

OE ENERGY MARKET SNAPSHOT

National – Data Through October 2016

Office of Enforcement
Federal Energy Regulatory Commission
November 2016

2016/2017 Winter Assessment

A decorative graphic consisting of several overlapping red lines that intersect to form a cross shape, centered on the page.

Markets Cautiously Optimistic Nearing Winter

- Natural gas and power prices are likely to be higher than last winter
- Normal to above average temperatures are expected
- Normal residential and commercial natural gas demand are expected, but lower power burn
- Falling production offset by plentiful storage with potential for imports from Canada
- New pipelines will reduce regional price differences
- New England and Southern California present challenges
- Renewables are changing California ramping requirements
- Entrants are small to mid-size generators and renewable projects, which are accompanied by new transmission projects
- Electric generation mix is changing

Futures Prices Higher

Location	2016 [^]	2017*	Δ
Algonquin (New England)	\$9.69	\$7.71	-20%
Transco Zone 6 non-NY (Mid-Atlantic)	\$6.21	\$6.26	+1%
Chicago City-Gates	\$2.62	\$3.84	+47%
Transco Zone 6 NY (New York City)	\$9.29	\$8.95	-4%
Dominion South (Marcellus)	\$1.97	\$2.14	+9%
Southern California Border	\$2.85	\$3.79	+33%
Henry Hub	\$2.77	\$3.55	+28%
Massachusetts Hub	\$89.28	\$78.93	-12%
PJM Western Hub	\$50.56	\$55.80	+10%
Northwest (Mid-C)	\$24.88	\$32.05	+29%
Southern California (SP-15)	\$33.76	\$41.18	+22%

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*January - February 2017

[^]January - February 2016

*Power Note: Prices in \$/MWh. Peak financial swap prices.

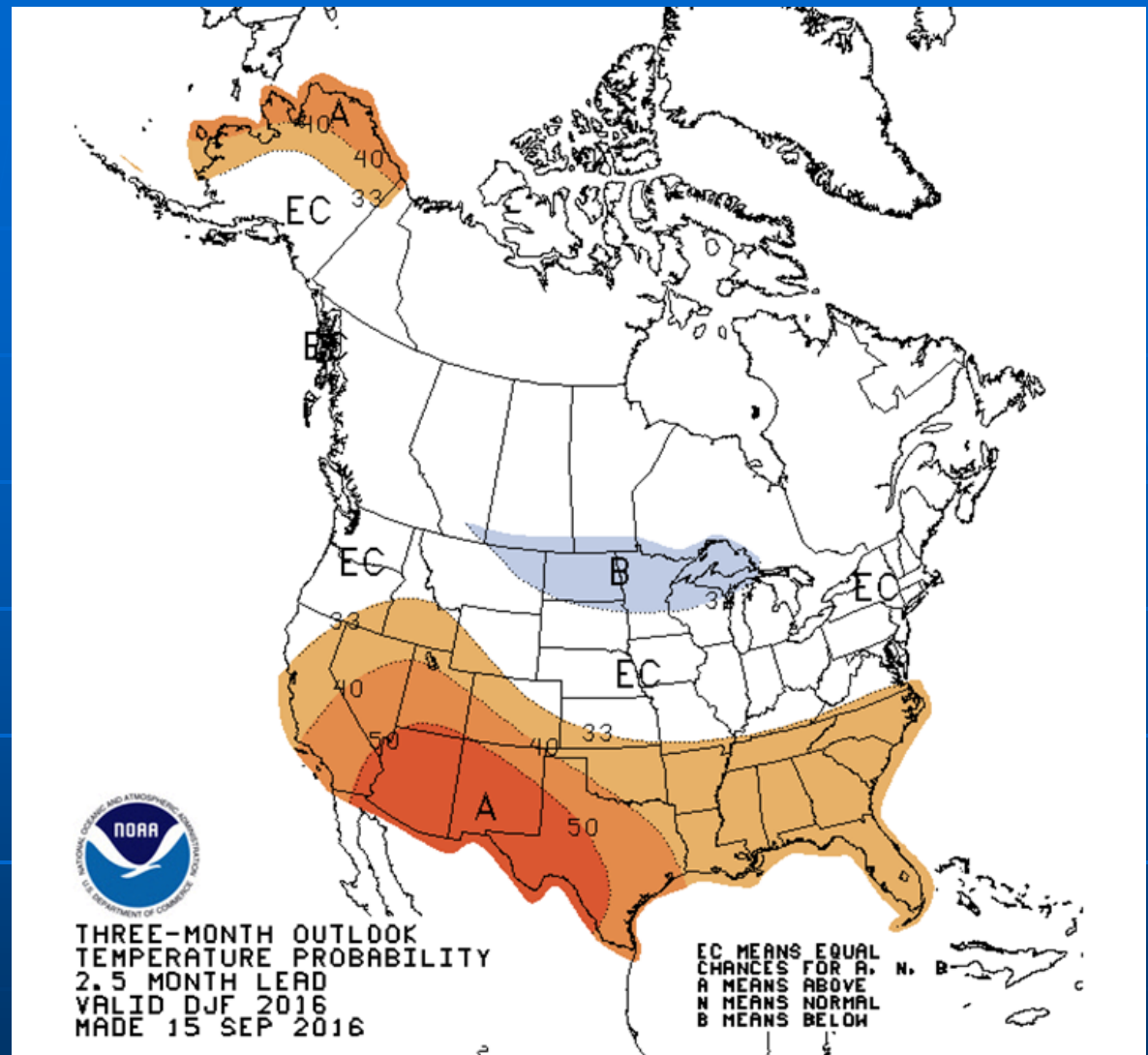
*Gas Note: Prices in \$/MMBtu. Regional futures natural gas prices are the sum of the Henry Hub futures contract price plus the regional basis futures.

Source: Derived from NYMEX and IntercontinentalExchange

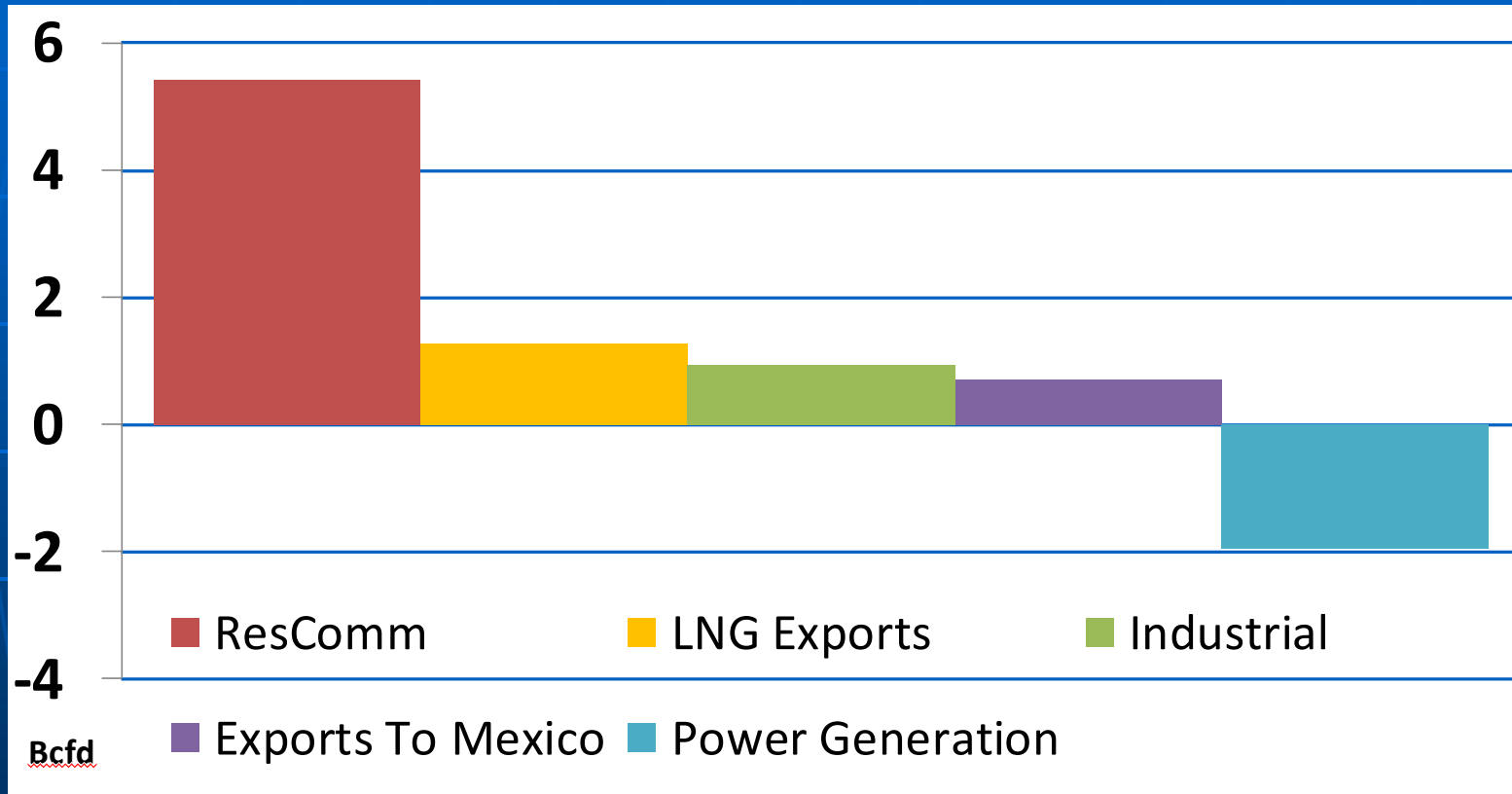
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Forecasters Call for Broadly Normal Winter Temperatures

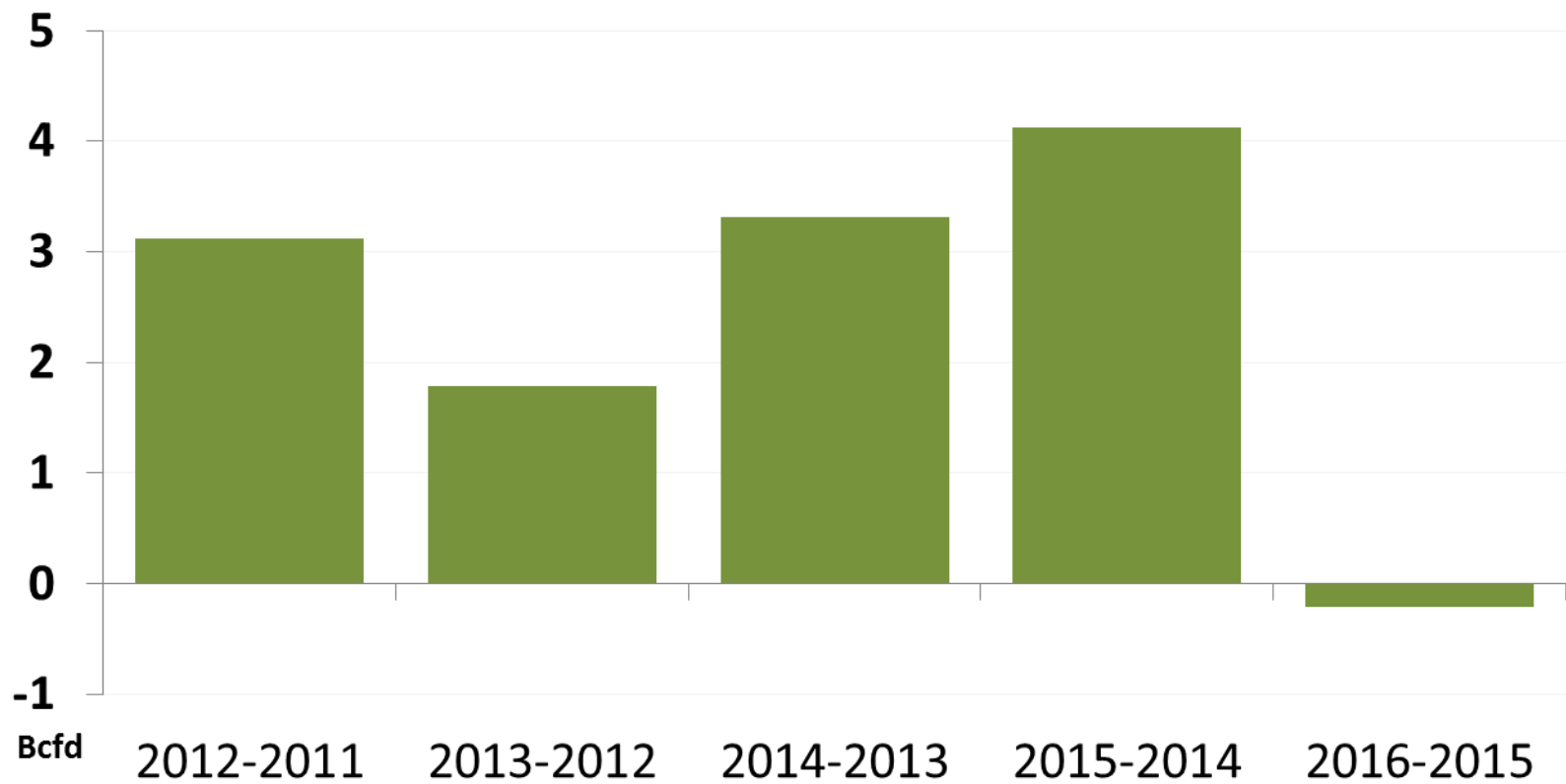
Source: National Oceanic and Atmospheric Administration



Gas Demand Likely to Rebound in 2016-17

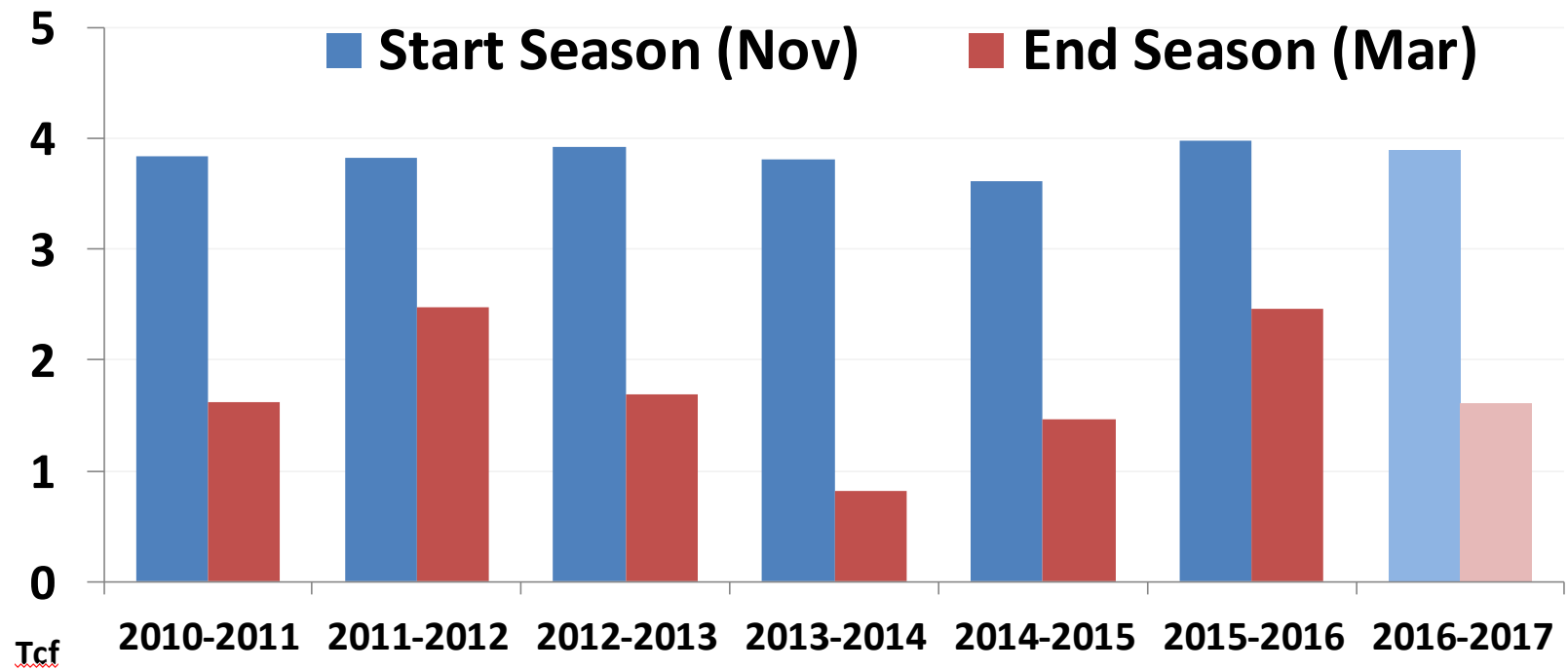


Production Sees First Decline of Shale Era



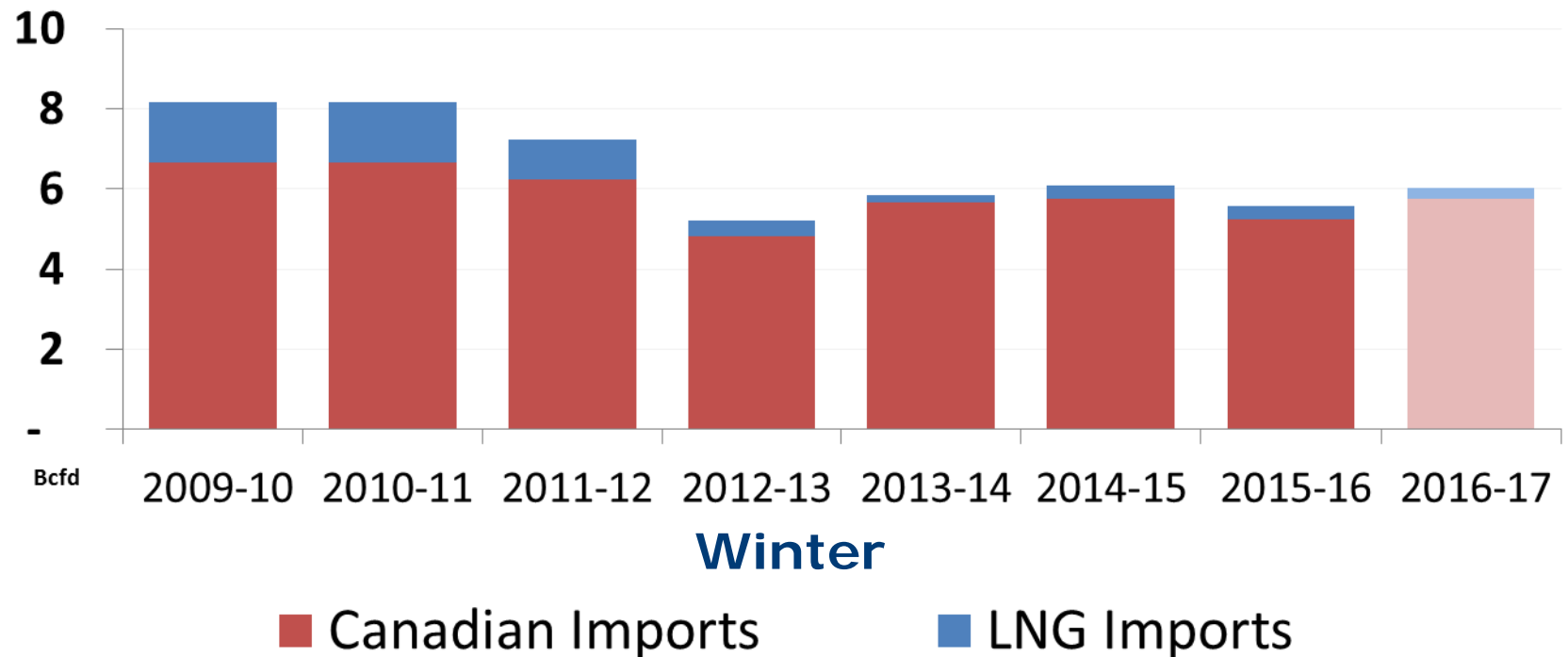
Sources: Derived
from Bentek, EIA

Strong Storage Inventories Keep Market Well Supplied

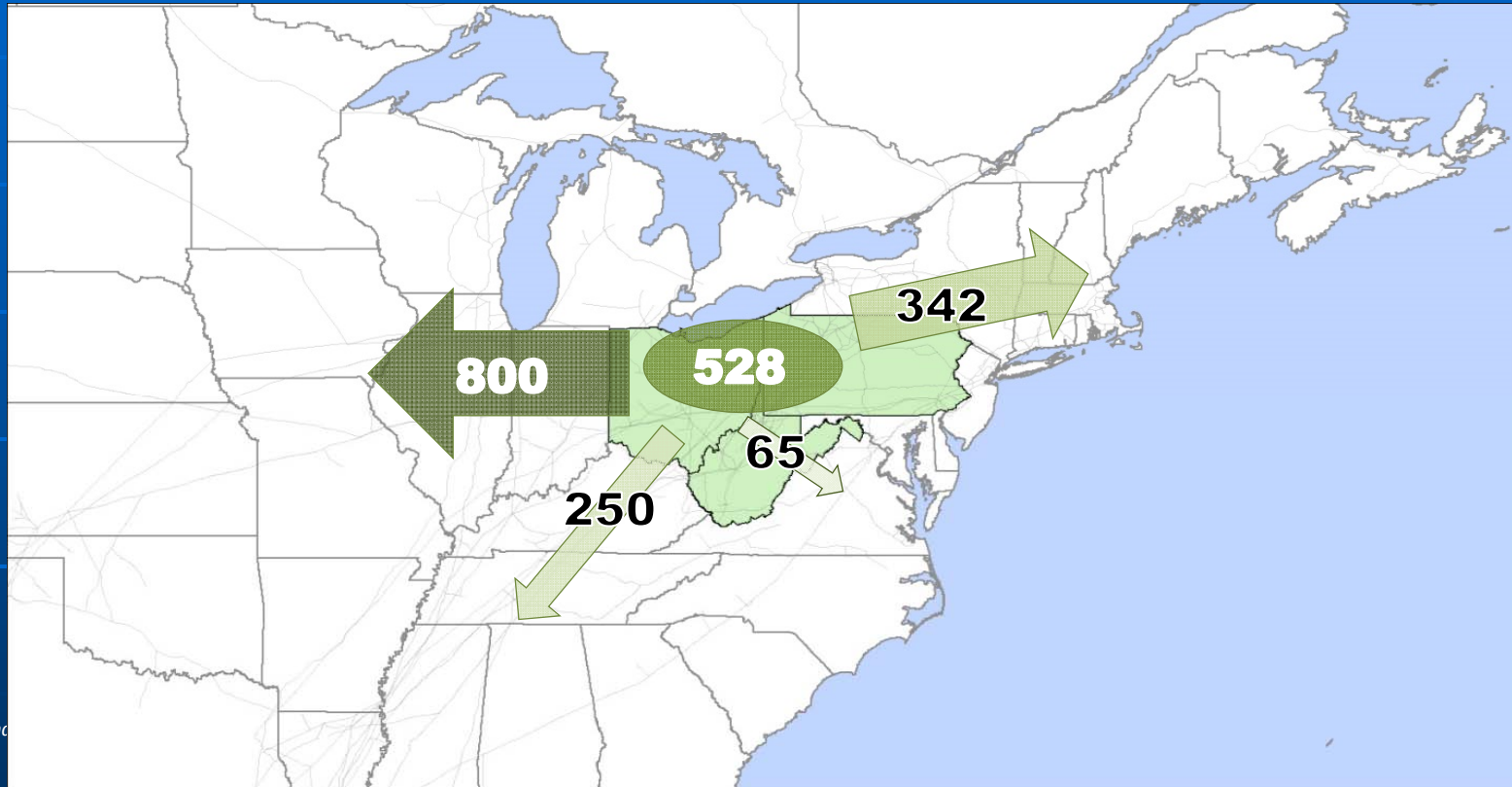


Sources:
Derived from
Bentek, EIA

Canada and LNG Imports Fill in Supply Gaps



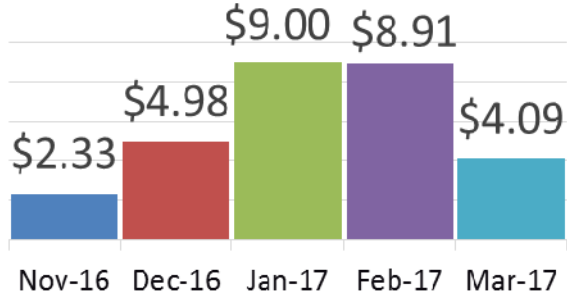
Pipeline Additions Help Ease Market Area Prices



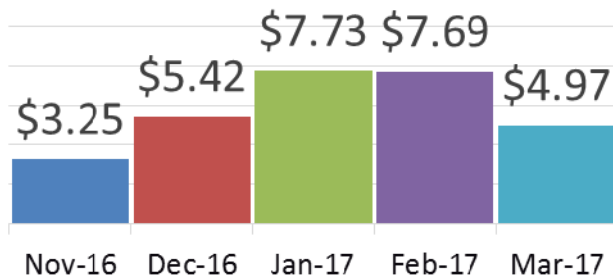
Sources: Derived from
Velocity Suite, ABB
Enterprise Software and
Bentek, in MMcfd

NYC has Nation's Highest Winter Gas Prices (\$/Mmbtu)

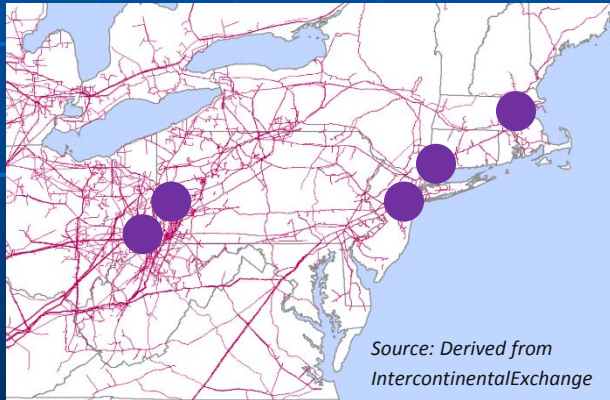
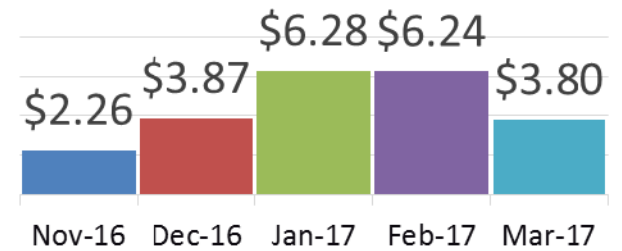
Transco Zone 6-NY



