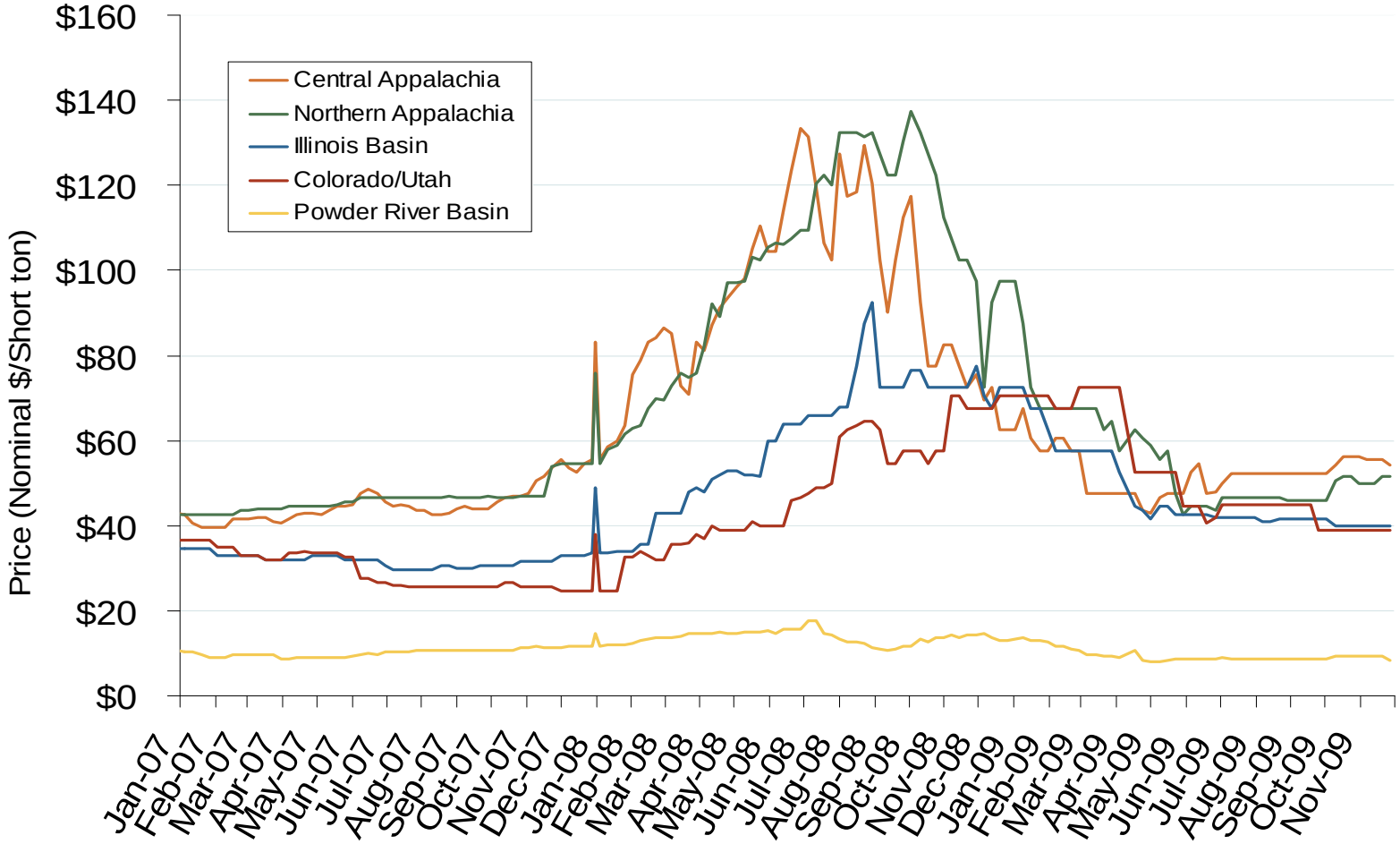


Source: Derived from *ICE* and *Bloomberg* data.

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.

Updated December 8, 2009

Regional Coal Spot Prices

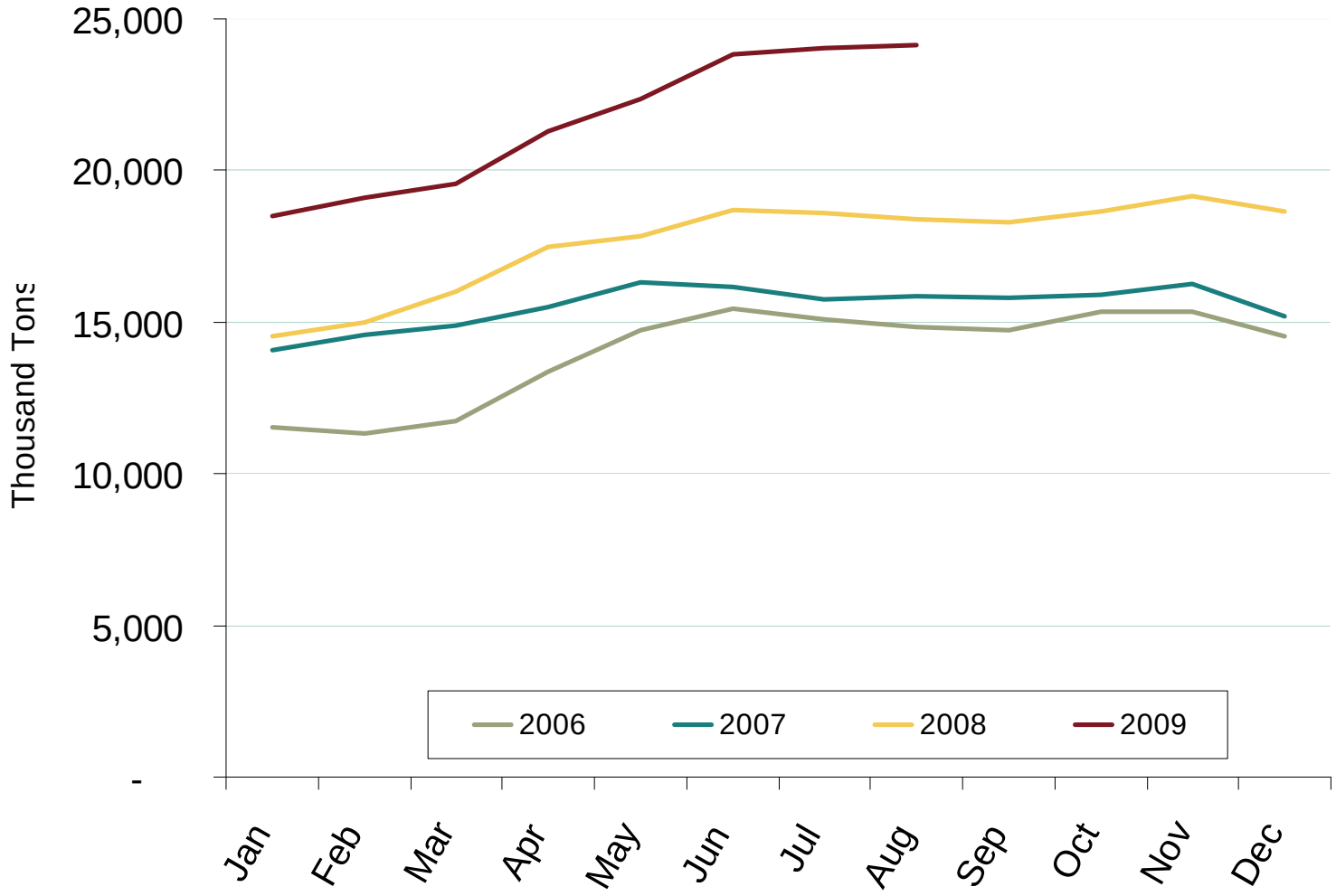


Note: the Central Appalachian (CAPP) coal is priced at Big Sandy. All others are mine mouth prices. Prices do not include transportation costs to a plant, as those can vary widely by contract specifications. Prices exclude incremental cost of emissions allowances.

Source: Derived from *Bloomberg* data.

Updated December 8, 2009

Western Coal Stockpiles at Electric Power Generating Facilities



Source: Energy Information Administration. Excludes Industrial and Commercial Plants.

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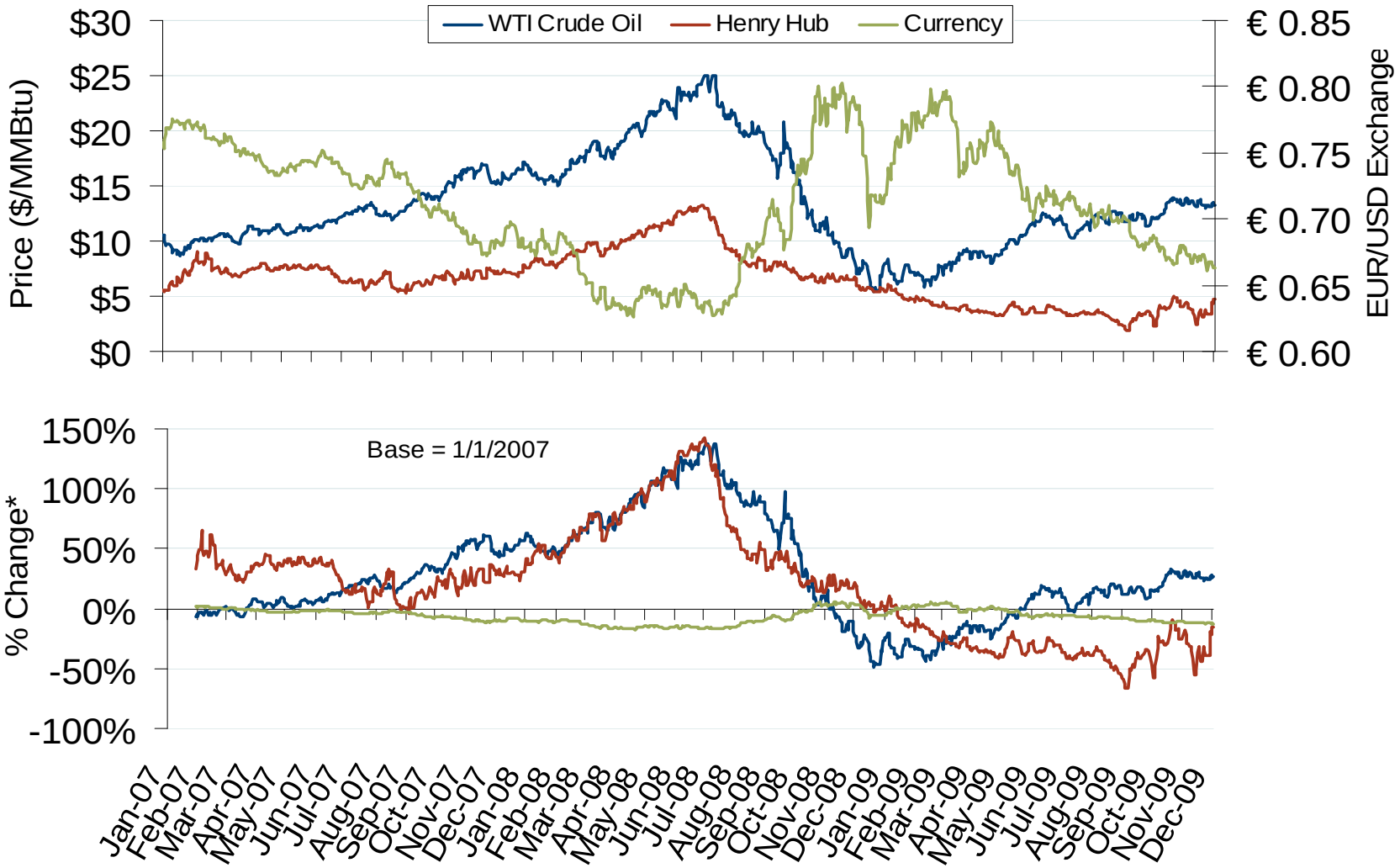
Oil, Natural Gas and Currency Spot Prices



