Constellation
An Exelon Company

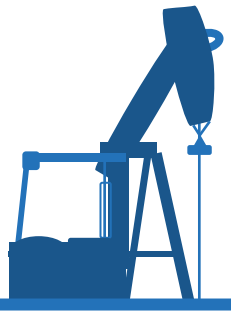
AEE Illiana Chapter
Energy Market Update

March 23, 2017

2016 – A Year of Rebalancing in the Natural Gas Market

U.S. **NG production declines** on annual basis for first time in the shale-boom era

Average daily NG output:
2015 = 74.1 Bcf/d
2016 = 72.3 Bcf/d



EIA projects **2%** increase in NG production in 2017 and **4%** in 2018

SUPPLY

Power sector natural gas demand reaches all-time record of **41 Bcf/d**

Natural gas surpasses coal as the primary fuel for power generation for the first time ever on an annual basis

Hottest summer since 1950

NG & oil drilling **rig counts fall to 30-year low** in May 2016… then **increase by 50%** in second half of the year

Total gas storage injections are **40% smaller** than 2015

Gas storage hits record high: **4,047 Bcf**

DEMAND

NG exports to Mexico grow by 25% to a record **3.5 Bcf/d**

Flows of NG into Sabine Pass reach **1.8 Bcf/d** with LNG exports totaling **106 Bcf** via 35 cargos through September

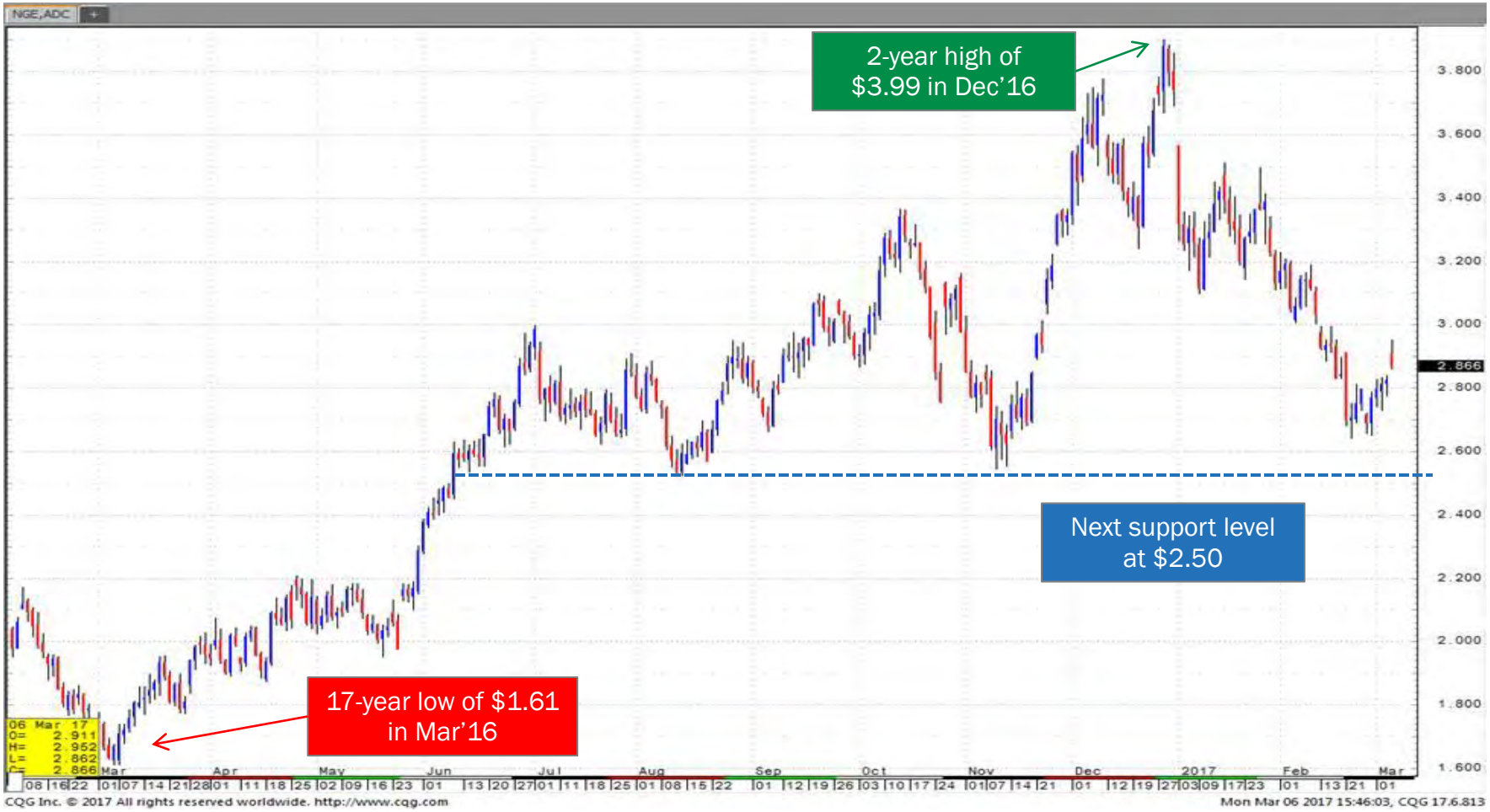
Industrial NG demand increases by **1%**

Customer Takeaway: Production declines and strong demand growth have driven a rebound in NG prices in 2016.

Source: Constellation, Baker Hughes, EIA, S&P Global Platts

Constellation
An Exelon Company

Short-Term NG Prices Rally from 17-Year Low to 2-Year High

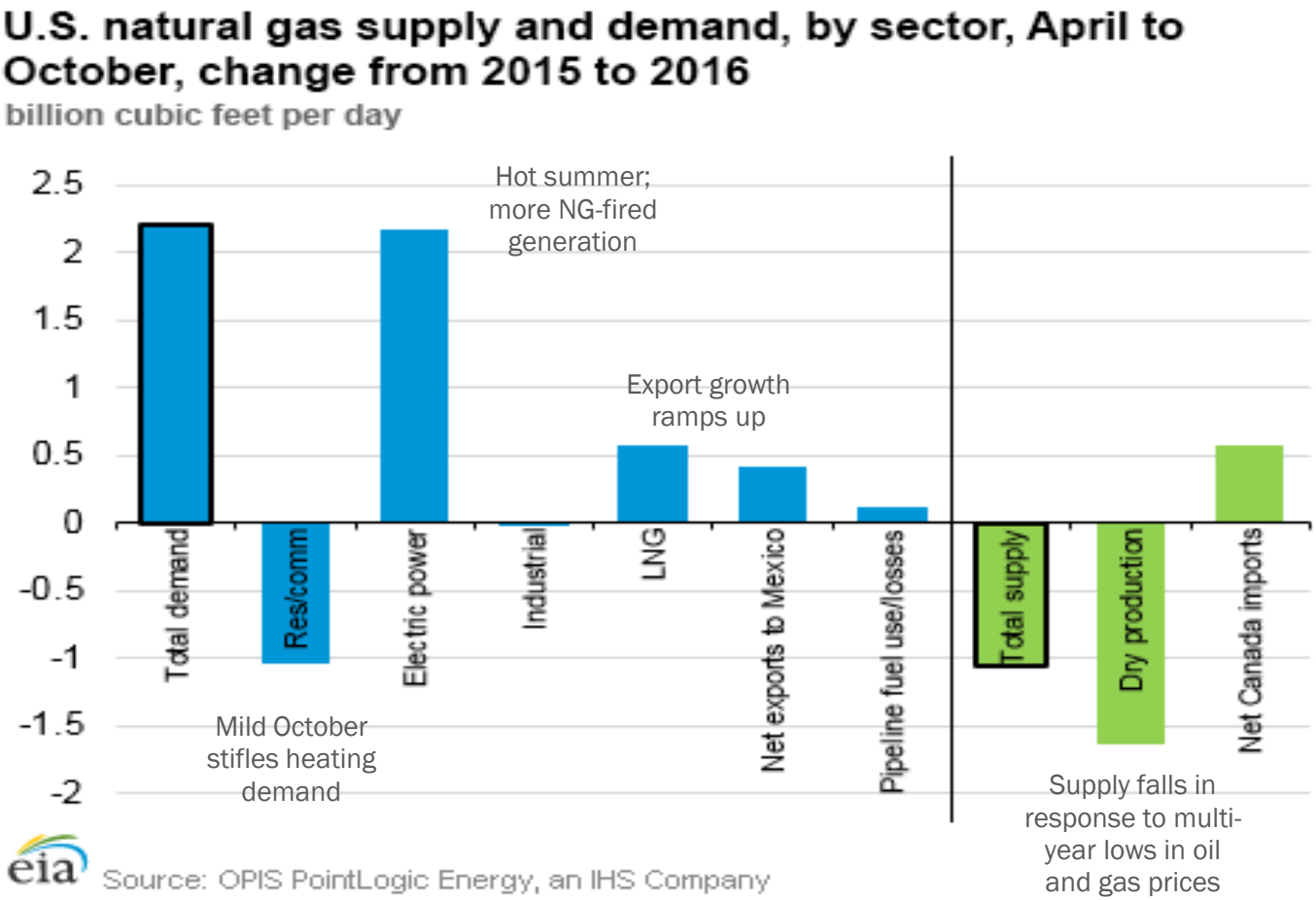


Customer Takeaway: NYMEX natural gas futures recovered from a 17-year low to a 2-year high in 2016 as supply declined and demand increased. While another warm winter caused prices to pull back to $3, a tighter supply-demand balance is keeping the market supported well above year-ago price levels.

Source: NYMEX

Constellation. An Exelon Company

Supply-Demand Balance Tightens in 2016-17



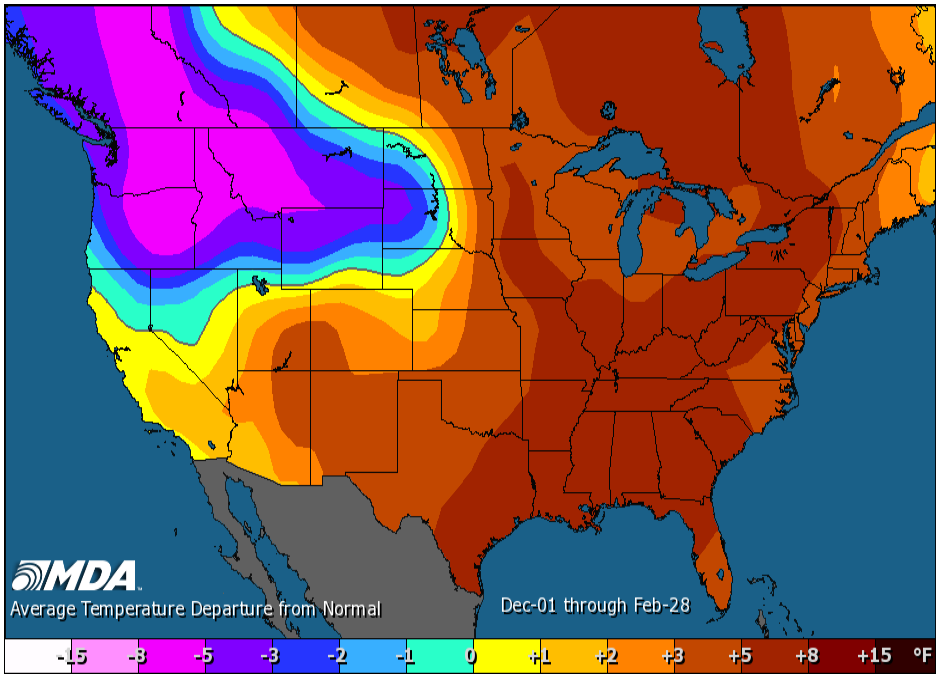
Customer Takeaway: The supply-demand balance from April – October in the natural gas market has tightened by ~3 Bcf/d compared to a year ago, due mostly to strong gas demand from the power sector combined with growth in LNG exports and exports via pipeline to Mexico.

Data Source: EIA

Constellation. An Exelon Company

Second Warmest Dec-Feb on Record

DEC-FEB REALIZED + FORECAST TEMPERATURE DEPARTURES FROM NORMAL



DEC-FEB NATIONAL GWHDD RANKINGS

58/66	Dec-1 2005 - Feb-28 2006	2417.63
59/66	Dec-1 1982 - Feb-28 1983	2412.87
60/66	Dec-1 1998 - Feb-28 1999	2407.09
61/66	Dec-1 1952 - Feb-28 1953	2393.61
62/66	Dec-1 1991 - Feb-28 1992	2363.99
63/66	Dec-1 1997 - Feb-28 1998	2331.13
64/66	Dec-1 2001 - Feb-28 2002	2305.86
65/66	Dec-1 2011 - Feb-28 2012	2279.79
-	target	2260.03
66/66	Dec-1 2015 - Feb-28 2016	2247.84

- The map on the left shows December 2016 – February 2017 realized + forecast temperature departures.
- A record warm February has pushed the Dec-Feb gas weighted heating degree total down to the 2nd warmest since 1950.
- About 2260 gas weighted HDDs are expected for this winter, which is still colder than last year's winter HDD total of 2248.
- The only areas to see below normal temperatures are the Northwest and northern Rockies.

Source: EarthSat

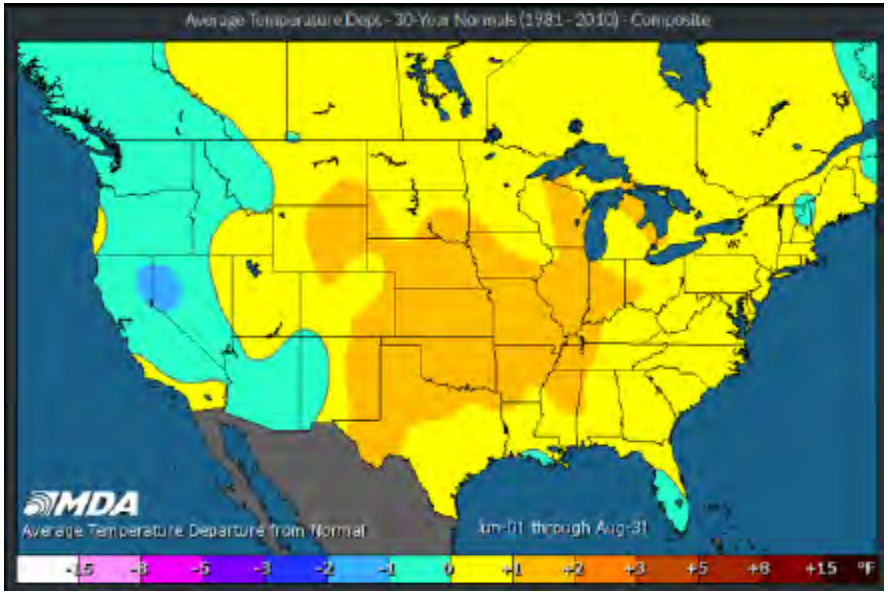
Constellation
An Exelon Company

Summer 2017 First Look

WARMEST WINTERS ON RECORD AND THE FOLLOWING SUMMER

WDD	DJF GWHDD	JJA PWCDD
2015-16	2247.8	1040.0
2011-12	2279.8	1002.4
2016-17*	2289.2	?
2001-02	2305.9	933.3
1997-98	2331.1	917.0
1991-92	2364.0	738.1
1952-53	2393.6	889.8
1998-99	2407.1	893.5
1982-83	2412.9	923.7
2005-06	2417.6	965.2
1953-54	2429.3	896.1
30y Normal	2605.0	880.7

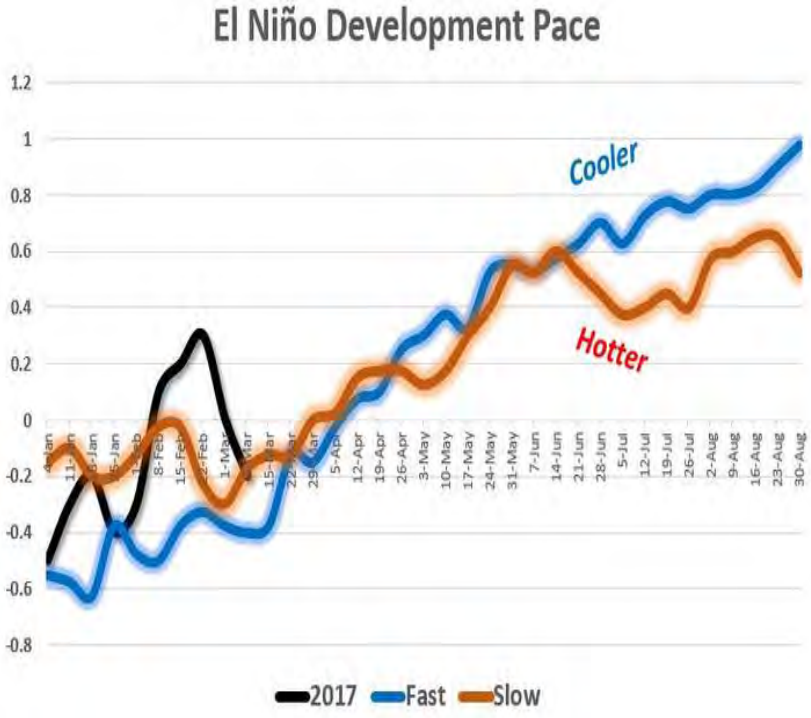
AVERAGE SUMMER TEMP ANOMALY FOLLOWING A TOP 10 WARM WINTER

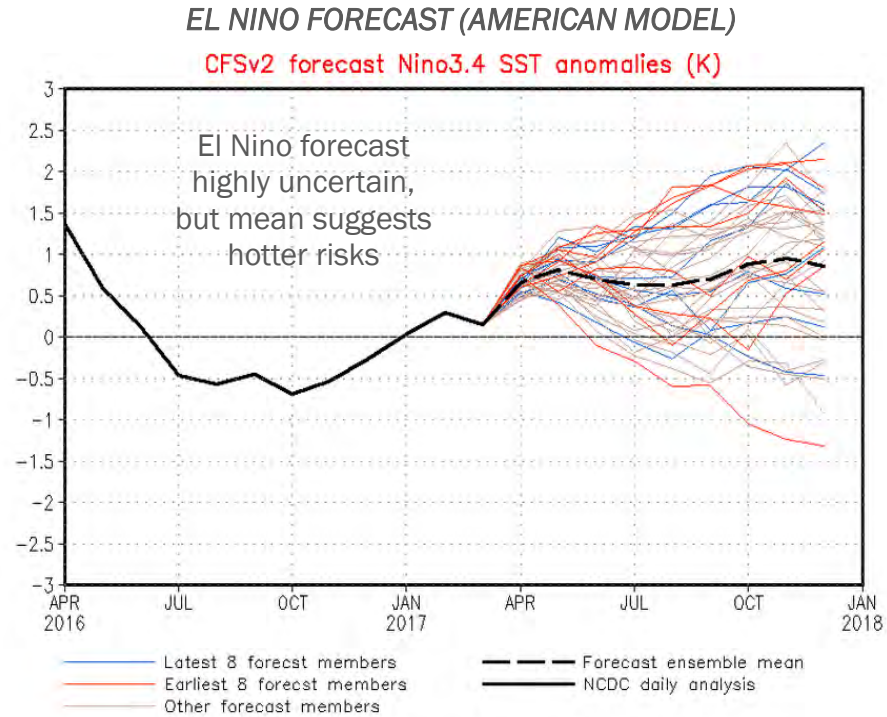


- Does a warm winter usually translate to a hotter than normal summer?
- Nine out of the top 10 warmest winters ended up having a hotter than normal following summer.
- Only 1 warm winter ended up with a cooler than normal following summer (1991-92).
- The 10-year normal is extremely warm. The current 10-year normal is near the 8th hottest summer since 1950.
- Moderate to severe drought in parts of Mid-con, Southeast, and East Coast also poses hotter risks for summer since dry ground reinforces hot air.

Data source: EarthSat

Summer Factor: El Nino



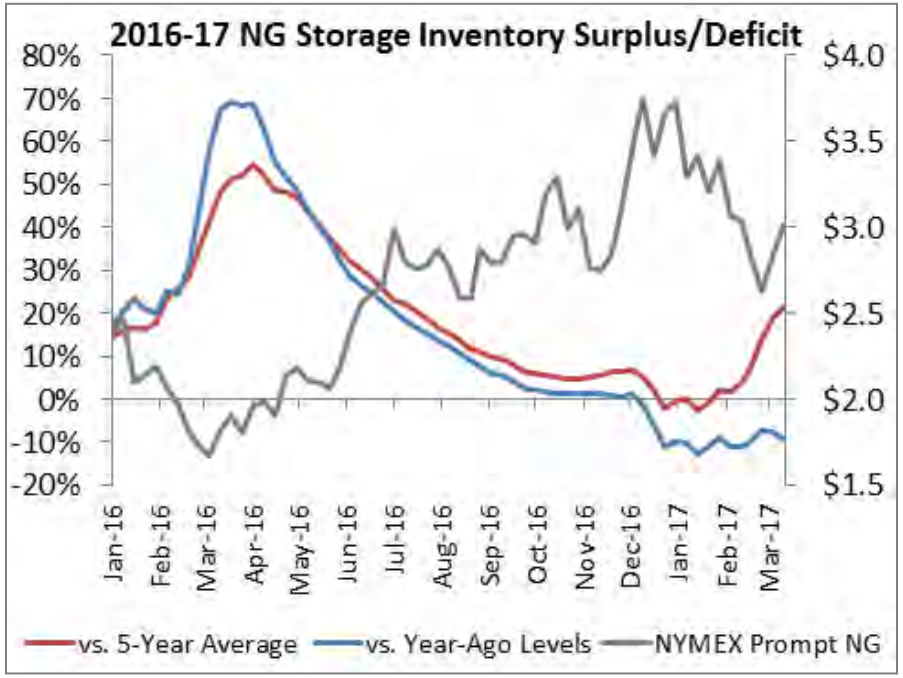


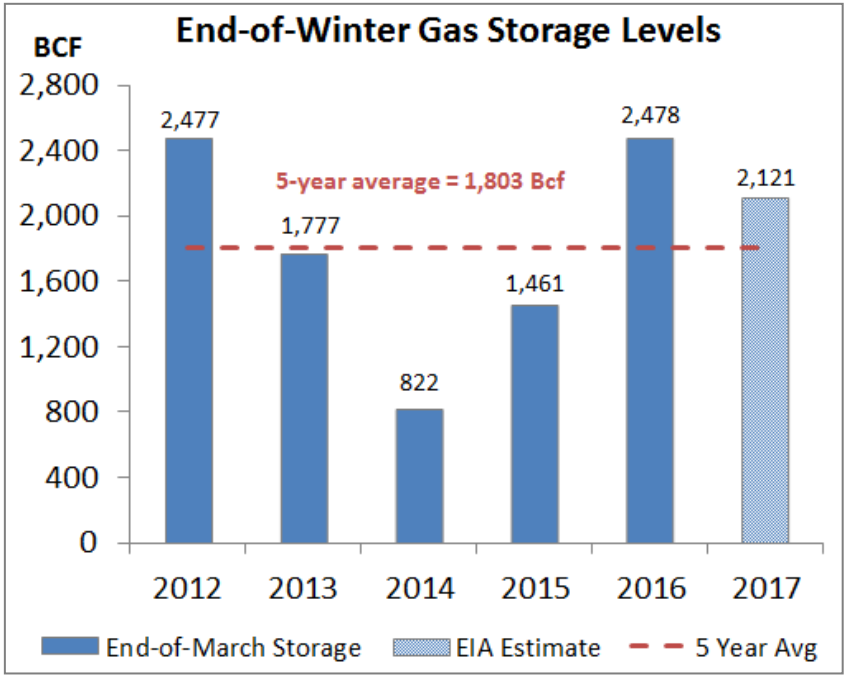
- One factor that may determine Summer 2017 temperatures is El Nino strength.
- Despite some recent cooling, the tropical Pacific has been warming over the past 2 months.
- Some model forecasts are showing El Nino development, however the intensity is highly uncertain. The model on the left shows a range between a strong El Nino and neutral conditions.
- Past summers with developing El Ninos tend to fall into 2 camp:
  - Fast development tends to lead to cooler summers, as storminess tends to be active.
  - Slow development tends to lead to hotter summers, which keeps a cap on storminess.

Data sources: CWG and NOAA

Constellation. An Exelon Company

Gas Inventories Return to Near-Normal Levels





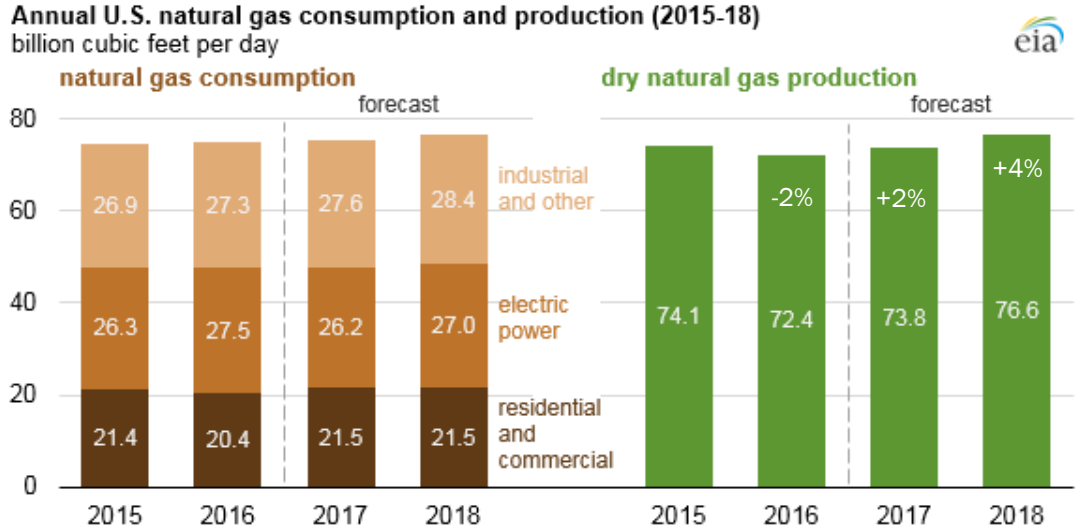
- A year ago, storage inventories were over 870 Bcf (54%) higher than the five year average.
- Due to light injections last year and a cold start to winter, inventories briefly fell below the five-year average this winter. Inventories are now at a 10% deficit to year-ago levels.
- Due to near-record warmth since January, inventory levels have climbed back to a 20% surplus to the five-year average, with end-of-winter stocks now on pace to exceed 2,000 Bcf for only the third time.
- The return of inventories to "normal" levels have been a key driver of the natural gas recovery in the past year.

Customer Takeaway: The natural gas market has recovered from a significant oversupply in early 2016 as declining supply and stronger demand have returned inventory levels to near-normal levels.

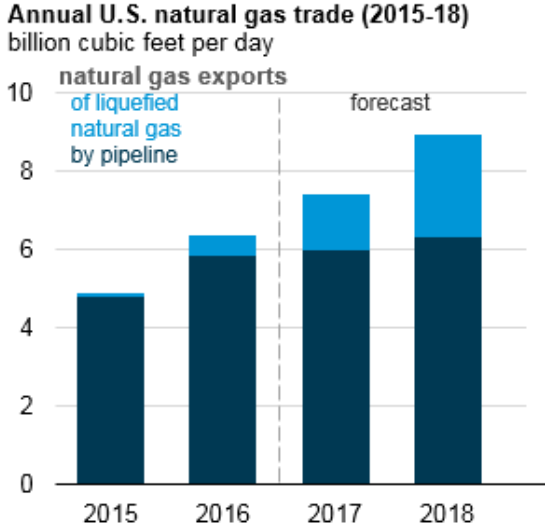
Data Source: EIA

Constellation
An Exelon Company

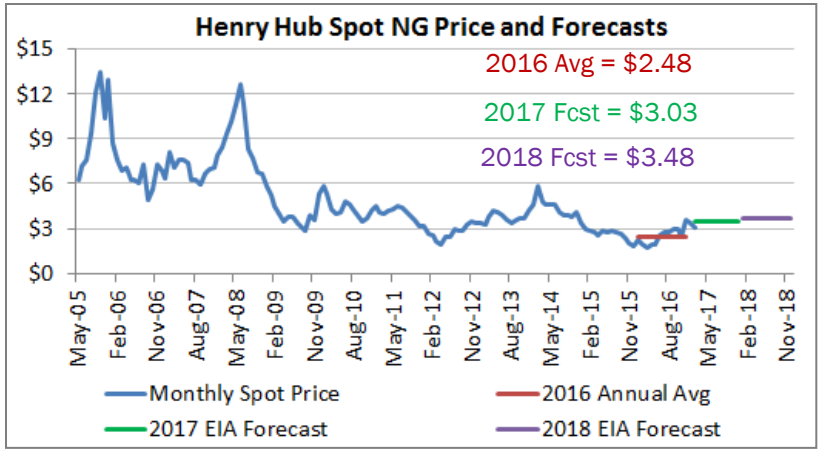
EIA: Production, Consumption, and Exports to Rise in Next Two Years



Source: U.S. