

OE ENERGY MARKET SNAPSHOT

National – Data Through October 2016

Office of Enforcement
Federal Energy Regulatory Commission
November 2016

2016/2017 Winter Assessment



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.

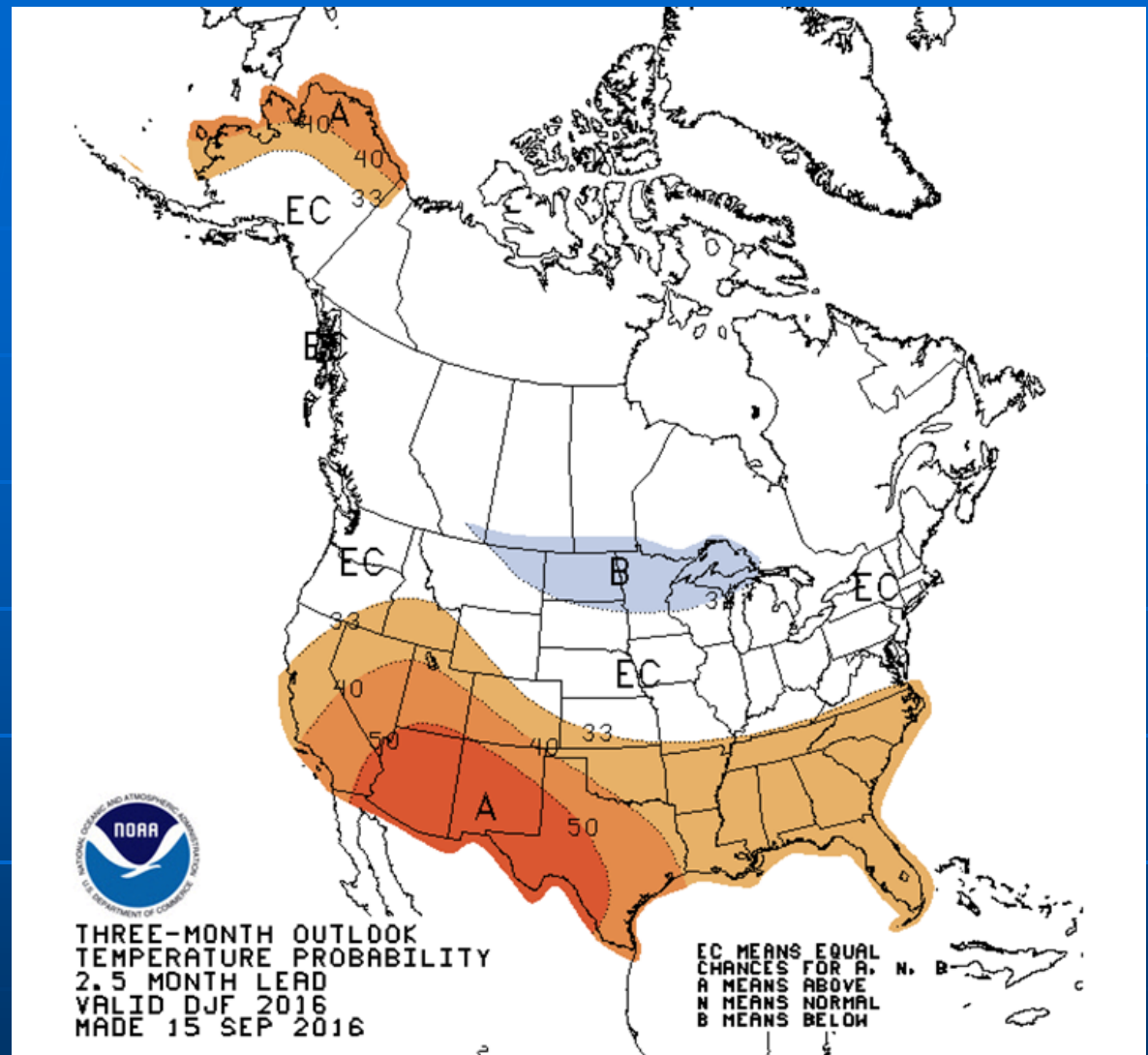
*Gas Note: Prices in \$/MMBtu. Regional futures natural gas prices are the sum of the Henry Hub futures contract price plus the regional basis futures.

Source: Derived from NYMEX and IntercontinentalExchange

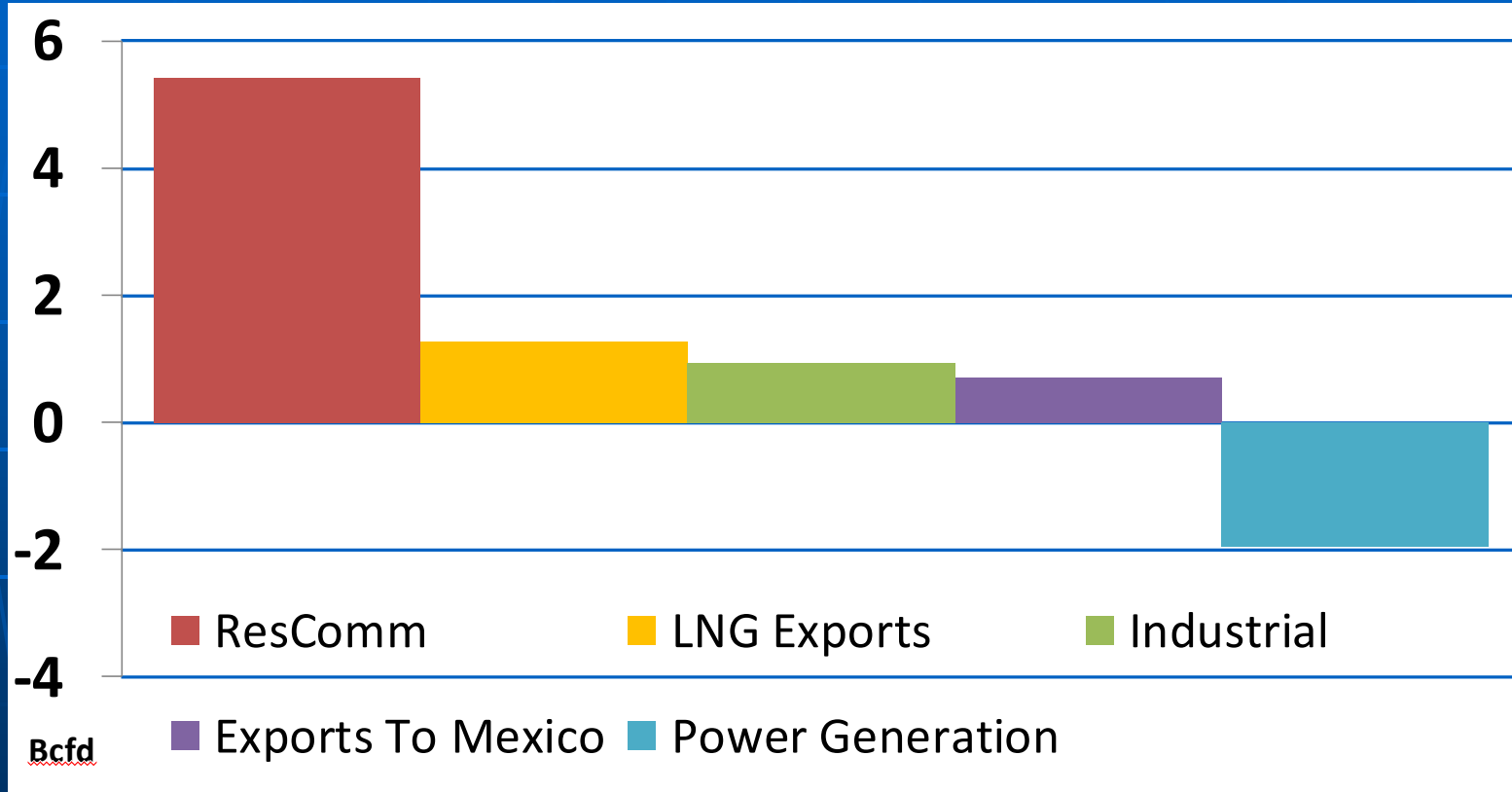
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Forecasters Call for Broadly Normal Winter Temperatures

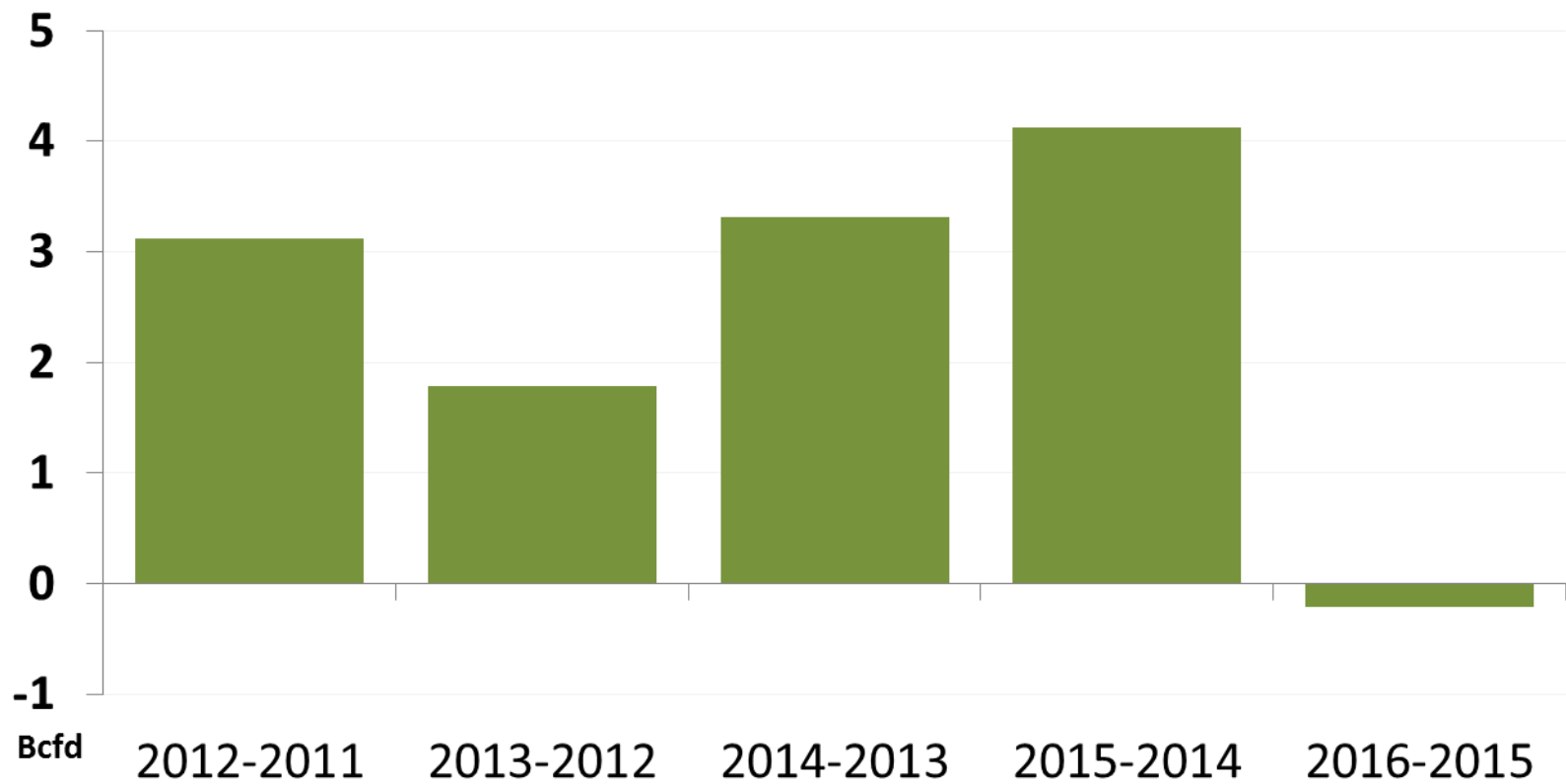
Source: National Oceanic and Atmospheric Administration