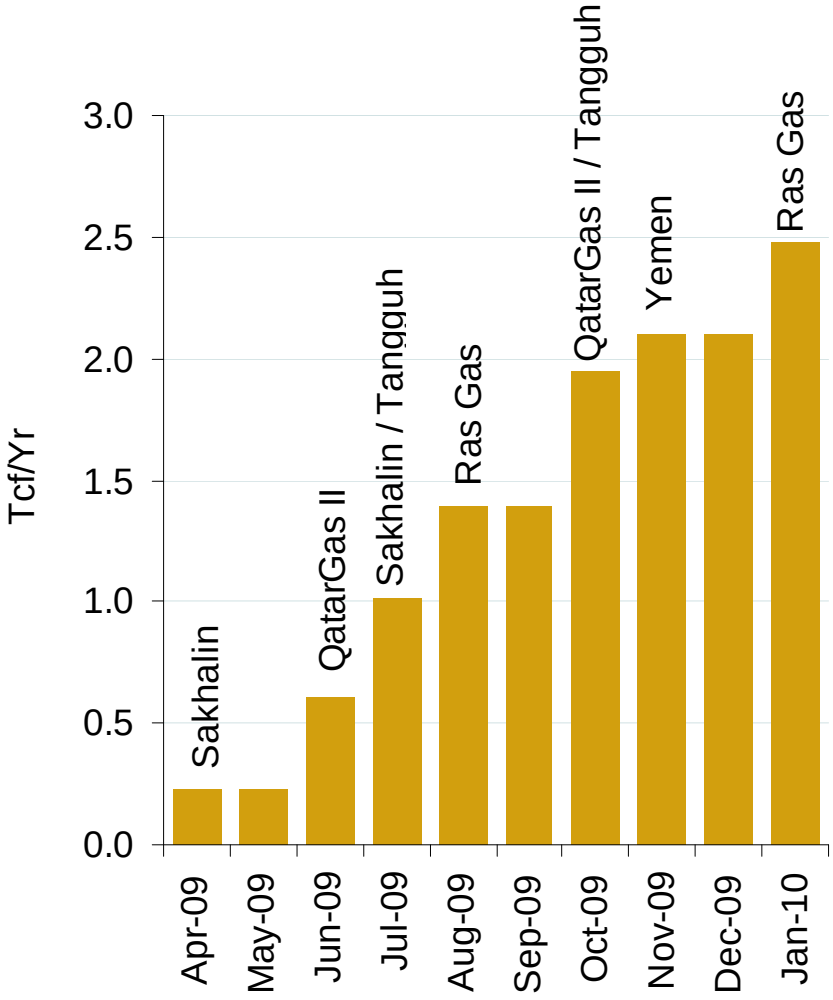
Source: Derived from *Bloomberg* data.

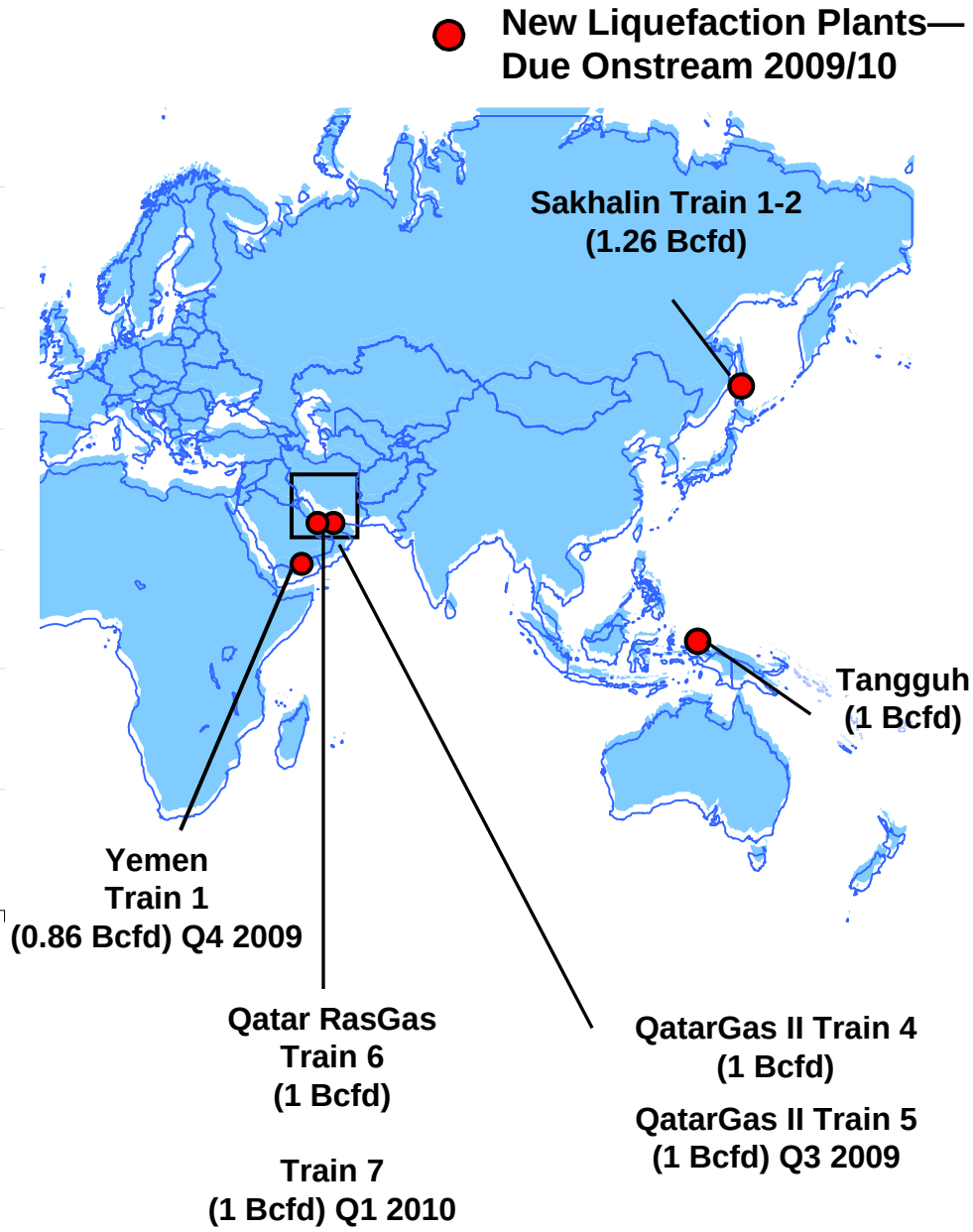
Updated December 8, 2009

Natural Gas Market : Global LNG Supply Additions

Federal Energy Regulatory Commission • Market Oversight @ FERC.gov

2009 Cumulative Liquefaction Additions

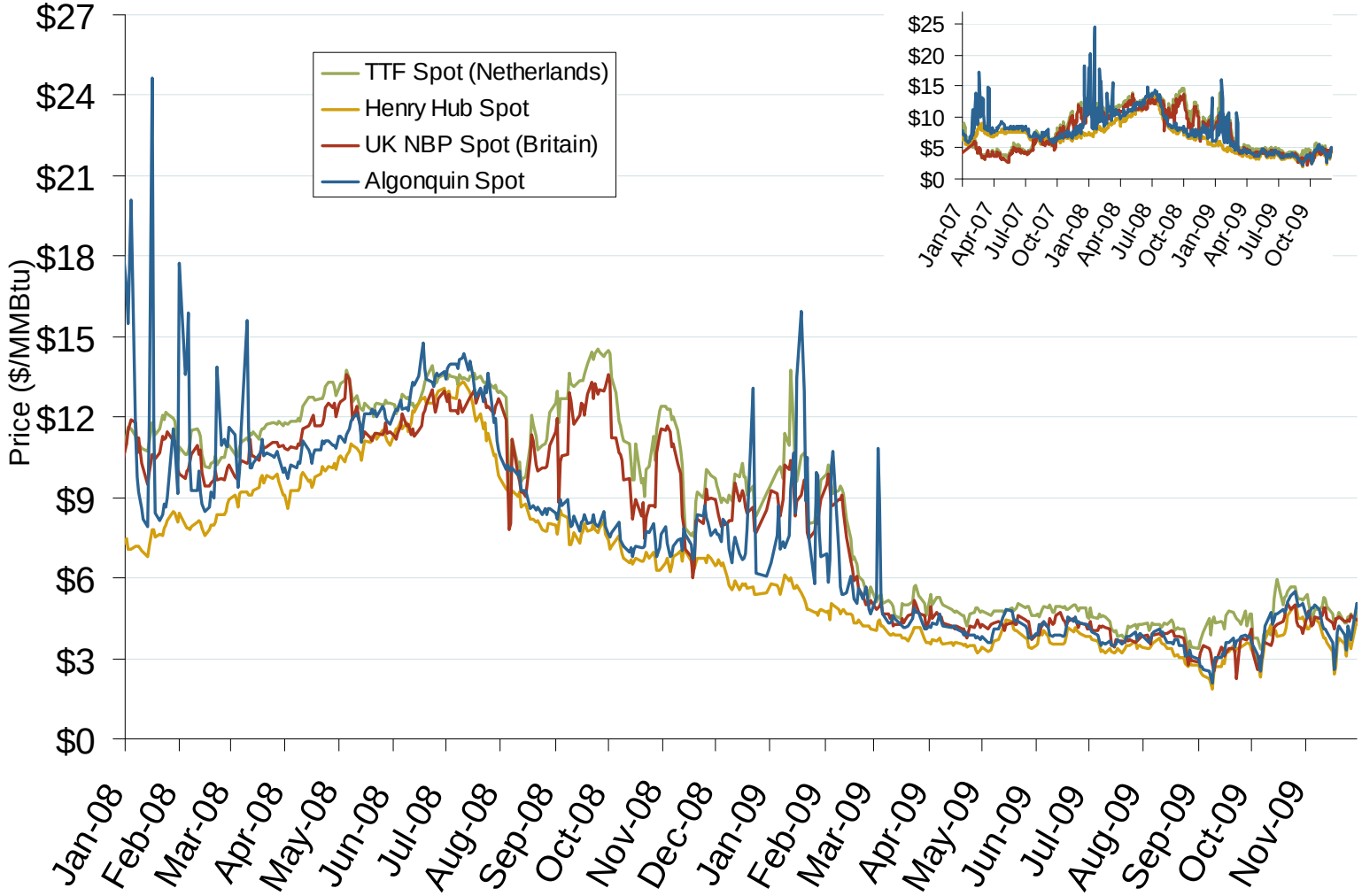




Source: Waterborne LNG

December 2009 Western Snapshot Report

Atlantic Basin European and US Spot Natural Gas Prices



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

Updated December 8, 2009

World LNG Estimated December 2009 Landed Prices

Source: *Waterborne Energy, Inc.* Data in $US/MMBtu.

