OE ENERGY MARKET SNAPSHOT

National – Data Through April 2018

Office of Enforcement
Federal Energy Regulatory Commission
May 2018

2018 Summer Assessment

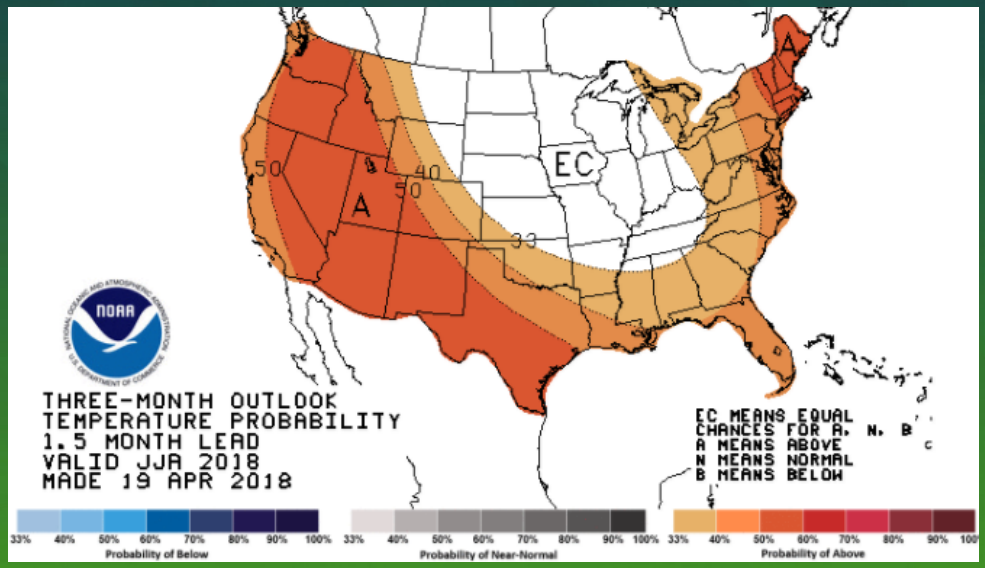
Summer 2018 Energy Market and Reliability Assessment

May 2018

Electric and Natural Gas Markets Appear Ready for a Potentially Warm Summer

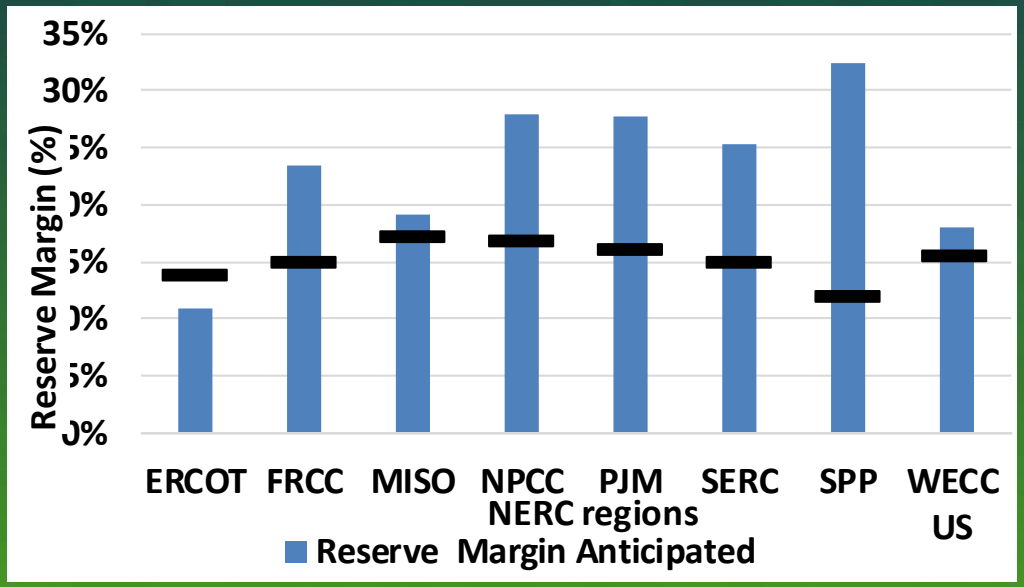
- Summer temperatures are expected to be above average.
- Reserve margins are expected to be adequate in most regions.
- Natural gas demand from power generators may set record highs this summer.
- Natural gas production could also set record highs.
- Performance requirements will apply to a majority of capacity resources in ISO New England and PJM.

NOAA Forecasts Above-Normal Temperatures for Summer 2018



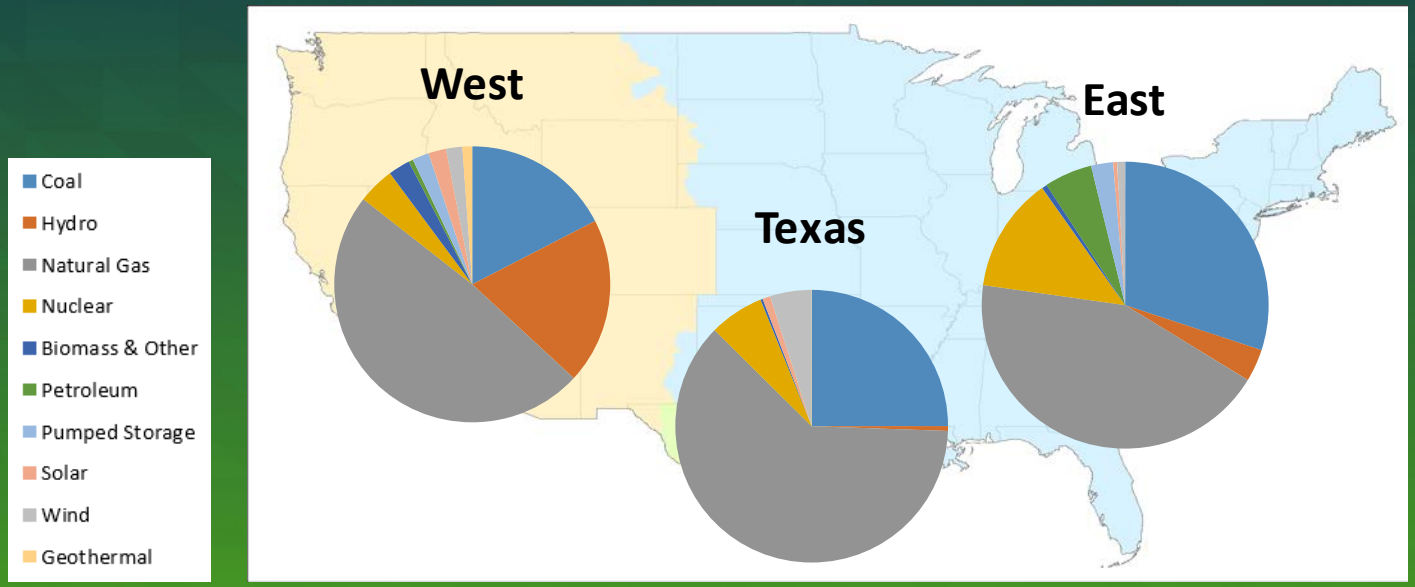
Source: National Oceanic and Atmospheric Association

Reserve Margins Adequate in Most NERC Regions



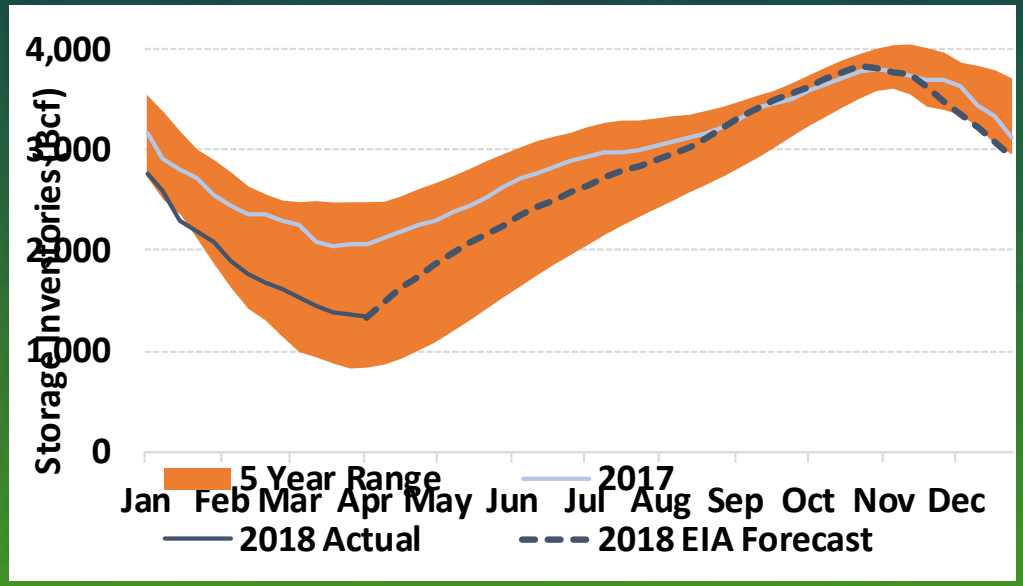
Source: 2018 NERC Summer Reliability Assessment Data

Diverse Generating Capacity Available During On-Peak Load



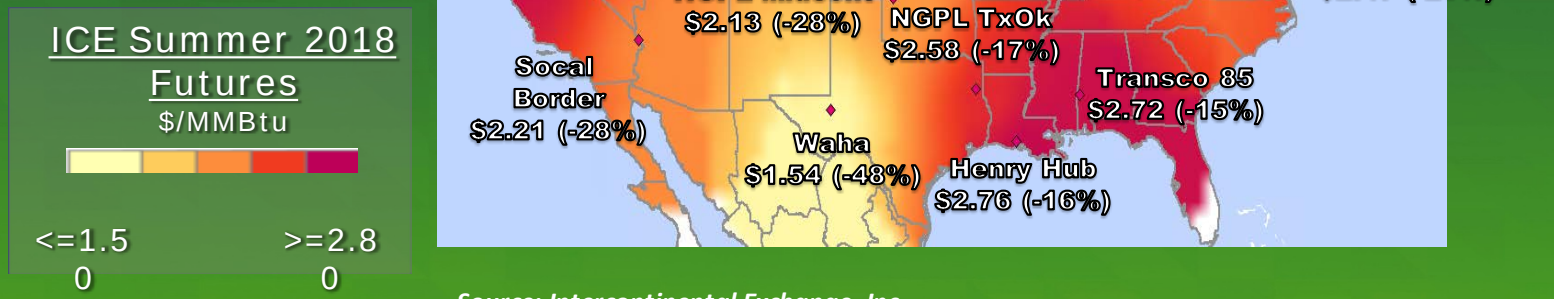
Source: 2017 NERC LTRA Data, On-Peak Forecast Capacity for Summer 2018

Natural Gas Storage Levels Expected to Remain Within Five Year Range



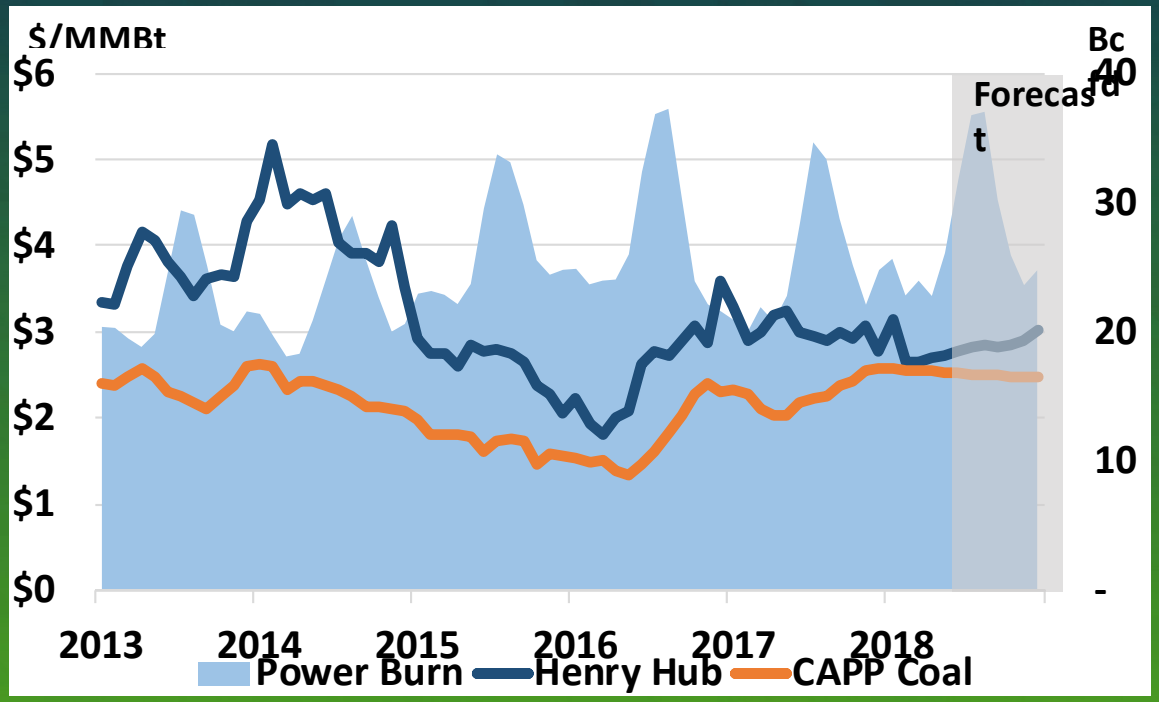
Source: U.S. Energy Information Administration