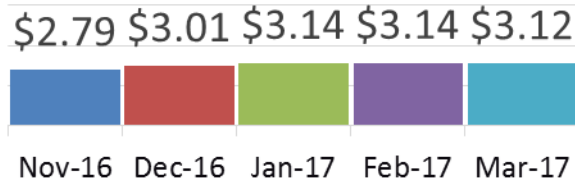
Algonquin City-Gates



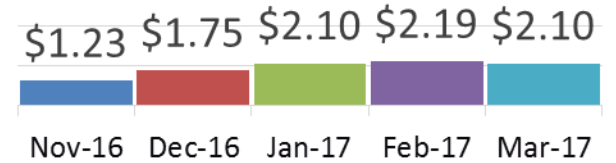
Transco Z 6-Non NY



Columbia Gas TCO



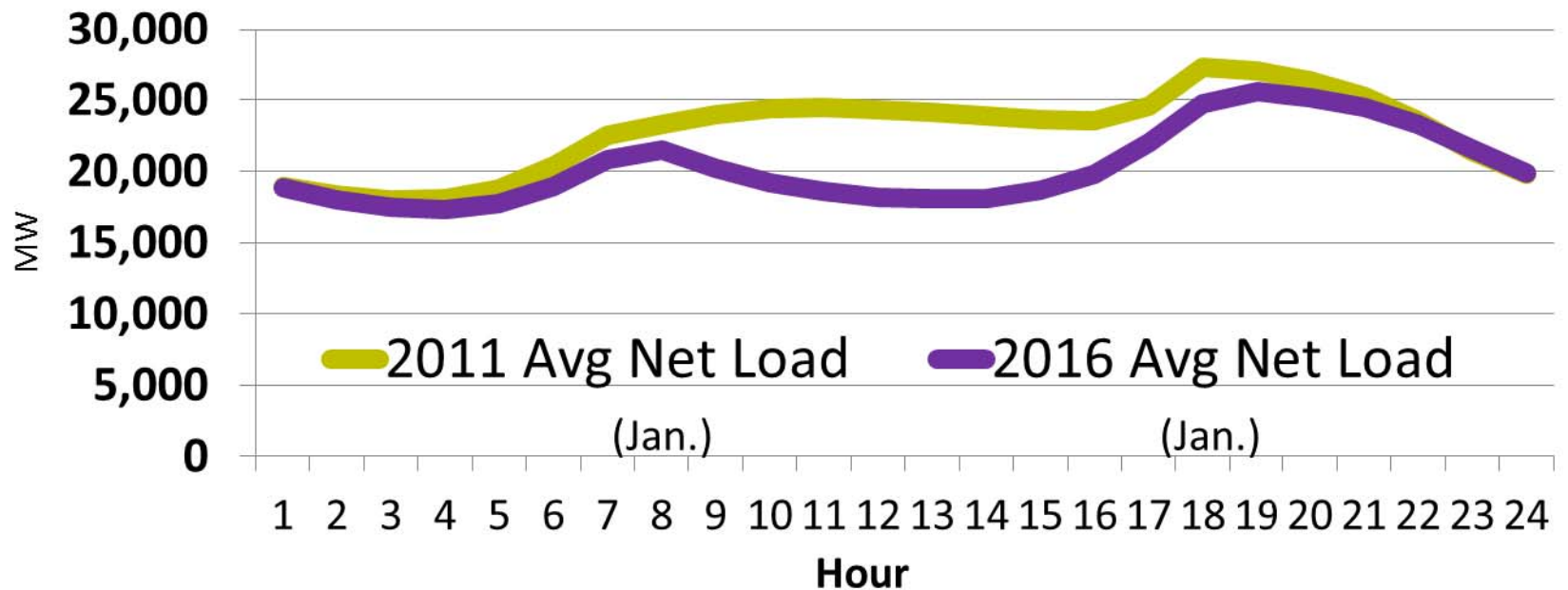
Dominion South



Aliso Canyon Outage Stresses California Markets

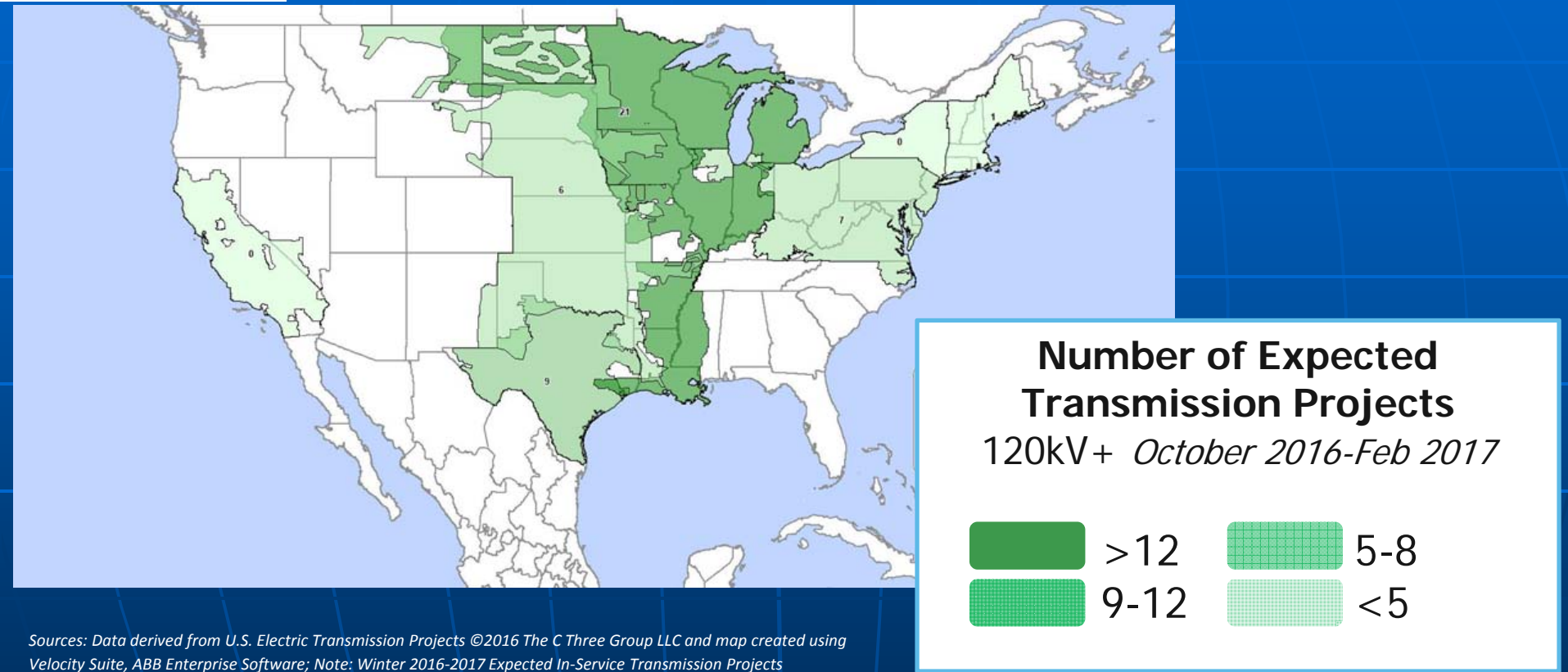


CAISO: Adapting to the Widening "Duck" Curve

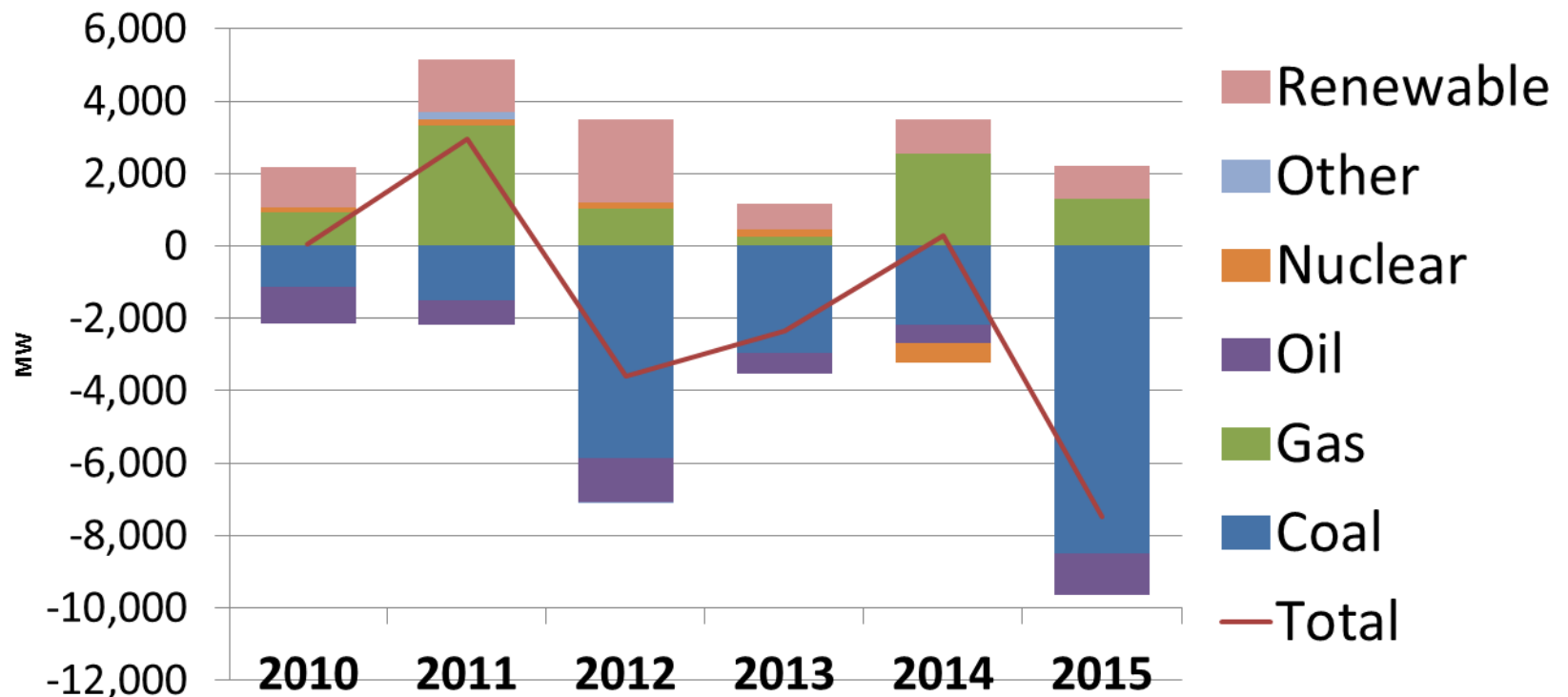


Sources: Derived from Velocity Suite, ABB Enterprise Software

Recent/Upcoming Developments: Power Plants & Transmission



Historical Year-over-year Electric Capacity Change



Source: Derived from
Velocity Suite, ABB
Enterprise Software

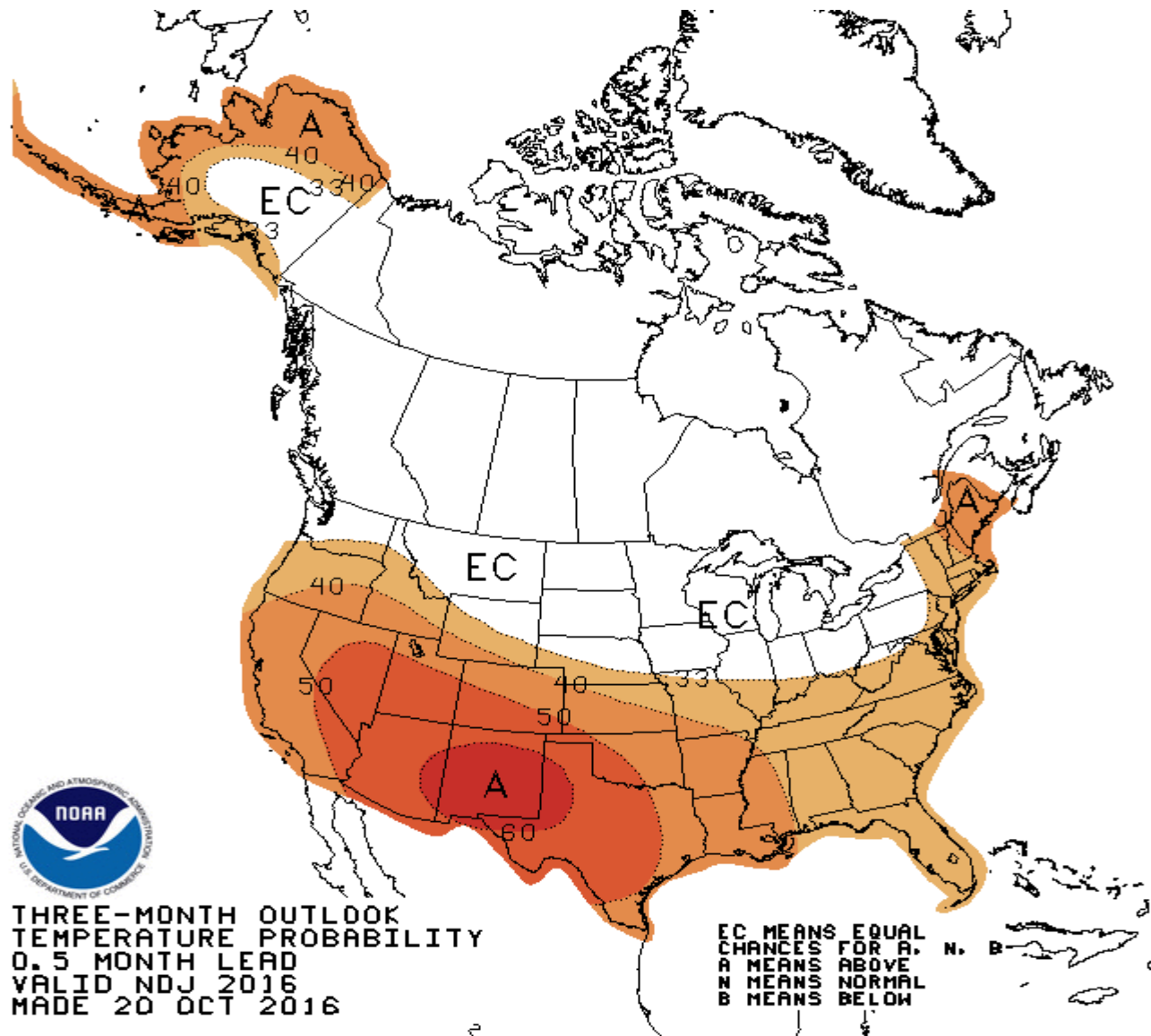
Conclusion

- Supply and demand are balancing in the natural gas market
- Prices in both power and natural gas have responded to rebalancing, but remain relatively low
- New pipeline connections have strengthened deliverability
- Gas storage leaves markets well supplied for winter
- The Northeast and Southern California may experience localized challenges
- Increased renewable generation requires flexible resources for evening ramp in CAISO
- Transmission projects may help to relieve price divergences
- Natural gas for electricity generation continues to increase