December 2009 Western Snapshot Report

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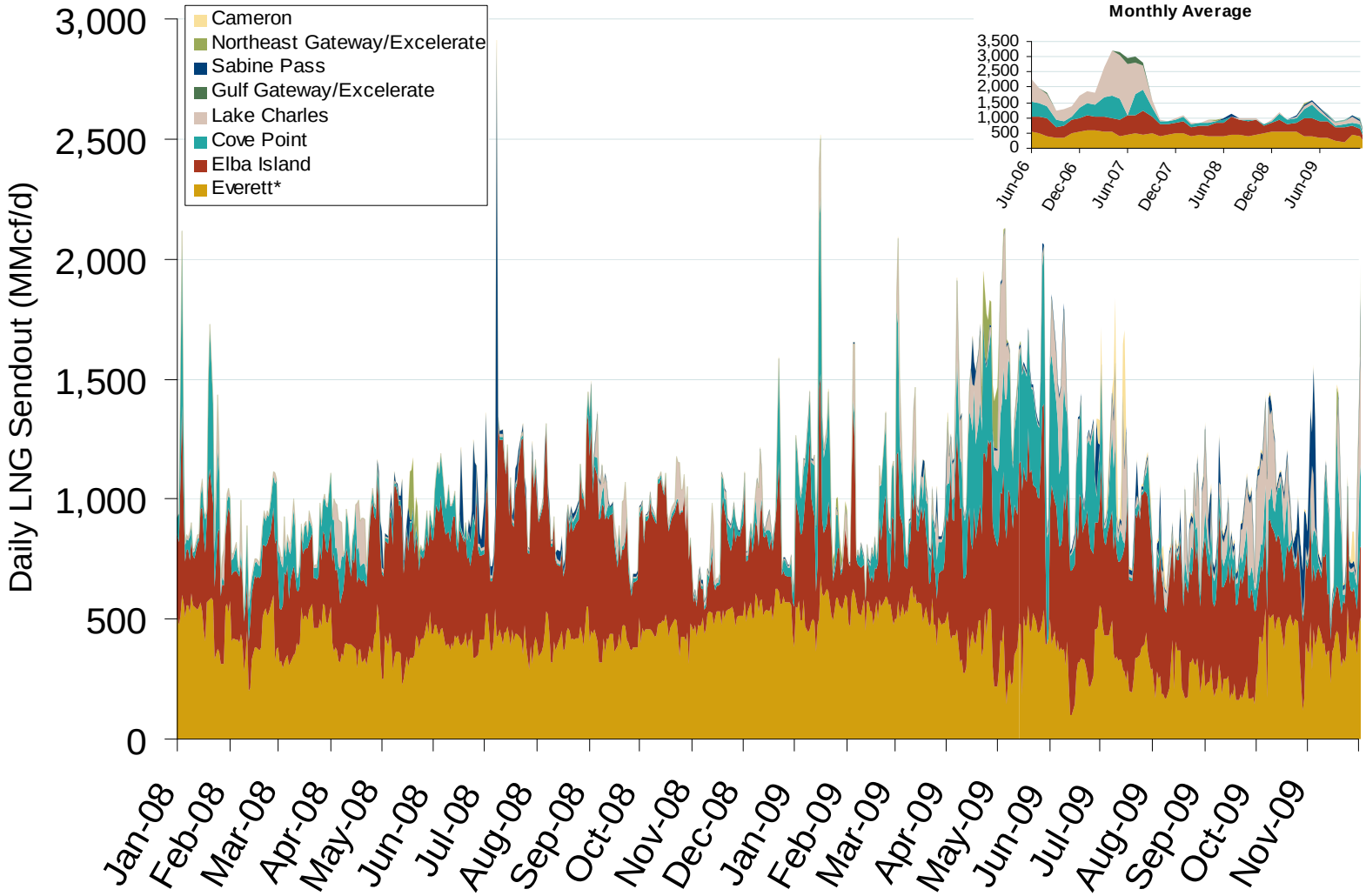
Daily Gas Sendout from Existing U.S. LNG Facilities



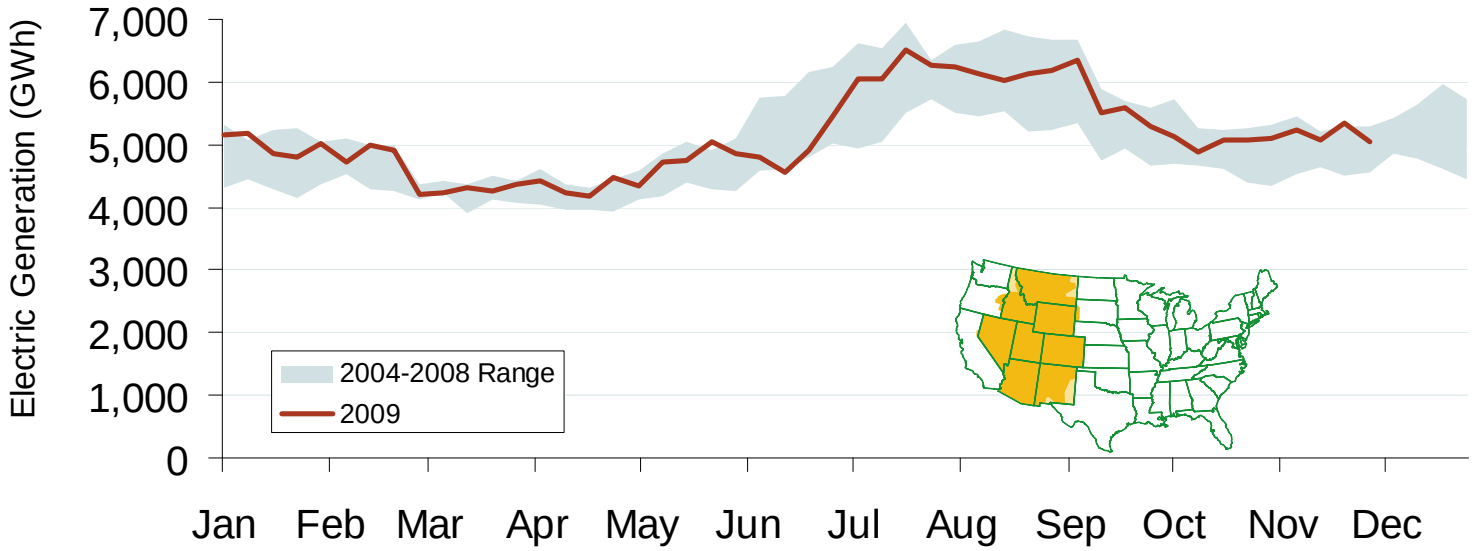
Source: Derived from *Bentek* data.

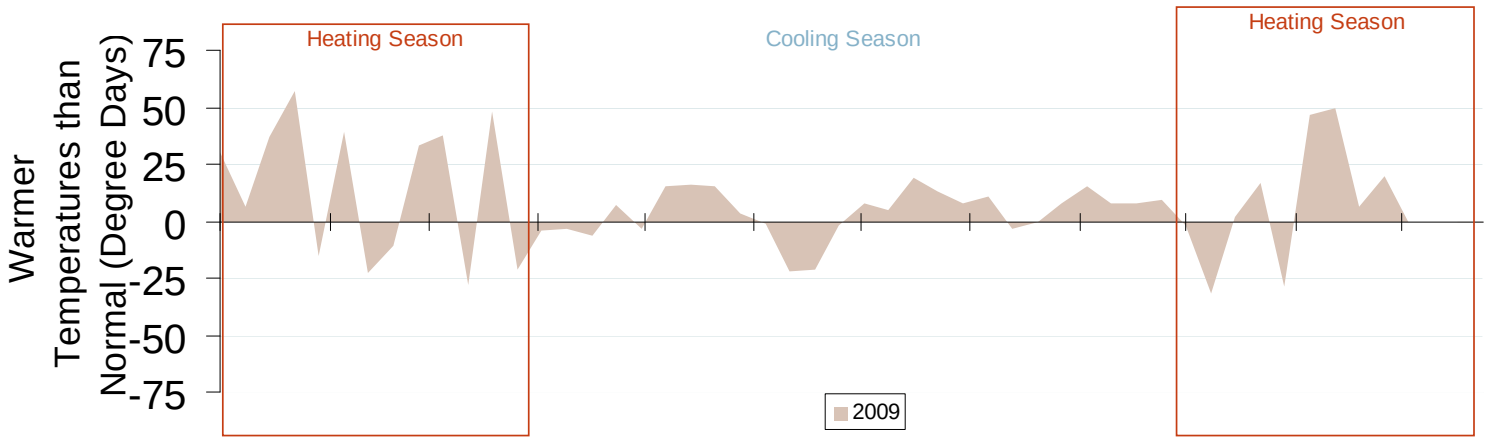
* Everett data includes flows onto the AGT and TGP interstate lines, plus estimates of flows to the Mystic 7 power plant, Keyspan Boston Gas, and LNG trucked out of the terminal. Excludes Freeport LNG which flows via intrastate pipelines.