Gas Demand Likely to Rebound in 2016-17

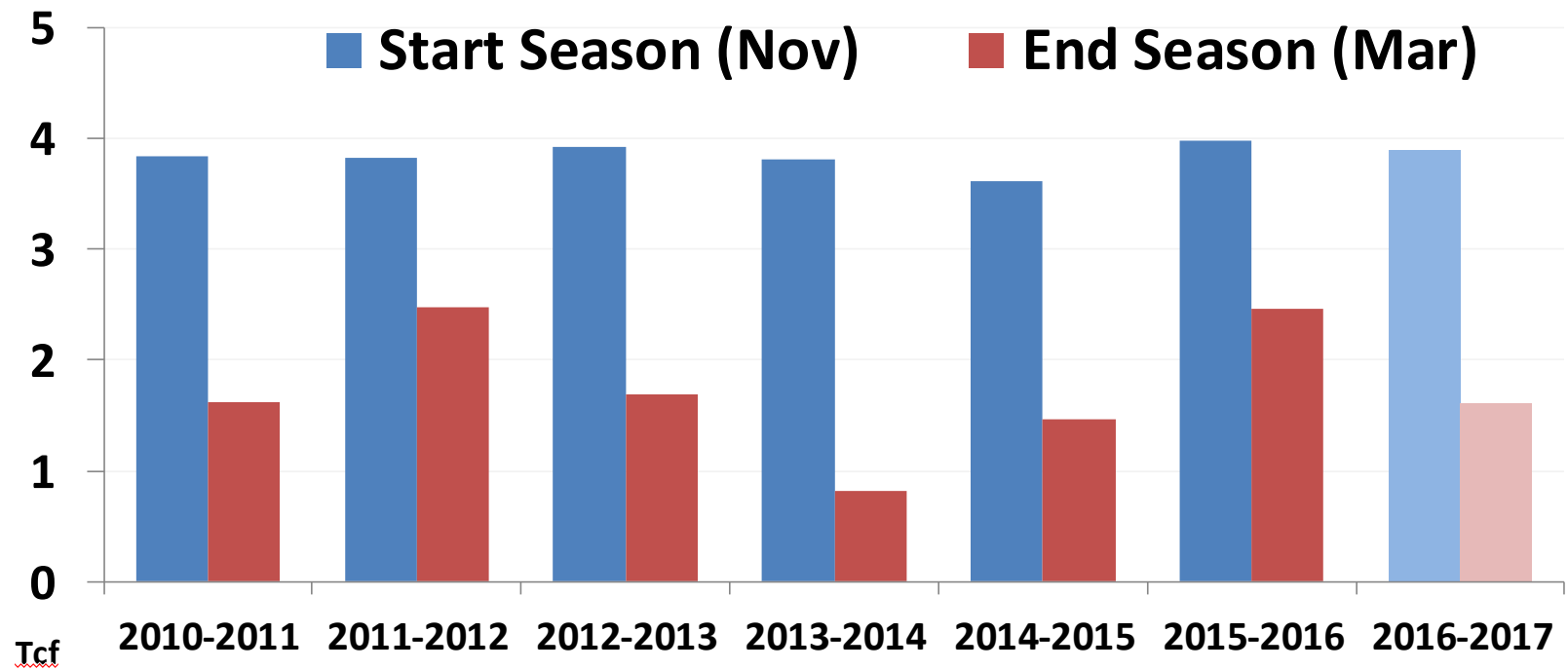


Production Sees First Decline of Shale Era



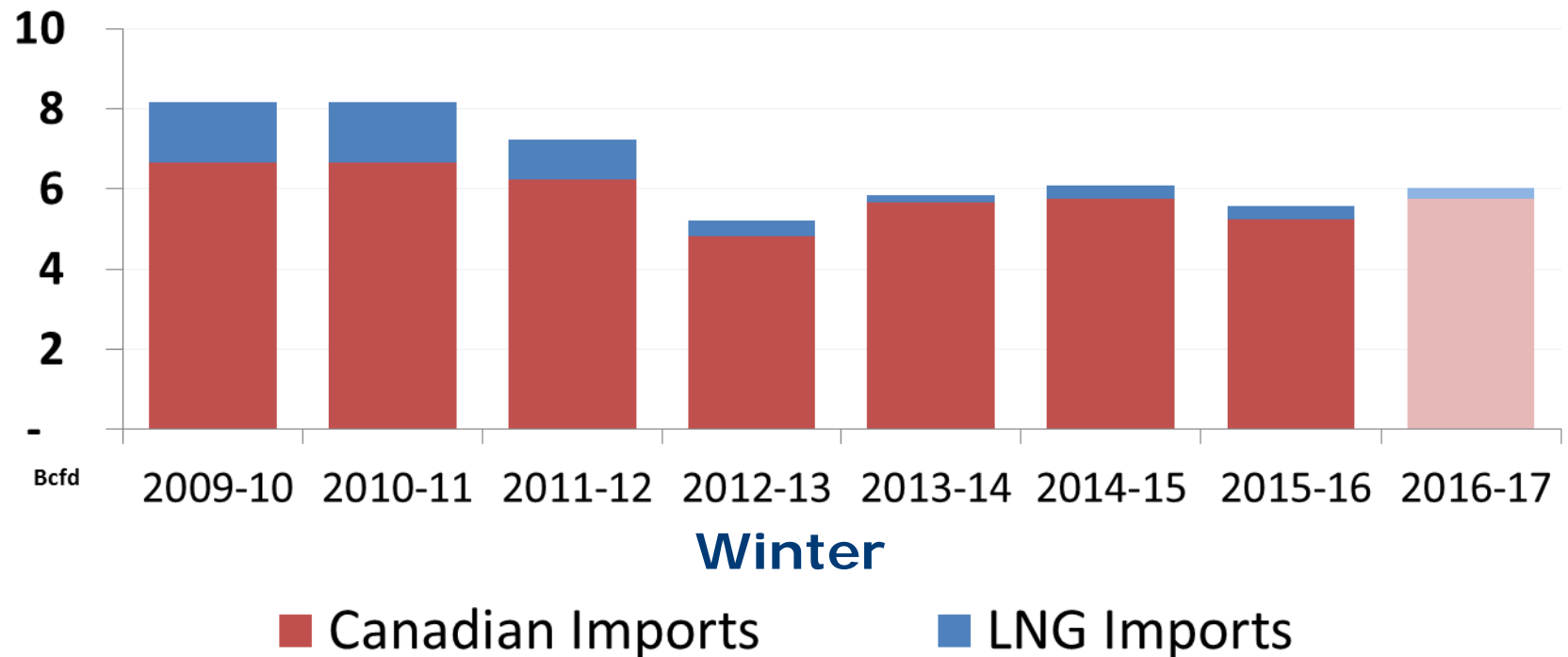
Sources: Derived
from Bentek, EIA

Strong Storage Inventories Keep Market Well Supplied

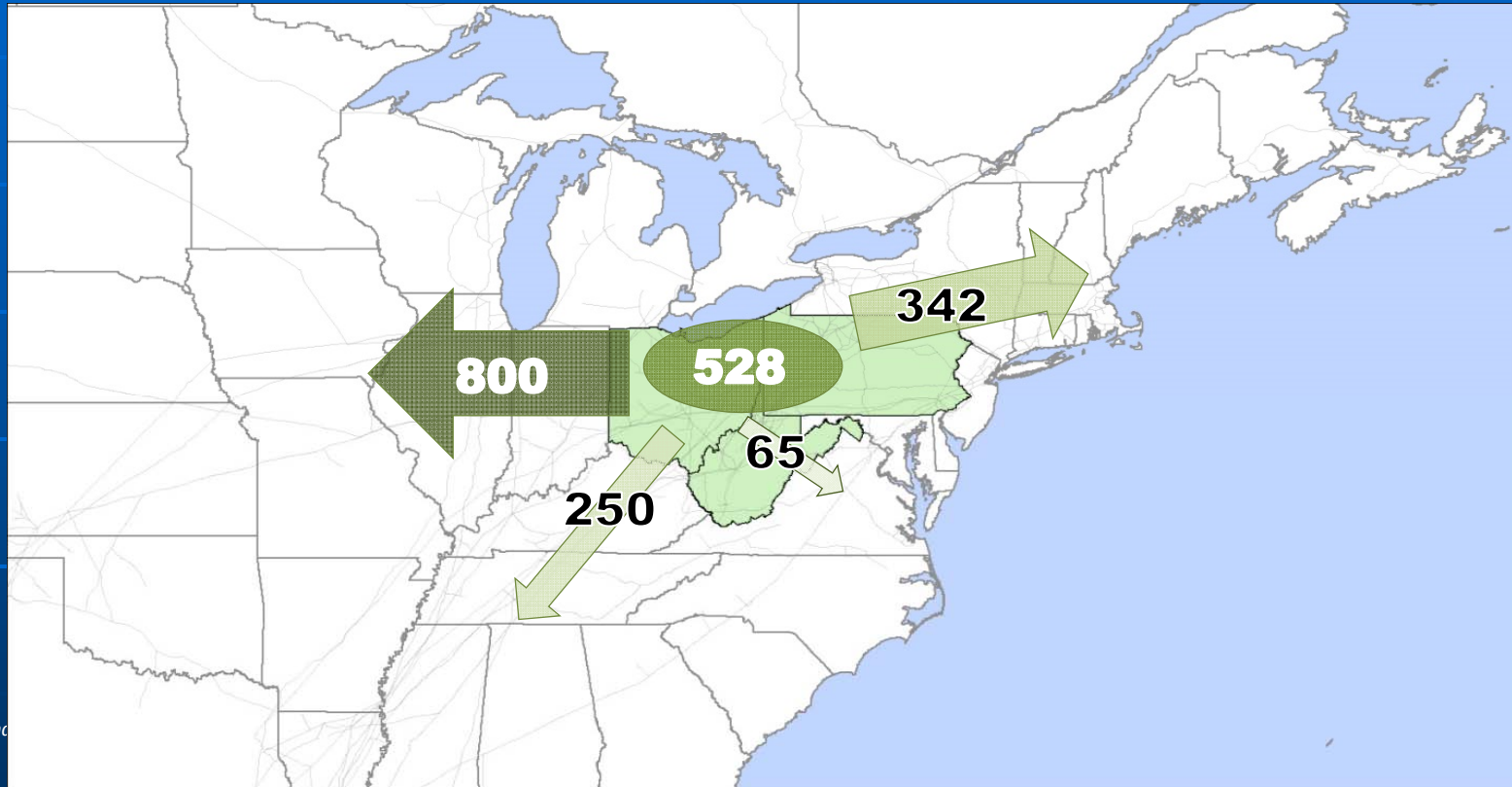


Sources:
Derived from
Bentek, EIA

Canada and LNG Imports Fill in Supply Gaps



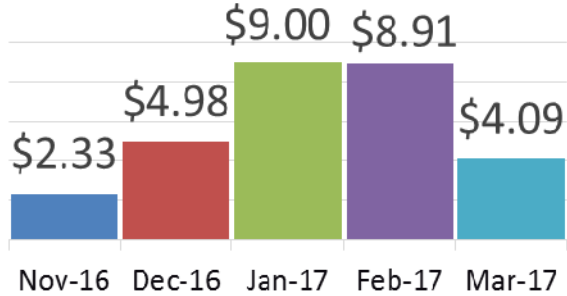
Pipeline Additions Help Ease Market Area Prices



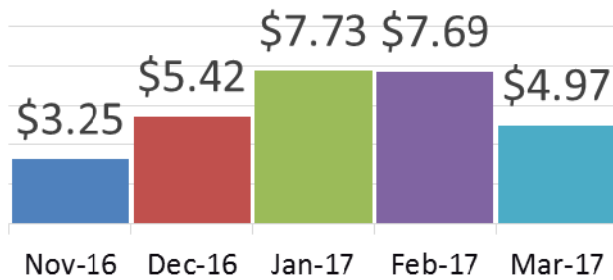
Sources: Derived from
Velocity Suite, ABB
Enterprise Software and
Bentek, in MMcfd

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

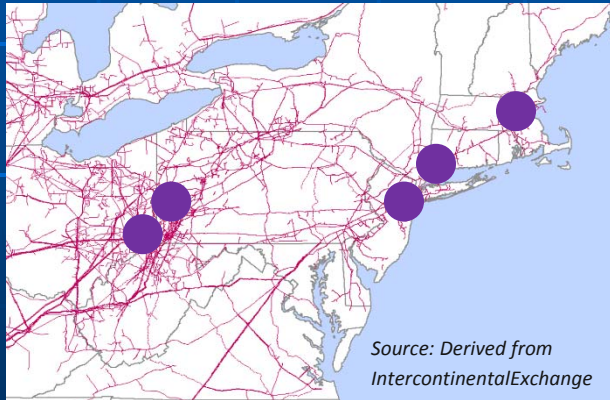
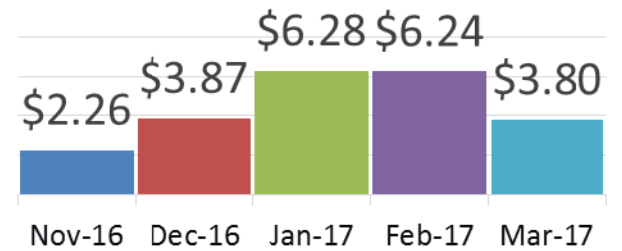
Transco Zone 6-NY