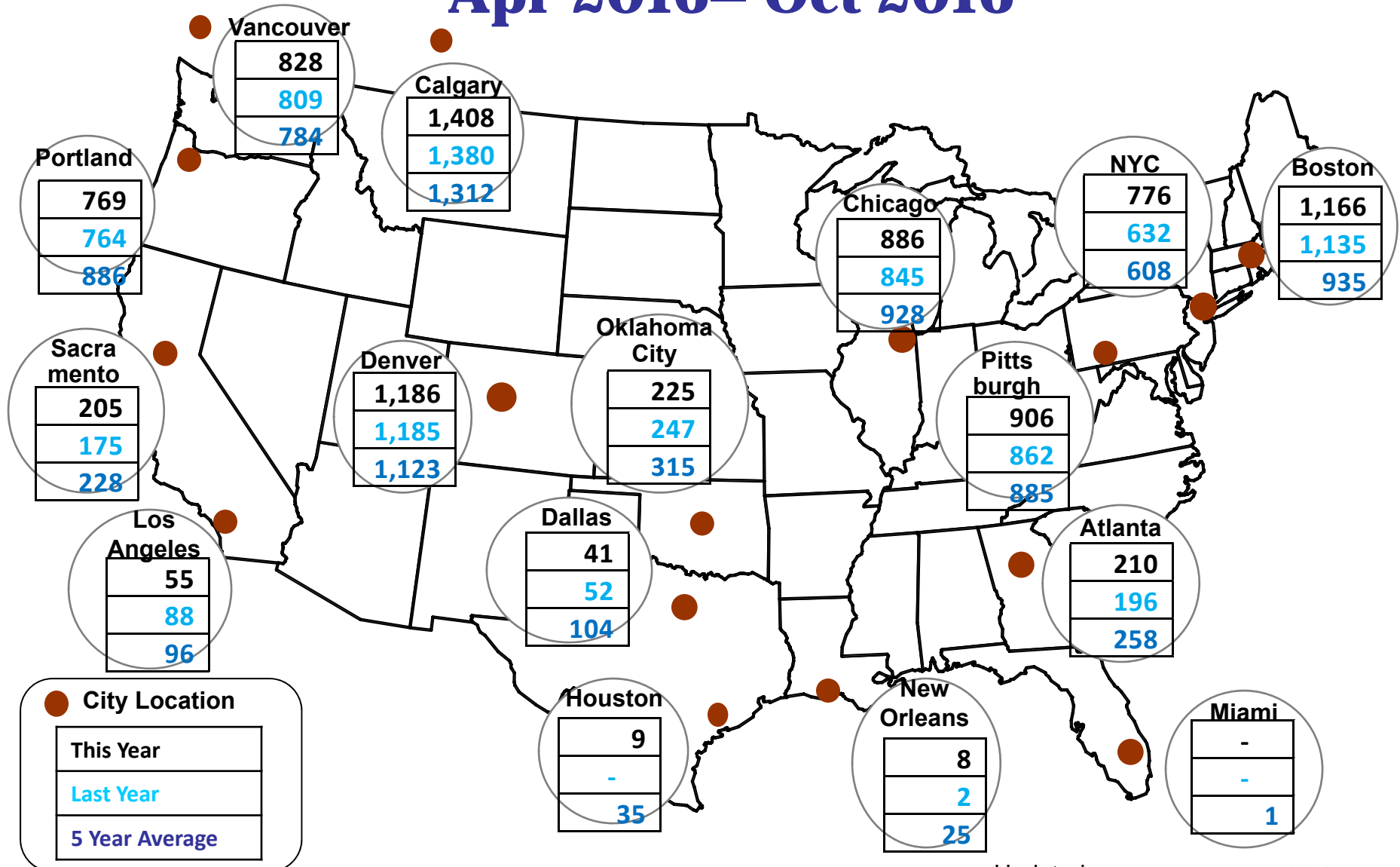


National Slides

NOAA November 2016 Through January 2017 Outlook



Cumulative HDDs by City Apr 2016– Oct 2016



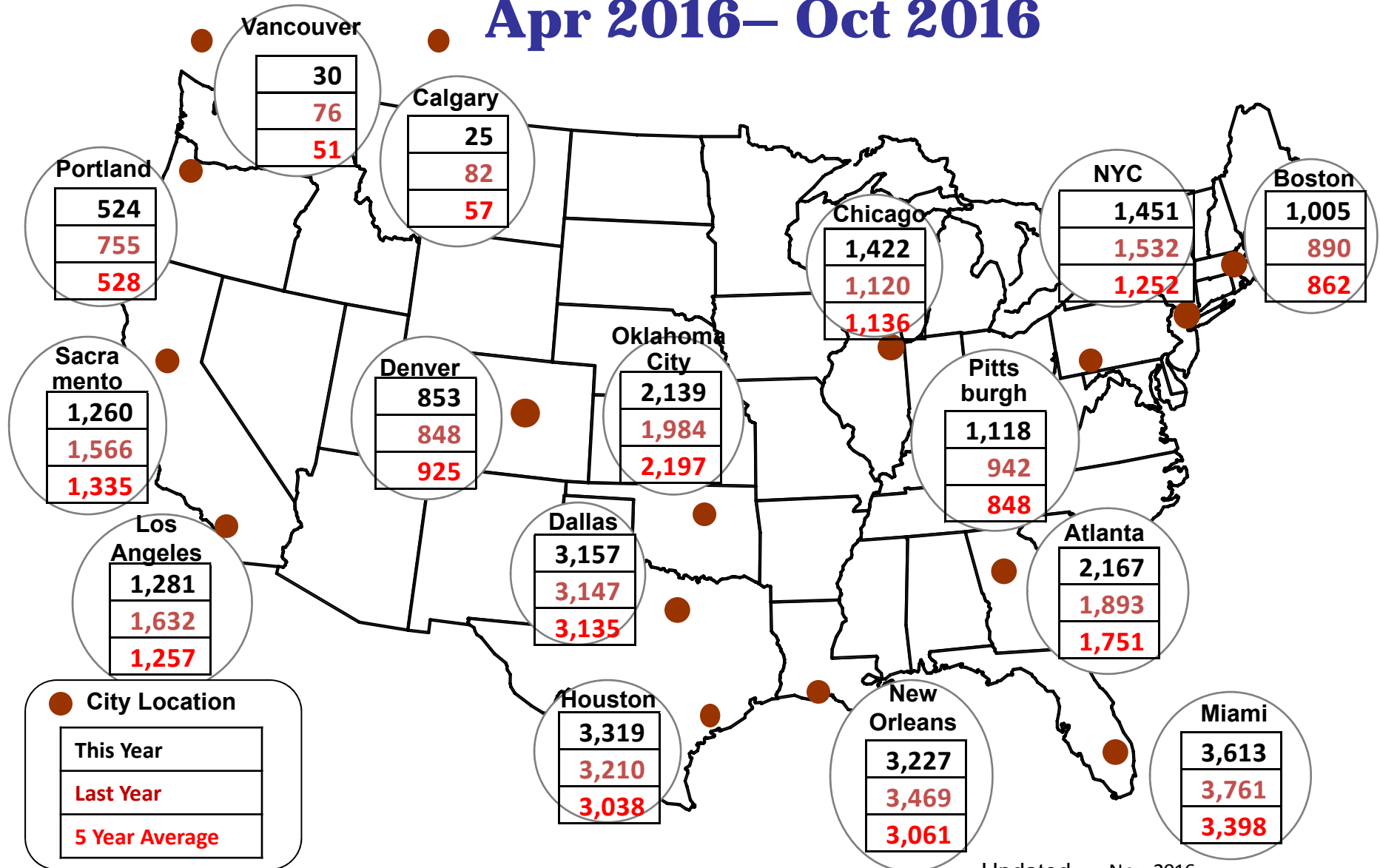
Source: Bloomberg Weather (daily data summed quarterly)

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Cumulative CDDs by City

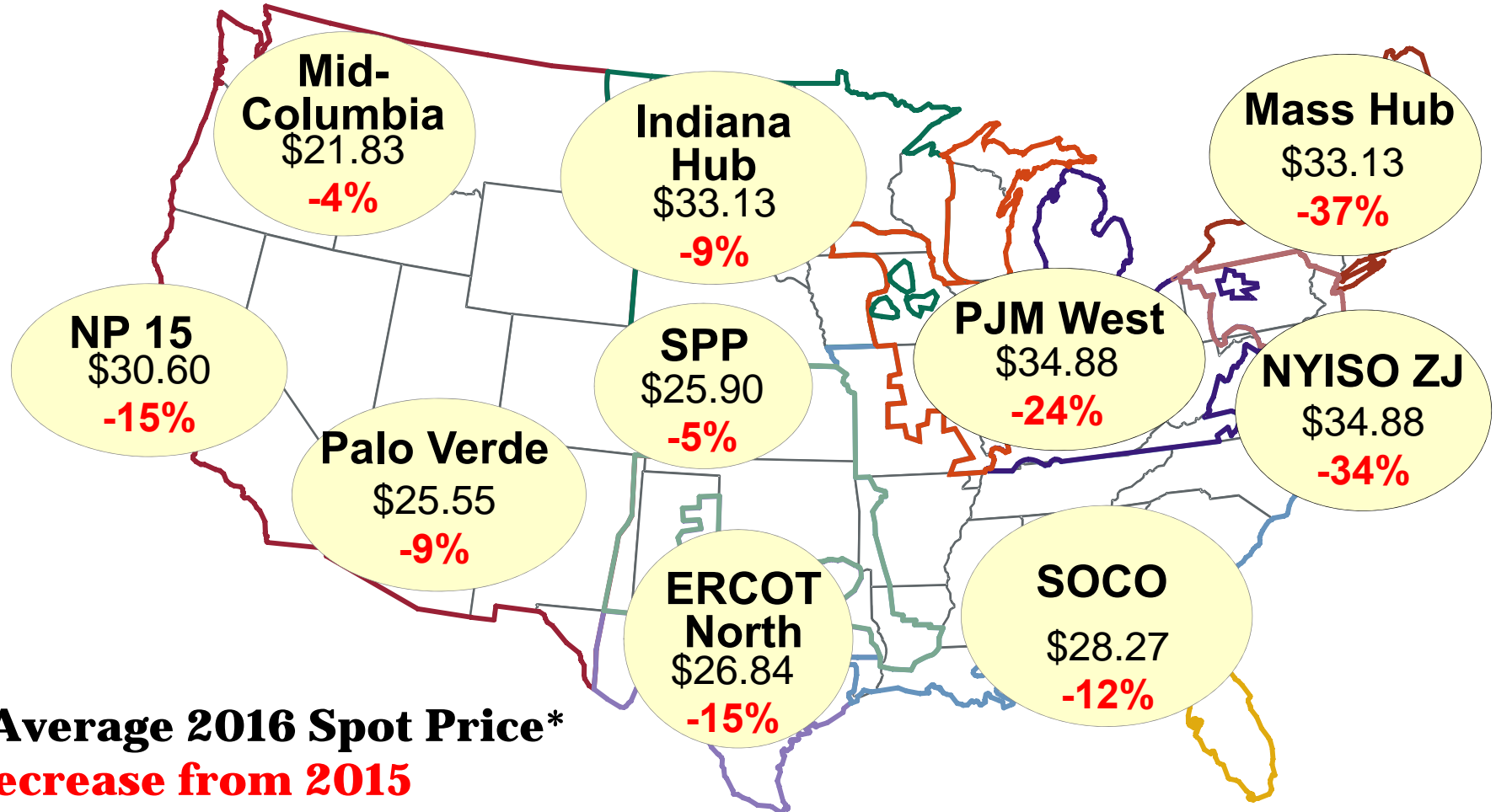
Apr 2016– Oct 2016



Source: Bloomberg Weather (daily data summed quarterly)

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2016 Spot Power Prices (\$/MWh)



\$ = Average 2016 Spot Price*

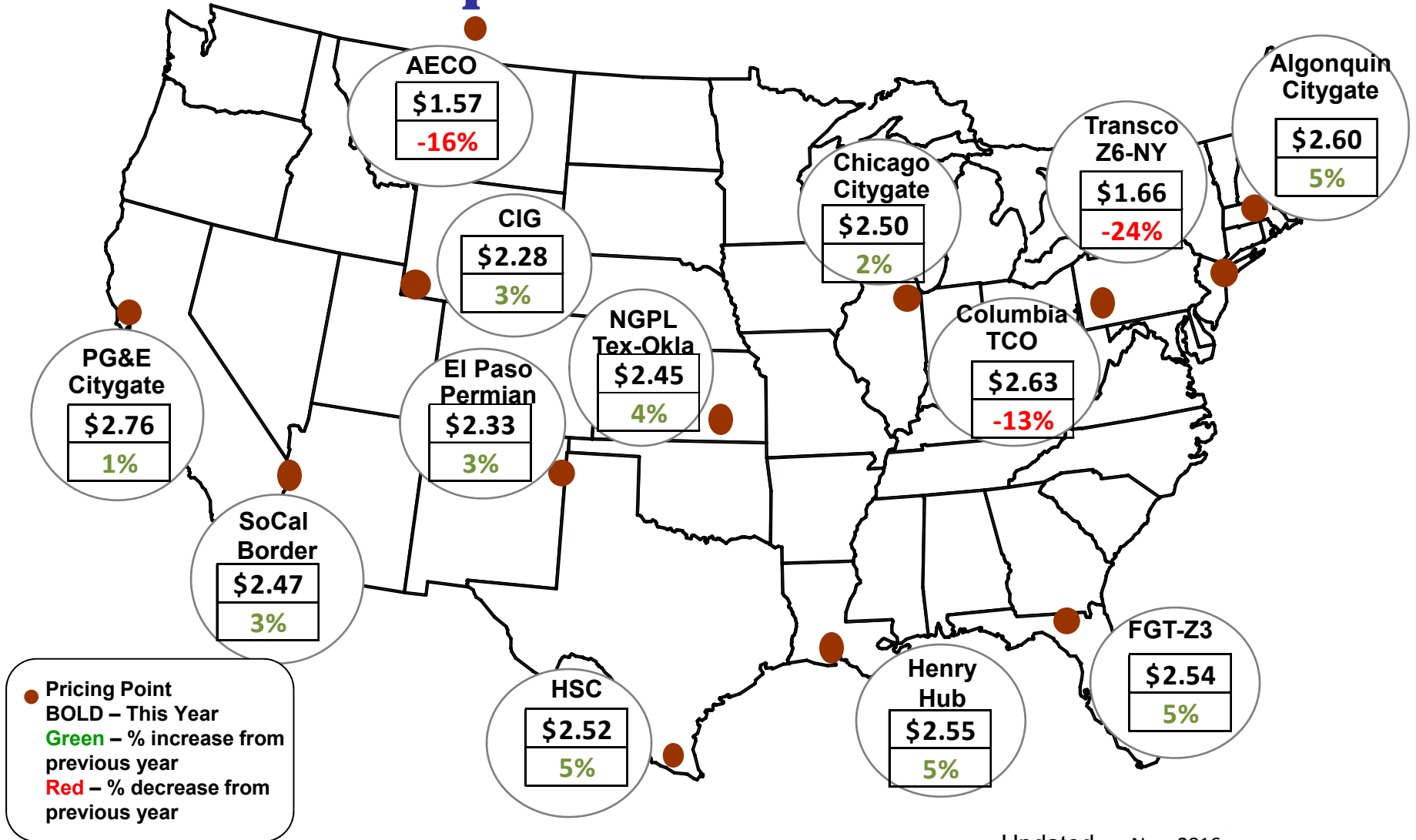
% Decrease from 2015

* Average On-Peak Day-Ahead from January to October

SPP Price is an average of the North and South Hubs

Source: RTO/ISO and ICE Data

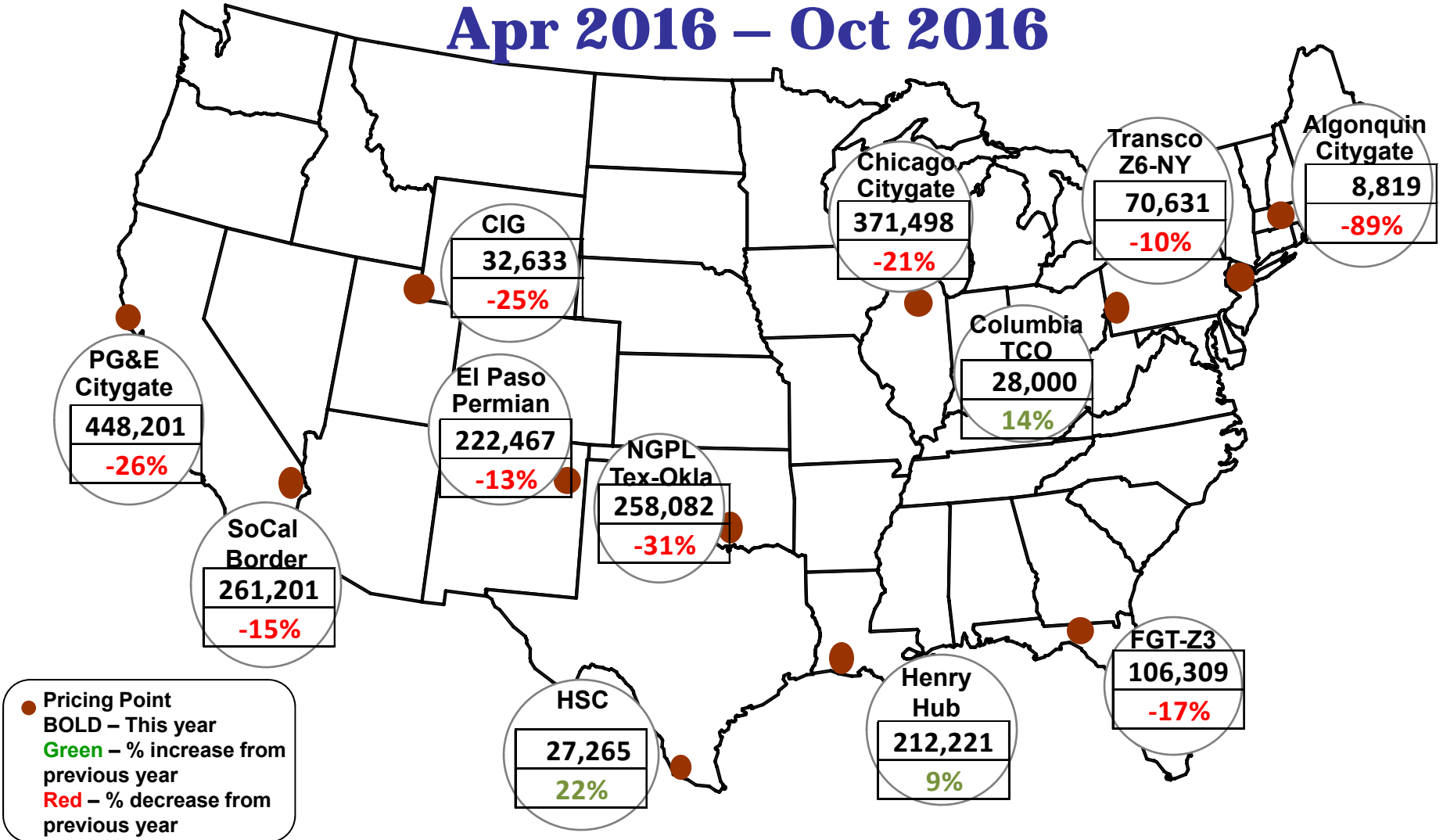
Spot Natural Gas Prices Average (\$/MMBtu) Apr 2016 – Oct 2016