Updated December 8, 2009

Electricity Markets

Weekly Electric Generation Output and Temperatures Rocky Mountains Region

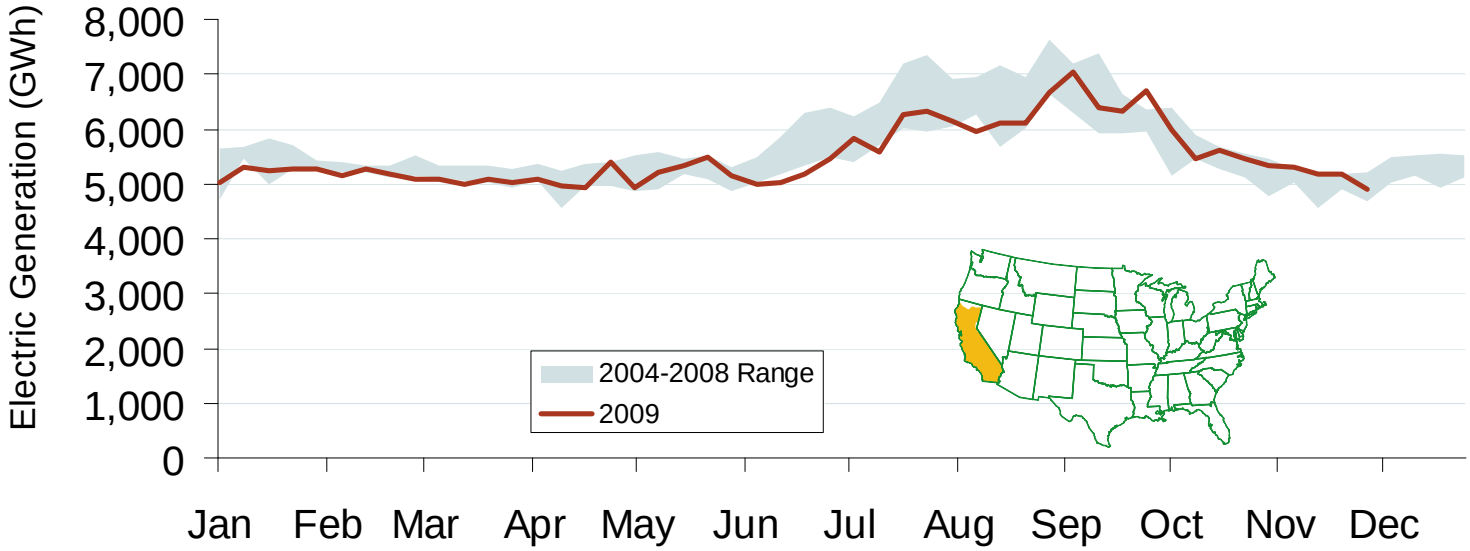


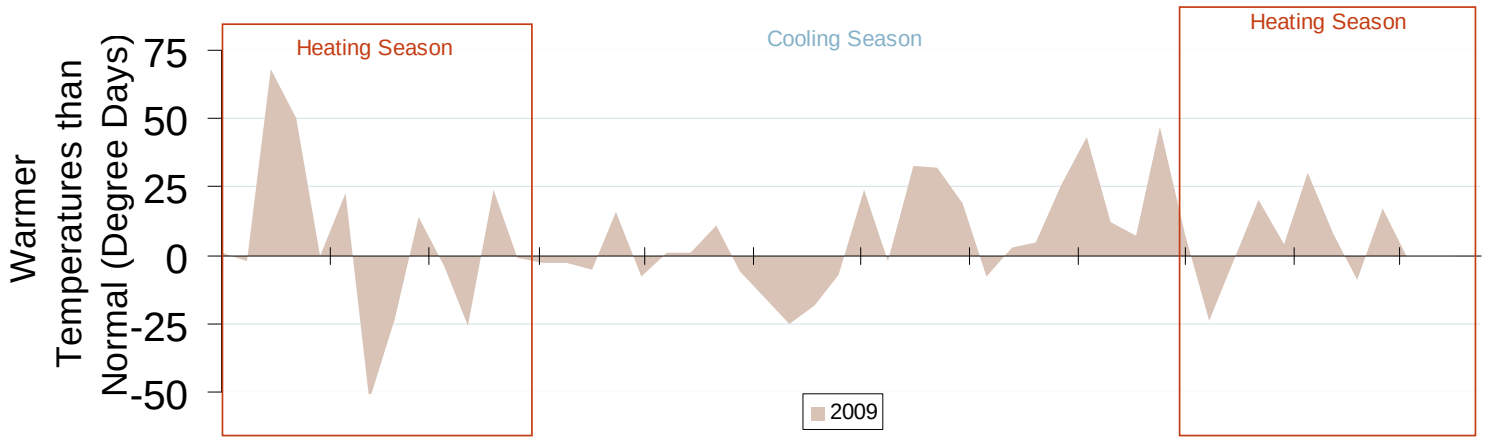


Source: Derived from *EEI* and *NOAA* data.

Updated December 8, 2009

Weekly Electric Generation Output and Temperatures California

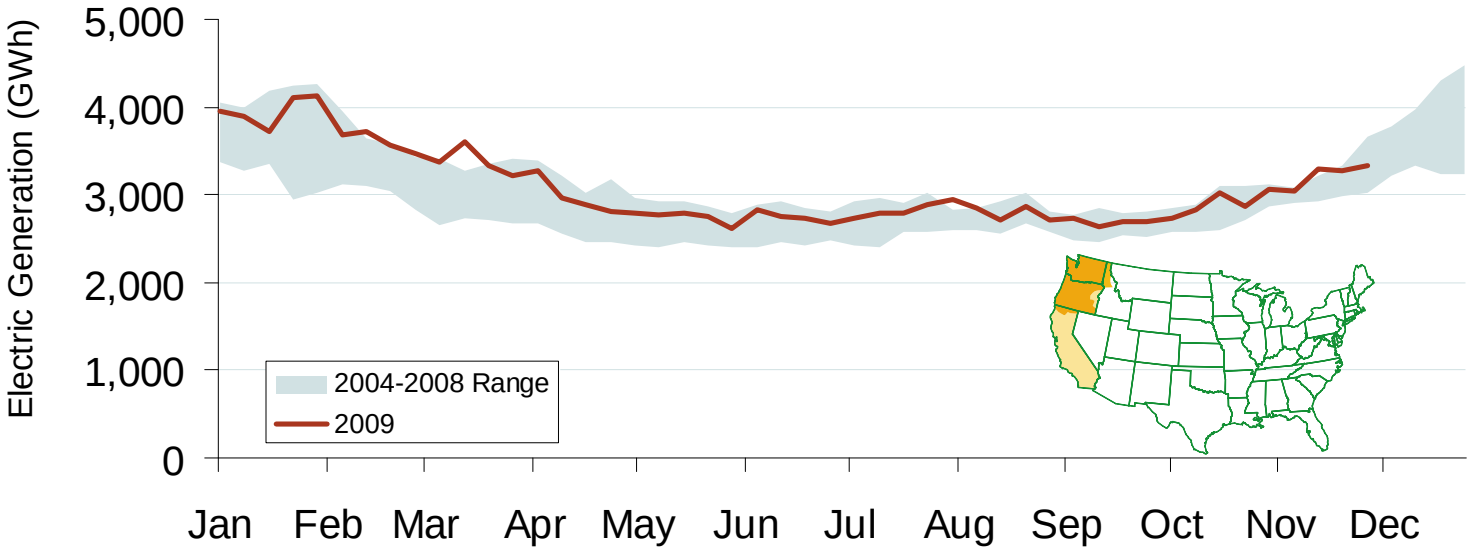


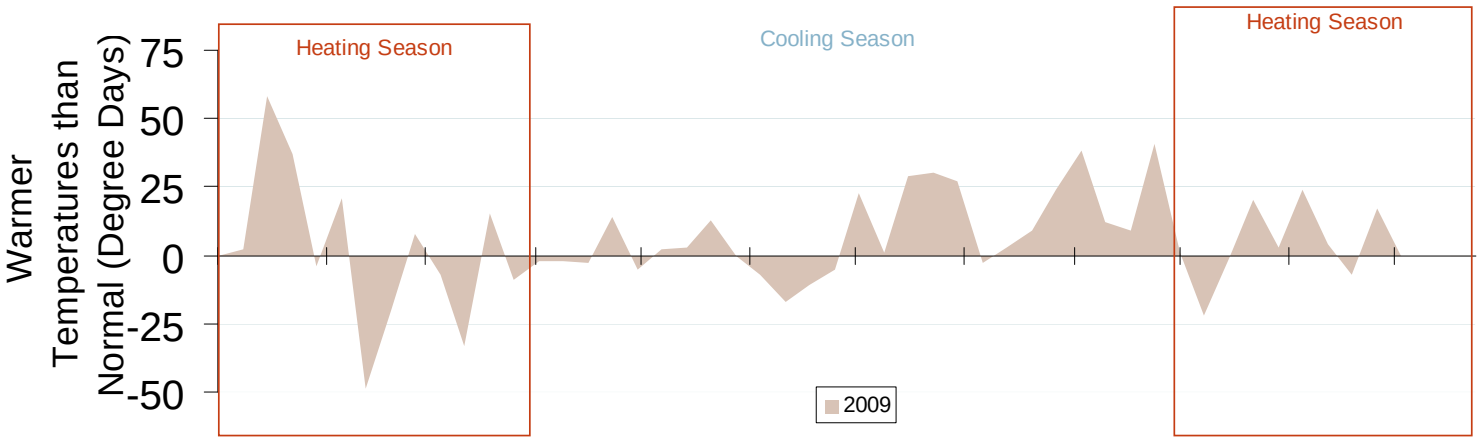


Source: Derived from *EEI* and *NOAA* data.

Updated December 8, 2009

Weekly Electric Generation Output and Temperatures Pacific Northwest Region

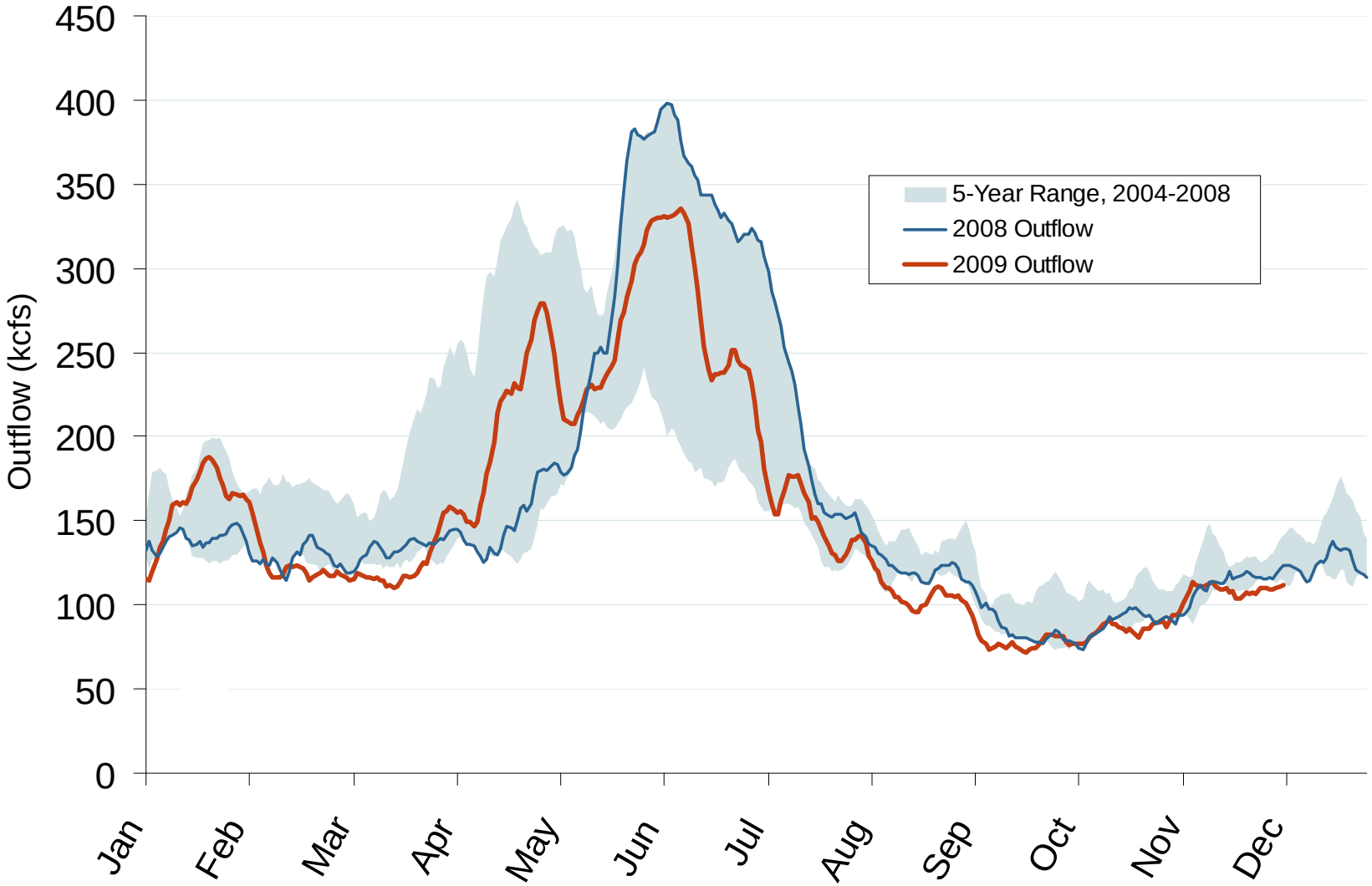




Source: Derived from *EEI* and *NOAA* data.