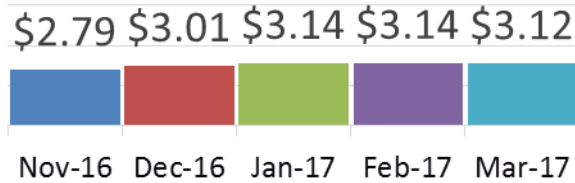
Algonquin City-Gates



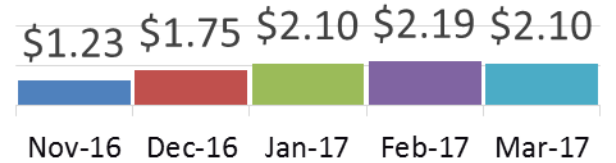
Transco Z 6-Non NY



Columbia Gas TCO



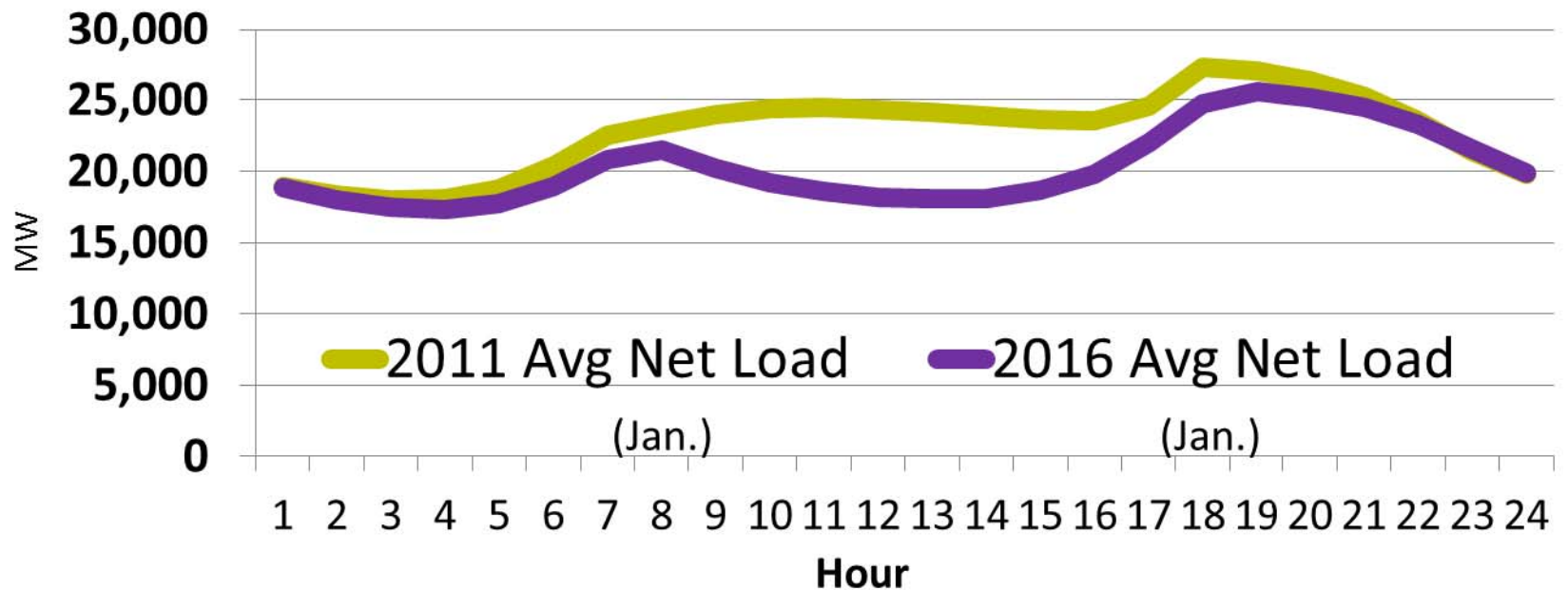
Dominion South



Aliso Canyon Outage Stresses California Markets

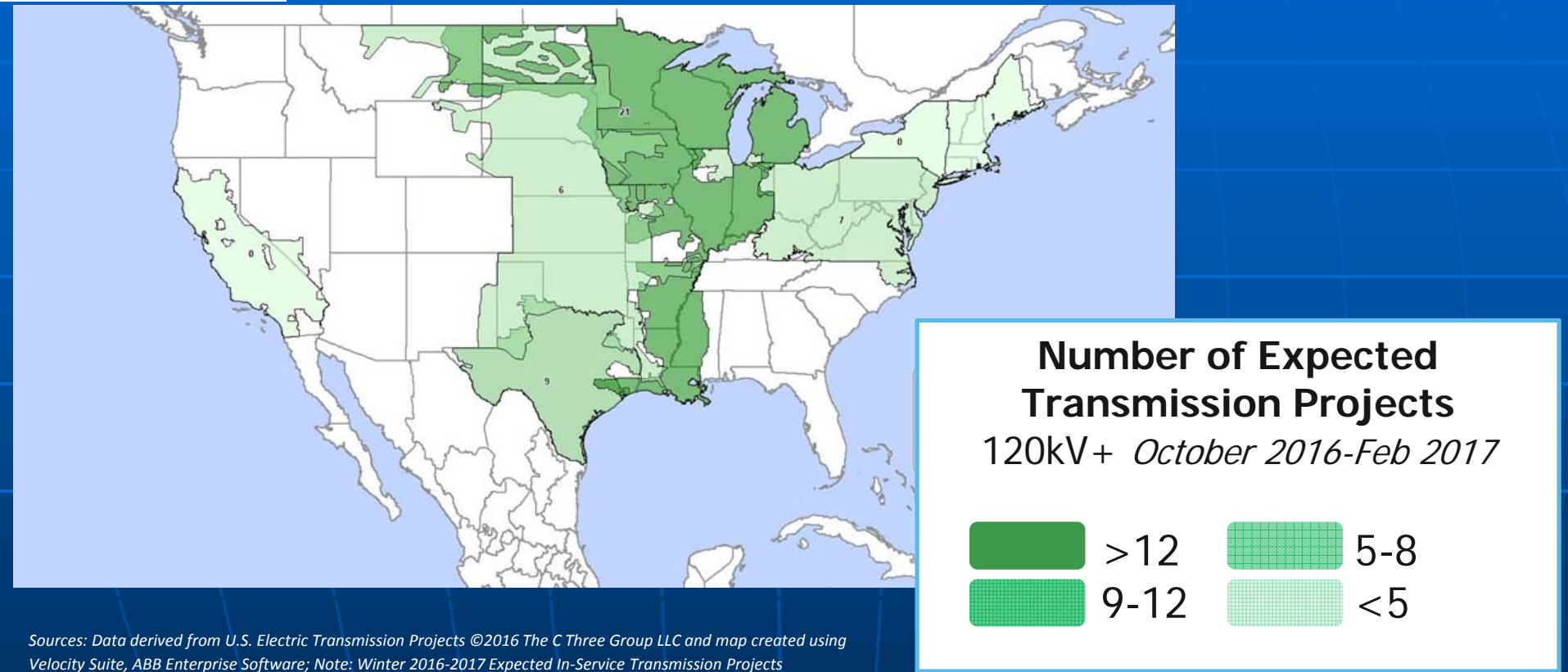


CAISO: Adapting to the Widening "Duck" Curve

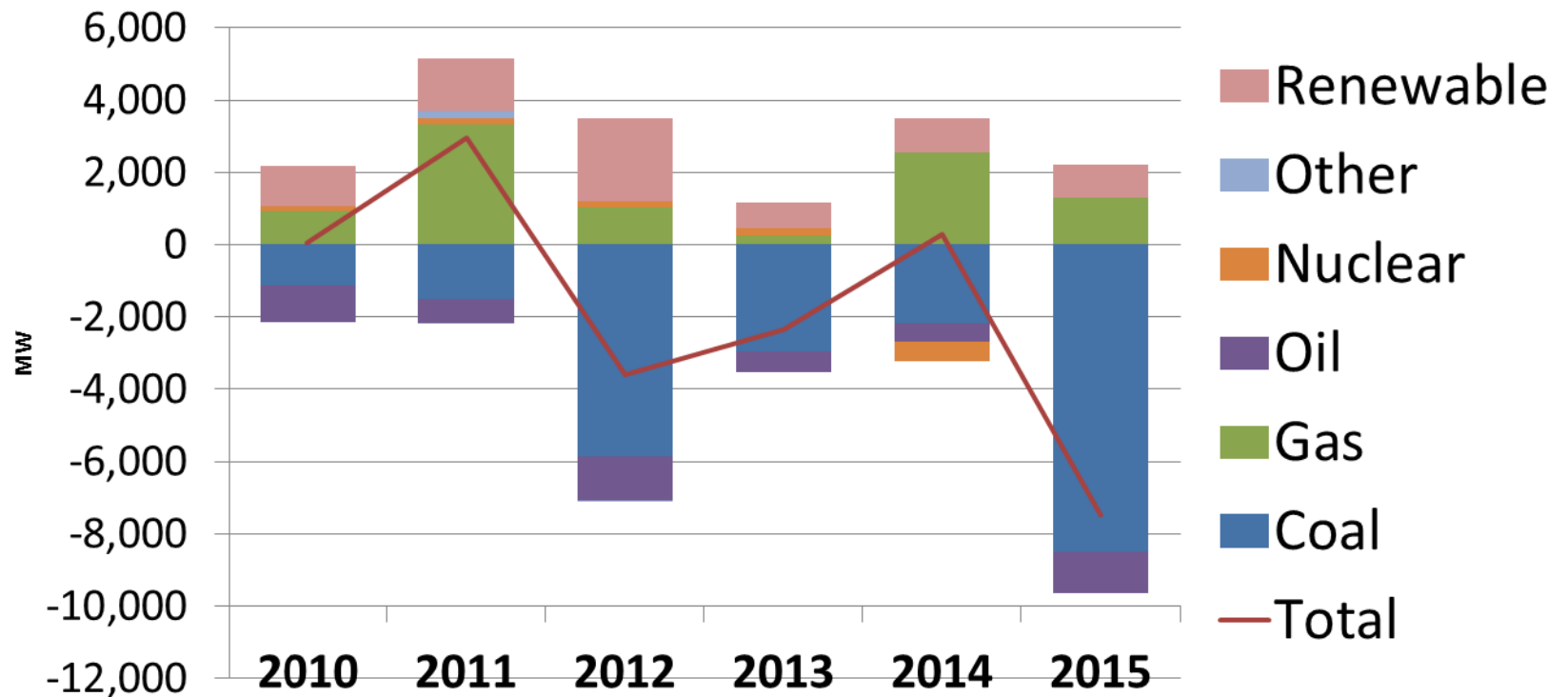


Sources: Derived from Velocity Suite, ABB Enterprise Software

Recent/Upcoming Developments: Power Plants & Transmission



Historical Year-over-year Electric Capacity Change



Source: Derived from
Velocity Suite, ABB
Enterprise Software

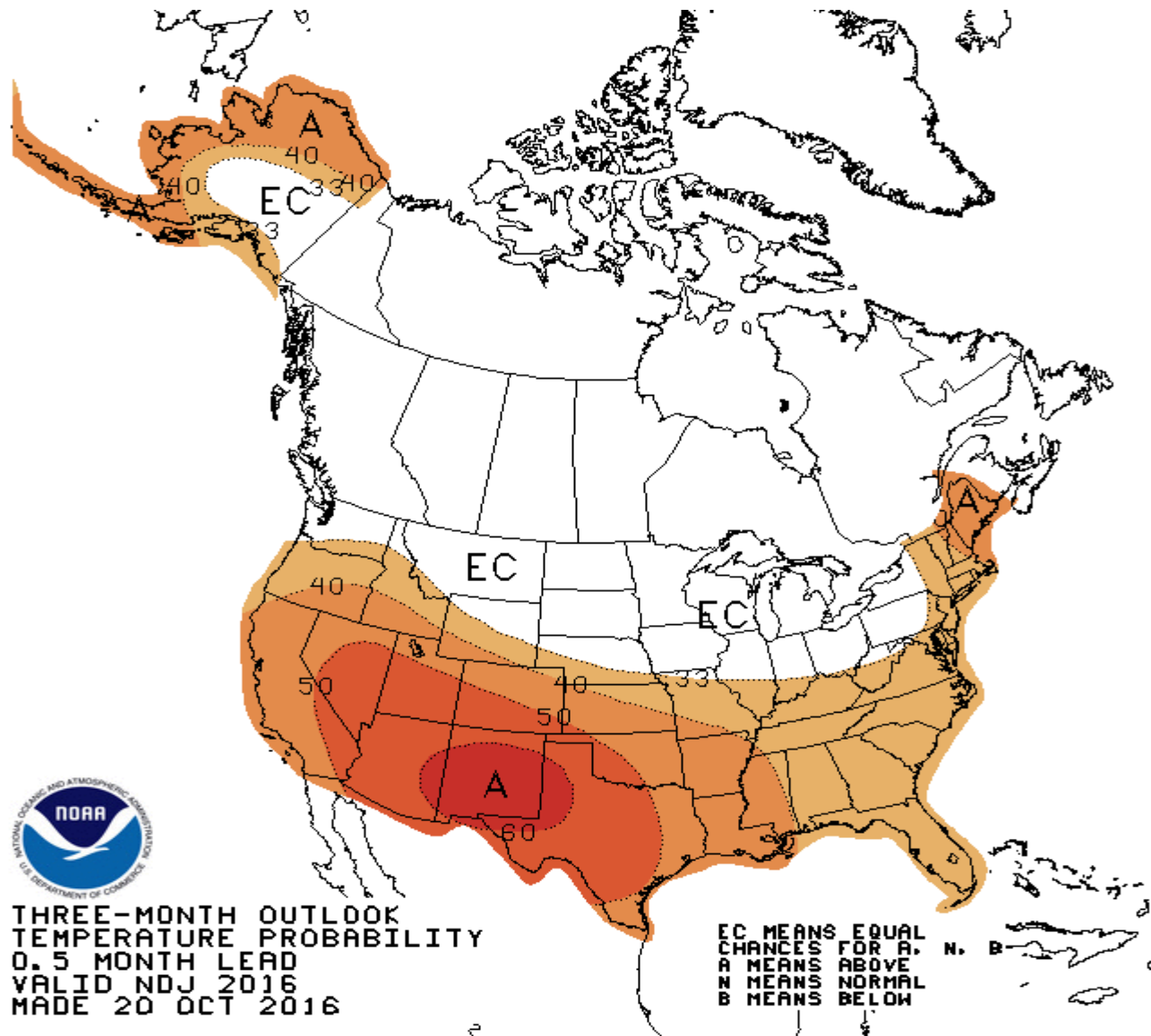
Conclusion

- 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

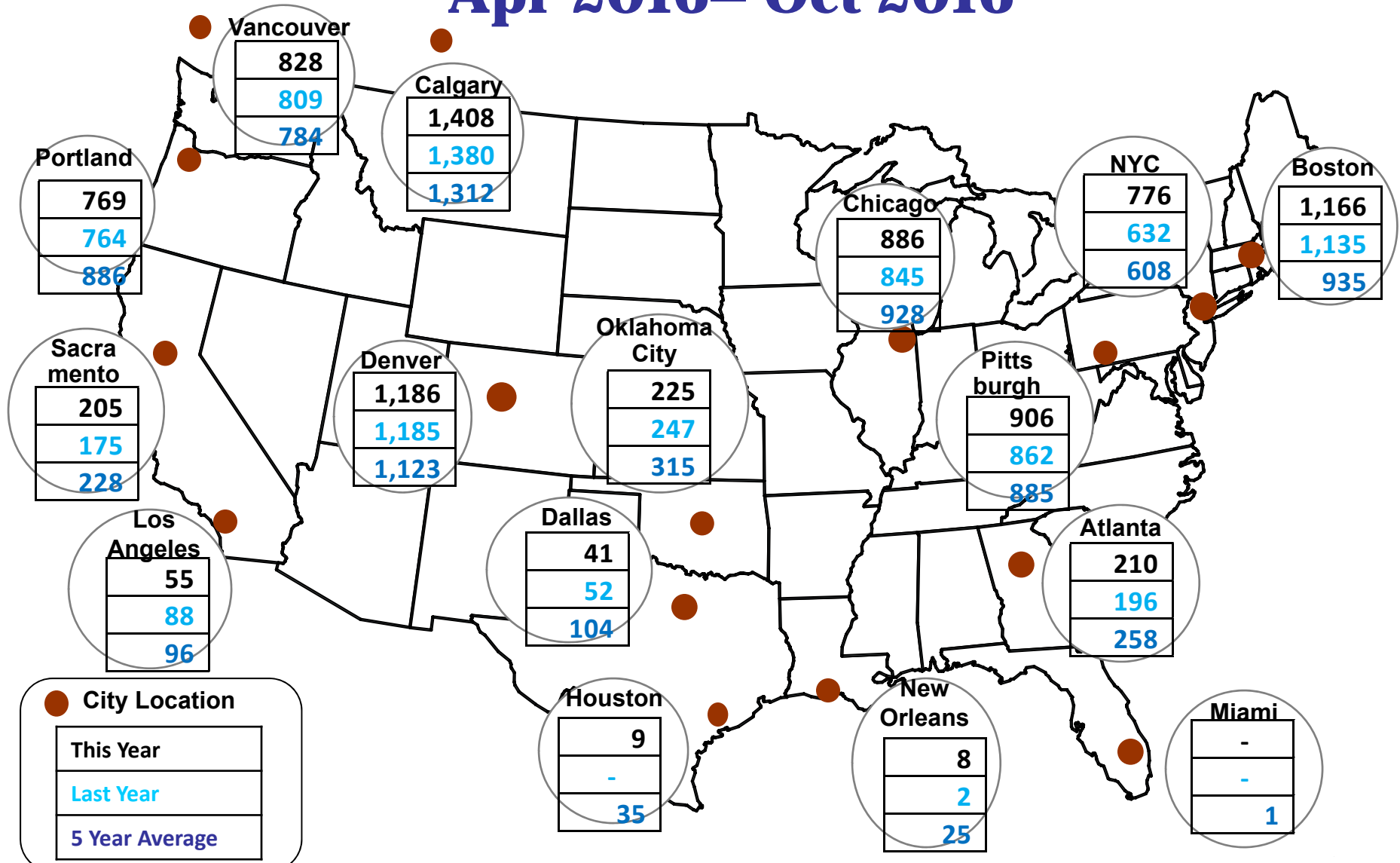