Source: ICE

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Spot Average Natural Gas Trading Volumes (MMBtus) Apr 2016 – Oct 2016

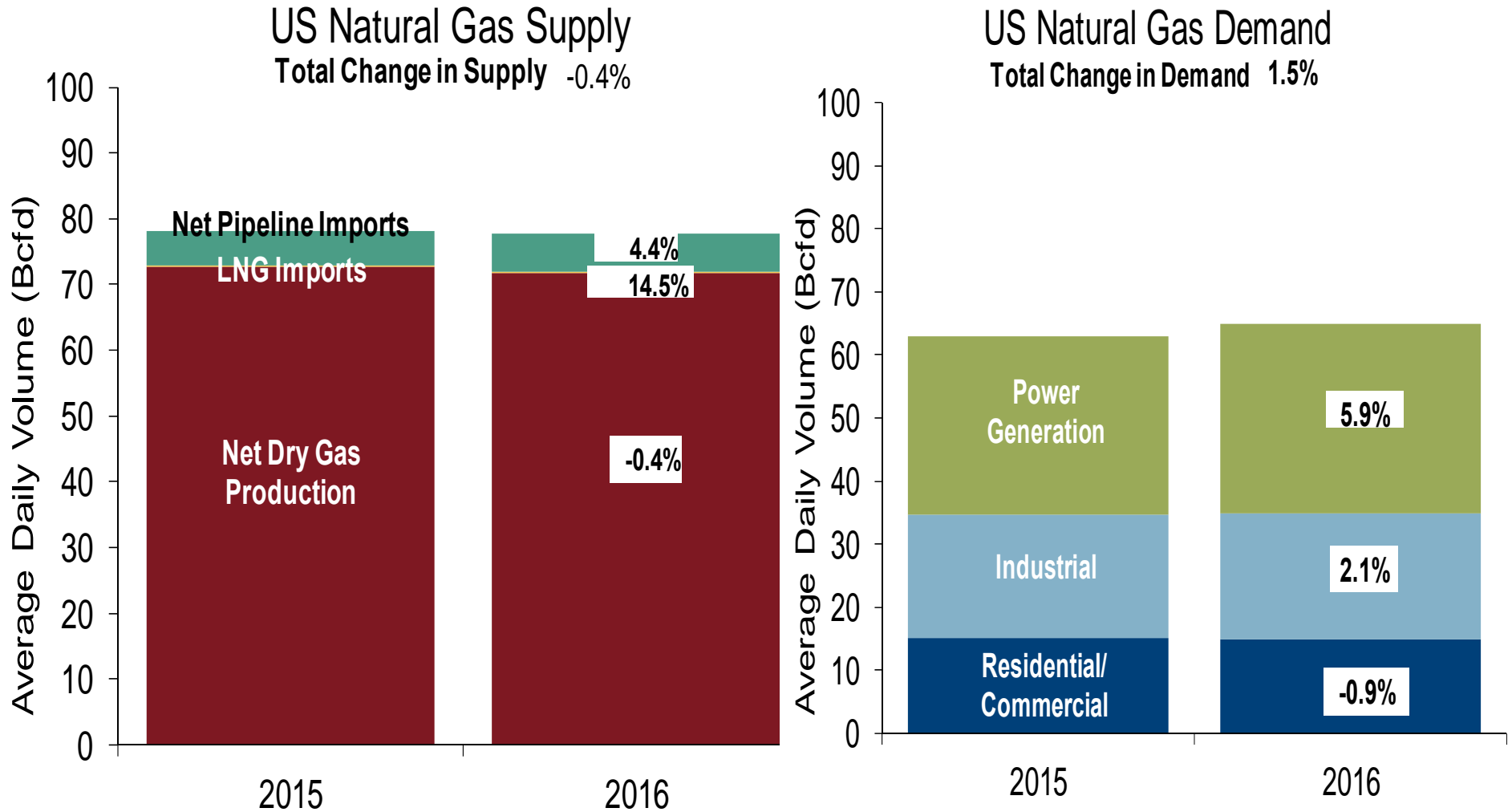


Source: ICE

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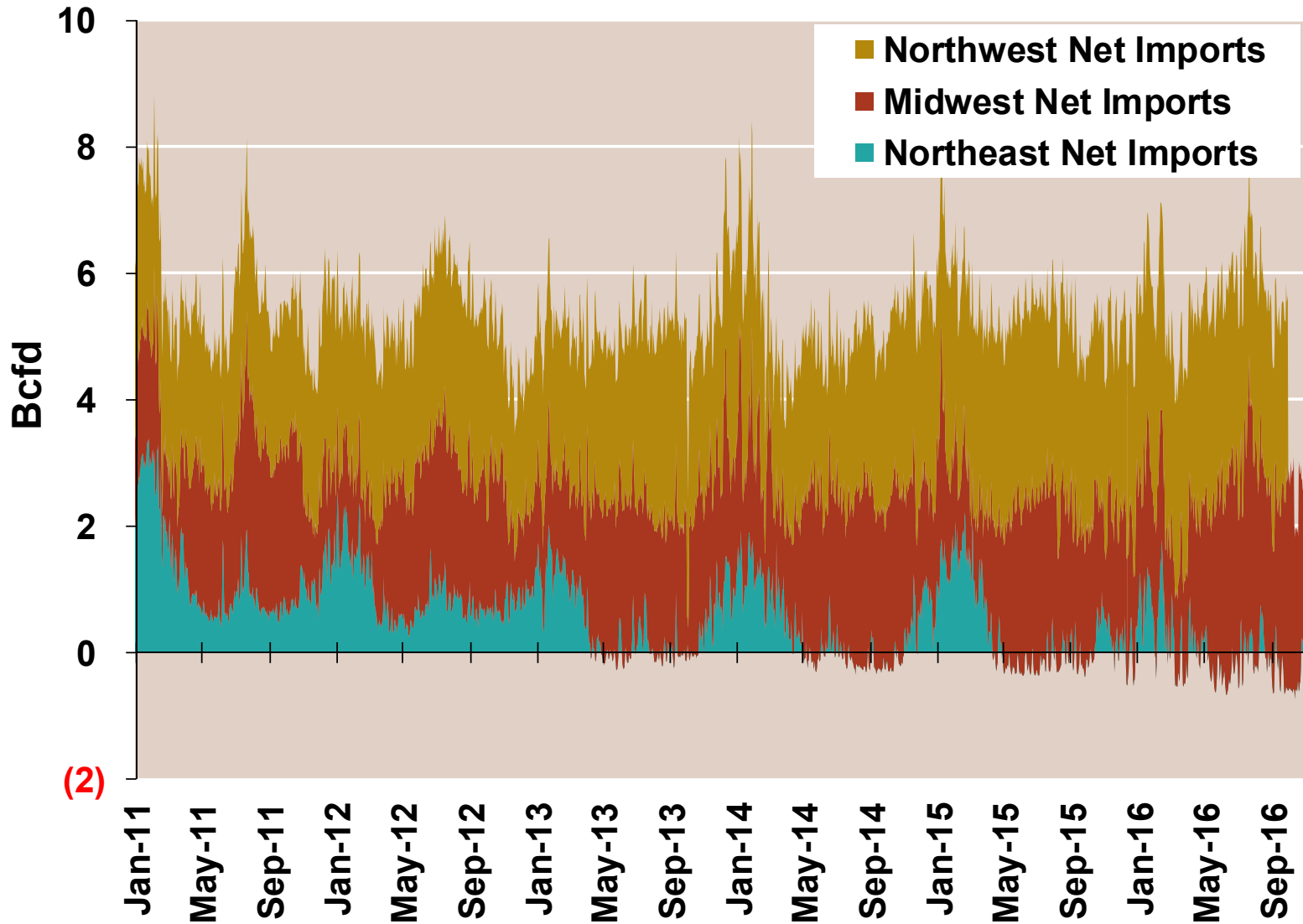
U.S. NG Supply and Demand

Apr 2015 – Oct 2015 vs Apr 2016 – Oct 2016

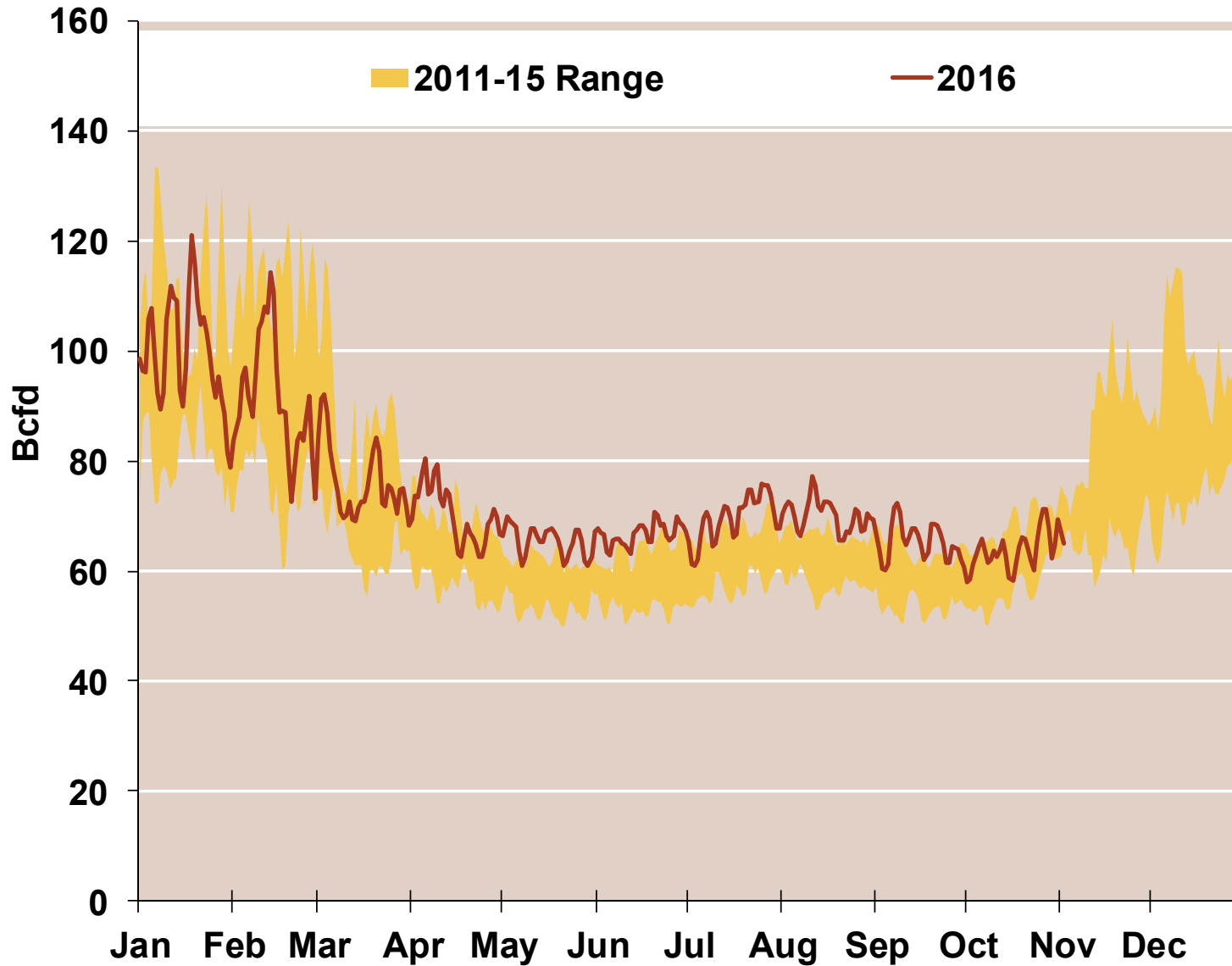


Note: Balance includes all amounts not attributable to other categories.
Source: Derived from *Bentek Energy* data

Regional Imports from Canada

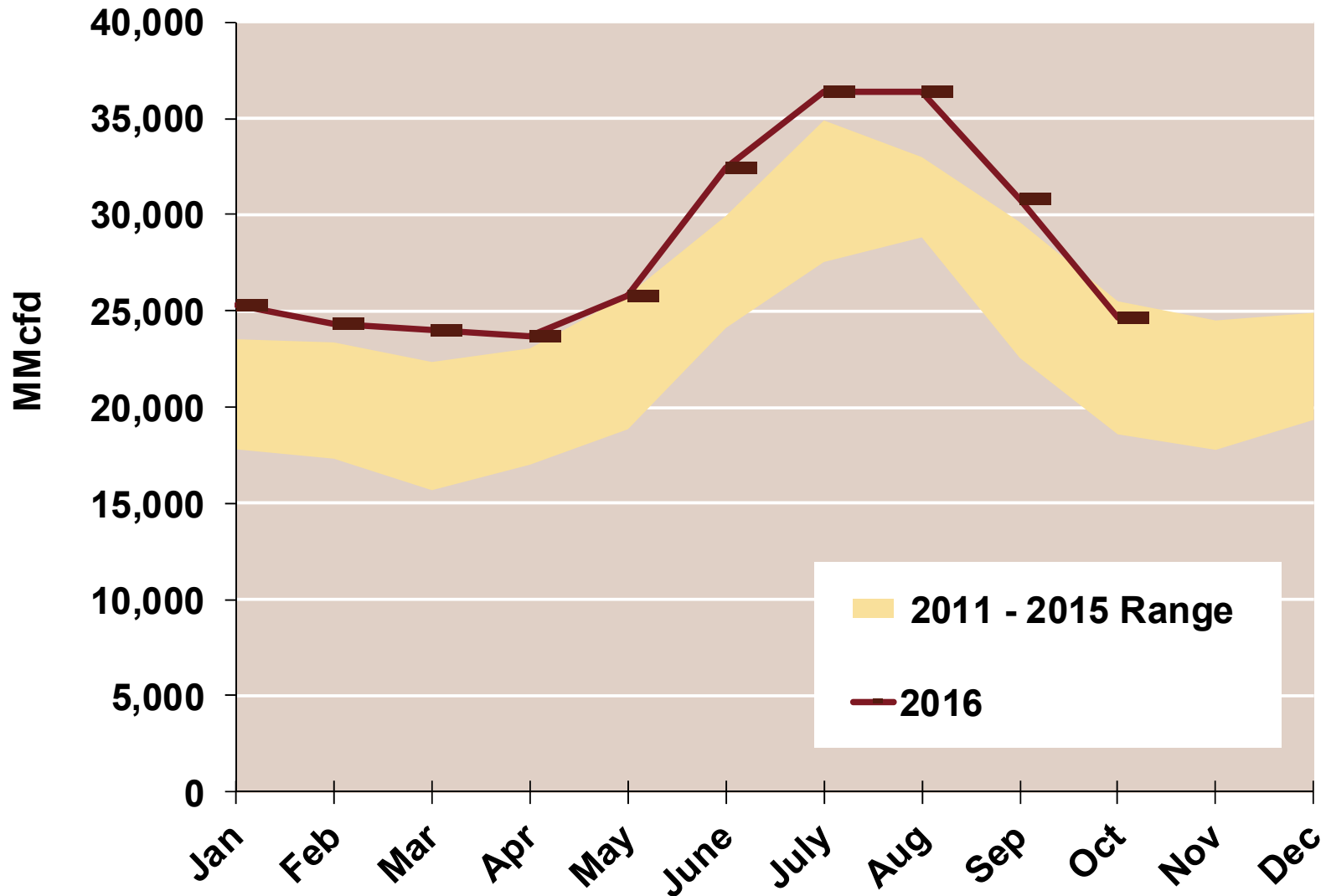


Total U.S. Natural Gas Demand All Sectors

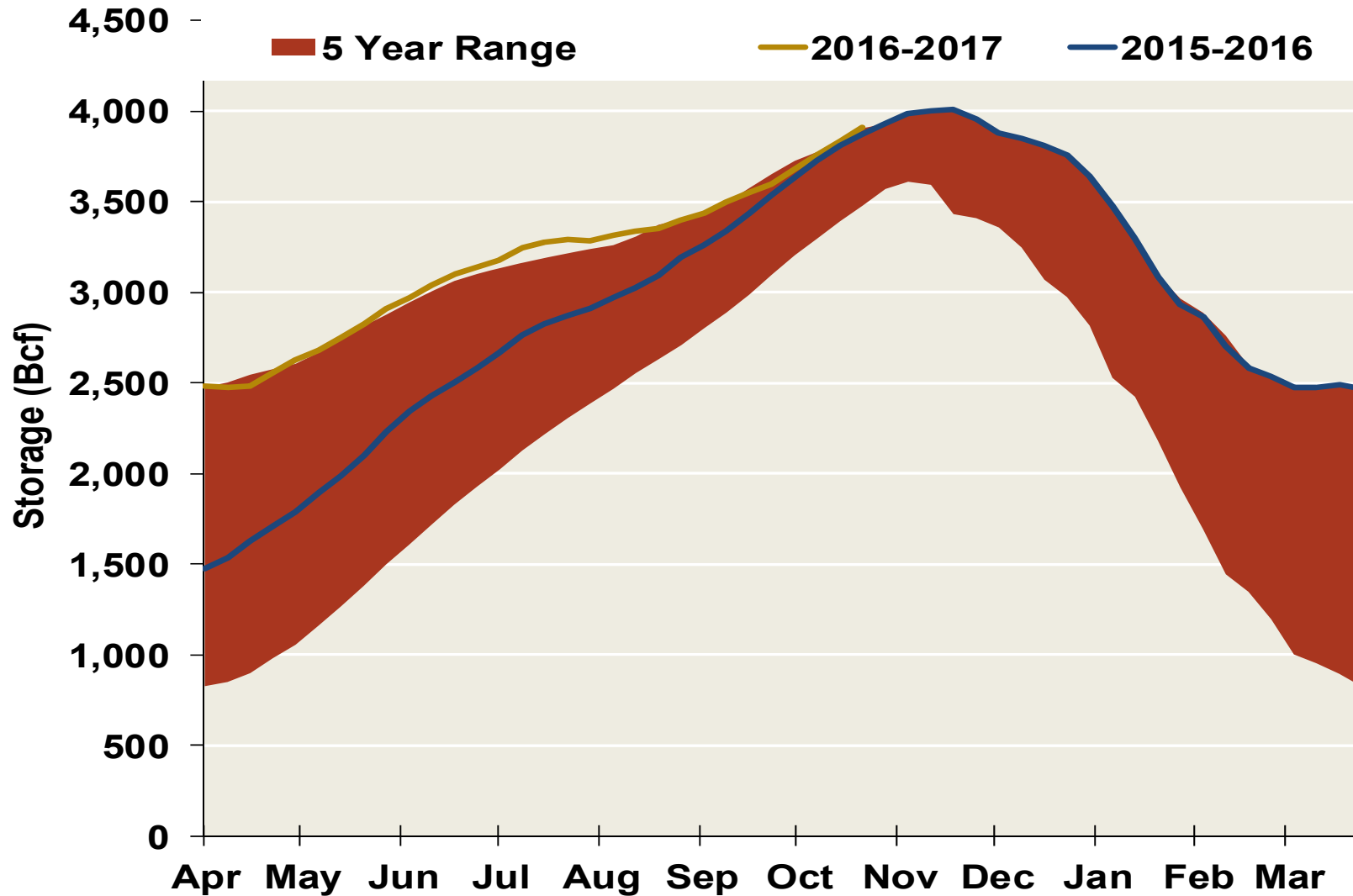


Source: Derived from *Bentek Energy* data, derived from interstate pipeline flow and modeled data.

U.S. Natural Gas Consumption for Power Generation



EIA National Storage Inventories

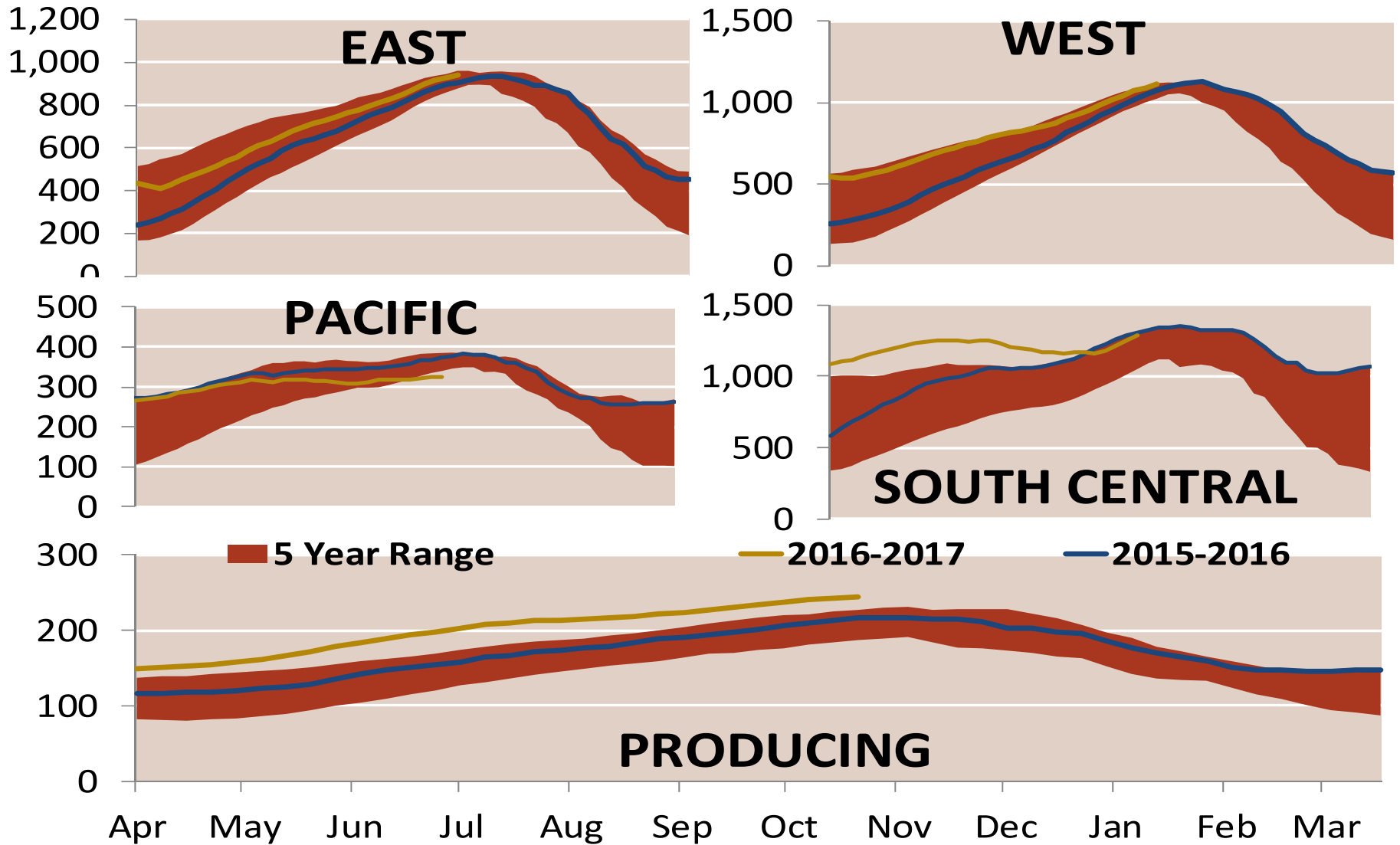


Notes:

Source: Derived from Bloomberg Data

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EIA Regional Storage Inventories

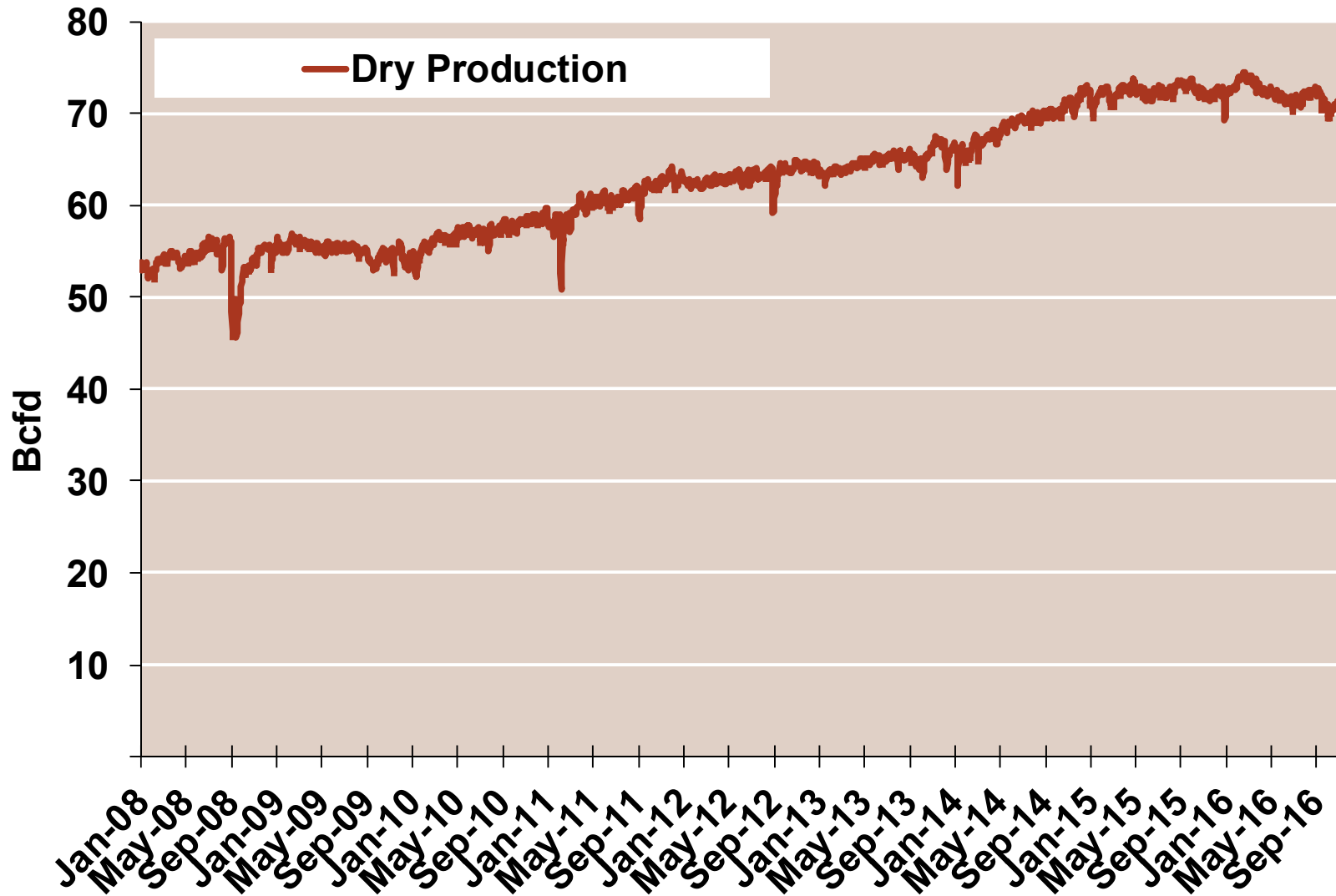


Not

Source: Derived from Bloomberg Data

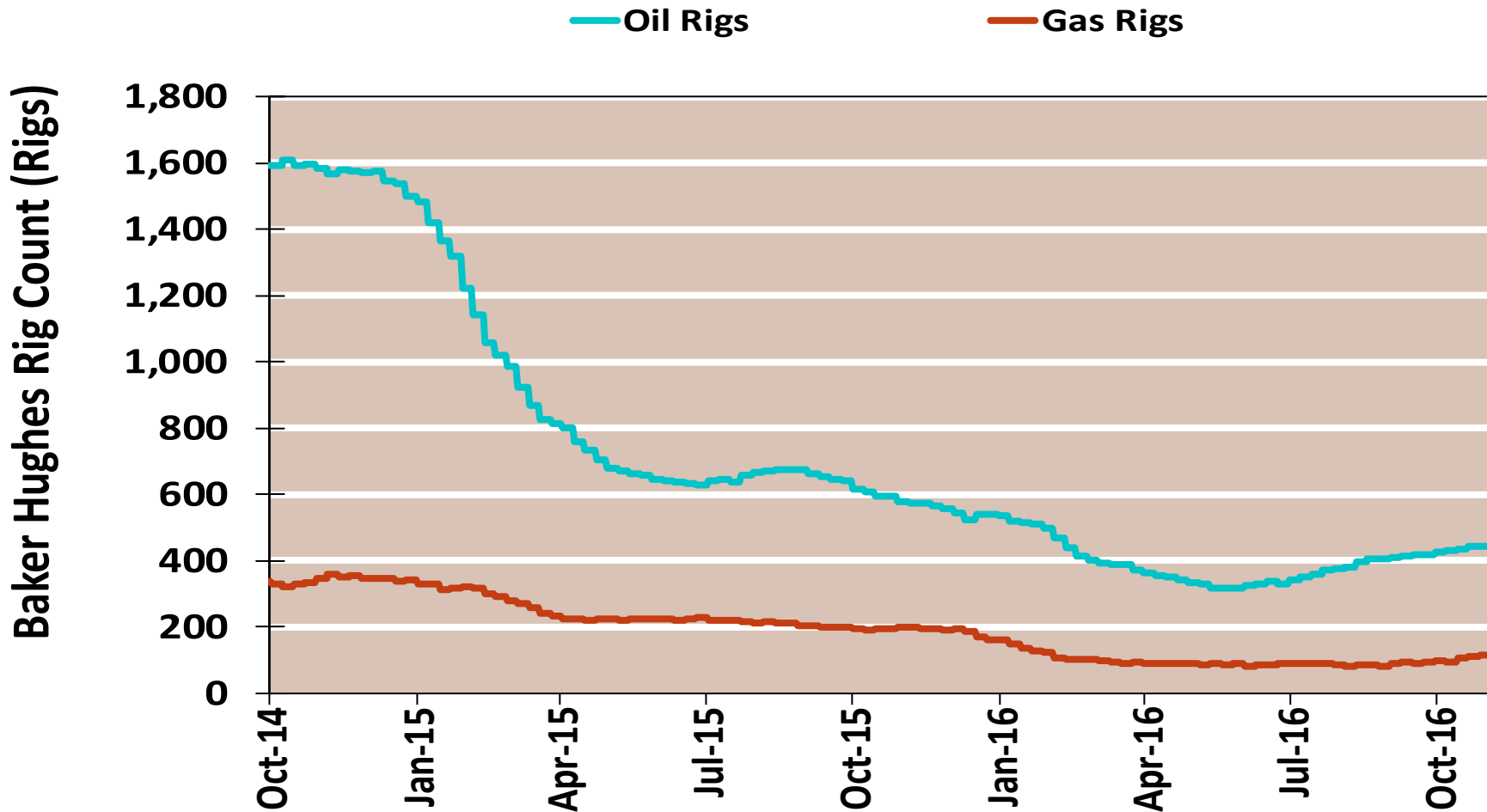
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Monthly U.S. Dry Gas Production – Lower 48 States



Note: Prior to July 2010, chart was derived from a combination of EIA and Bentek Energy data
Source: Derived from Bentek Energy data

Rigs by Type

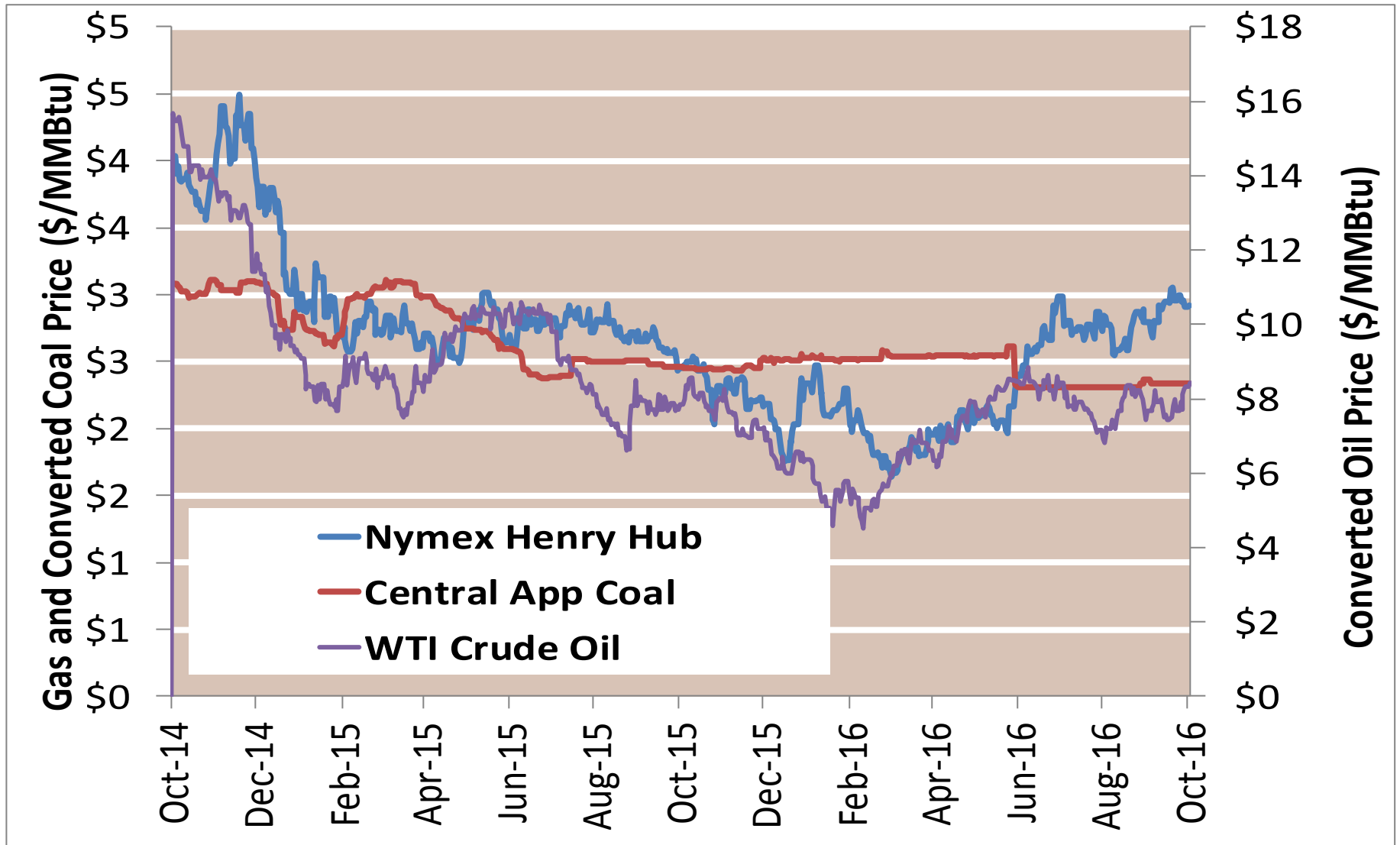


Notes:

Source: Derived from Bloomberg data

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Gas vs Coal

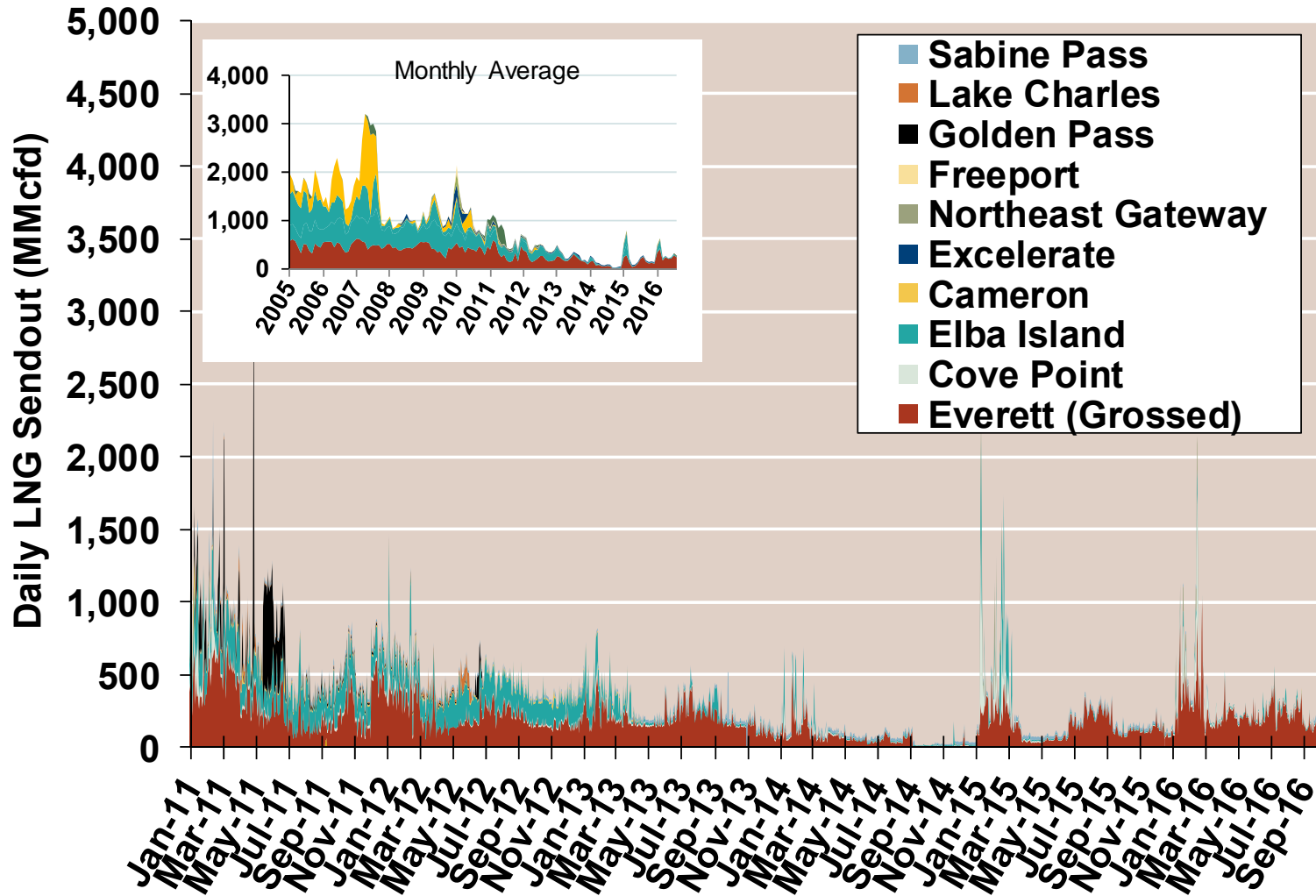


Notes:

Source: Derived from Bloomberg data

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Daily Gas Sendout from Existing U.S. LNG Facilities

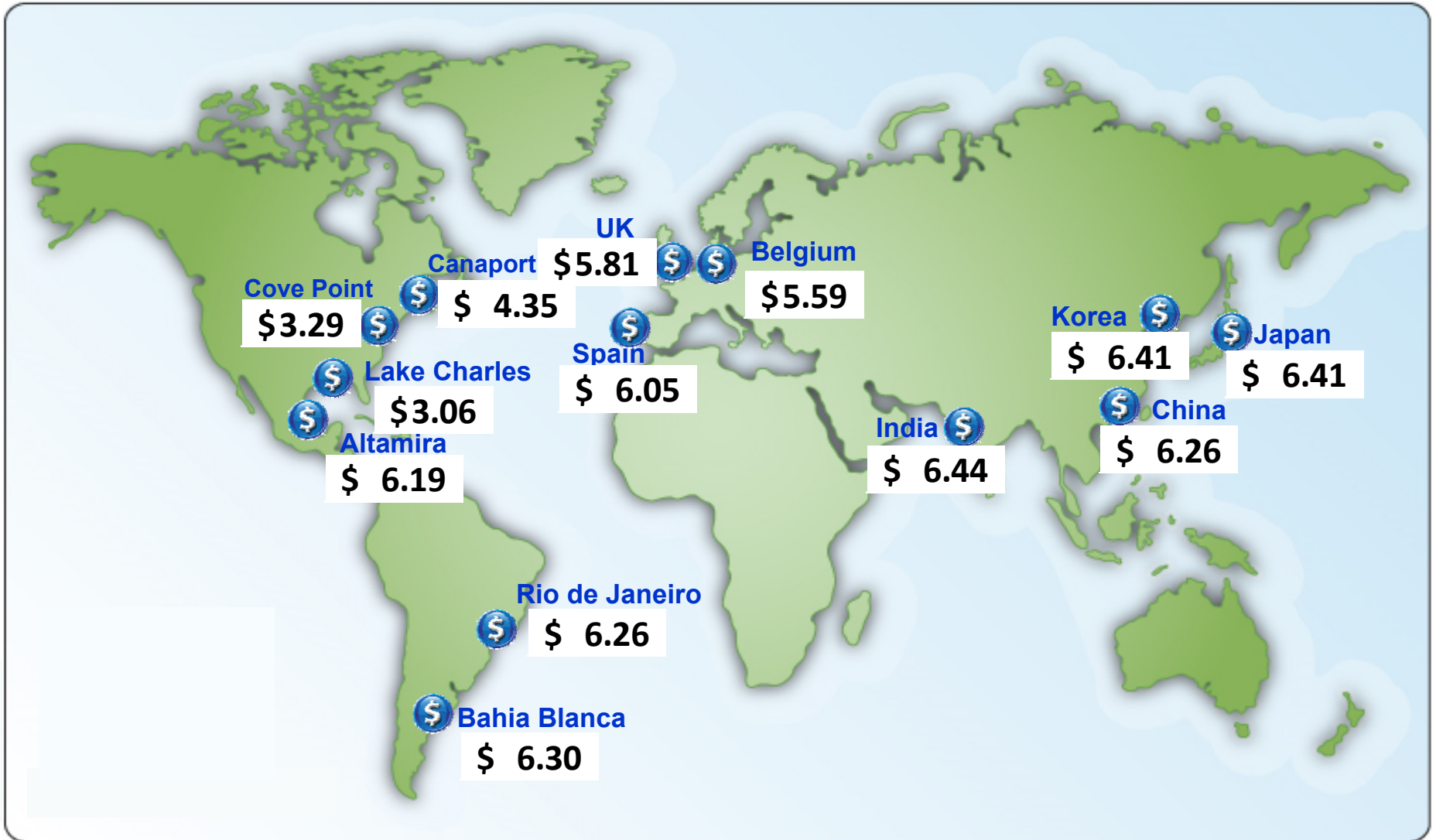


Notes: Everett data includes flows onto the AGT and TGP interstate lines, plus estimates of flows to the Mystic 7 power plant, Keyspan Boston Gas, and LNG trucked out of the terminal. Excludes flows to the Freeport LNG which flows via intrastate pipelines and flows to the Mystic 8 and 9 power plants.

Source: Derived from *Bentek Energy* data

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World LNG Estimated Landed Prices: Oct 2016

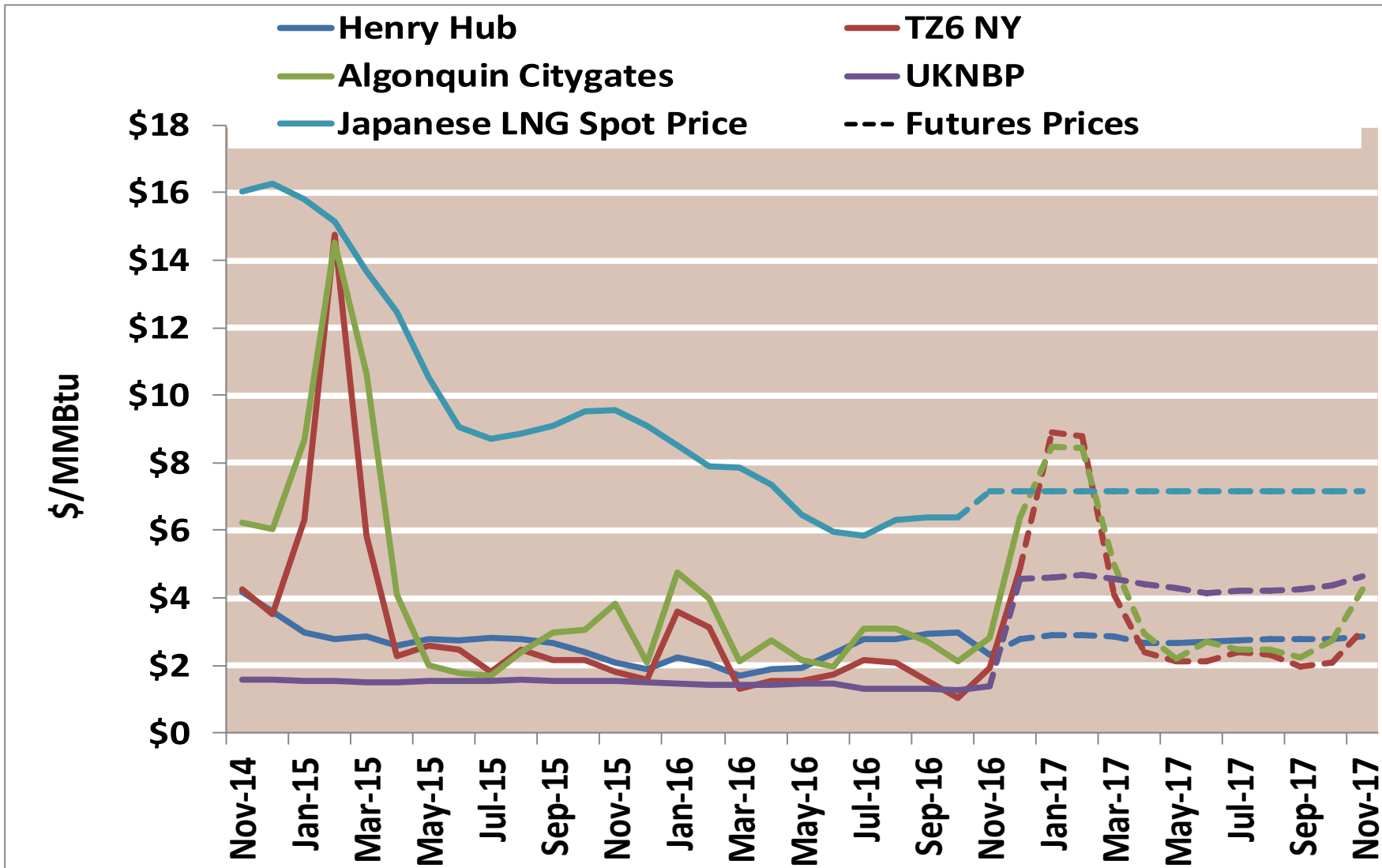


Source: Waterborne Energy, Inc. Data in \$US/MMBtu

Note: Includes information and Data supplied by IHS Global Inc. and its affiliates ("IHS"); Copyright (publication year) all rights reserved. Landed prices are the monthly average of weekly trades from the prior month.

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Historical and Future World Gas Prices

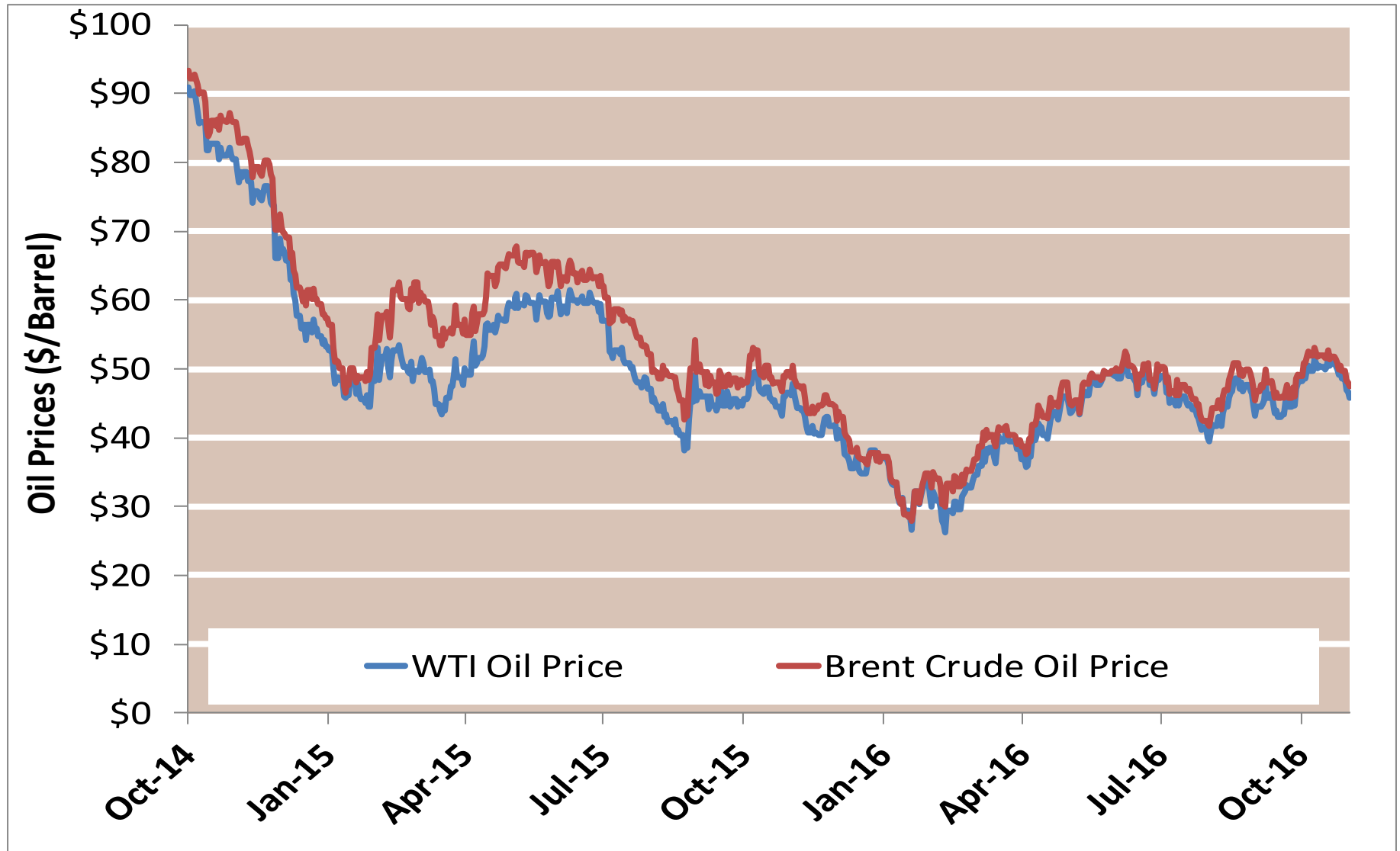


Notes:

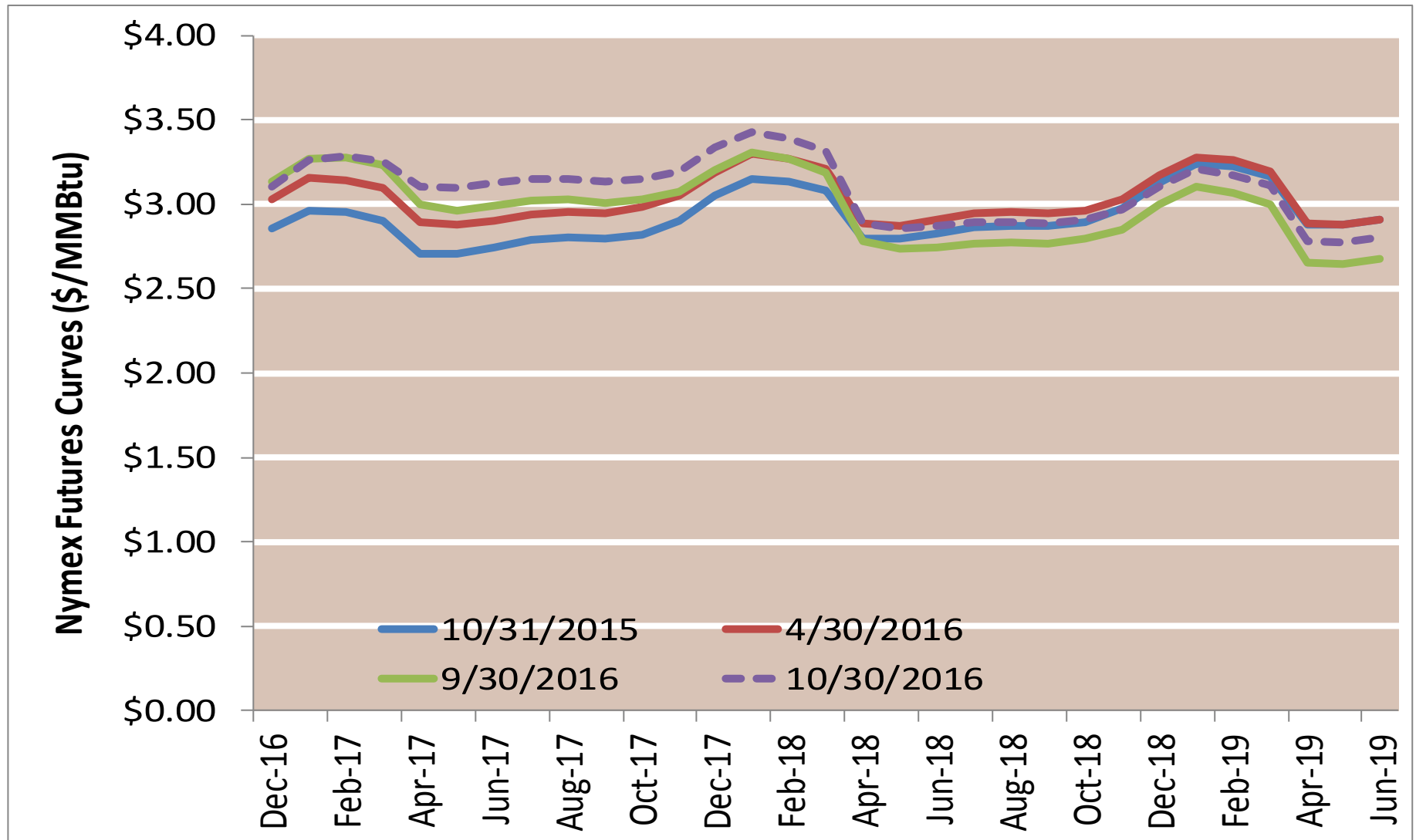
Source: Derived from Bloomberg data

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WTI vs Brent Crude Oil Price



Nymex Futures Curves



Infrastructure Report

Office of Energy Projects Energy
Infrastructure Update

<http://www.ferc.gov/legal/staff-reports.asp>

(see “Energy Infrastructure” tab)

Natural Gas Highlights

Natural Gas Activities in September 2016

Status	No. of Projects	Storage Capacity (Bcf)	Deliverability (MMcf/d)	Capacity (MMcf/d)	Miles of Pipeline	Compression (HP)
Pipeline						
Placed in Service	6			1,345.0	85.5	36,000
Certificated	5			367.6	18.9	139,221
Proposed	2			0.0	23.2	0

Natural Gas Activities through September 30, 2016

January through September 30, 2015

Status	No. of Projects	Storage Capacity (Bcf)	Deliverability (MMcf/d)	Capacity (MMcf/d)	Miles of Pipeline	Compression (HP)
Pipeline						
Placed in Service through September 30, 2015	24 16			4,609.3 5,505.7	274.6 203.5	129,695 127,925
Certificated through September 30, 2015	46 26			14,382.5 7,541.0	1,136.5 360.6	1,251,340 247,078
Storage						
Placed in Service through September 30, 2015	0 5	0.0 11.4	0 53			0 4,800
Certificated through September 30, 2015	0 2	0.0 2.7	0 0			0 0
LNG (Import & Export)						
Placed in Service through September 30, 2015	1 0	0 0	700 0			0 0
Certificated (Import/Export) through September 30, 2015	4 1	10.2 0	3,181 1,400			0 0

Electric Generation Highlights

New Generation In-Service (New Build and Expansion)

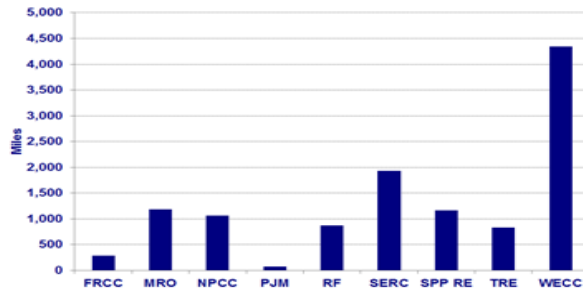
Primary Fuel Type	September 2016		January – September 2016 Cumulative		January – September 2015 Cumulative	
	No. of Units	Installed Capacity (MW)	No. of Units	Installed Capacity (MW)	No. of Units	Installed Capacity (MW)
Coal	0	0	3	45	2	6
Natural Gas	14	364	77	7,371	57	5,403
Nuclear	0	0	0	0	2	152
Oil	0	0	5	12	15	21
Water	0	0	27	228	21	158
Wind	0	0	34	2,661	37	4,136
Biomass	0	0	25	54	33	267
Geothermal Steam	0	0	0	0	2	64
Solar	16	601	225	3,440	219	1,552
Waste Heat	0	0	1	15	0	0
Other *	1	0	6	0	9	0
Total	31	965	403	13,826	397	11,759

Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC which include plants with nameplate capacity of 1 MW or greater. The data may be subject to update.

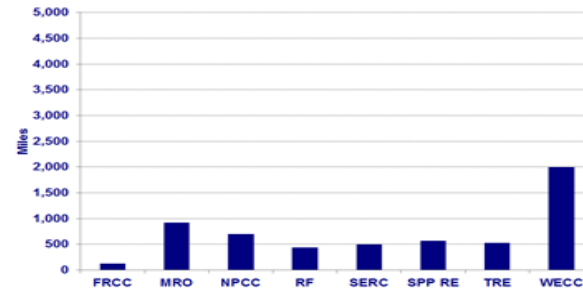
Electric Transmission Highlights

Voltage (kV)	Transmission Projects Completed				Proposed Transmission Projects In-Service by September 2018	
	September 2016	September 2015	January – September 2016 Cumulative	January – December 2015 Cumulative	High Probability of Completion	All
	Line Length (miles)					
≤230	41.5	15.1	285.9	694.3	2,654.3	5,122.9
345	36.0	82.0	199.4	1,230.5	2,208.9	3,734.7
500	0.0	0.0	43.0	355.0	925.3	2,884.3
Total U.S.	77.5	97.1	528.3	2,279.8	5,788.5	11,741.9

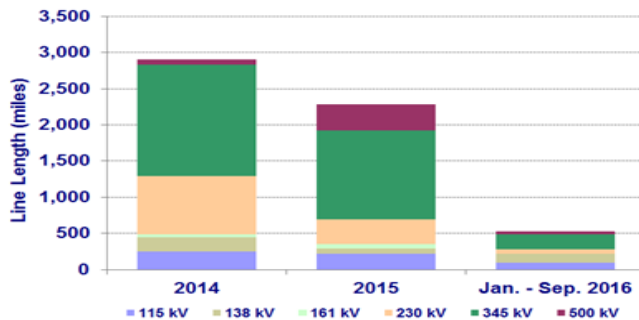
All Transmission Projects with a Proposed In-Service Date by September 2018



Transmission Projects with a High Probability of being completed by September 2018



New Transmission Projects by Voltage



Sources: Data derived from Staff Database and U.S. Electric Transmission Projects ©2016 The C Three Group, LLC.

Disclaimer: This Report contains analyses, presentations, and conclusions that may be based on or derived from the data sources cited, but do not necessarily reflect the positions or recommendations of the data providers.

Installed Generating Capacity

Total Available Installed Generating Capacity

	Installed Capacity (GW)	% of Total Capacity
Coal	293.73	24.99%
Natural Gas	510.26	43.42%
Nuclear	107.36	9.14%
Oil	44.98	3.83%
Water	100.35	8.54%
Wind	76.66	6.52%
Biomass	16.64	1.42%
Geothermal Steam	3.88	0.33%
Solar	19.39	1.65%
Waste Heat	1.17	0.10%
Other*	0.76	0.07%
Total	1,175.20	100.00%

Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC which include plants with nameplate capacity of 1 MW or greater. The data may be subject to update.