Updated December 8, 2009

Stream Flow at The Dalles Dam

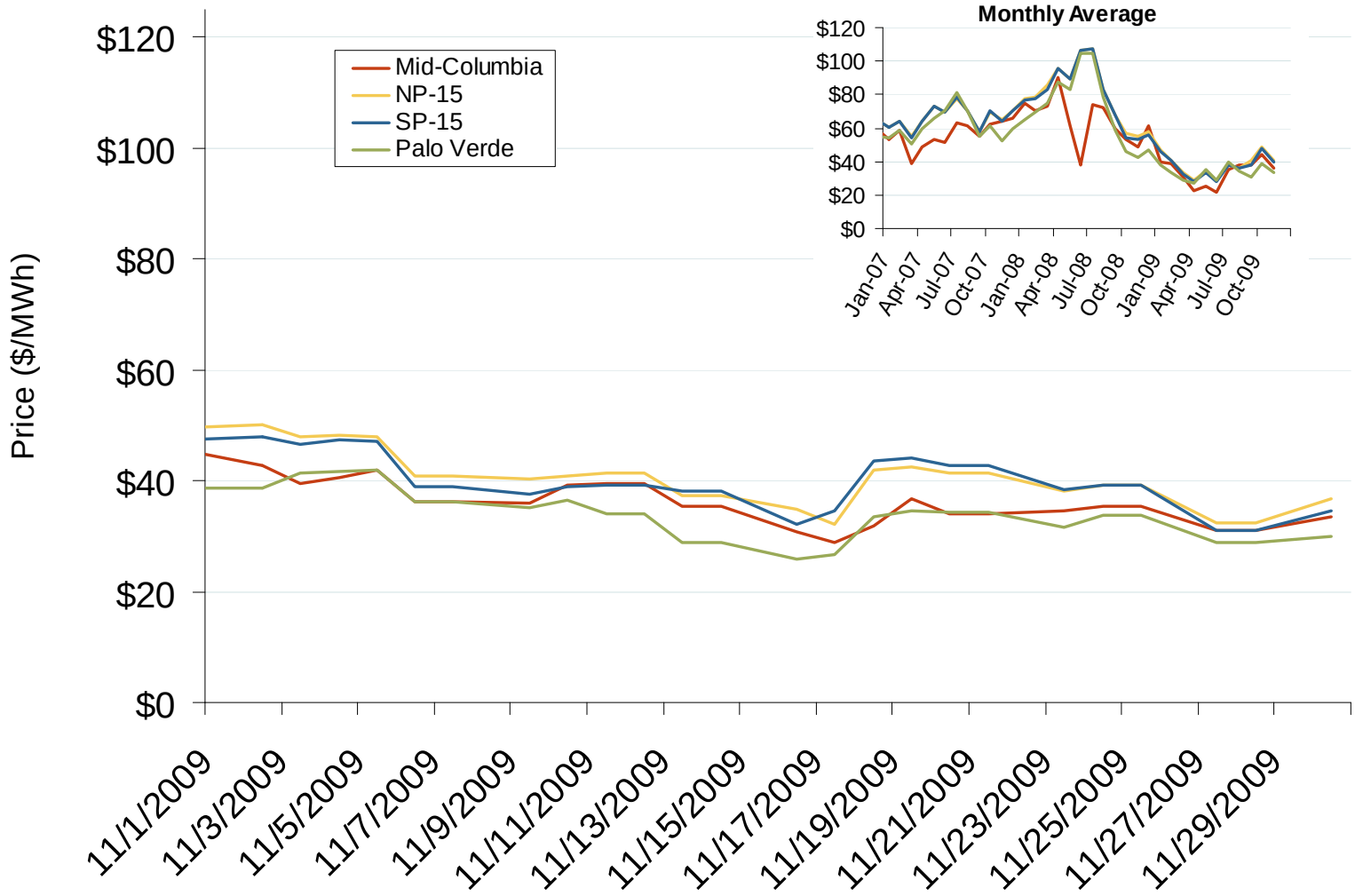


Source: Derived from *USACE* data.

Trend lines are 7-day moving averages.

Updated December 8, 2009

Western Daily Bilateral Day-Ahead On-Peak Prices



Source: Derived from *Platts* data.

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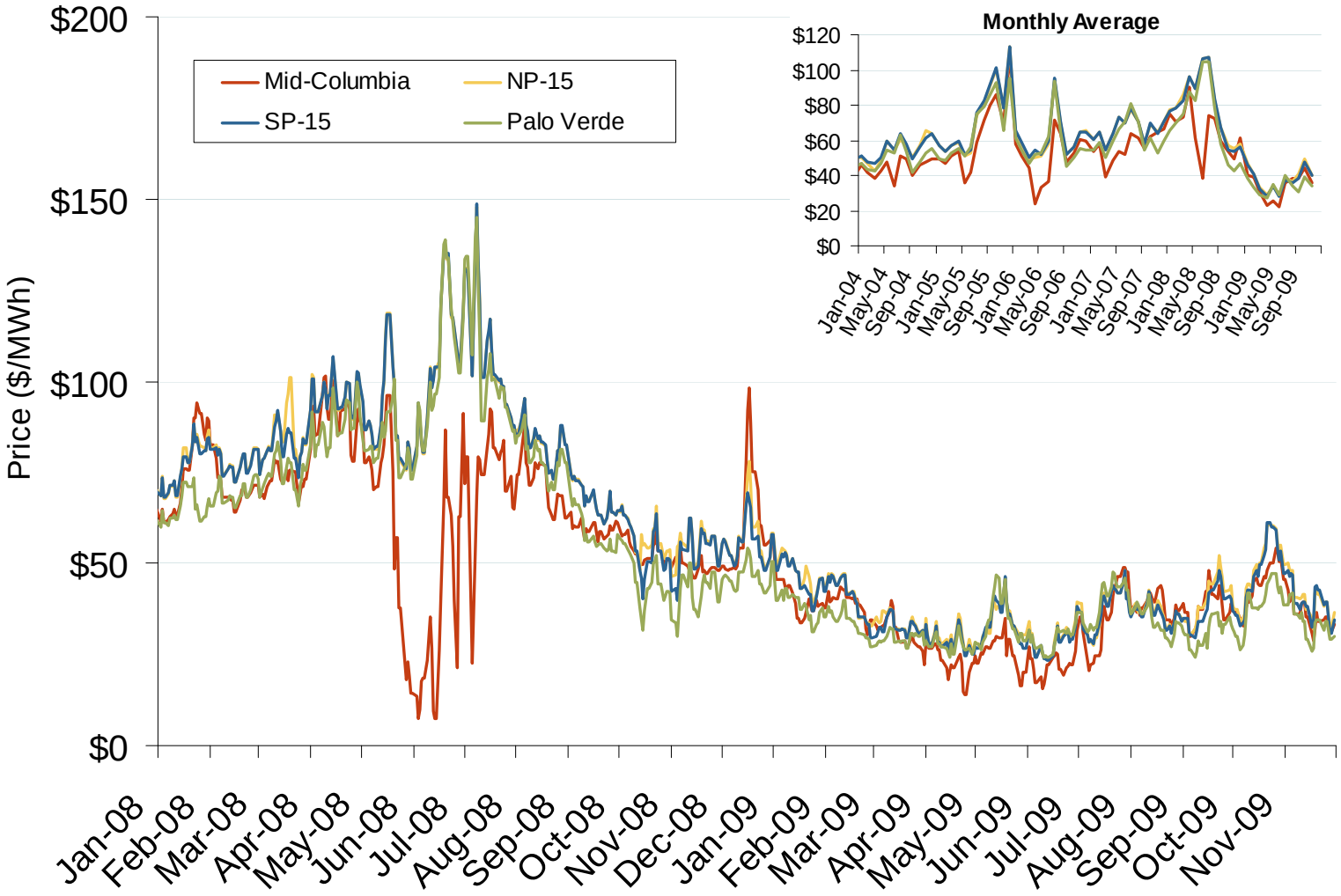

Source: Derived from *Platts* data.

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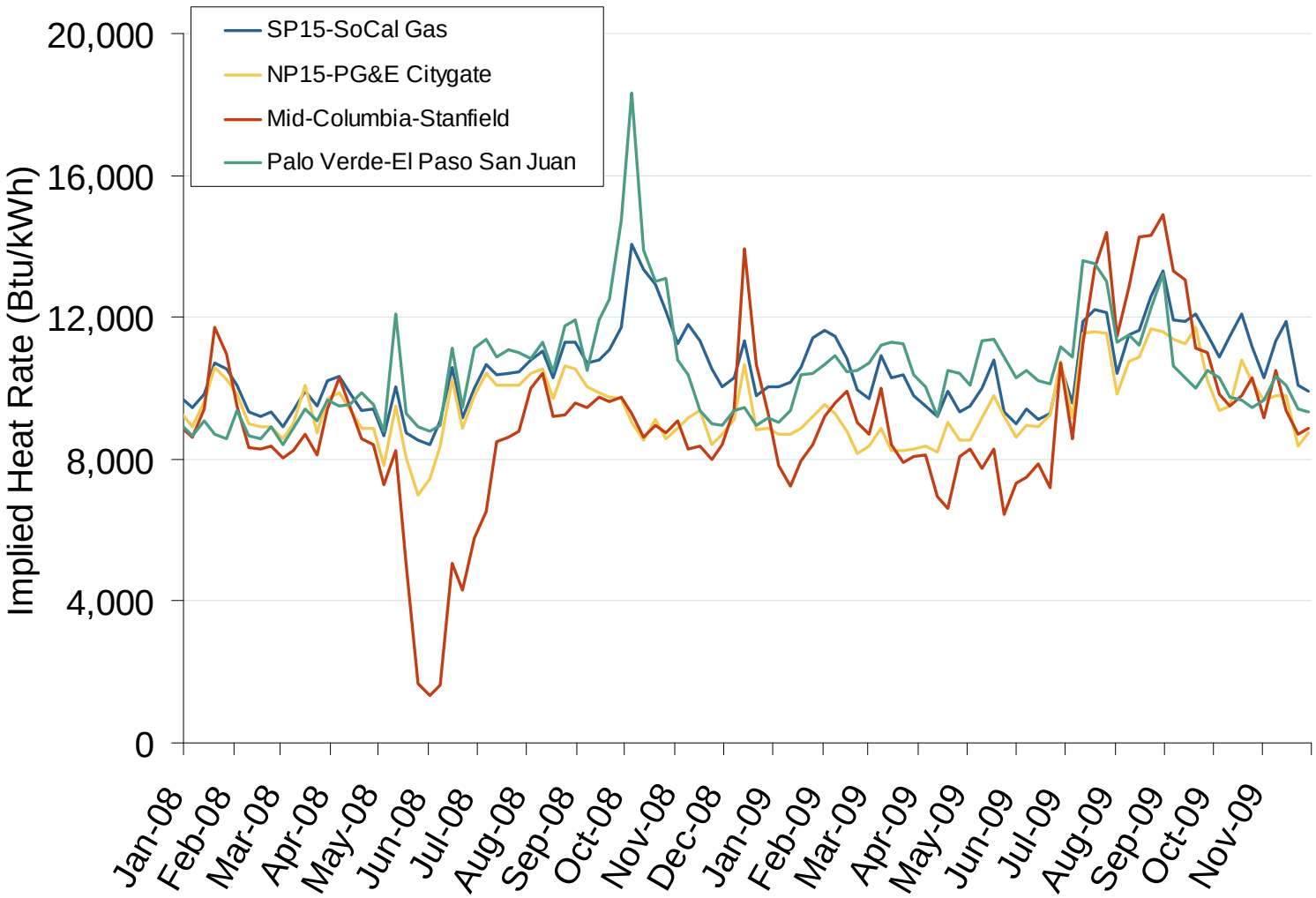
Implied Heat Rates at Western Trading Points Weekly Averages



Source: Derived from *Platts* on-peak electric and natural gas price data.