National Slides

NOAA November 2016 Through January 2017 Outlook



Cumulative HDDs by City Apr 2016– Oct 2016



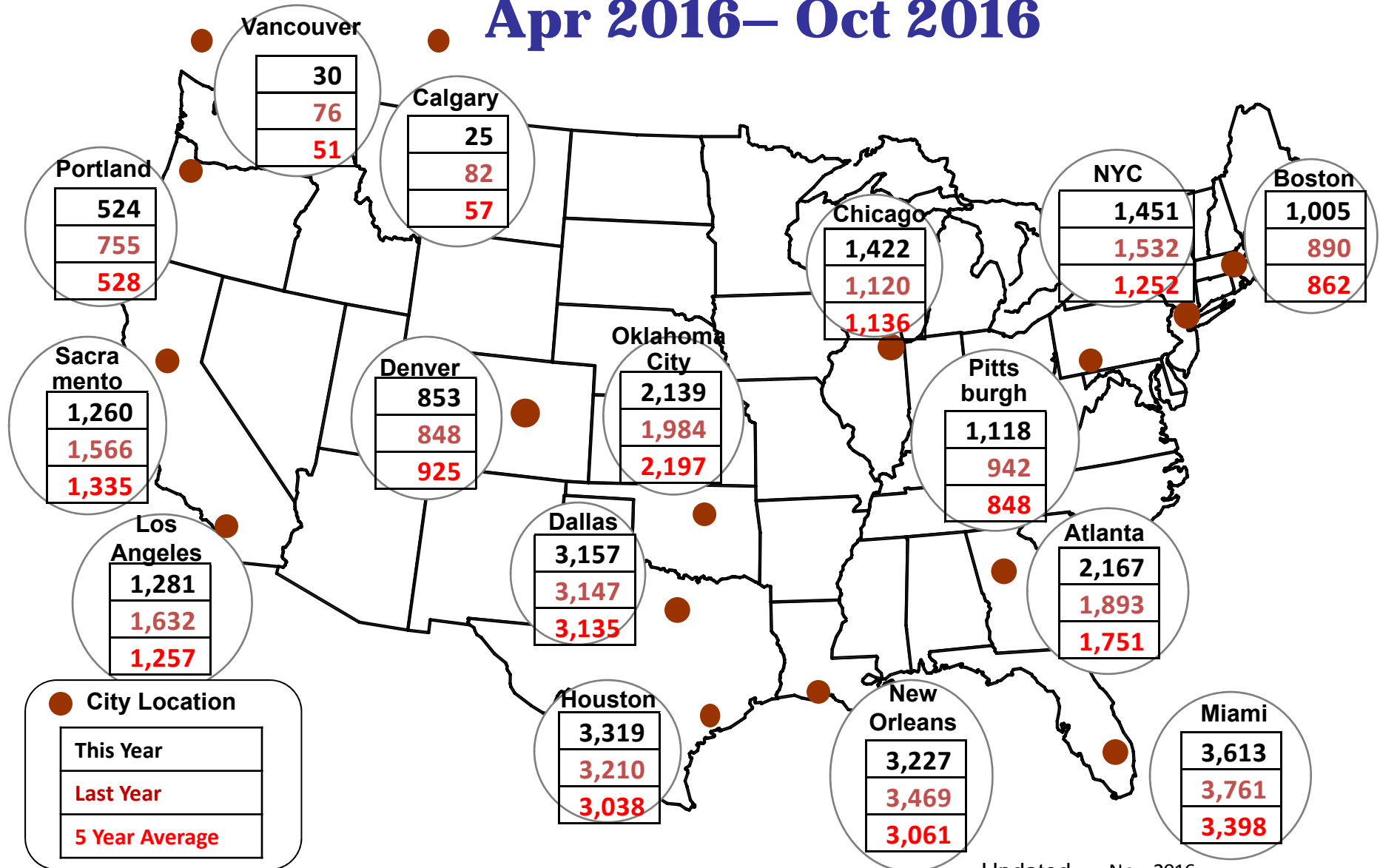
Source: Bloomberg Weather (daily data summed quarterly)

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Cumulative CDDs by City

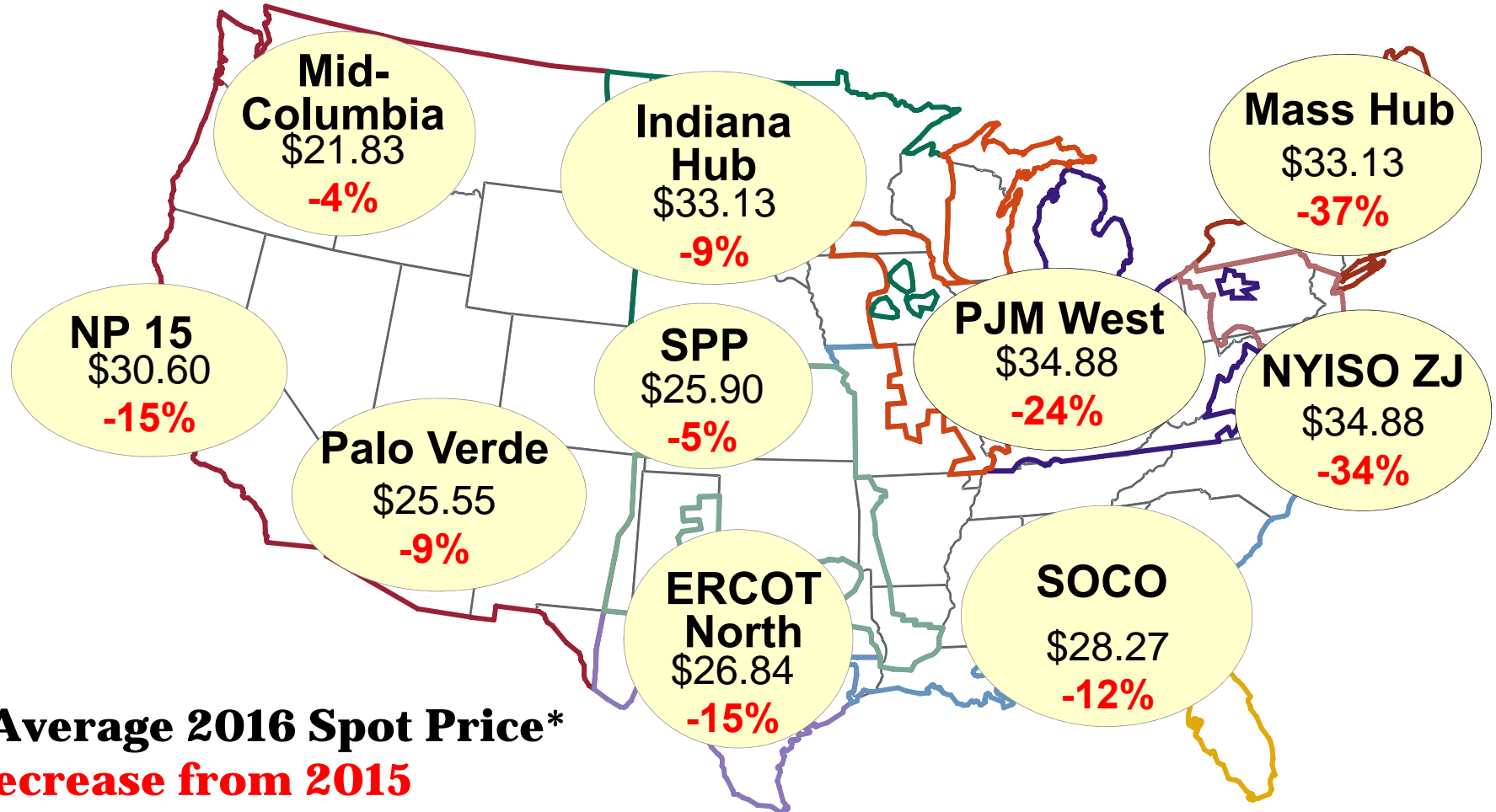
Apr 2016– Oct 2016



Source: Bloomberg Weather (daily data summed quarterly)

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2016 Spot Power Prices (\$/MWh)



\$ = Average 2016 Spot Price*

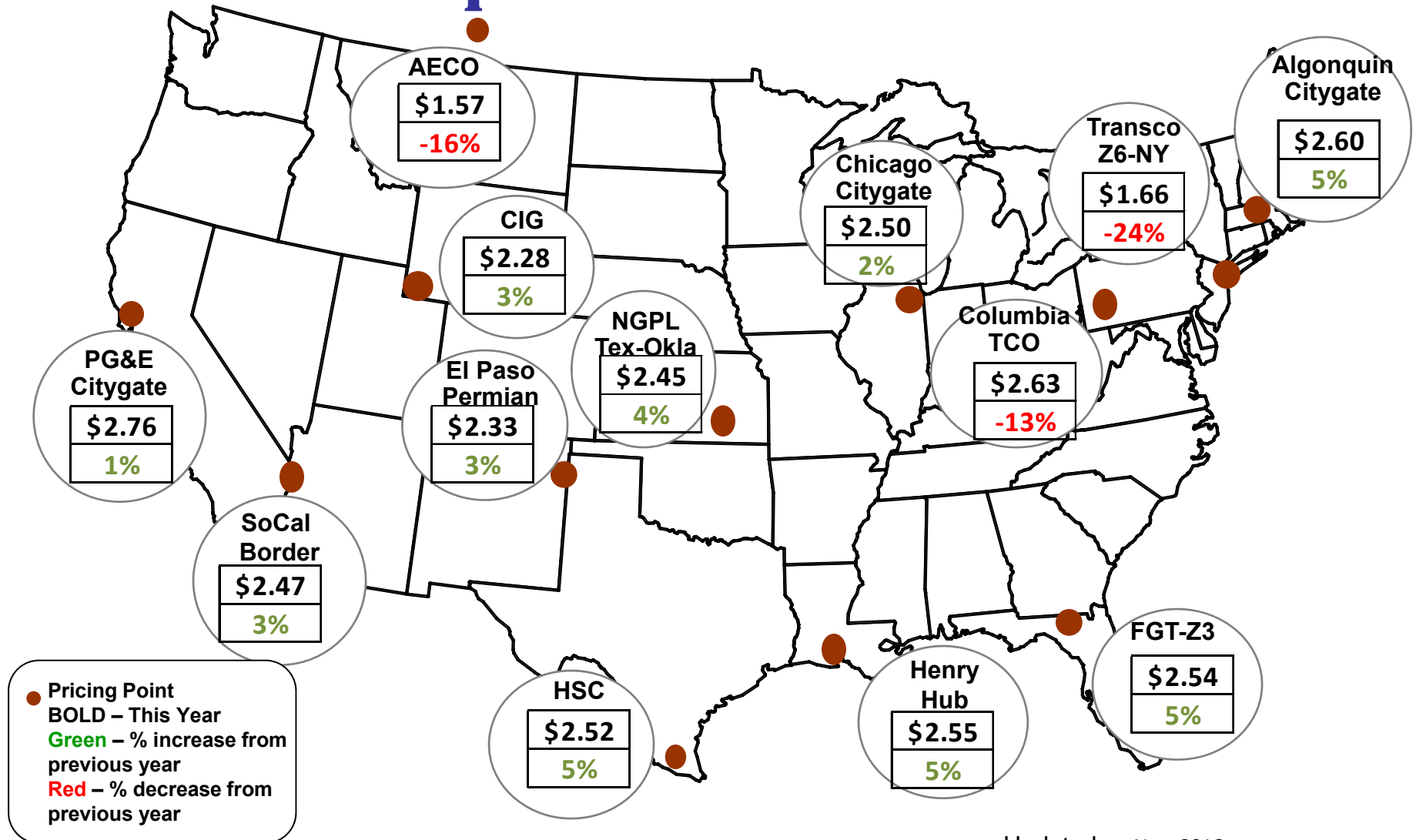
% Decrease from 2015

* 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

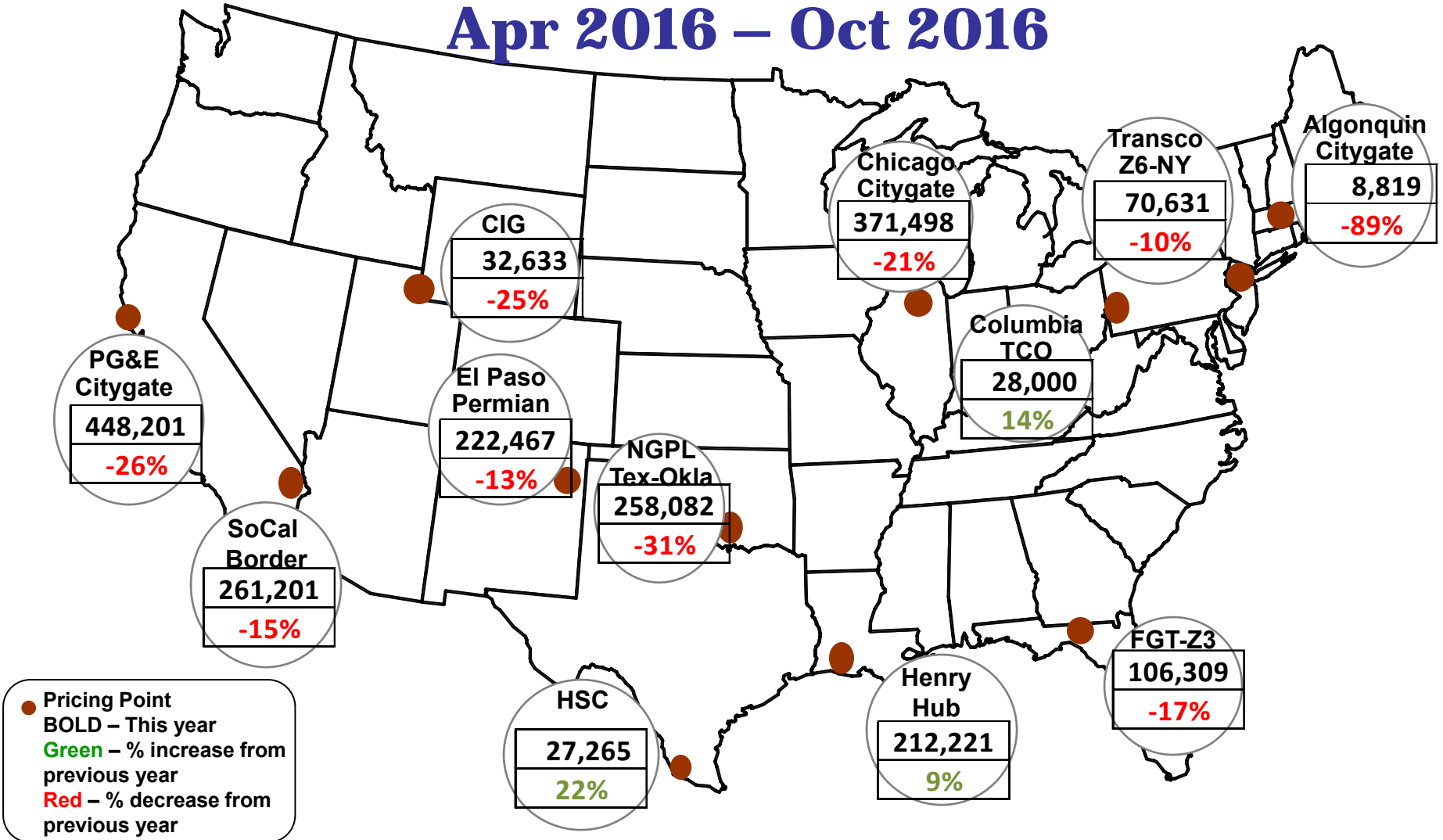
Spot Natural Gas Prices Average (\$/MMBtu) Apr 2016 – Oct 2016