Natural Gas Futures Prices Are Lower Across All Regions



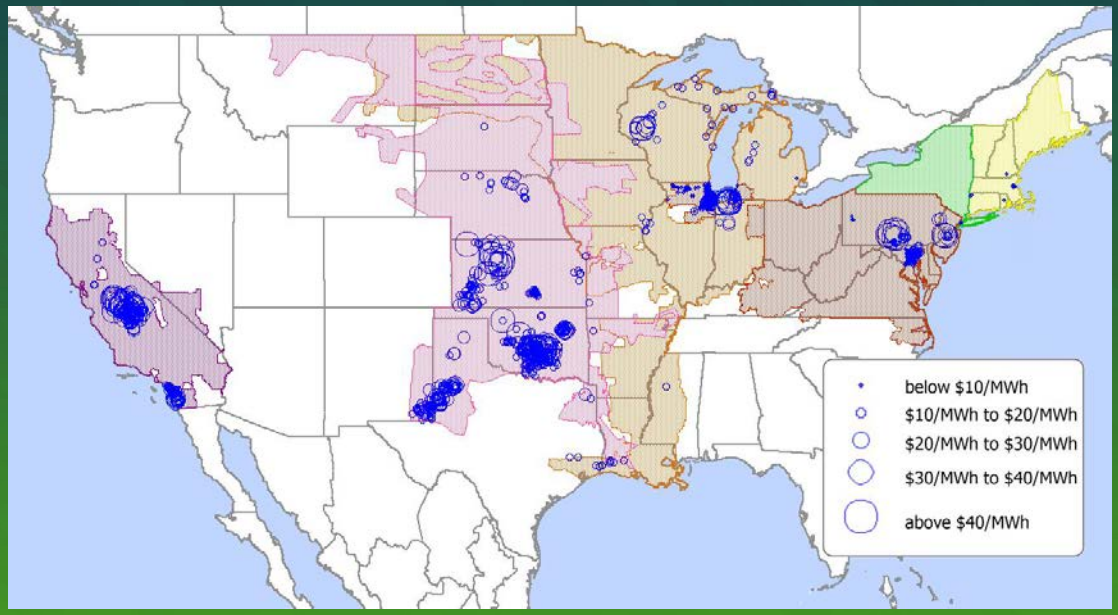
Source: Intercontinental Exchange, Inc.
Basis futures show prices for July and August 2018 as taken on March 23, 2018.
Comparison is to July and August 2017 basis futures; however cut off date may vary depending on availability.

Narrow Coal-Natural Gas Spread to Fuel Diverse Generation



Sources: U.S. Energy Information Administration, CME Group, Bentek Energy

Congested Nodes Identify Areas of Market Stress in Summer 2017

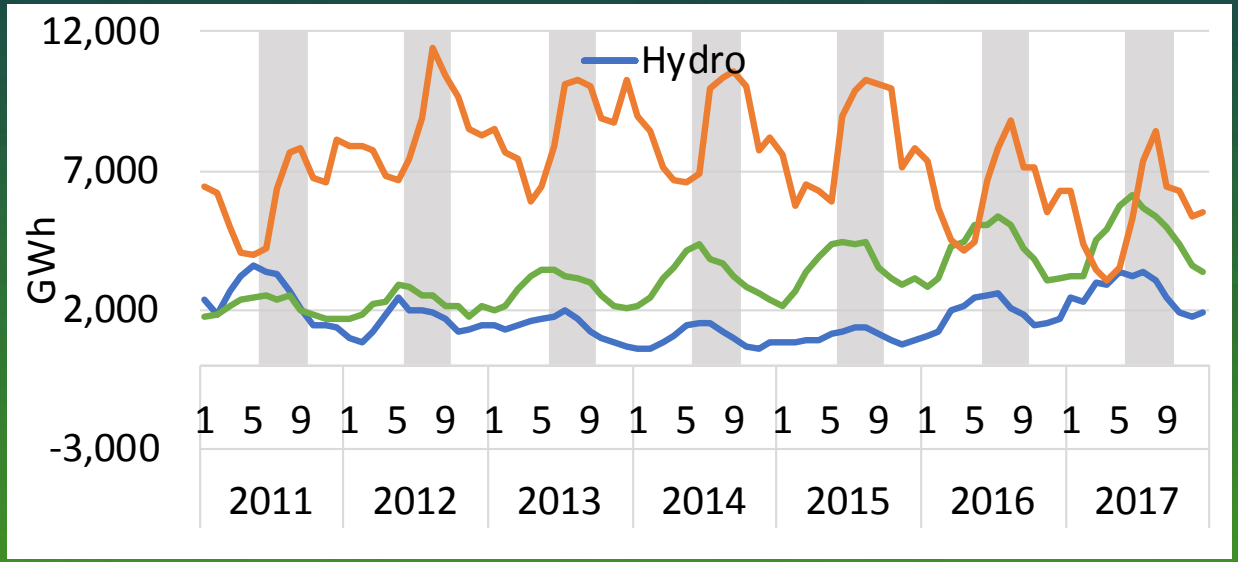


Source: YesEnergy.

Performance Requirements Will Apply to Majority of Capacity Resources in ISO New England and PJM

- PJM and ISO New England are adopting performance requirements in their capacity markets.
- PJM and ISO New England assess penalties when providers fail to perform in specified hours; give rewards to over-performers in those hours.
- No Performance Assessment Hours have been declared in PJM since the program began.
- ISO New England Pay for Performance rules start June 1.

CAISO Depends on Natural Gas and non-Hydro Renewable Generation in Dry Years



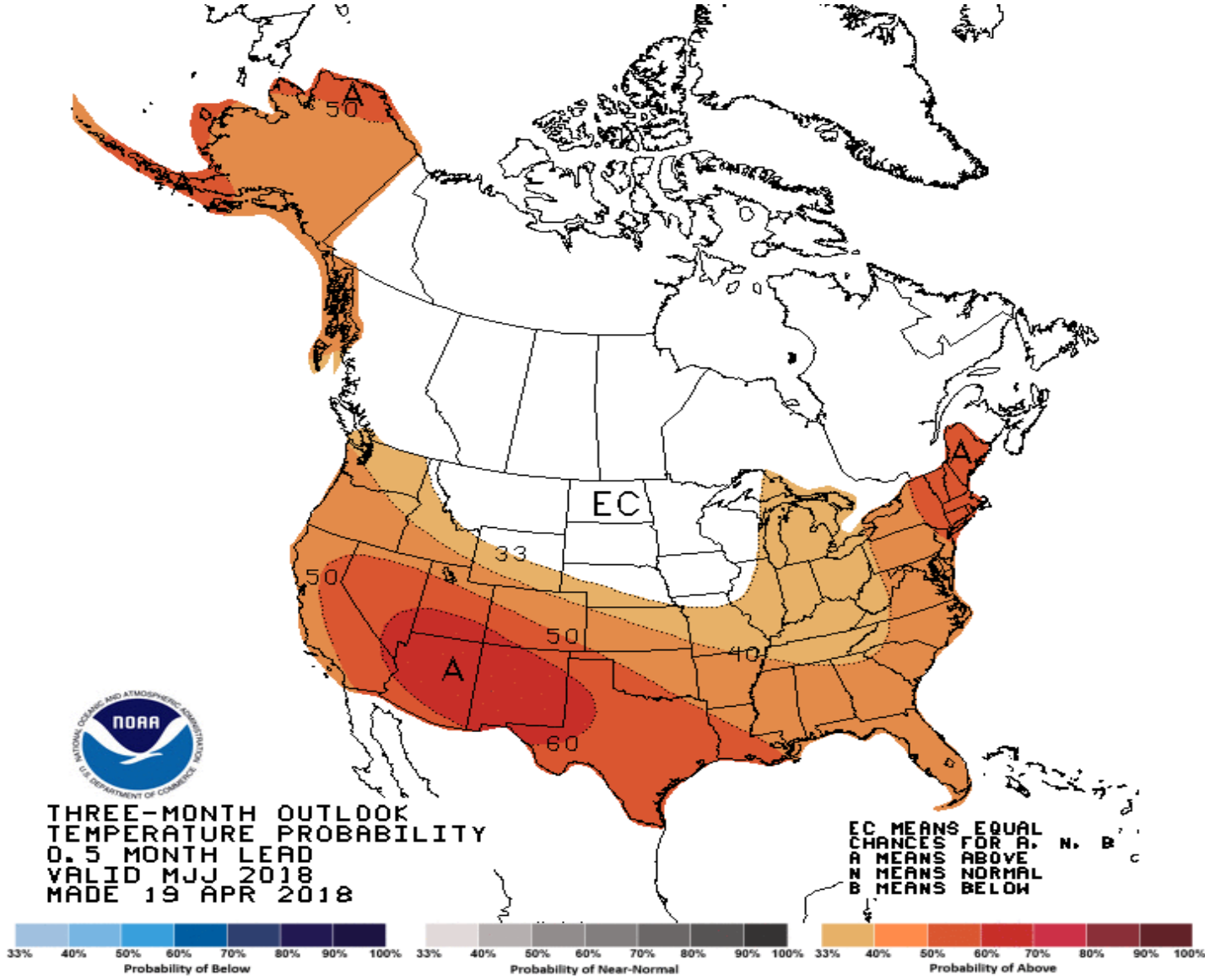
Source: ABB Velocity Suite
Note: Summer months in grey

Conclusions

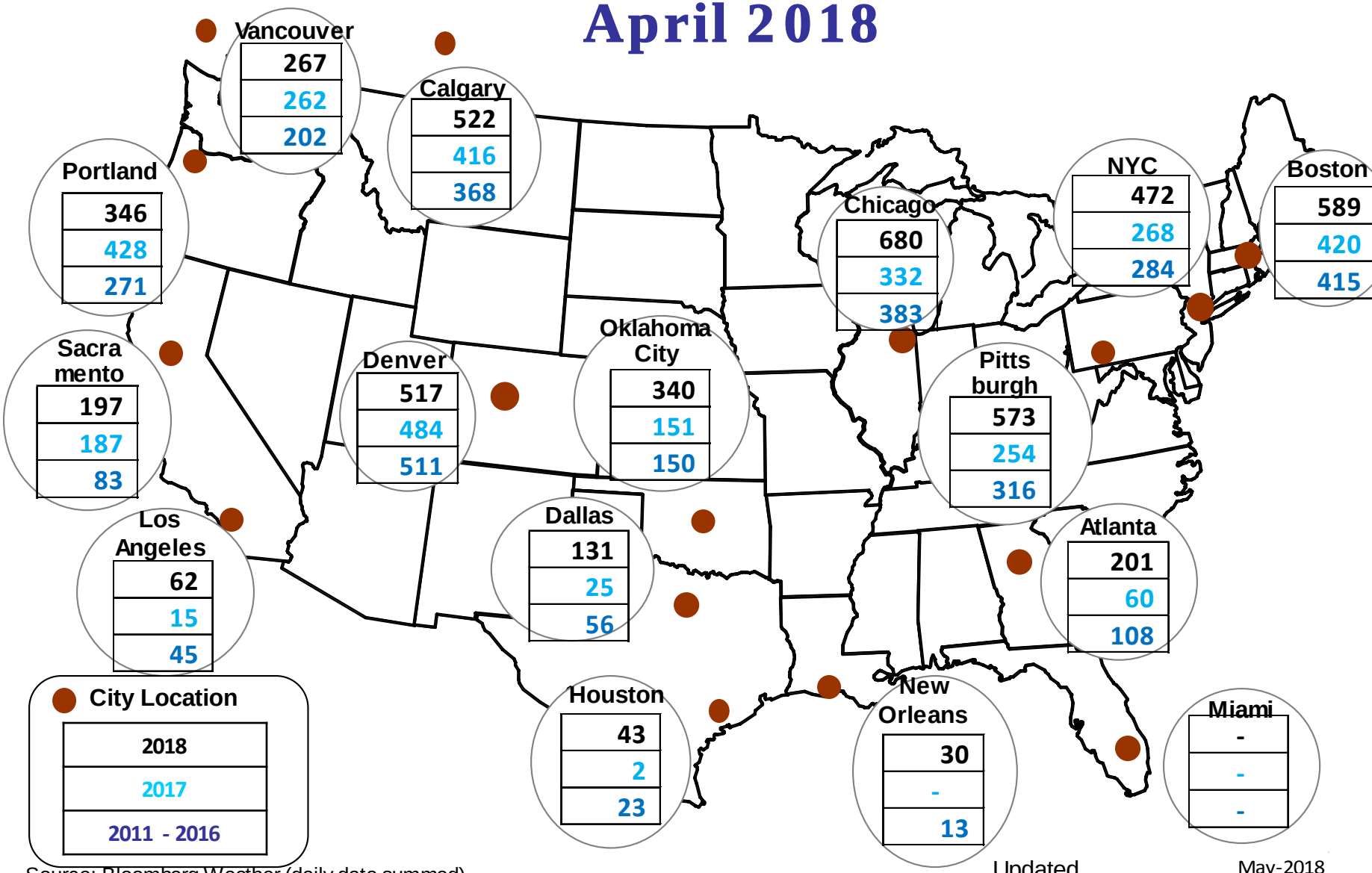
- Capacity and fuel availability appear adequate in most areas.
- ERCOT expects tight capacity conditions, but has mapped out procedures to maintain grid reliability.
- Lower-than-usual hydro production will affect the Western generation mix and may put upward pressure on energy prices in California.
- Adequate natural gas supplies in most regions will support anticipated gas generators' needs.

Fundamentals

NOAA May 2018 Through July 2018 Outlook



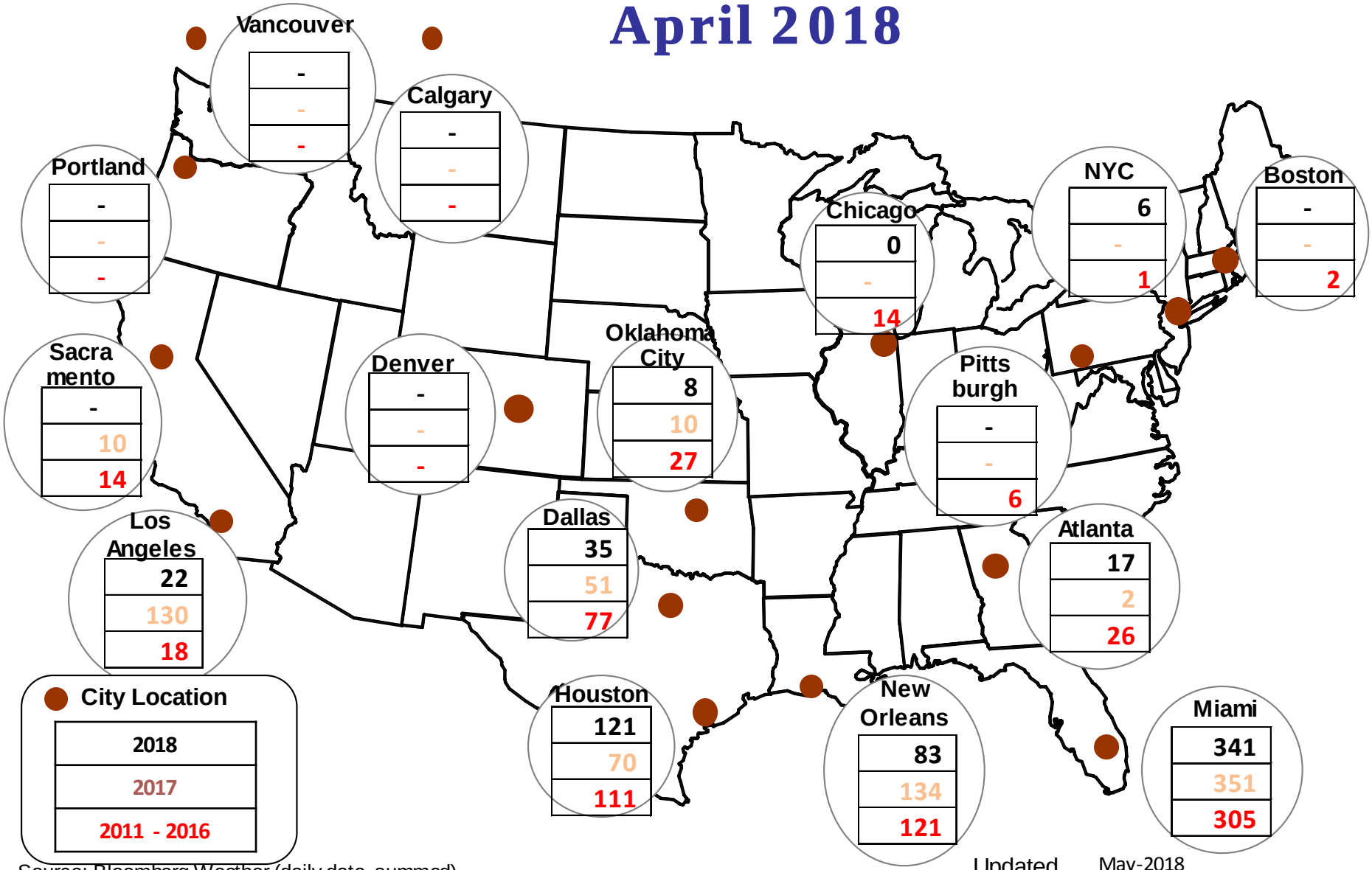
Cumulative HDDs by City
April 2018



Source: Bloomberg Weather (daily data summed)

Updated May-2018

Cumulative CDDs by City
April 2018



Source: Bloomberg Weather (daily data summed)

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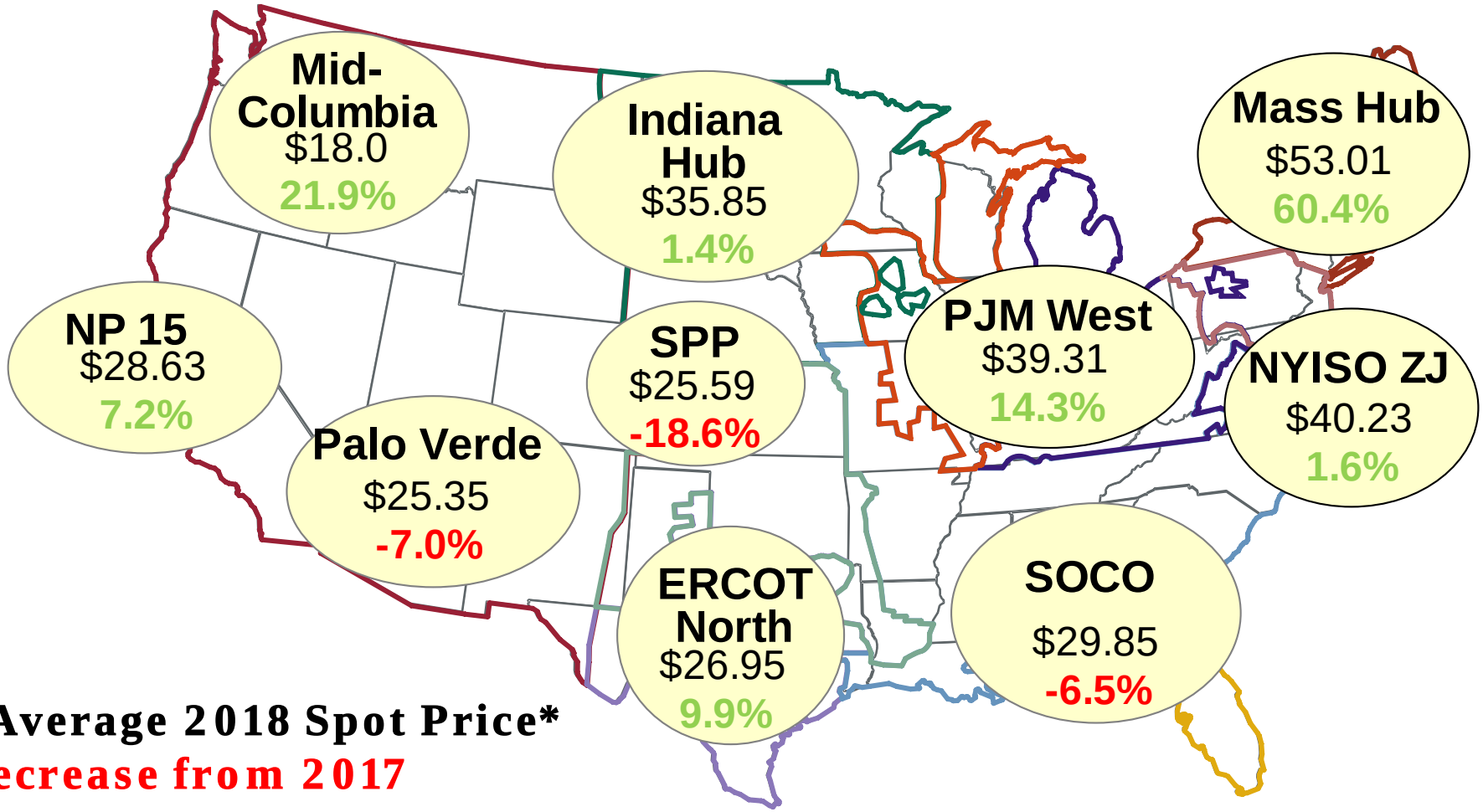
2018 April Spot Power Prices ($/MWh)



$ = Average 2018 Spot Price*

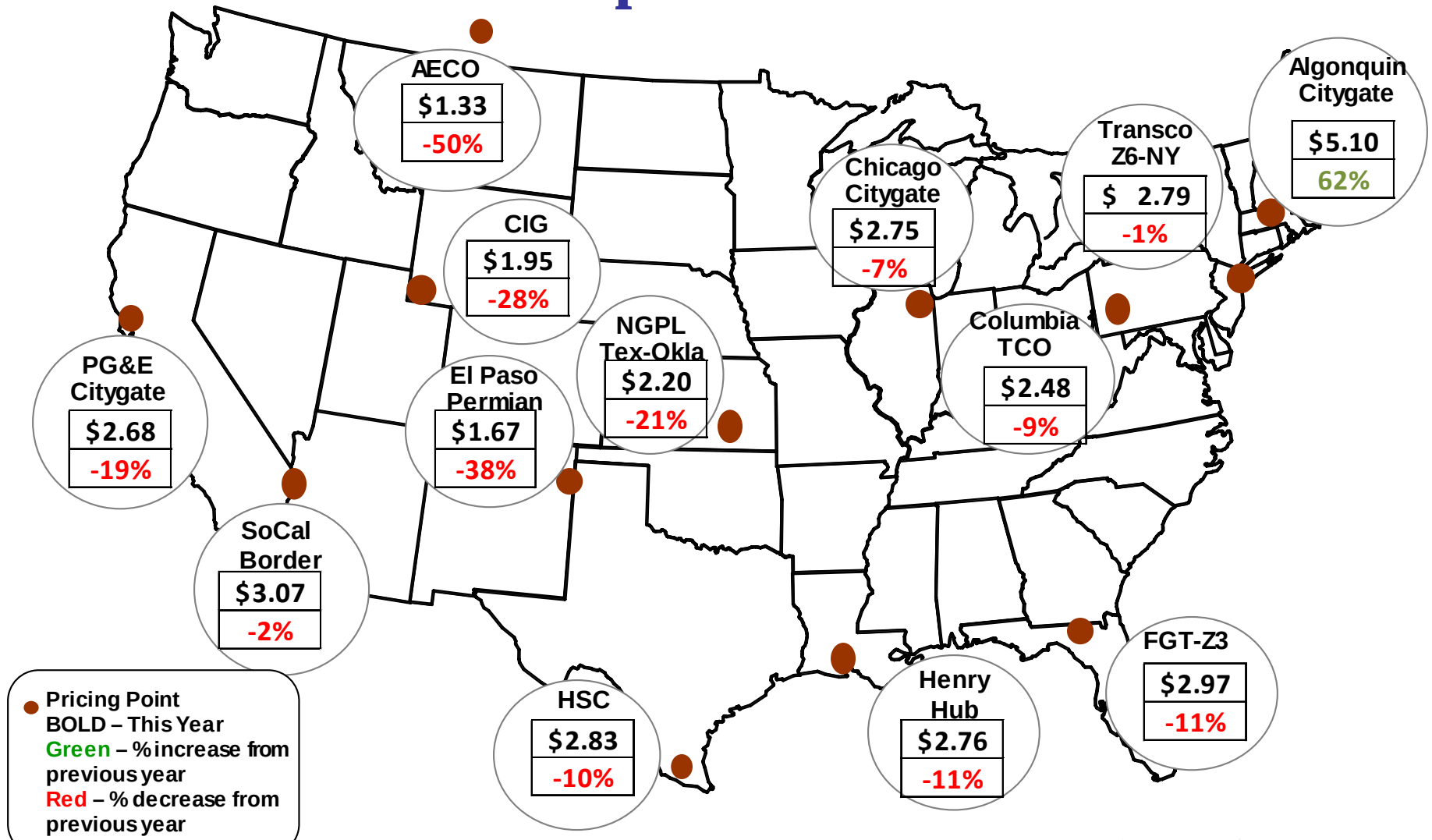
% Decrease from 2017

***Average On-Peak Day-Ahead for April 2018**

SPP Price is an average of the North and South Hubs

Source: RTO/ISO and ICE Data

Spot Natural Gas Prices Average ($/MMBtu) April 2018



Source: Bloomberg Platts Data

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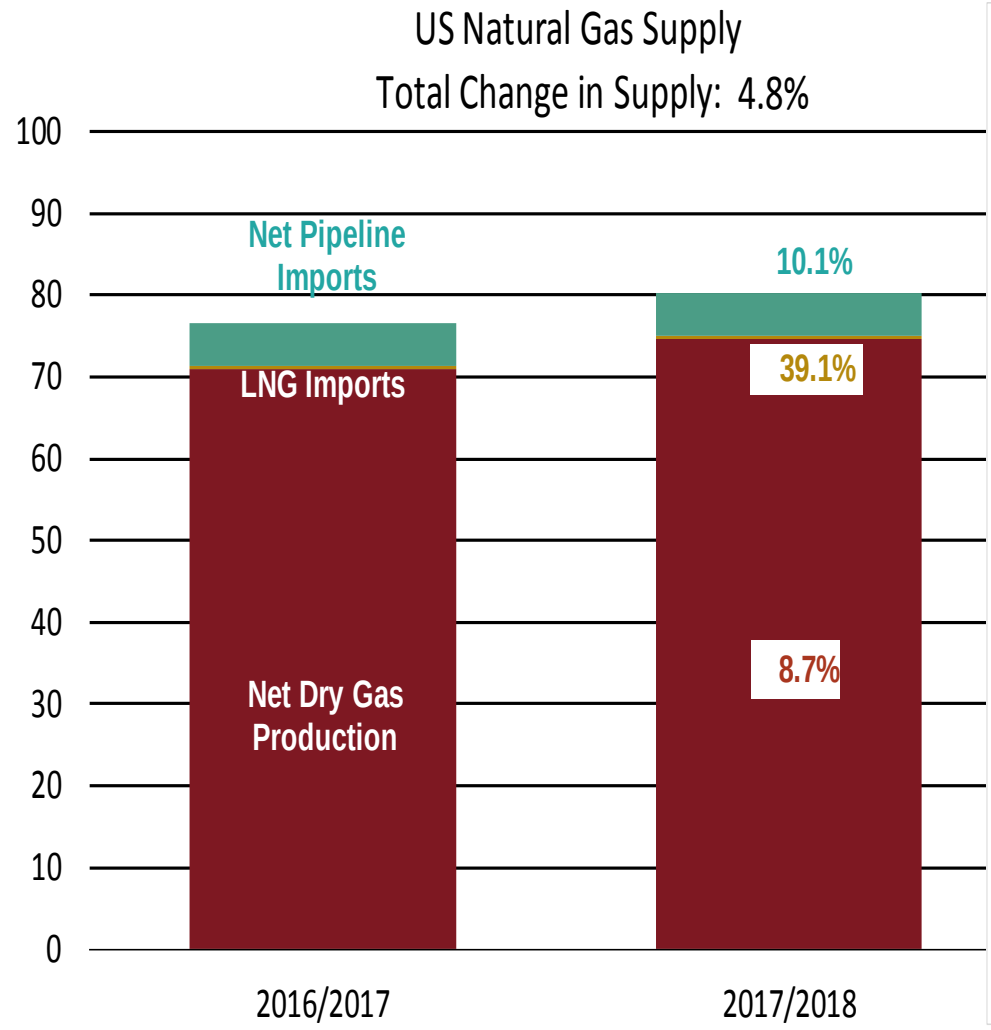
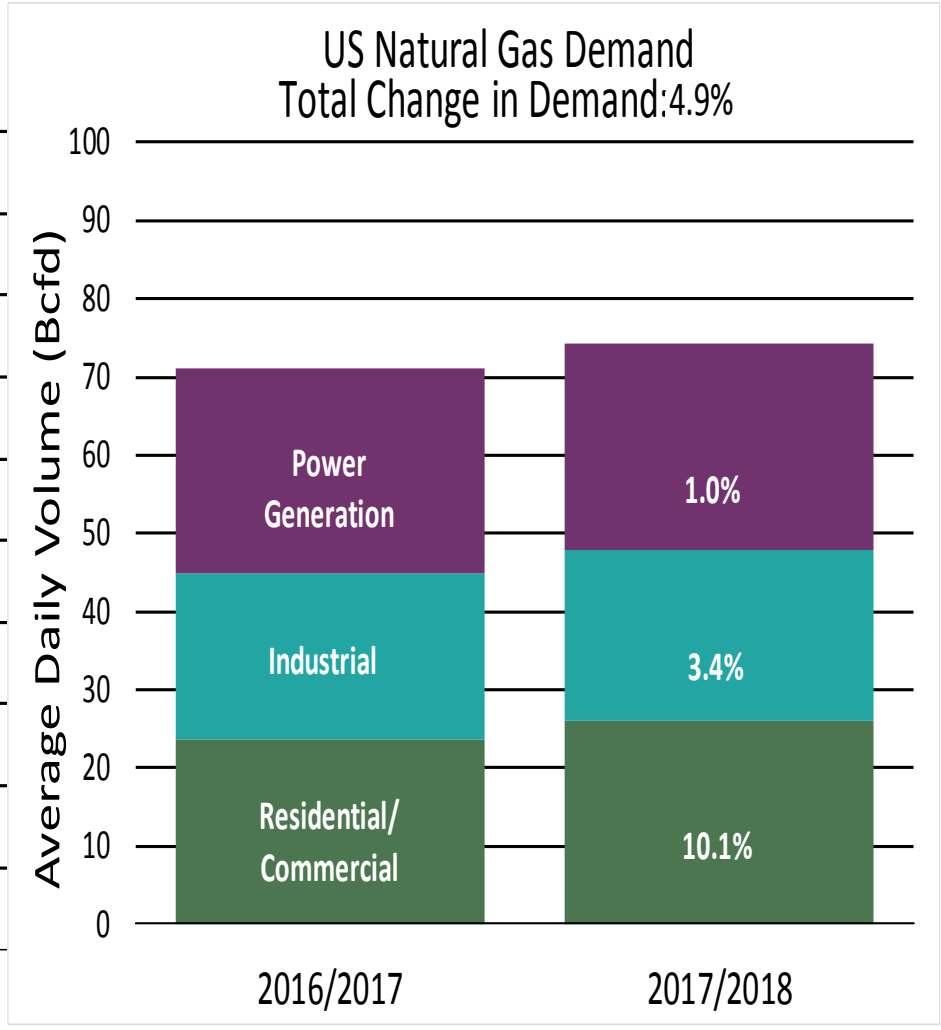
U.S. NG Supply and Demand

May 2016 – April 2017 vs May 2017 – April 2018





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

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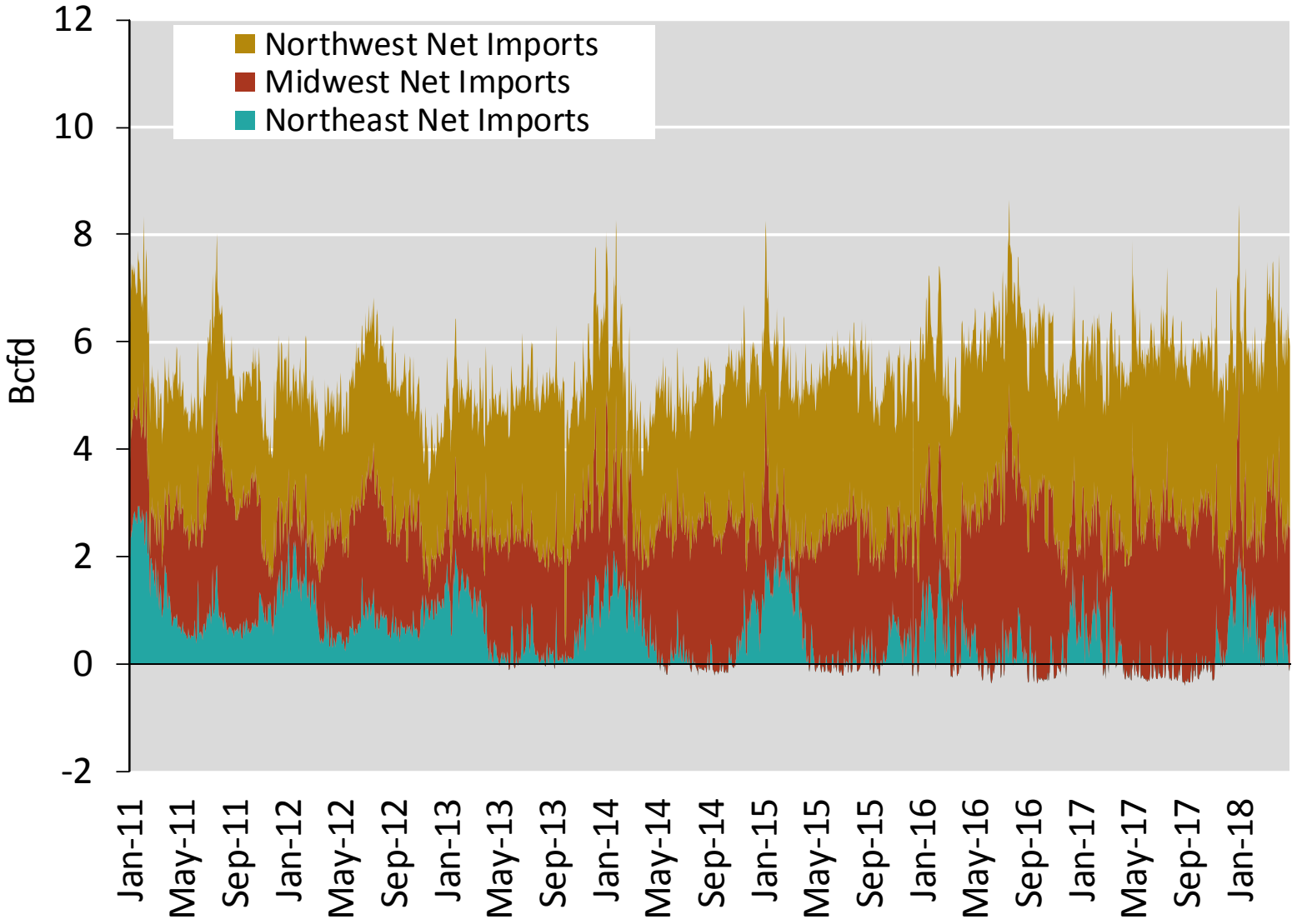
Regional Imports from Canada



Source: Derived from *Bentek Energy* data

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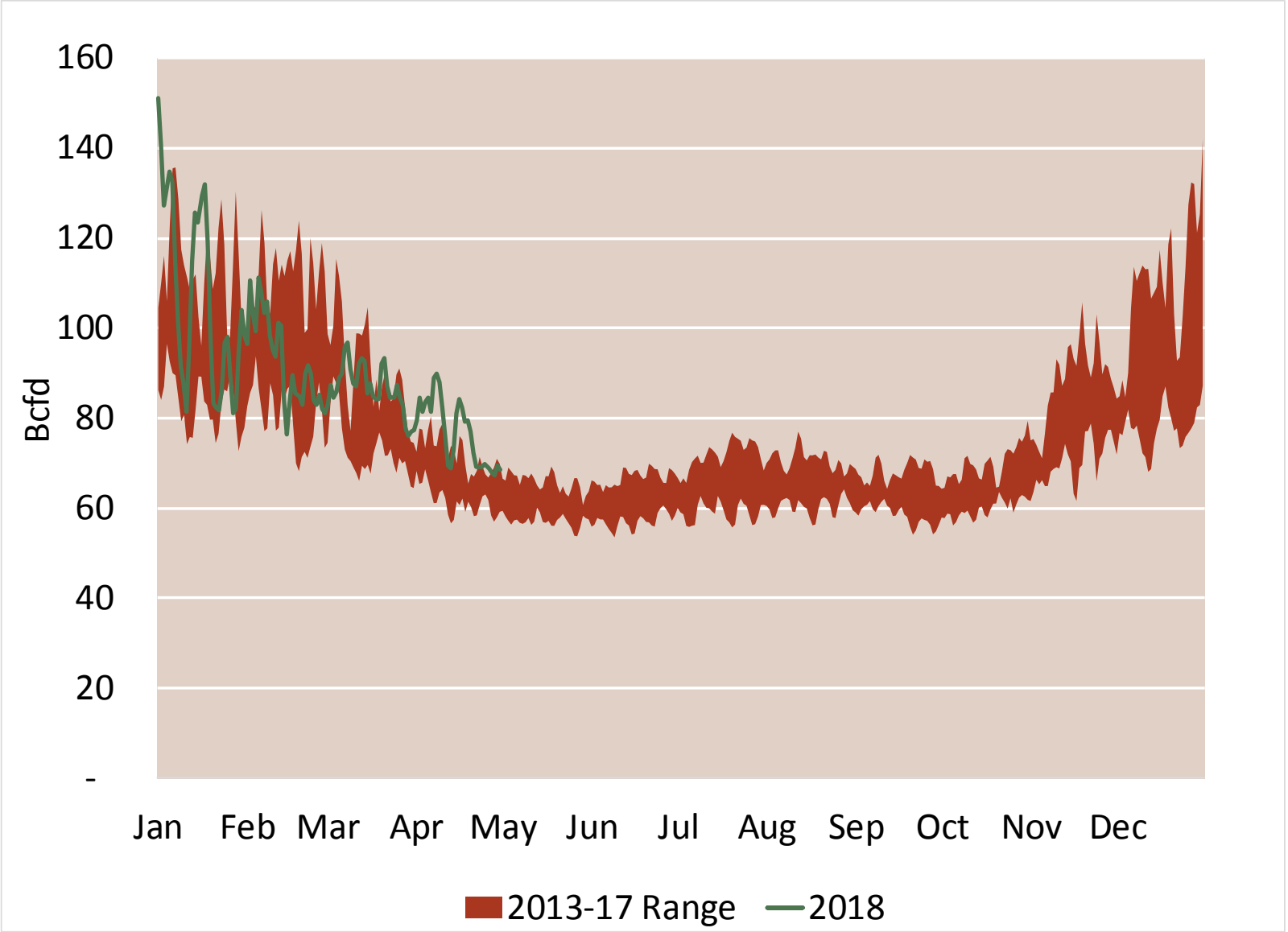
Total U.S. Natural Gas Demand All Sectors



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

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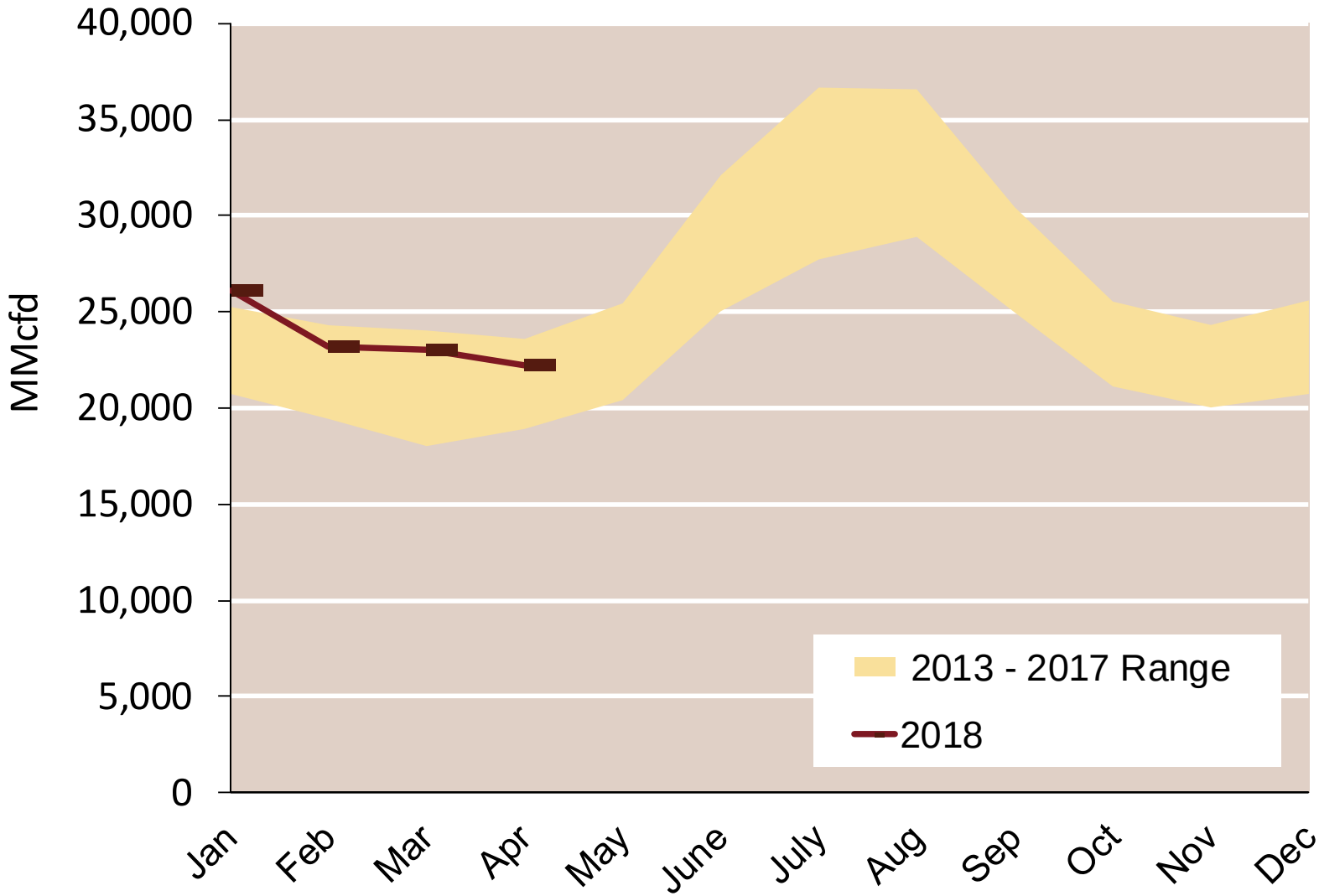
U.S. Natural Gas Consumption for Power Generation



Source: Derived from *Bentek Energy* data

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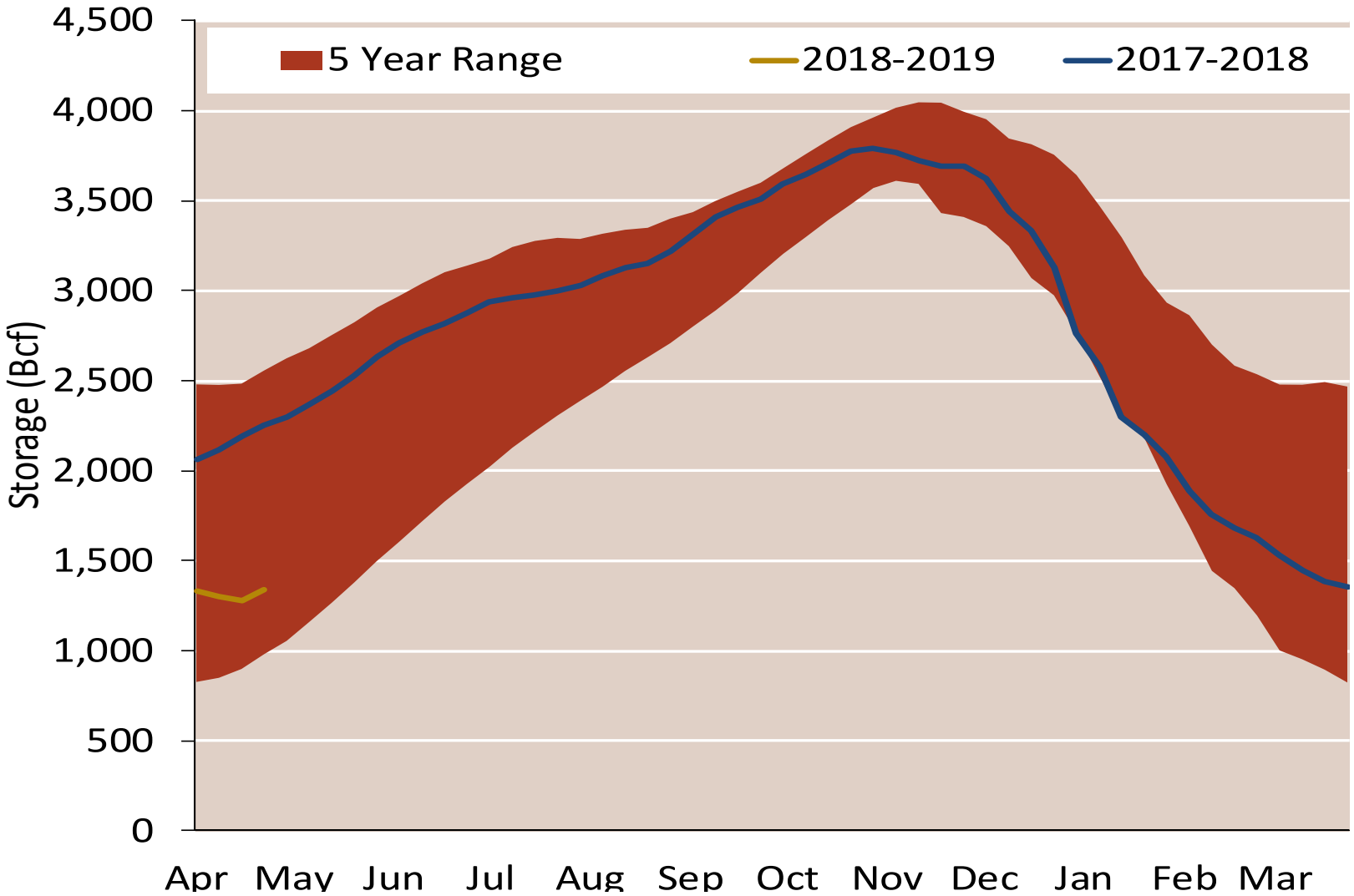
EIA National Storage Inventories



Notes:

Source: Derived from Bloomberg Data

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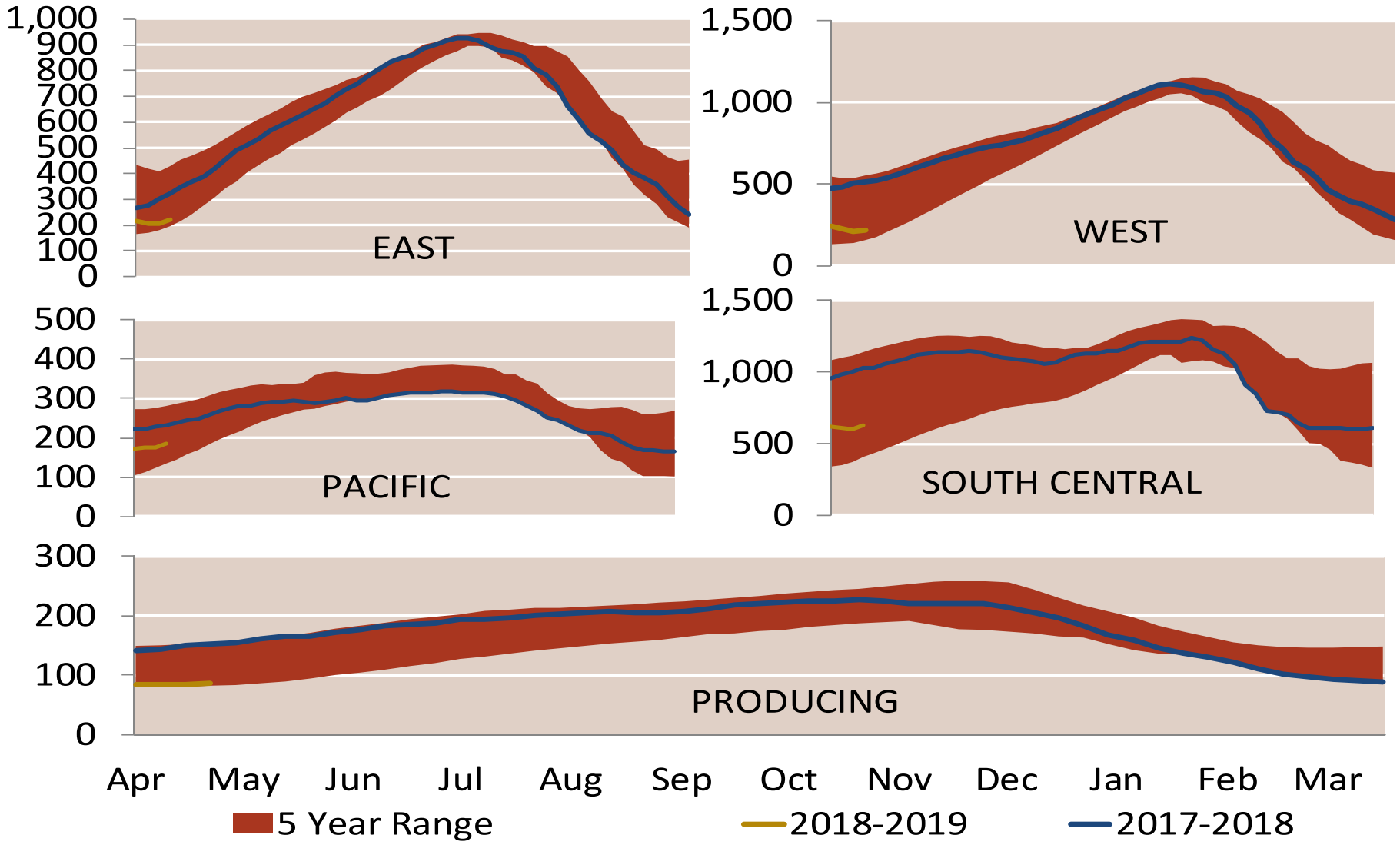
EIA Regional Storage Inventories



Not

Source: Derived from Bloomberg Data

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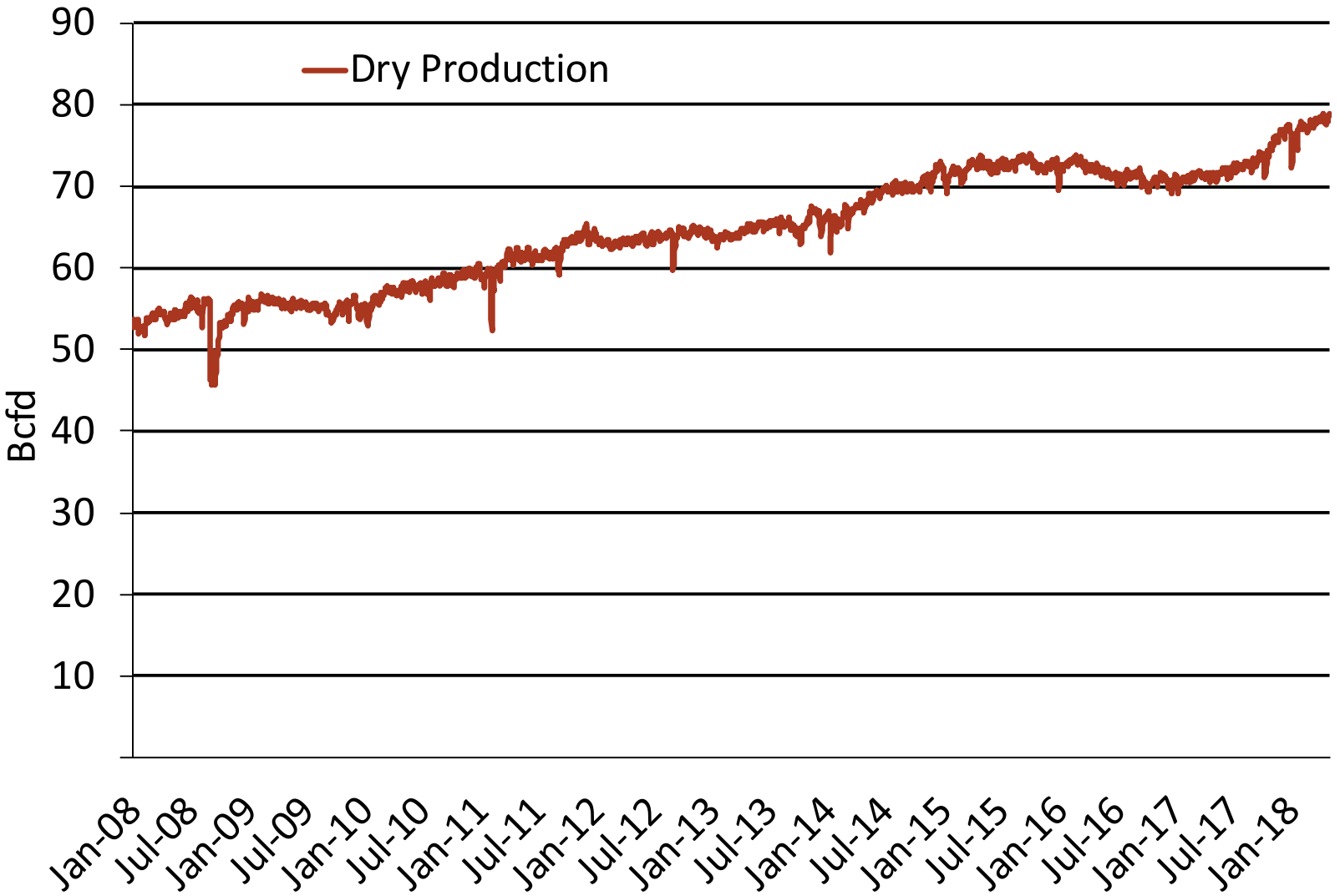
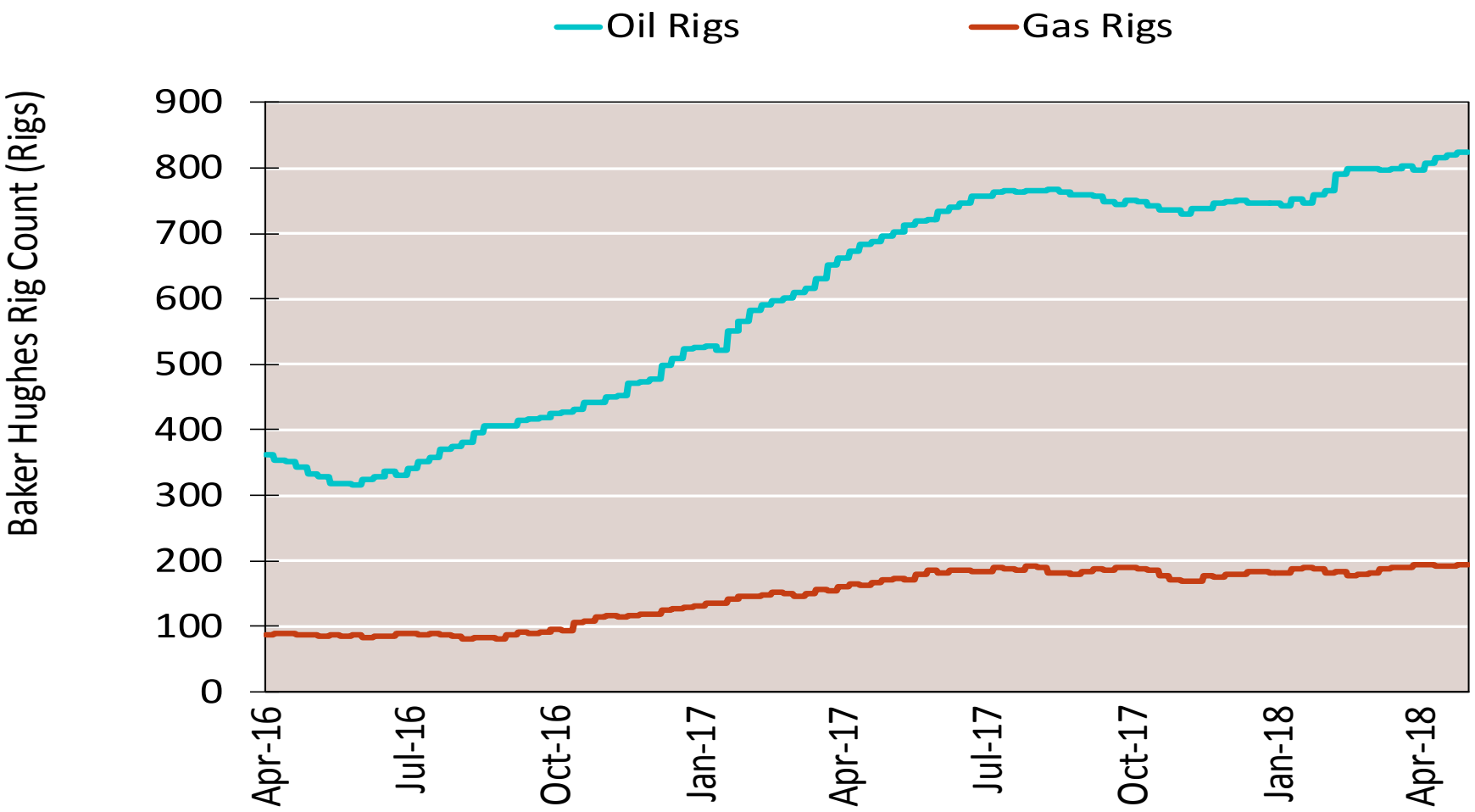
Monthly U.S. Dry Gas Production – Lower 48 States



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

Updated May-2018

Rigs by Type



Notes:

Source: Derived from Bloomberg data

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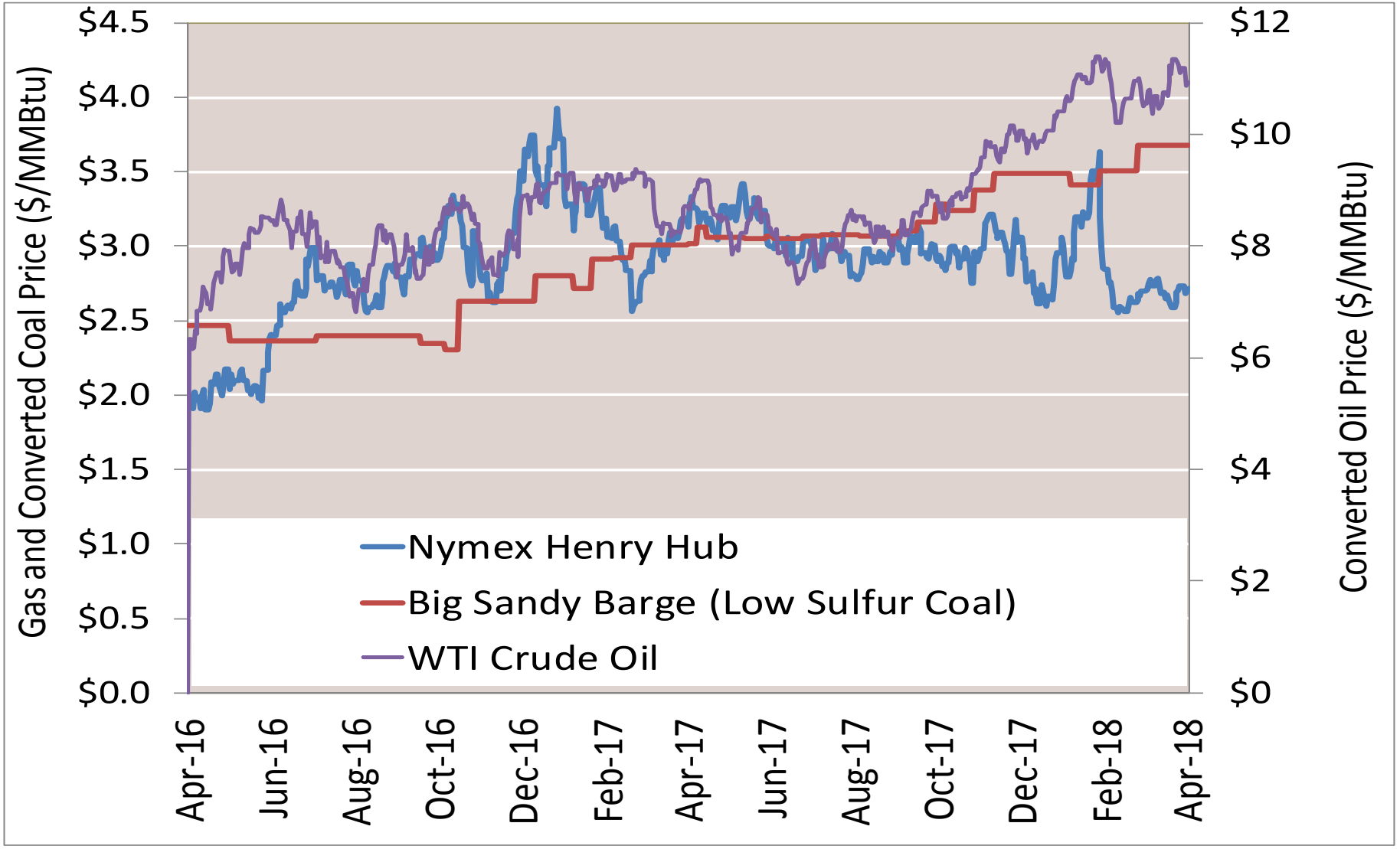
Competing Fuels



Notes:

Source: Derived from Bloomberg data

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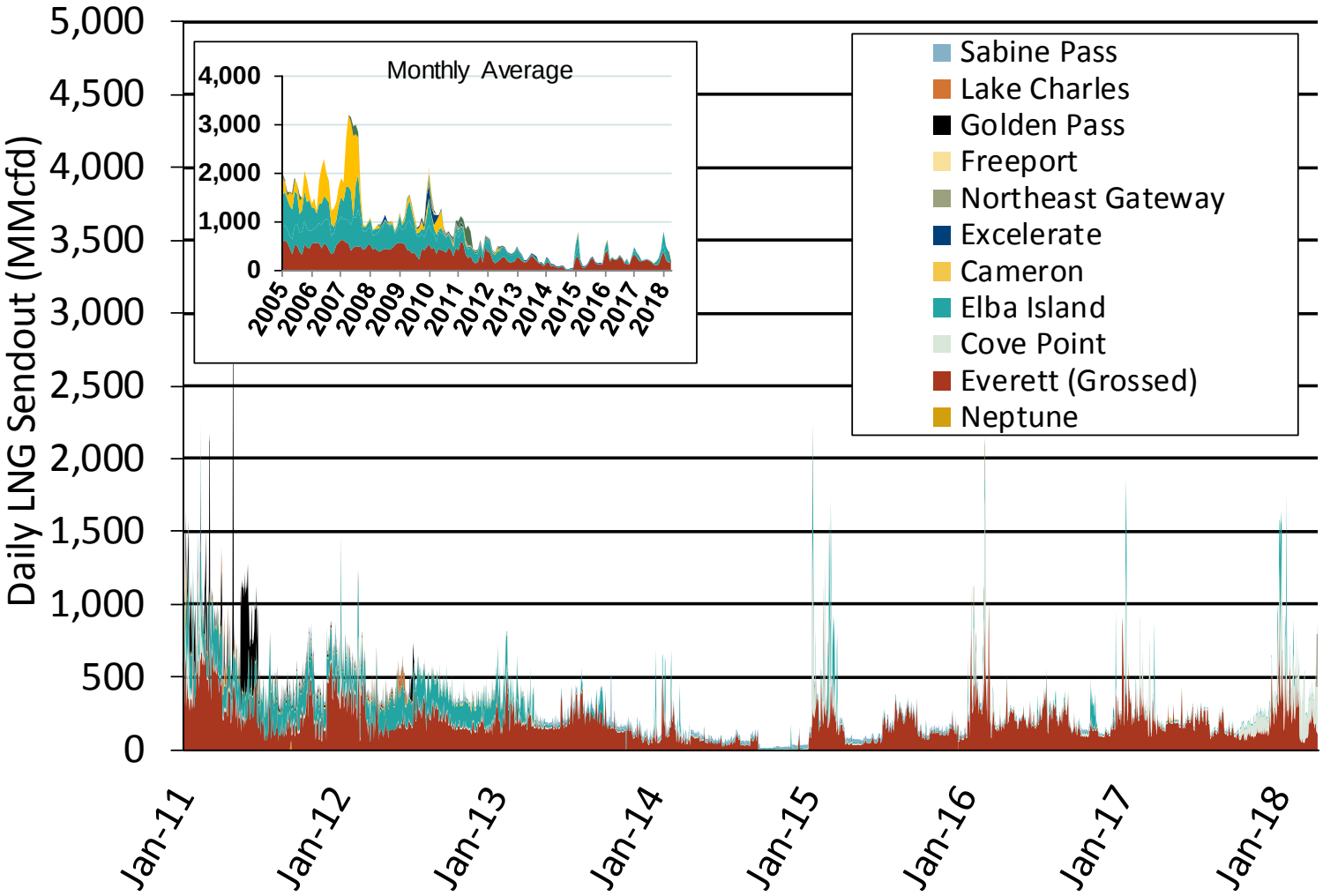
Daily Gas Sendout from Existing U.S. LNG Facilities



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

Updated May-2018

World LNG Estimated Landed Prices: April 2018

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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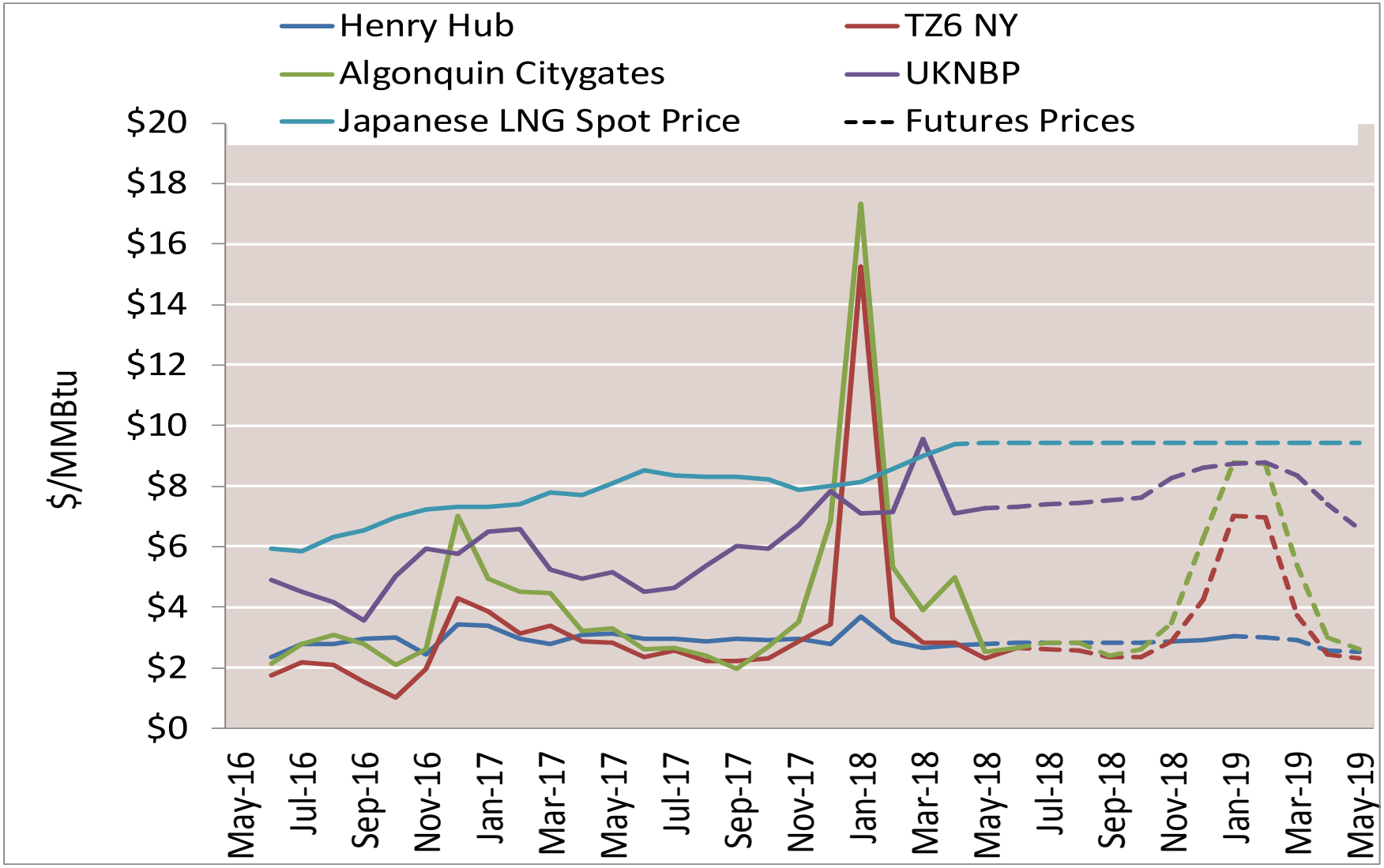
Historical and World Gas Futures Prices



Notes:

Source: Derived from Bloomberg data

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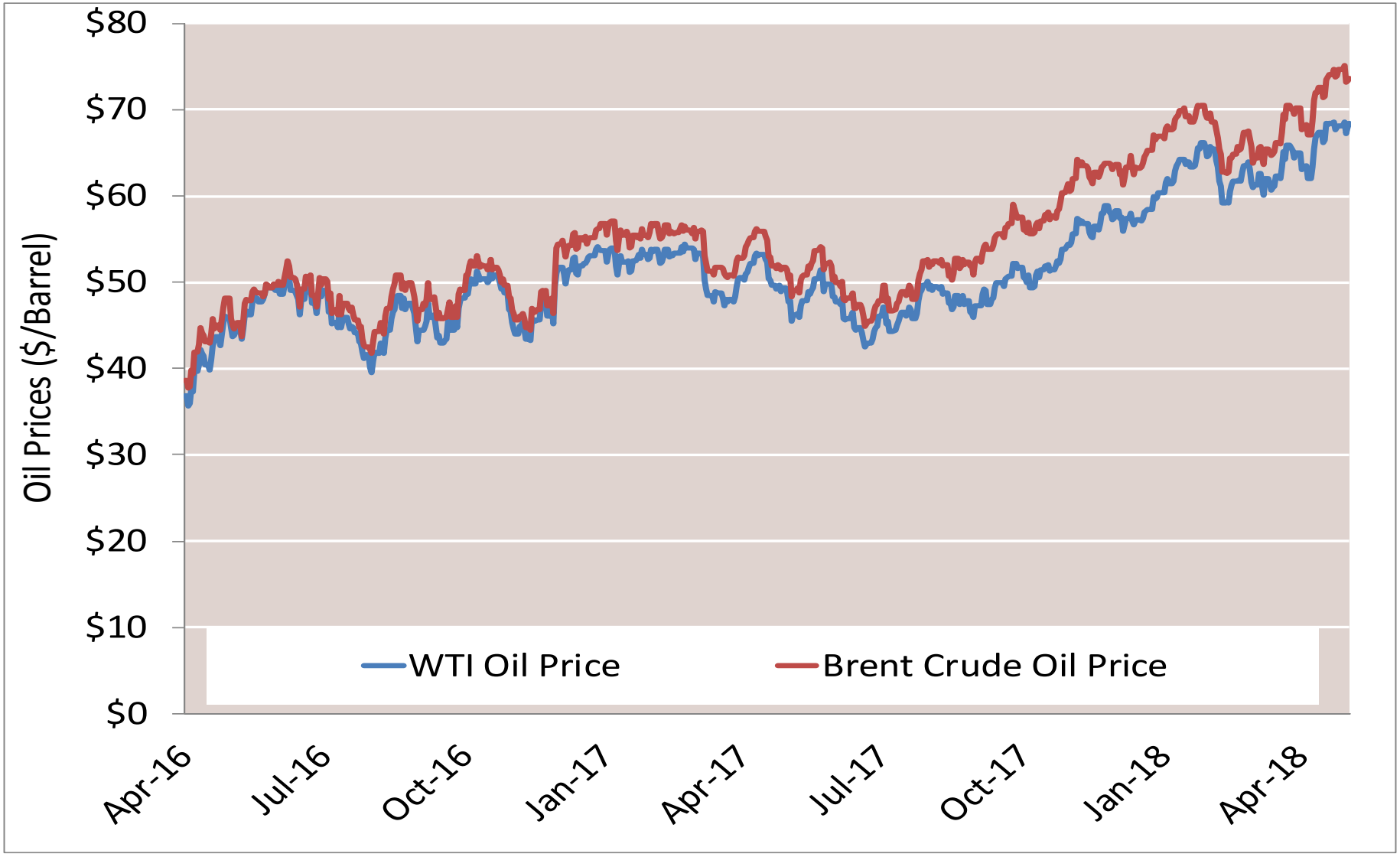
WTI vs Brent Crude Oil Price



Source: Derived from Bloomberg data

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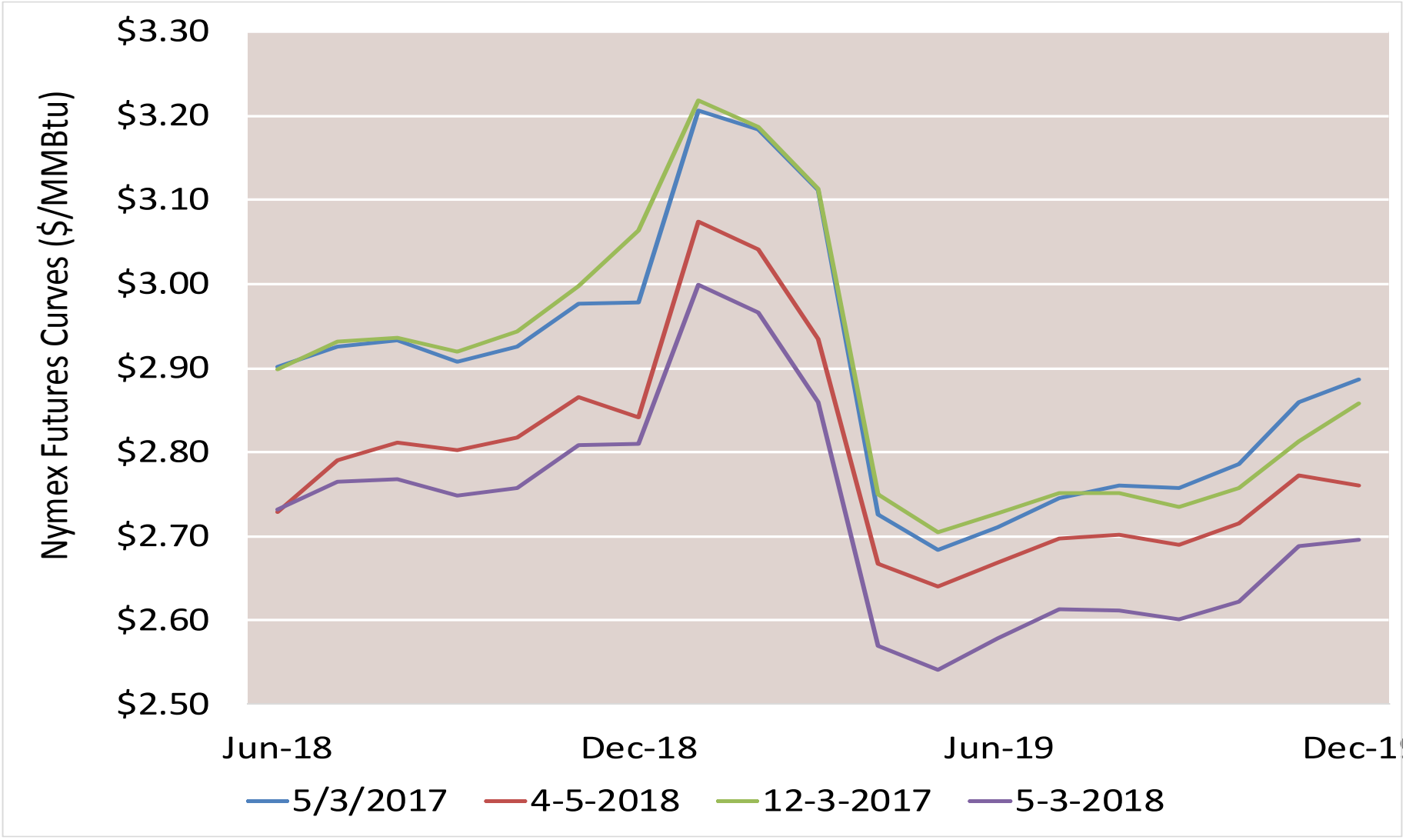
Nymex Futures Curves



Source: Derived from Bloomberg data

Updated May-2018

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 March 2018

Status	No. of Projects	Storage Capacity (Bcf)	Deliverability (MMcf/d)	Capacity (MMcf/d)	Miles of Pipeline	Compression (HP)
Pipeline						
Placed in Service	2			980	34	62,760
Certificated	5			464	40	0
Proposed	6			1,612	179	44,300
Storage						
Placed in Service	0	0.0	0.0			0.0
Certificated	0	0.0	0.0			0
Proposed	1	0.0	9.0			0
LNG (Import & Export)						
Placed in Service (Export)	1	0.0	825.0			0
Certificated (Import/Export)	0	0.0	0.0			0
Proposed (Import/Export)	0	0.0	0.0			0

Natural Gas Activities through March 31, 2018

January through March 31, 2017

Status	No. of Projects	Storage Capacity (BCF)	Deliverability (MMcf/d)	Capacity (MMcf/d)	Miles of Pipeline	Compression (HP)
Pipeline						
Placed in Service	2			980.0	34.1	62,760
through March 31, 2017	7			2269.3	58.1	135,850
Certificated	16			3251.5	242.4	121,015
through March 31, 2017	12			9627.9	1253.2	618,584
Storage						
Placed in Service	0	0.0	0.0			0
through March 31, 2017	0	0.0	0.0			0
Certificated	1	0.3	125.0			0
through March 31, 2017	0	0.0	0.0			0
LNG (Import & Export)						
Placed in Service (Export)	1	0.0	825.0			0
through March 31, 2017	1	0.0	700.0			0
Certificated (Import/Export)	0	0.0	0.0			0
through March 31, 2017	0	0.0	0.0			0

Source: Staff Database

Electric Generation Highlights

New Generation In-Service (New Build and Expansion)

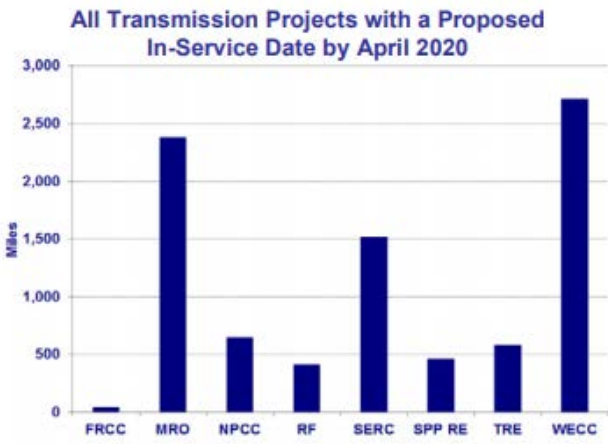
	March 2018		January – March 2018 Cumulative		January – March 2017 Cumulative	
Primary Fuel Type	No. of Units	Installed Capacity (MW)	No. of Units	Installed Capacity (MW)	No. of Units	Installed Capacity (MW)
Coal	0	0	0	0	0	0
Natural Gas	4	39	6	79	28	2,254
Nuclear	0	0	1	4	1	102
Oil	2	2	5	10	4	7
Water	3	6	5	18	3	12
Wind	1	200	16	1,793	32	2,852
Biomass	0	0	3	3	9	88
Geothermal Steam	0	0	1	19	0	0
Solar	24	442	92	1,356	144	1,427
Waste Heat	0	0	0	0	1	220
Other *	3	80	6	80	10	1
Total	37	769	135	3,362	232	6,963

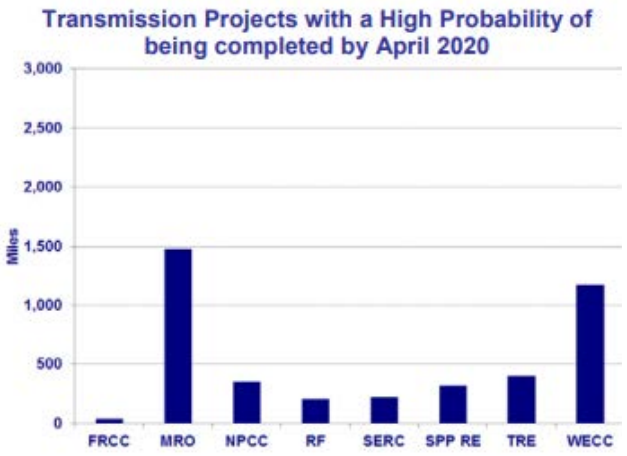
Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC. The data may be subject to update.

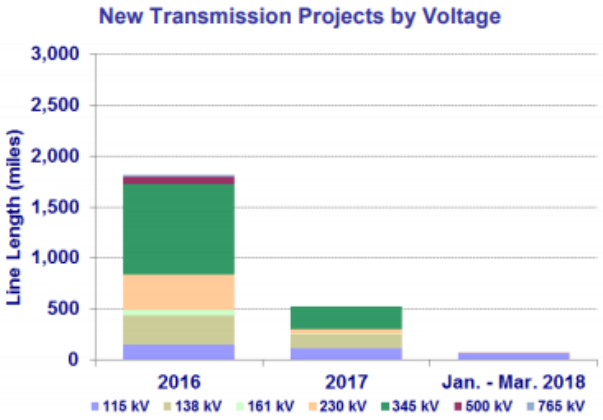
* "Other" includes purchased steam, tires, and miscellaneous technology such as batteries, fuel cells, energy storage, and fly wheel.

Electric Transmission Highlights

Voltage (kV)	Transmission Projects Completed				Proposed Transmission Projects In-Service by April 2020	
	March 2018	March 2017	January – March 2018 Cumulative	January – December 2017 Cumulative	High Probability of Completion	All
	Line Length (miles)					
≤230	11.0	55.3	77.0	301.9	1,419.0	3,056.2
345	0.0	64.0	0.0	218.5	2,379.5	4,032.2
500	0.0	0.0	0.0	0.0	393.4	1,678.4
Total U.S.	11.0	119.3	77.0	520.4	4,191.9	8,766.8







Installed Generating Capacity

Total Available Installed Generating Capacity

	Installed Capacity (GW)	% of Total Capacity
Coal	273.29	23.09%
Natural Gas	513.07	43.35%
Nuclear	108.18	9.14%
Oil	42.10	3.56%
Water	100.90	8.52%
Wind	90.76	7.67%
Biomass	16.55	1.40%
Geothermal Steam	3.85	0.33%
Solar	32.75	2.77%
Waste Heat	1.34	0.11%
Other*	0.79	0.07%
Total	1,183.58	100.00%

Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC. The data may be subject to update.

Proposed Additions

Proposed Generation Additions and Retirements by April 2021

	Additions		Retirements	
Primary Fuel Type	No. of Units	Installed Capacity (MW)	No. of Units	Installed Capacity (MW)
Coal	3	1,687	66	15,864
Natural Gas	346	89,740	135	15,098
Nuclear	6	6,363	5	4,532
Oil	24	741	39	473
Water	253	12,466	26	642
Wind	475	85,693	2	68
Biomass	58	697	20	83
Geothermal Steam	24	1,130	0	0
Solar	1739	49,090	5	2
Waste Heat	6	96	0	0
Other *	54	680	1	0
Total	2,988	248,383	299	36,762

Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC. The data may be subject to update.

* "Other" includes purchased steam, tires, and miscellaneous technology such as batteries, fuel cells, energy storage, and fly wheel.