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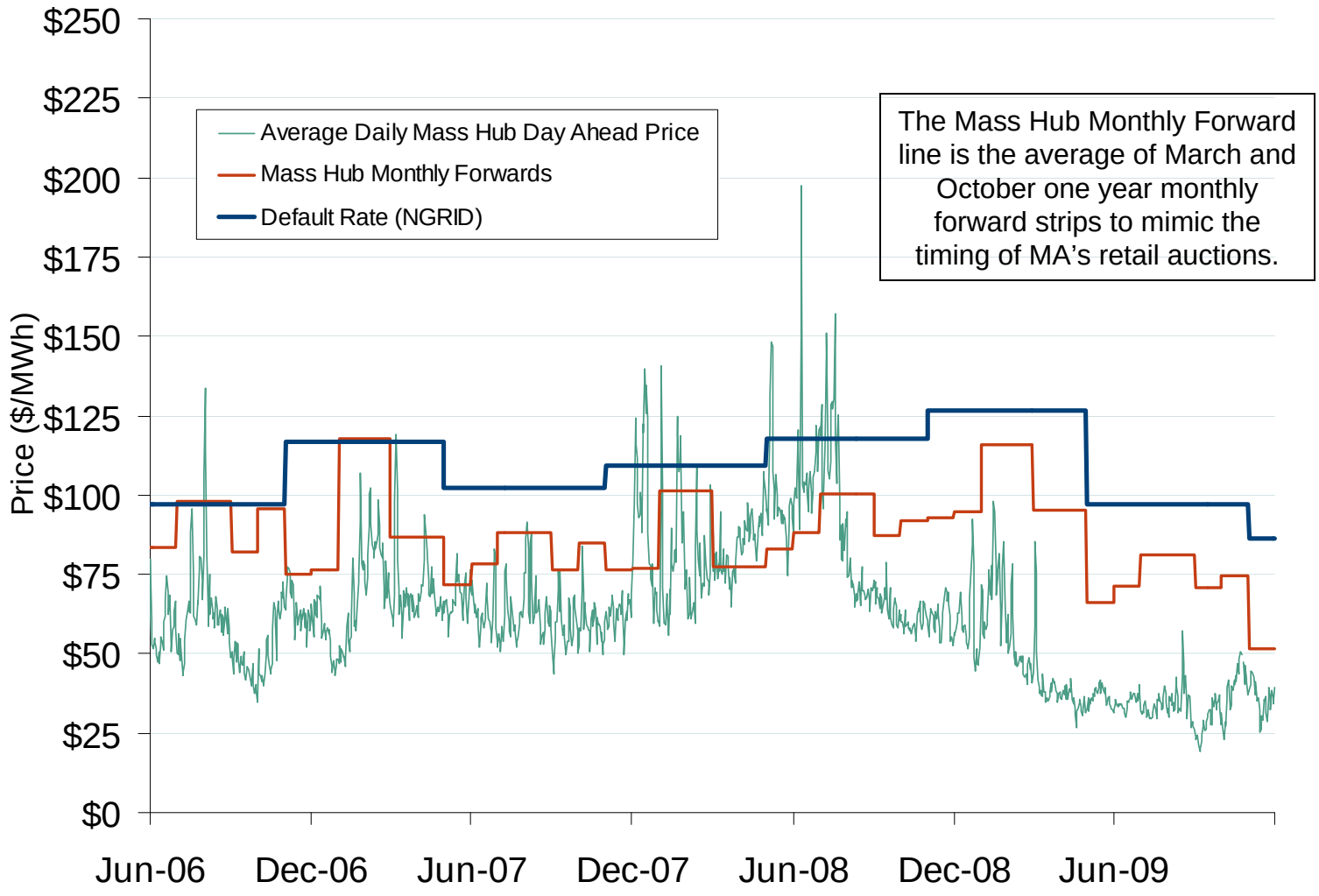
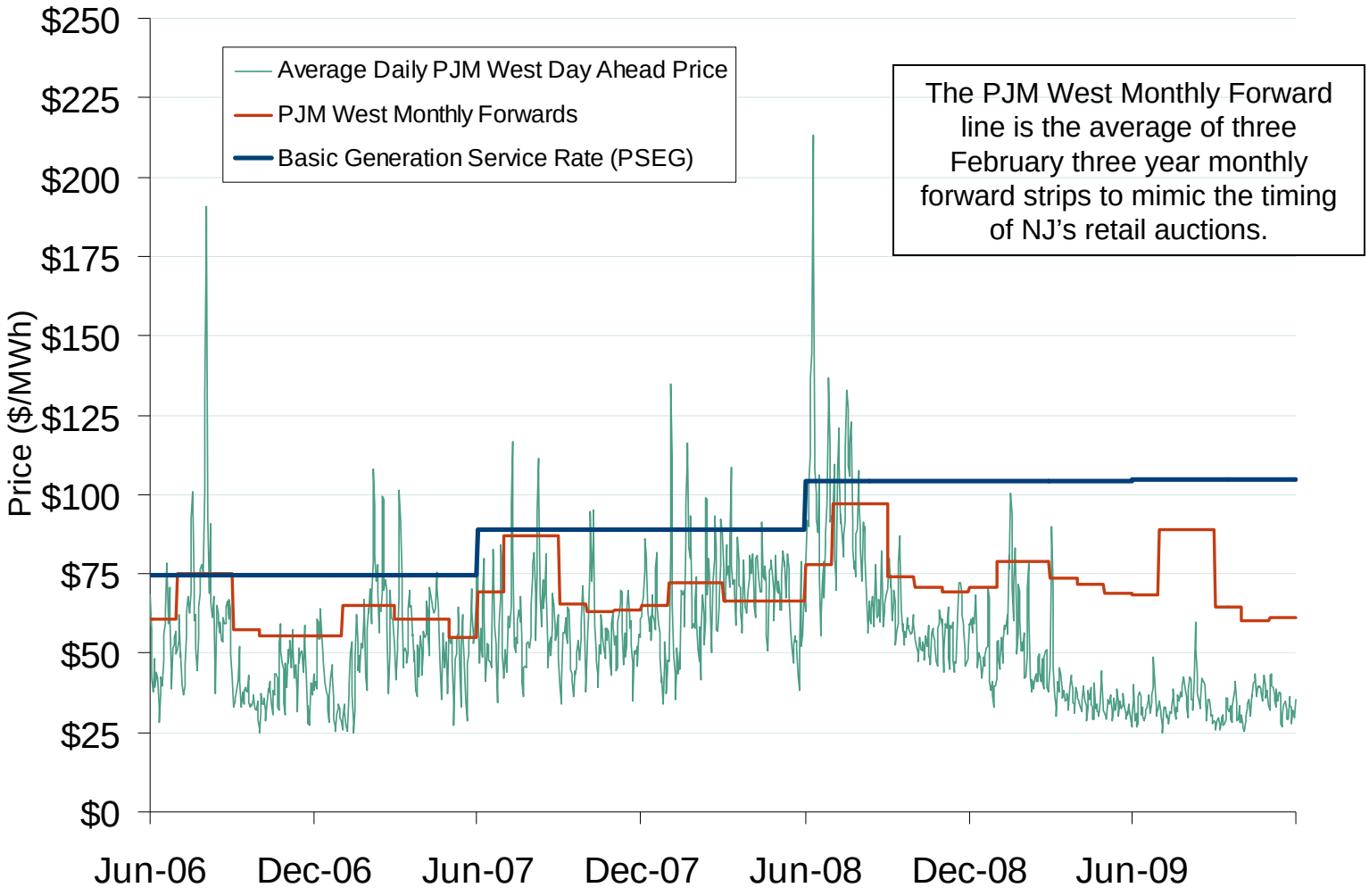
Massachusetts Default Rate and Mass Hub Wholesale Monthly Forward and Daily Spot Prices



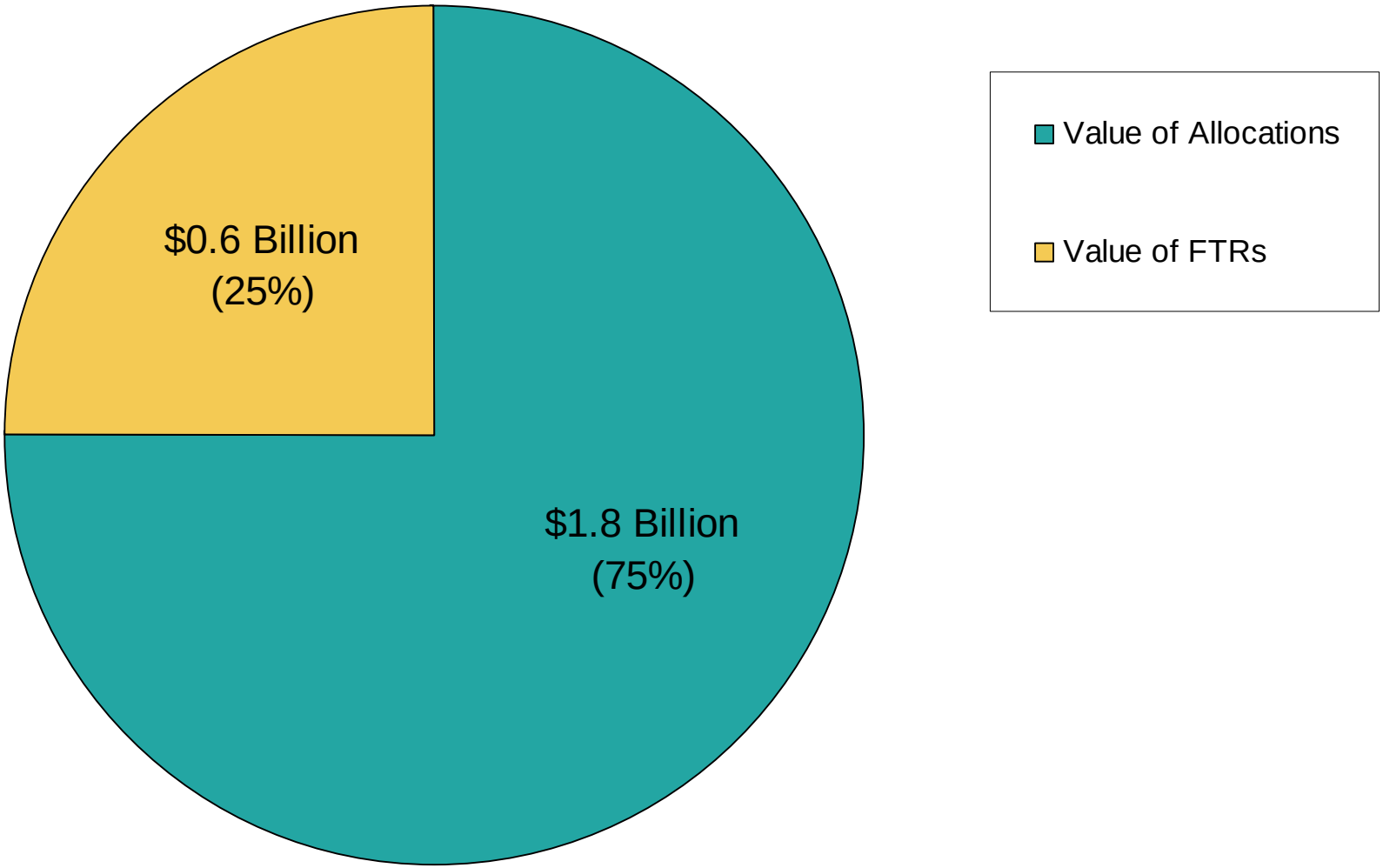
Source: Derived from Ventyx, Bloomberg and Massachusetts government data.

New Jersey's Basic Generation Service Rate and PJM West Wholesale Monthly Forward and Daily Spot Prices



Source: Derived from Ventyx, Bloomberg and New Jersey government data.

PJM 2008/09 Annual FTR Auction Value



Total Market Value = $2.4 Billion

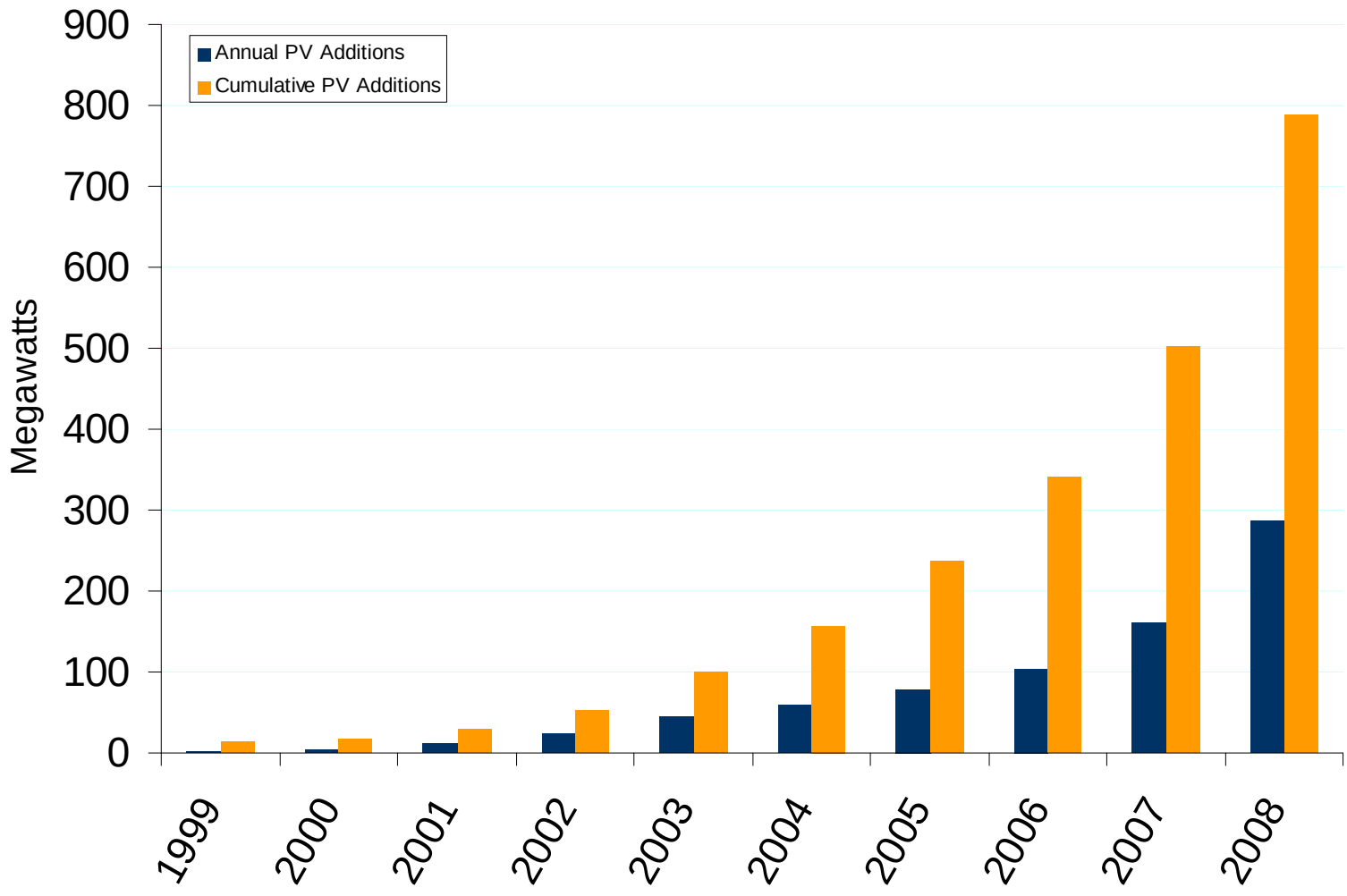
Source: Derived from Ventyx and PJM non-public data.

2009 FTR Market Participants active in multiple markets

FTR Market	2009 Market Participants	Active FTR Paths in 2009
PJM	181	51,156
MISO	100	18,715
ISO-NE	47	23,113
CAISO	41	15,485
NYISO	36	2,508
		110,977

Total Unique Participants	**309**

U.S. Grid-Connected Photovoltaic Capacity Growth, 1999 – 2008



Source: IREC: Interstate Renewable Energy Council
December 2009 Western Snapshot Report

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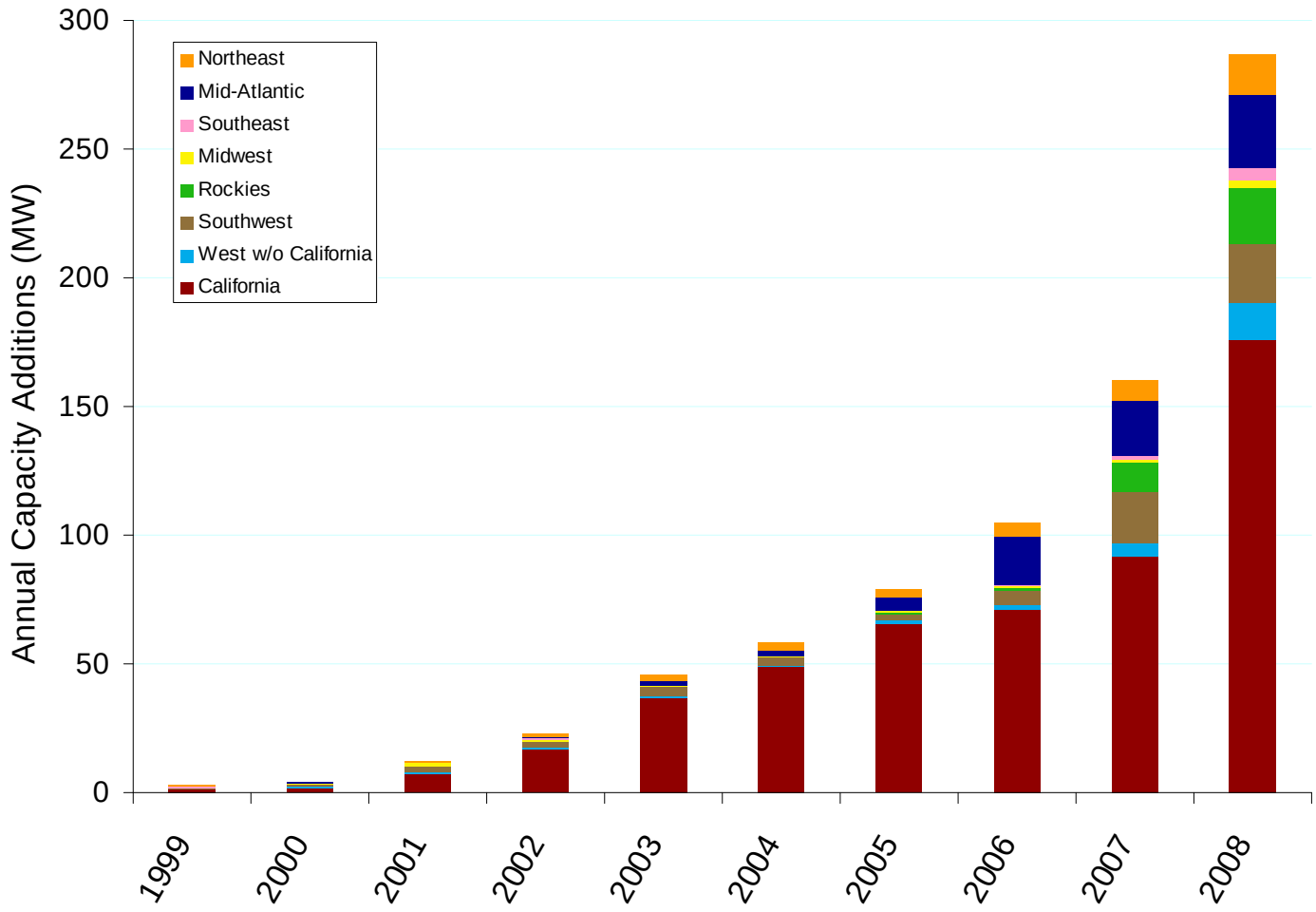
Regional Grid-Connected Photovoltaic Capacity Growth



Note: 43 states and D.C. have at least 1 MW of grid-connected PV:
Northeast: CT, ME, MA, NH, RI, VT
Mid-Atlantic: DE, DC, MD, NJ, NY, PA
Southeast: AL, AR, FL, GA, MS, NC, SC, TN, VA
Midwest: IL, IN, IA, KY, MI, MN, MO, OH, OK, WI
Rockies: CO, ID, MT, UT, WY
Southwest: AZ, NV, NM, TX
West w/o California: HI, OR, WA

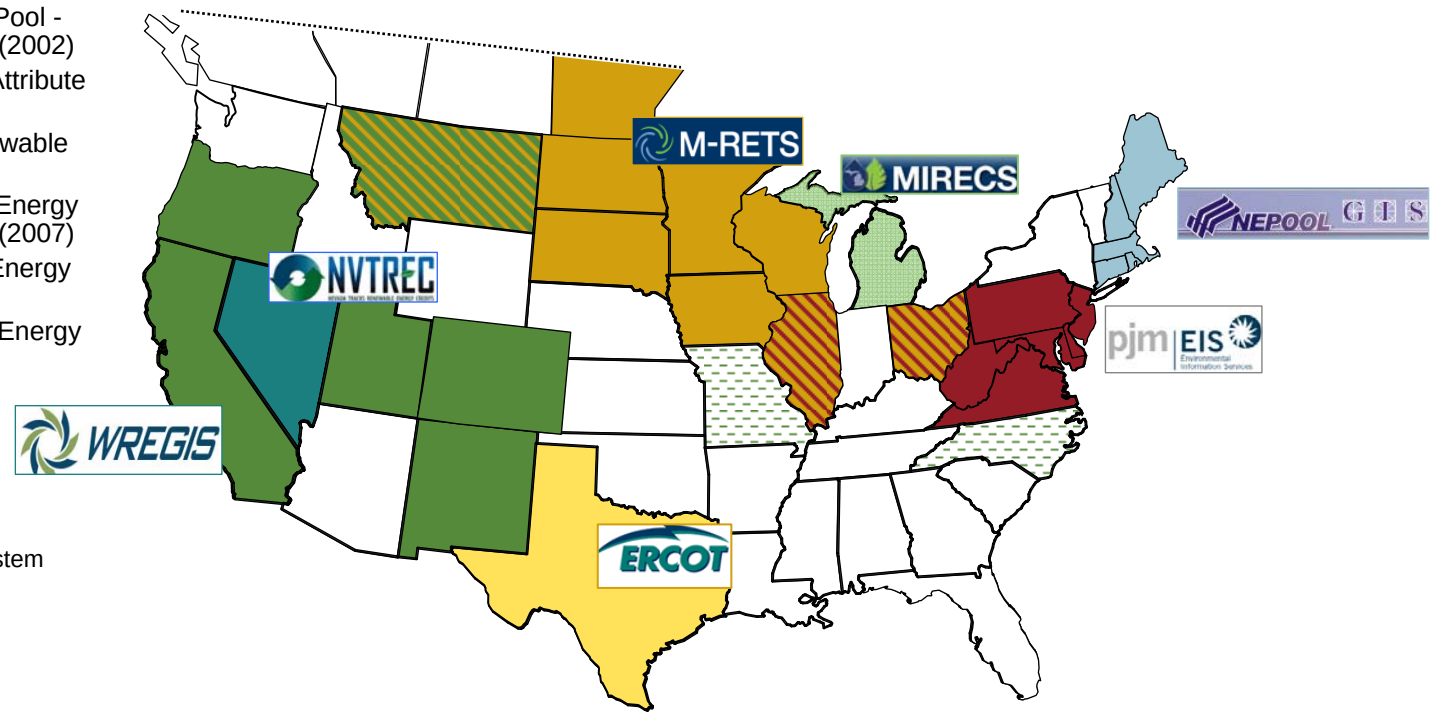
Source: Interstate Renewable Energy Council (IREC)
December 2009 Western Snapshot Report

Updated November 30, 2009

Seven Renewable Energy Tracking Systems Operate in North America

Tracking Systems: (year operational)

- **ERCOT:** Texas REC Trading System (2001)
- **NEPOOL – GIS:** New England Pool - Generation Information System (2002)
- **PJM – GATS:** PJM-Generator Attribute Tracking System (2005)
- **NVTREC:** Nevada Tracks Renewable Energy Credits (2007)
- **WREGIS:** Western Renewable Energy Generation Information System (2007)
- **M-RETS:** Midwest Renewable Energy Tracking System (2007)
- **MIRECS:** Michigan Renewable Energy Certification System (Oct 2009)



- NEPOOL-GIS
- PJM-EIS GATS
- MIRECS – Michigan REC System
- M-RETS
- ERCOT
- NVTREC
- WREGIS
- stripes, all colors – mixed states
- dashes – RFP issued for system developer & administrator

Updates at: http://www.ferc.gov/market-oversight/othr-mkts/renew/othr-rnw-rec-trk.pdf

Note: neither Alaska nor Hawaii have renewable tracking systems
Abbreviations: EERS – Energy Efficiency Resource Standard; REC - Renewable Energy Certificate; also renewable energy credit; RFP – request for proposal; RPS – Renewable Portfolio Standard (or RES, Renewable Electricity Standard); SREC – Solar REC
Sources: Individual tracking system administrators and websites; APX; State Commission websites

Updated December 4, 2009

Renewable Energy Certificate (REC) Tracking Systems

Seven Operating Systems Track RECs:

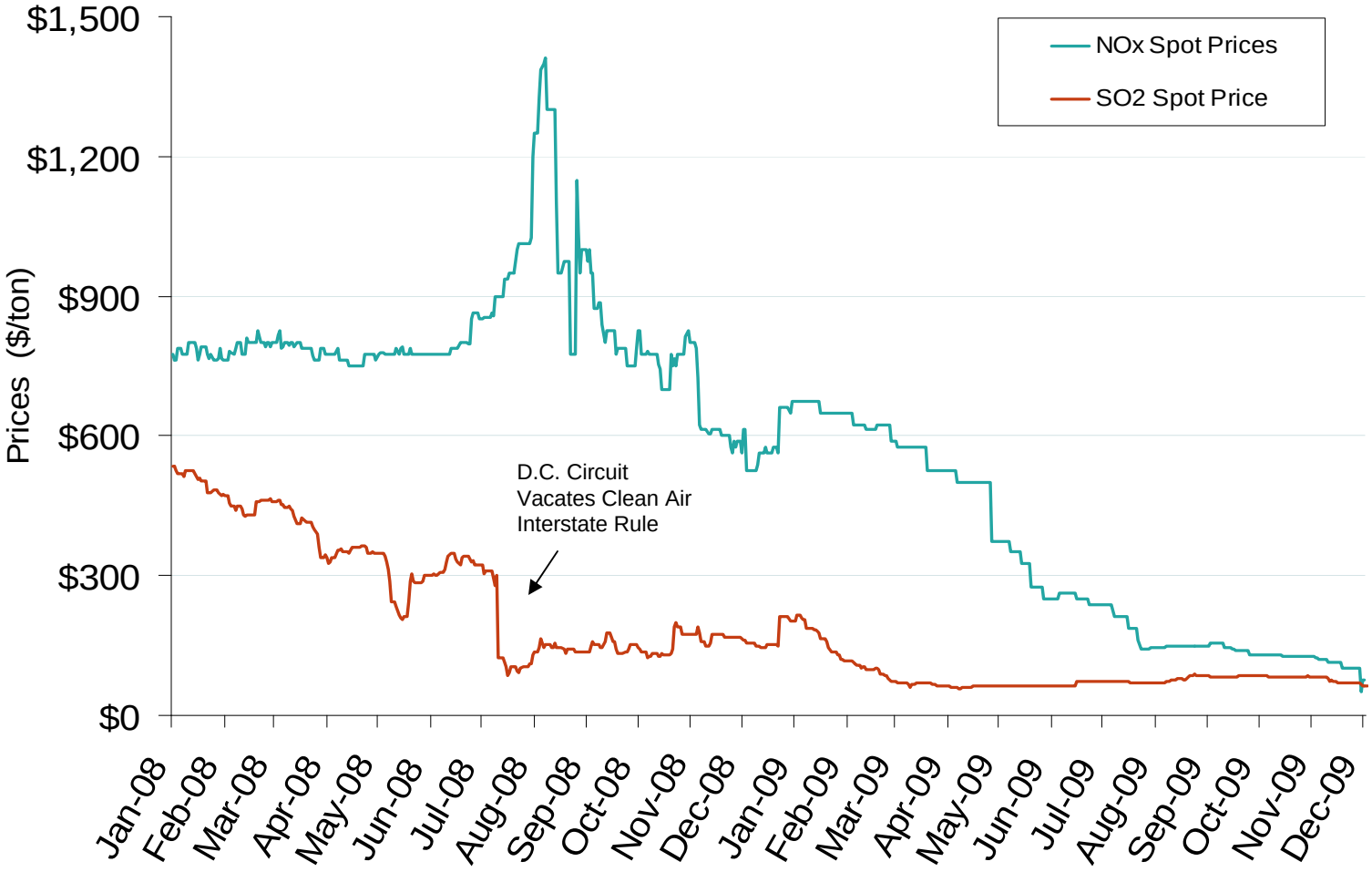
- These quasi-governmental regional entities were created as accounting systems to issue, track, and retire RECs, or certificates of renewable generation, within their jurisdiction in accordance with different state's Renewable Portfolio Standard (RPS) rules.
- Each reported megawatt-hour (MWh) of eligible generation results in a system-issued REC with a unique identification number to prevent double-counting.
- RECs allow regulators to track compliance with mandatory RPS targets and to verify progress in voluntary state renewable programs.
- Each REC includes attributes such as generator location, capacity, fuel-type and source, owner, and date operational. Records are tagged by program eligibility.
- Differences in intra-regional rules include whether RECs can be banked for use in future years and for how long; which renewable technologies are eligible; and whether some fuels or technologies are granted multiple credits.
- Compliance entities, such as retail suppliers, can meet RPS targets by purchasing RECs in lieu of generating renewable electricity.
- Most systems have added attributes to support other state, provincial, or regional programs or requirements such as solar set-asides, voluntary utility green-power programs, or emissions tracking.
- Where necessary, systems track conservation or energy efficiency credits in states with a combined RPS and Energy Efficiency Resource Standard (EERS).

The **Waxman-Markey** bill would give FERC responsibility for issuing federal RECs with respect to a national RES, and to develop a tracking system compatible with existing state, tribal, and regional systems.

State Tracking Activities:

- 24 states (including D.C.) with an RPS or goal use seven REC tracking systems to monitor compliance or progress.
- **Michigan** launched MIRECS – Michigan Renewable Energy Certification System on Oct 30. It chose a stand-alone system because the nuances of its RPS would have involved complicated and expensive modifications to PJM-GATS.
- **North Carolina** and **Missouri** issued RFPs for third-parties to design, implement and administer tracking systems (Oct 19).
  - **NC** will consider proposals to create a NC-RETS as an independent state system or to make modifications in an existing system to accommodate its RPS features.
  - **MO** asked that proposals be returned by Nov 4. The RFP was a discussion item at the PUC's November meeting.
- **Virginia** and **West Virginia** do not now require compliance RECs, although PJM-GATS tracks all generation for member utilities in those states, including renewables.
- States that don't participate in operating regional systems but track or plan to track RECs include:
  - **Nevada** has a PUC-run web-based system. NVTREC – Nevada Tracks Renewable Energy Credits – tracks renewable generation at the kilowatt/hour level, credit multipliers, and energy conservation with Portfolio Energy Credits. Generators and utilities are also eligible to register with WREGIS.
  - **New York** plans to have a regionally-compatible system that supports environmental disclosure.
- **APX, Inc.** designed the infrastructure for all operating systems except Nevada's and is developing a national system to track renewable certificates in states without renewable requirements. It administers the systems for NEPOOL-GIS, M-RETS, and MIRECS.

SO_2 Allowance Spot Prices and NOx Seasonal Allowance Spot Prices



Source: Bloomberg

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Brief Overview of the SO2 and NOx Emissions Markets

The electric power industry is a major source of sulfur dioxide emissions (SO2) and nitrogen dioxide emissions (NOx) – 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 NOx emissions.

Currently US policy encourages reduction in SO2 and NOx 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 NOx, 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 NOx 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 NOx 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) NOx 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, NOx sources must surrender one allowance to emit one ton of NOx.

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

Source – EPA