Source: ICE

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

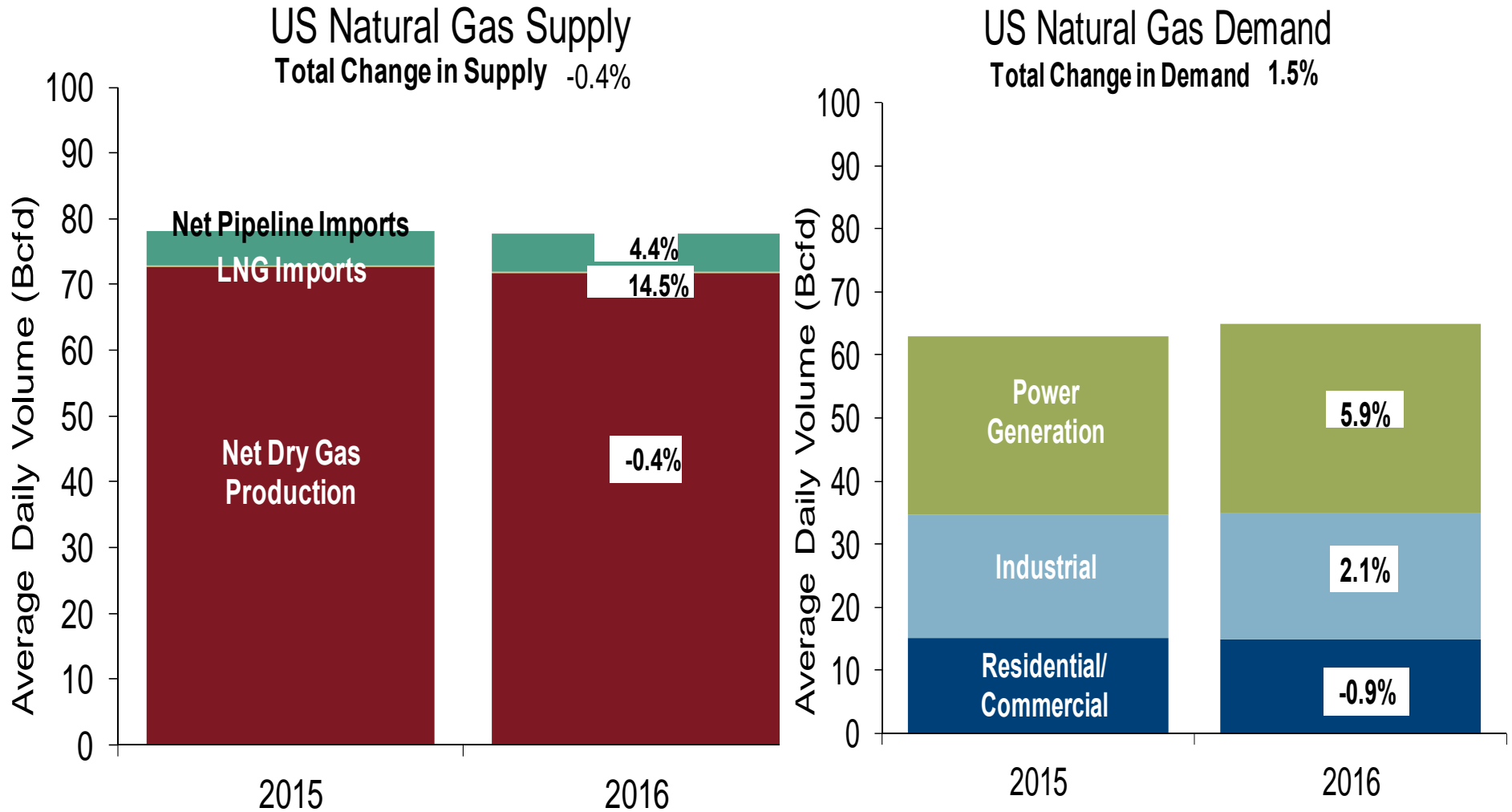


Source: ICE

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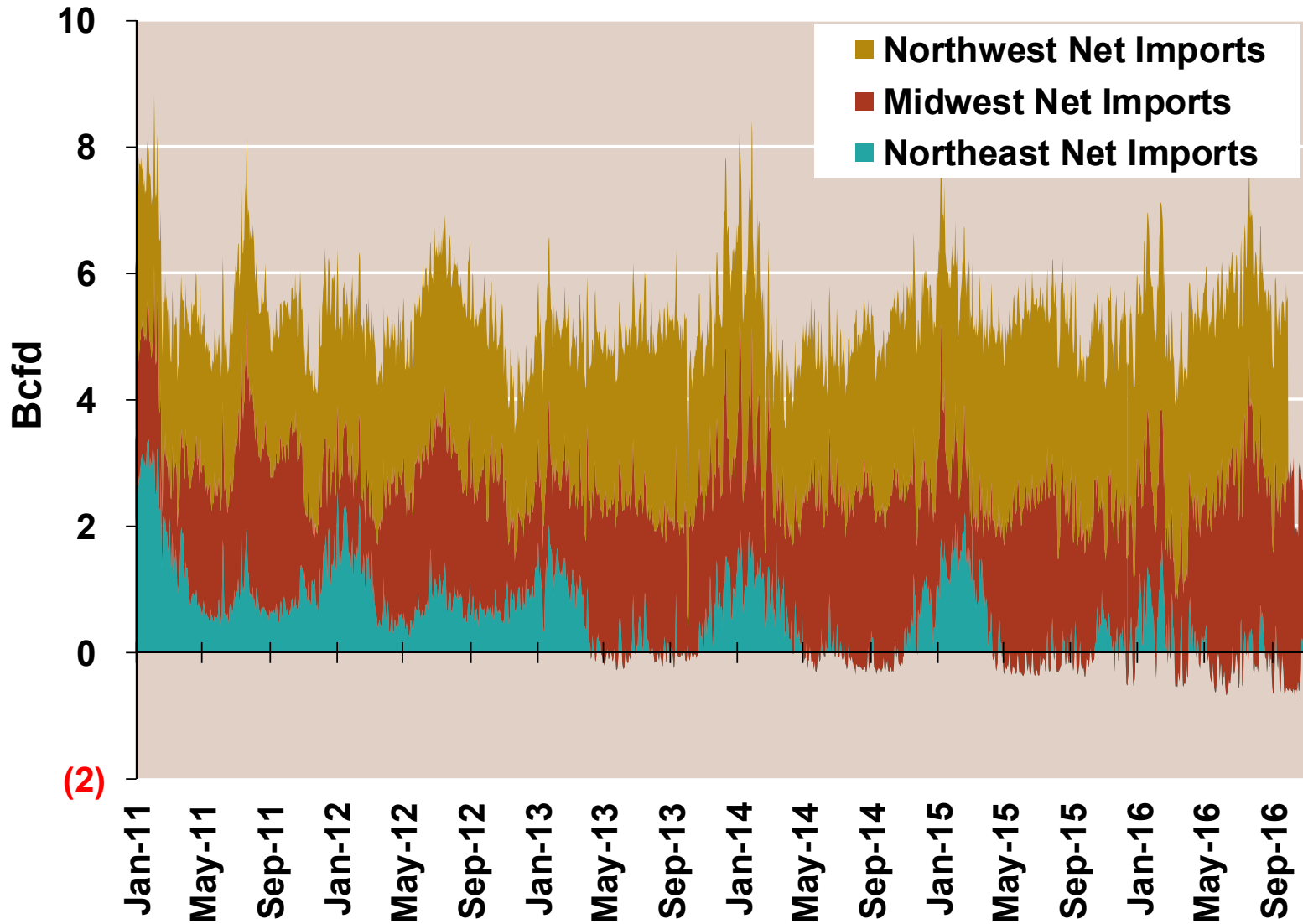
U.S. NG Supply and Demand

Apr 2015 – Oct 2015 vs Apr 2016 – Oct 2016



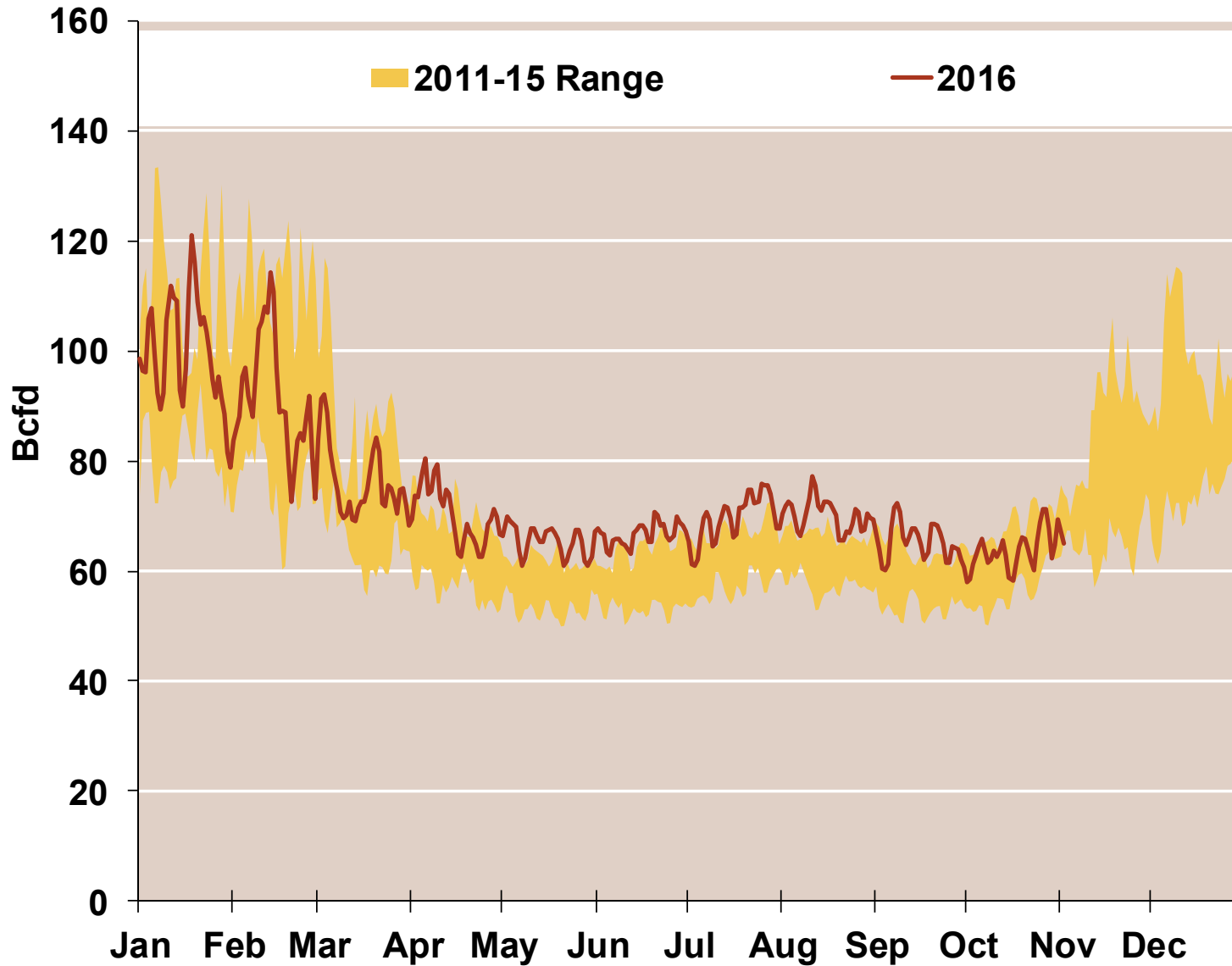
Note: Balance includes all amounts not attributable to other categories.
Source: Derived from *Bentek Energy* data

Regional Imports from Canada



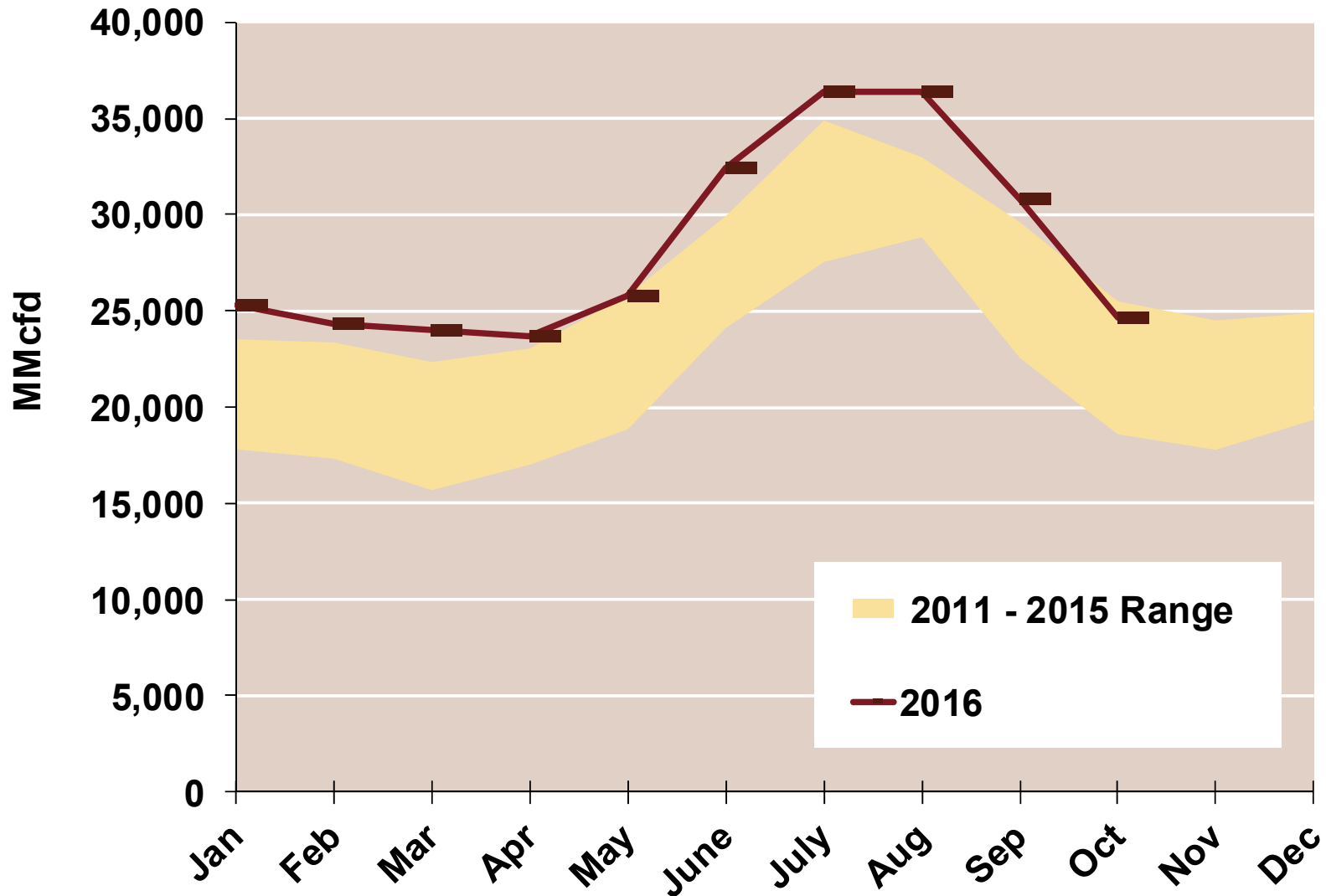
(2)

Total U.S. Natural Gas Demand All Sectors

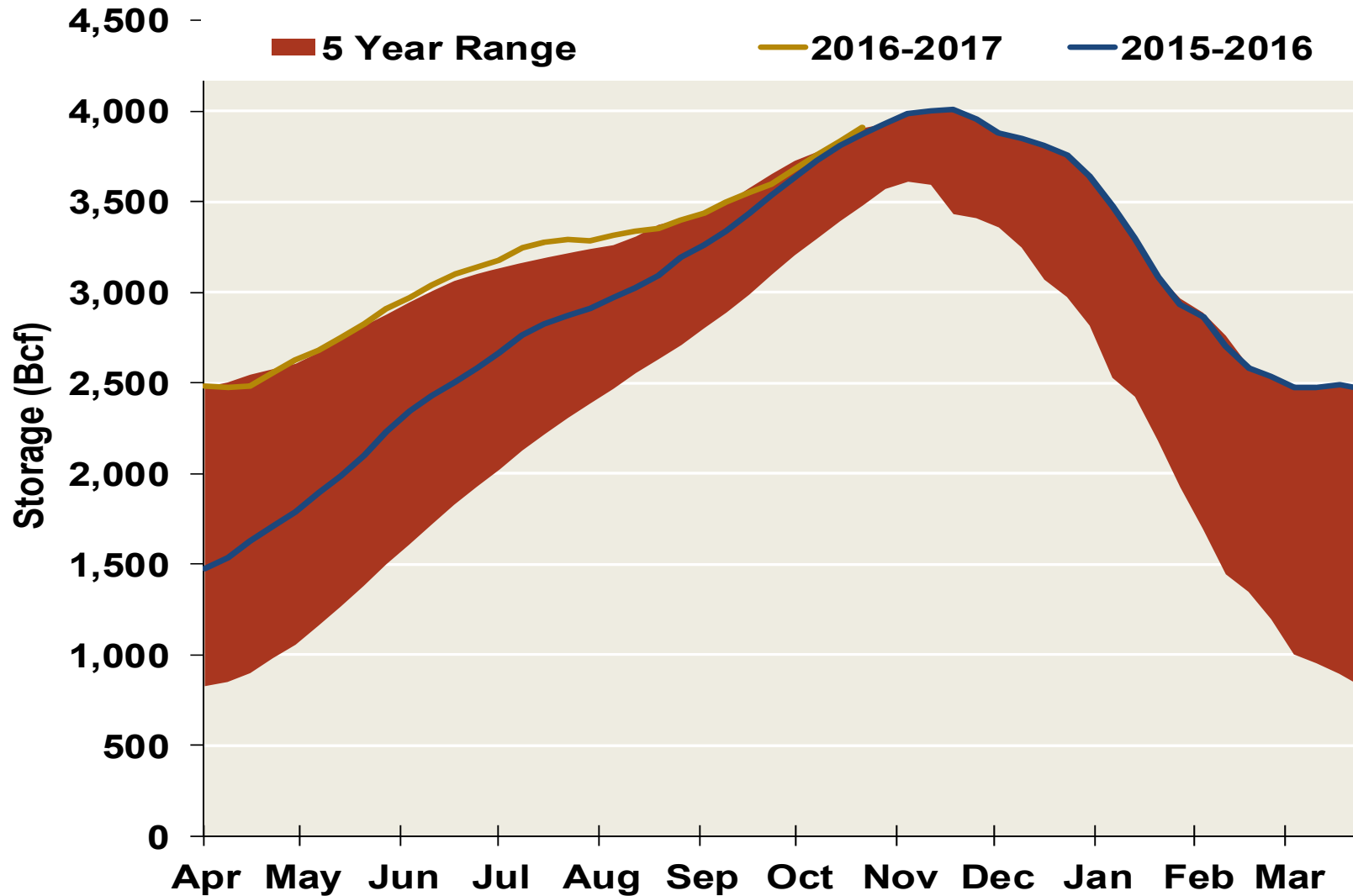


Source: Derived from *Bentek Energy* data, derived from interstate pipeline flow and modeled data.

U.S. Natural Gas Consumption for Power Generation



EIA National Storage Inventories

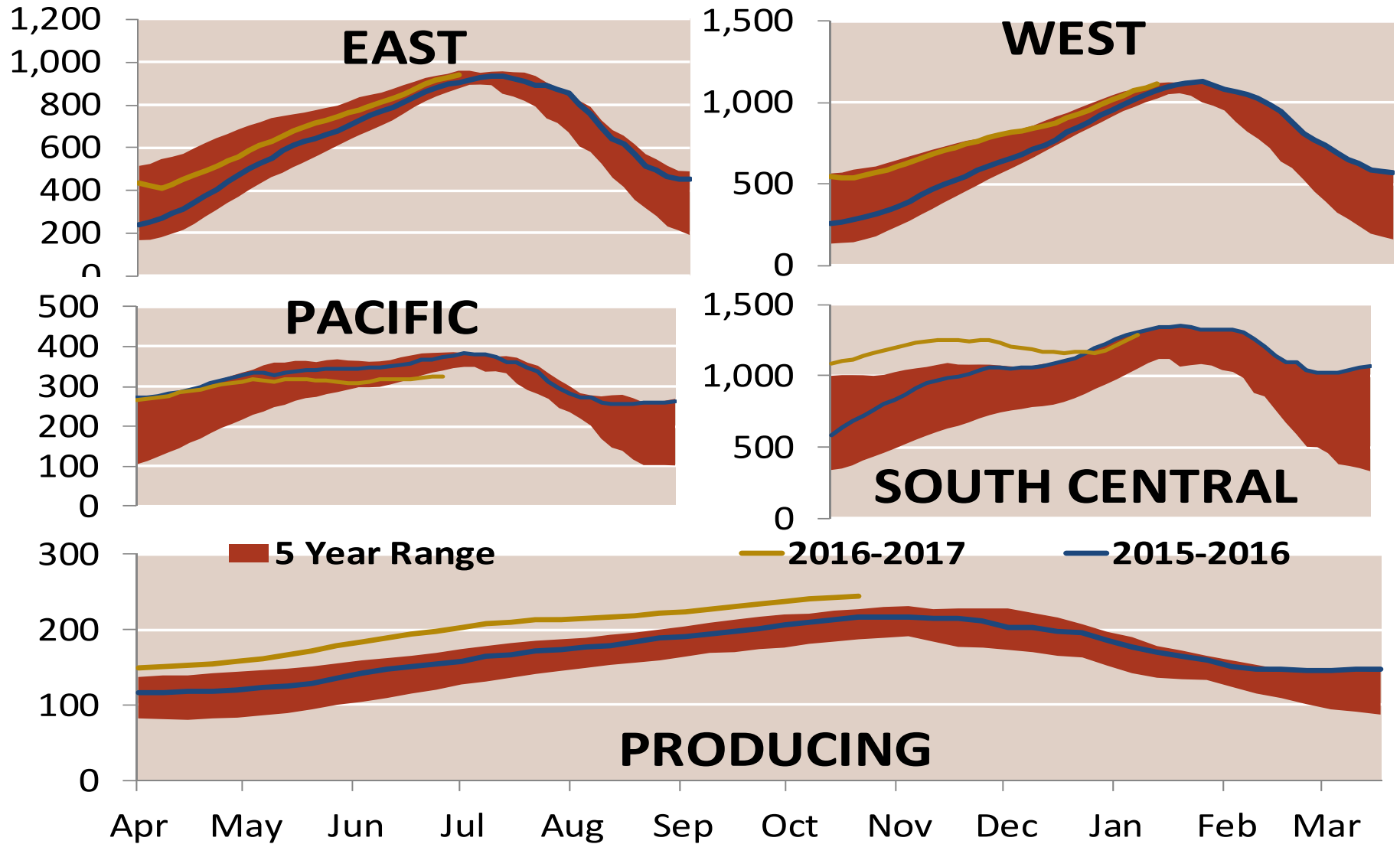


Notes:

Source: Derived from Bloomberg Data

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EIA Regional Storage Inventories

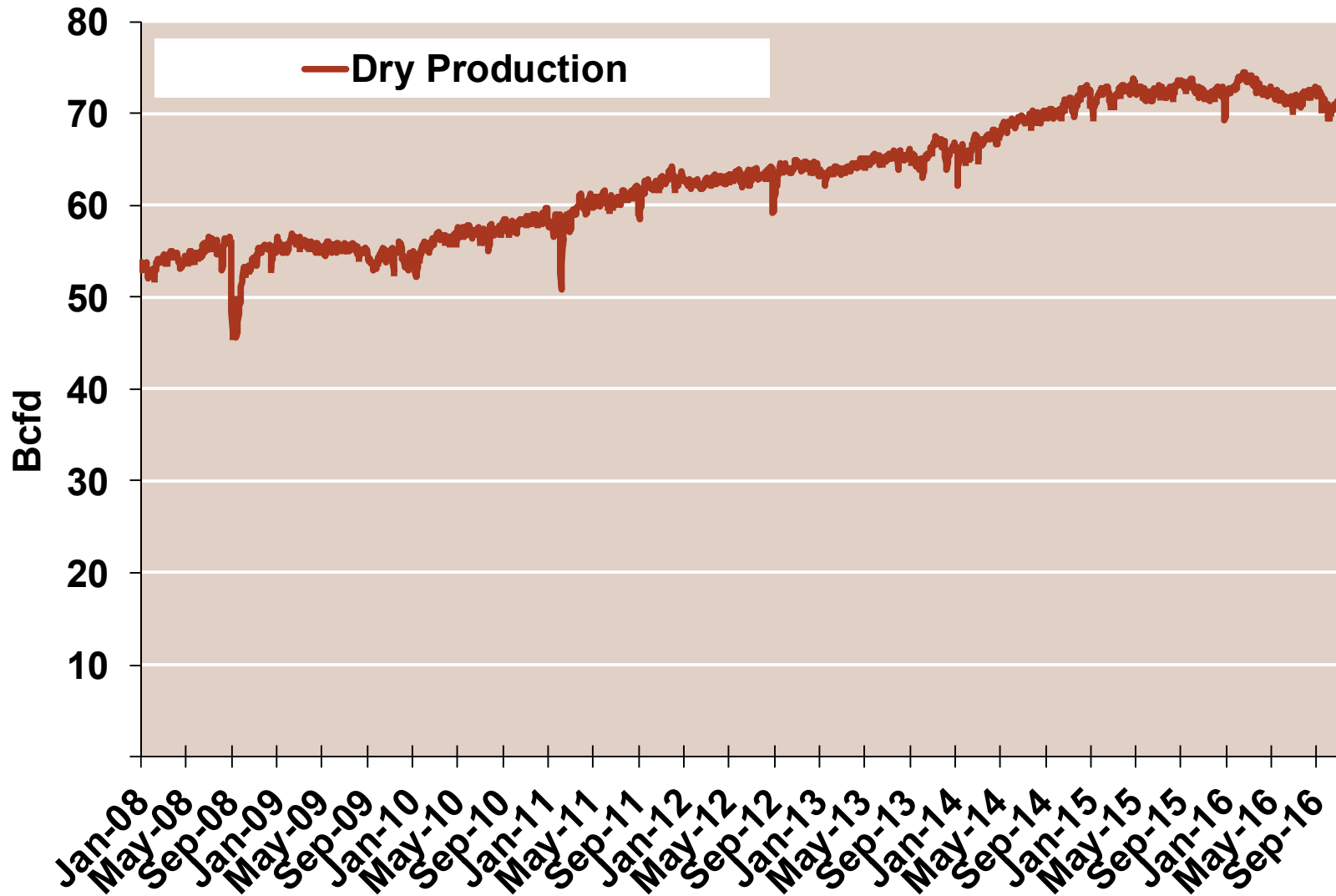


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Source: Derived from Bloomberg Data

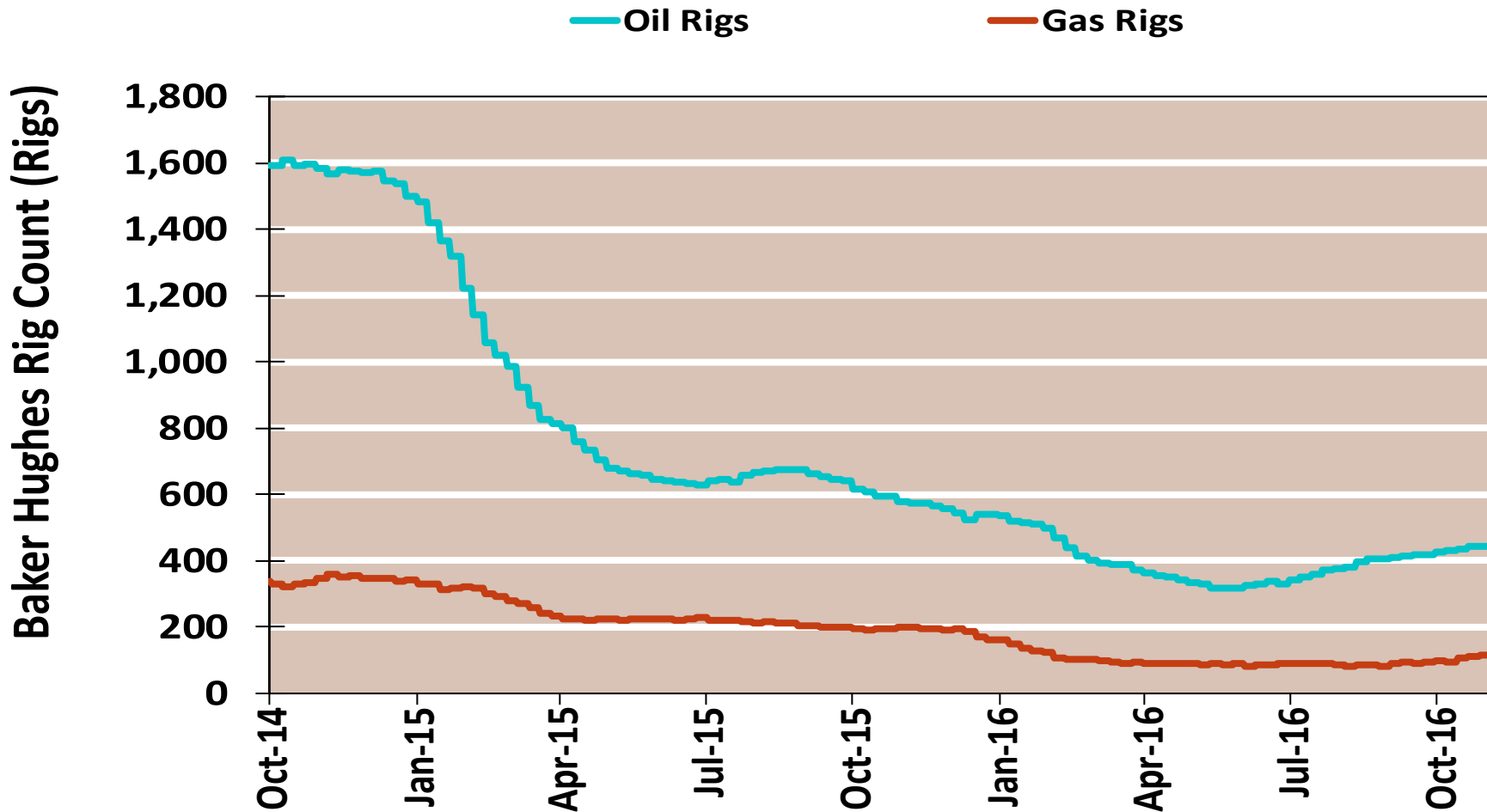
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Monthly U.S. Dry Gas Production – Lower 48 States



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

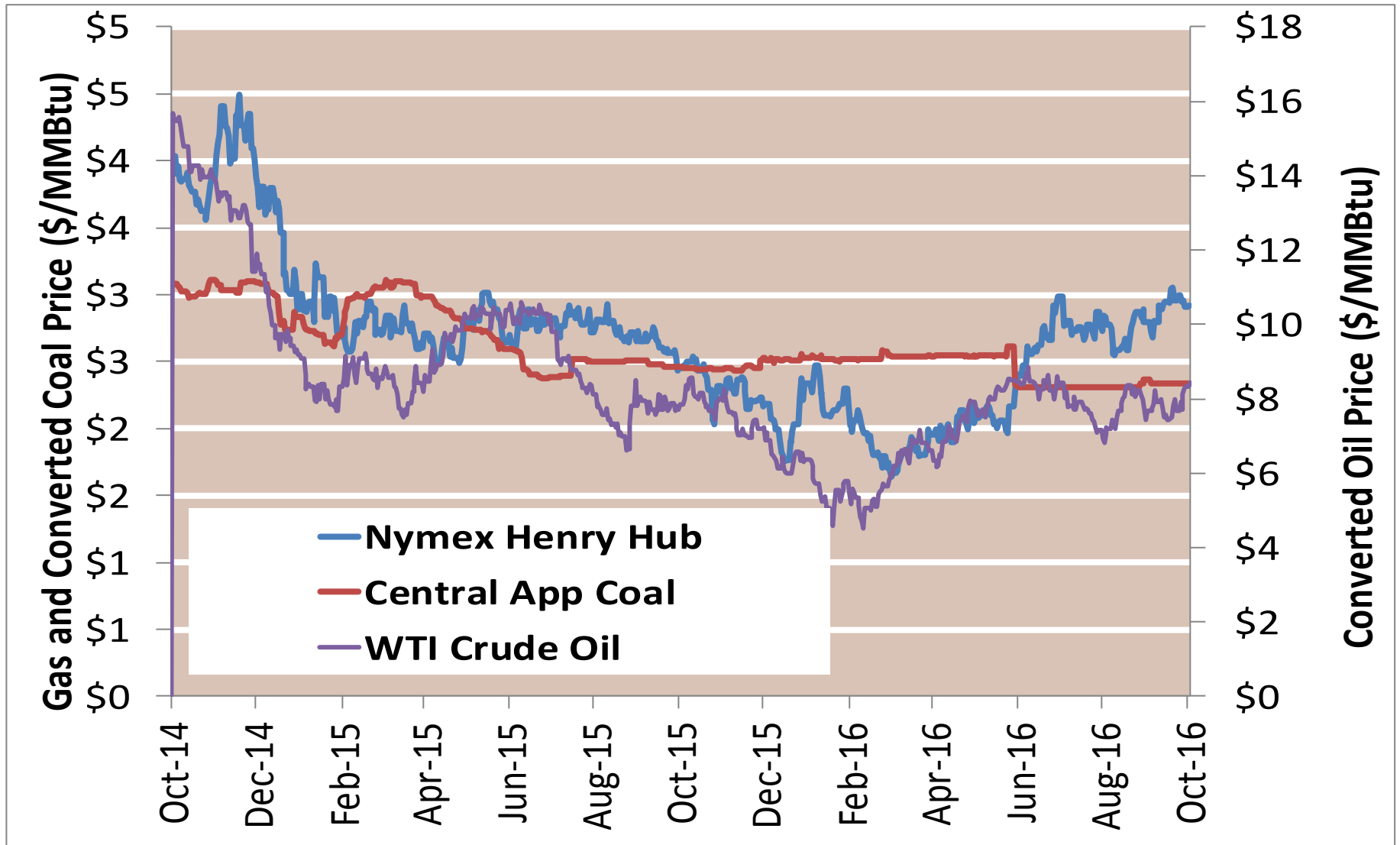


Notes:

Source: Derived from Bloomberg data

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Gas vs Coal

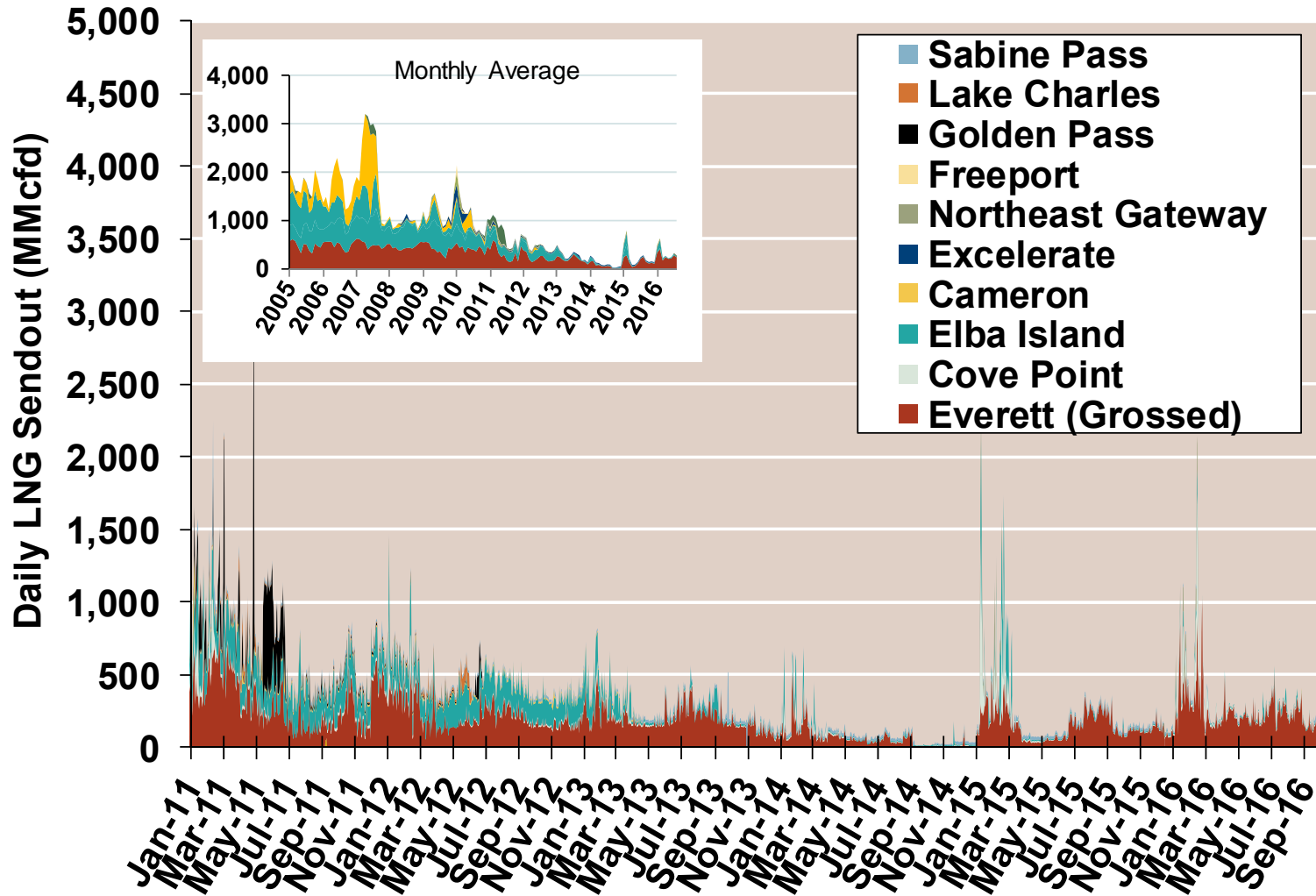


Notes:

Source: Derived from Bloomberg data

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Daily Gas Sendout from Existing U.S. LNG Facilities

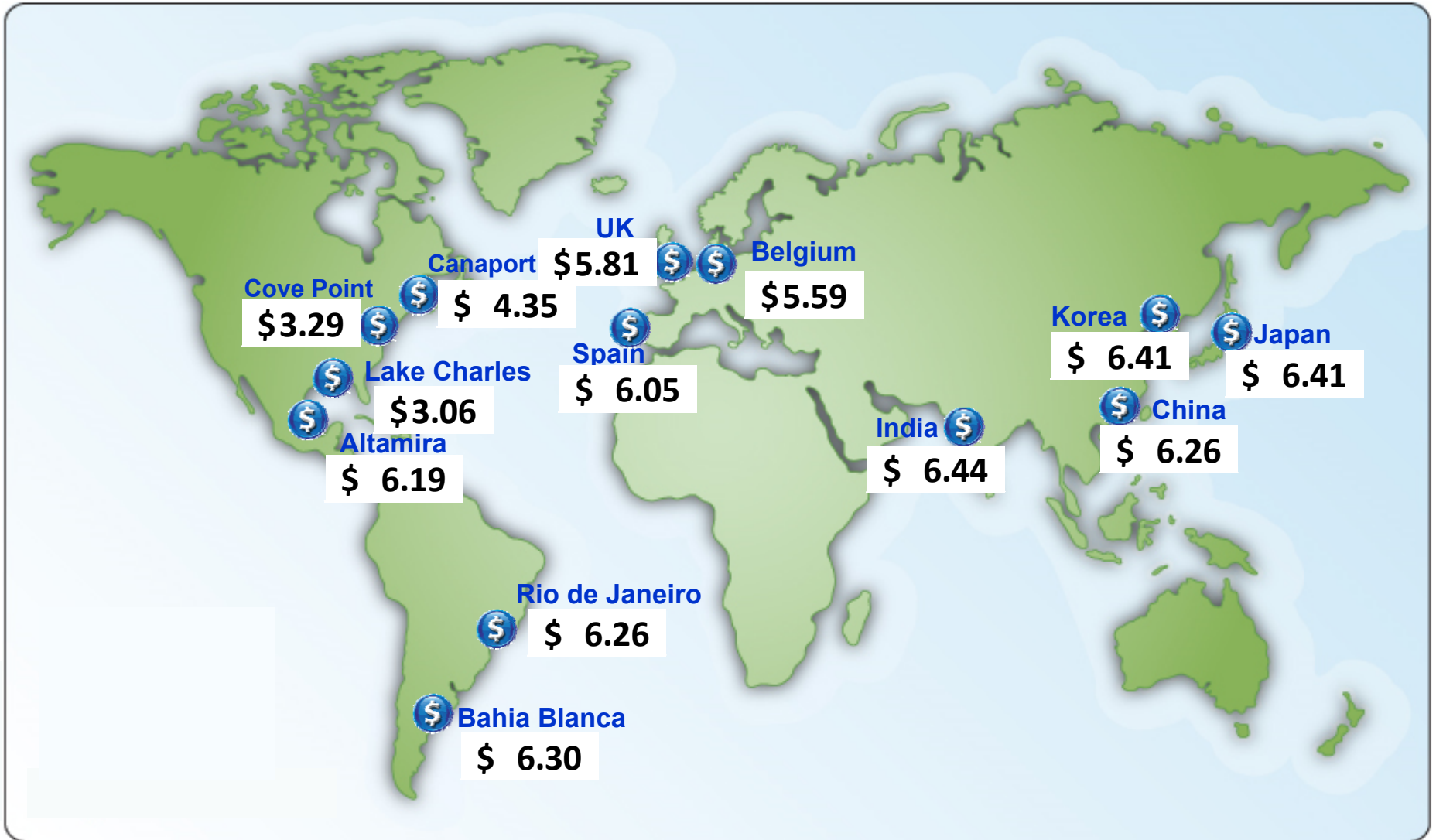


Notes: Everett data includes flows onto the AGT and TGP interstate lines, plus estimates of flows to the Mystic 7 power plant, Keyspan Boston Gas, and LNG trucked out of the terminal. Excludes flows to the Freeport LNG which flows via intrastate pipelines and flows to the Mystic 8 and 9 power plants.

Source: Derived from *Bentek Energy* data

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World LNG Estimated Landed Prices: Oct 2016



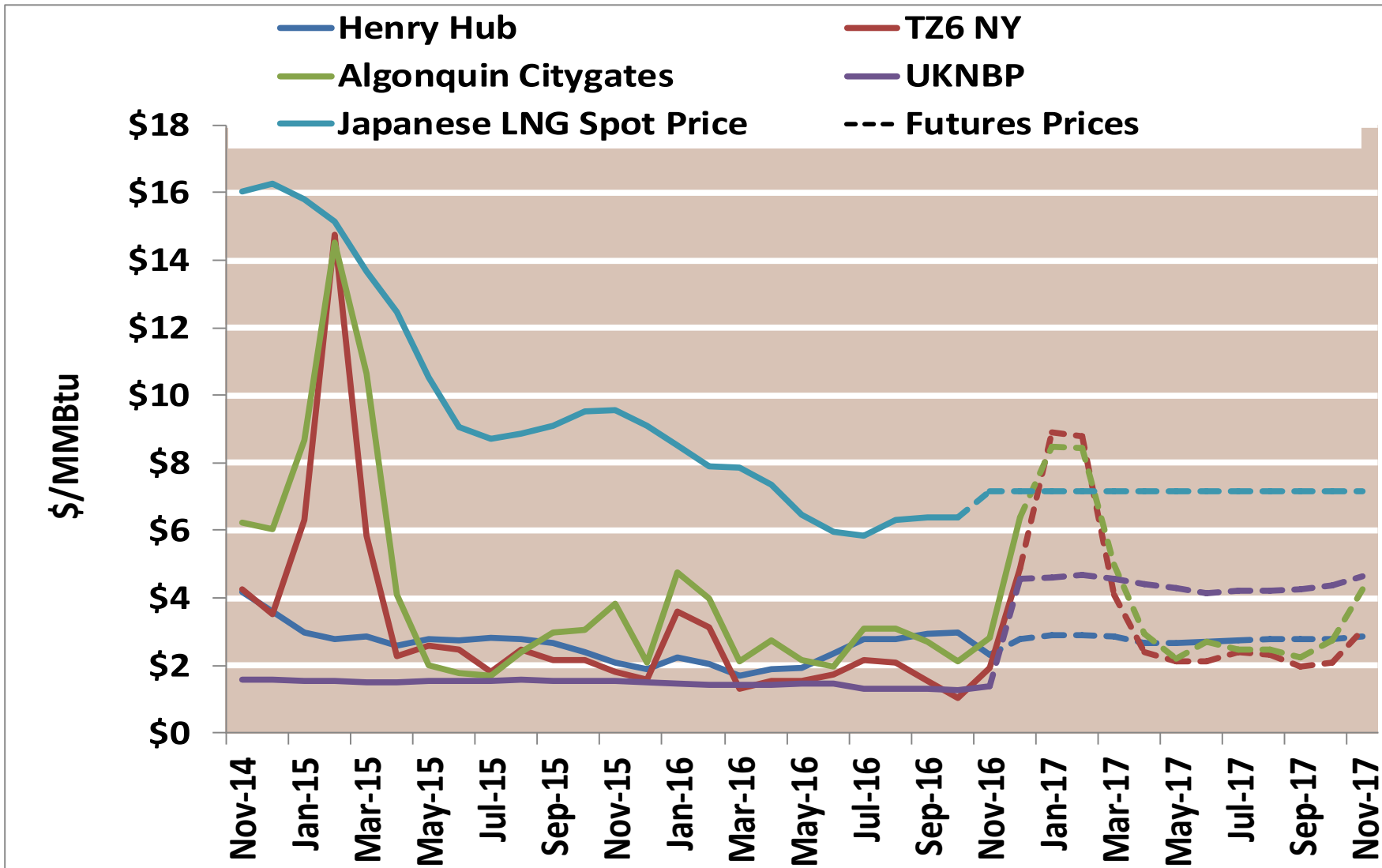
Source: Waterborne Energy, Inc. Data in \$US/MMBtu

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

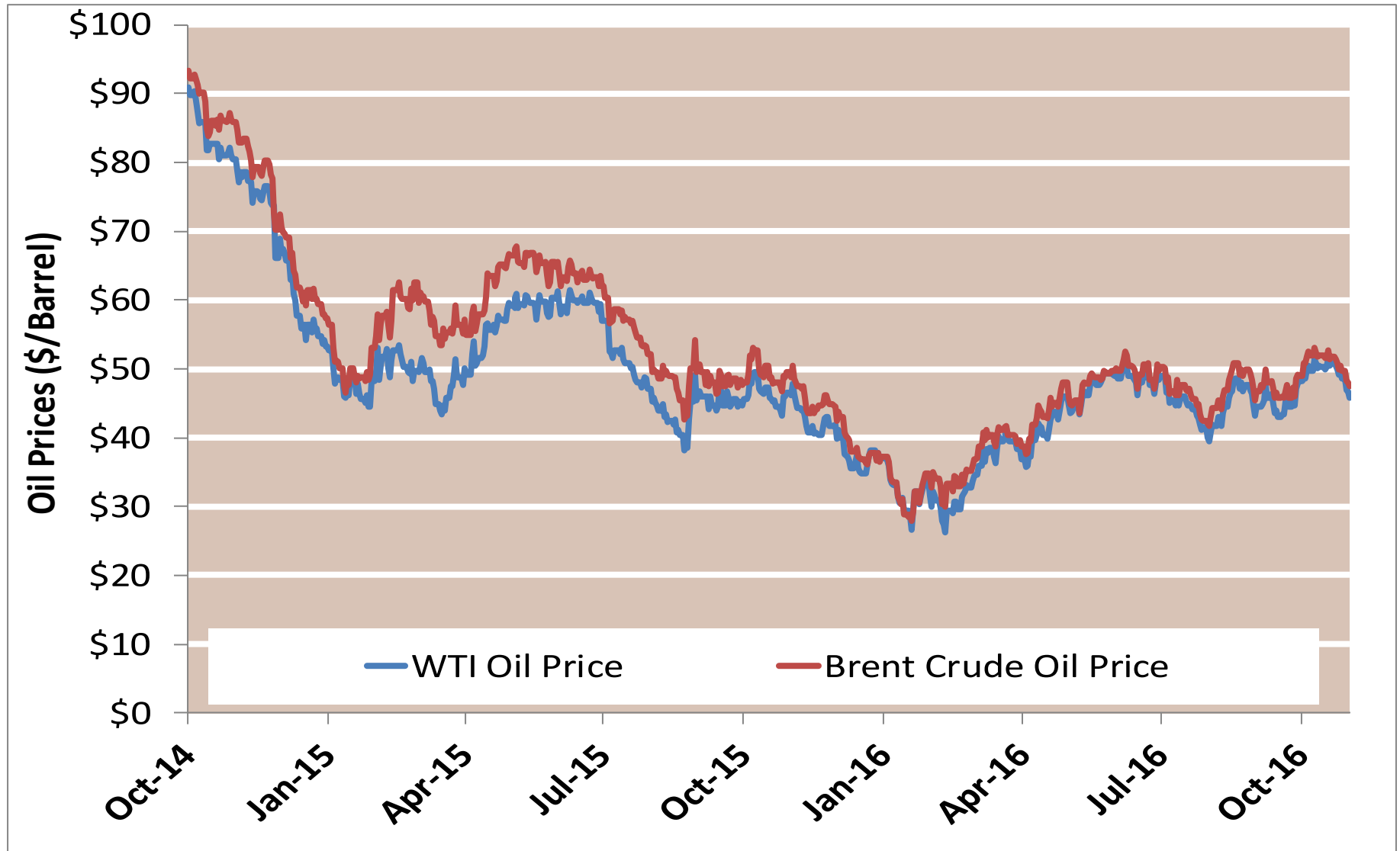


Notes:

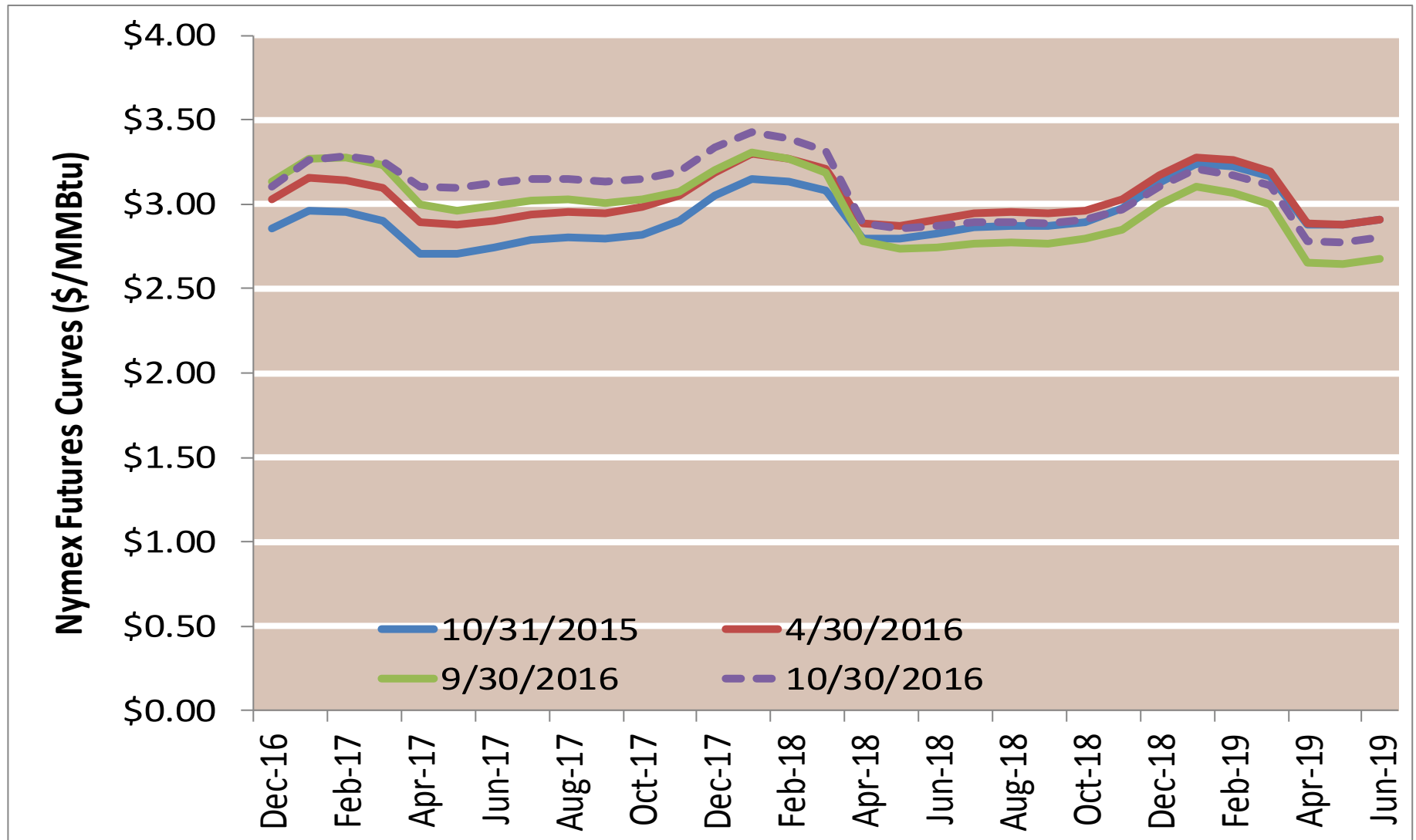
Source: Derived from Bloomberg data

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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)

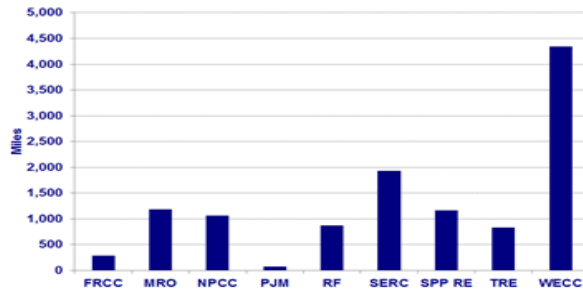
| Primary Fuel Type | September 2016 | | January – September 2016 Cumulative | | January – September 2015 Cumulative | |
|-------------------|----------------|-------------------------|--|-------------------------|--|-------------------------|
| | No. of Units | Installed Capacity (MW) | No. of Units | 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.

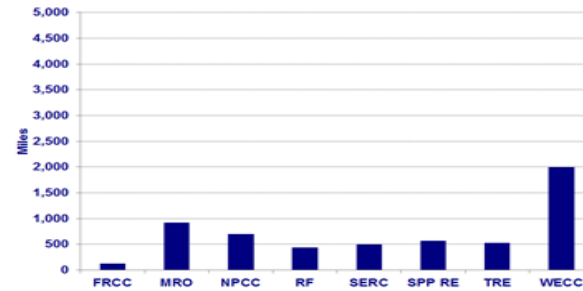
Electric Transmission Highlights

| 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 |

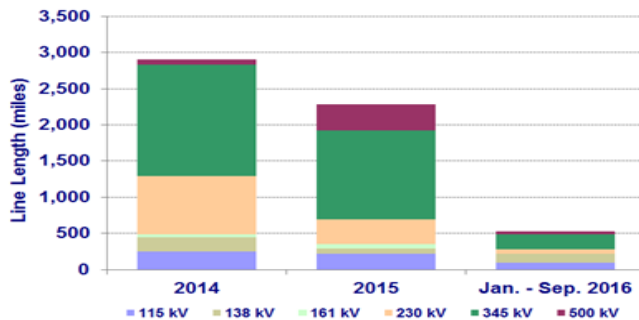
All Transmission Projects with a Proposed In-Service Date by September 2018



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.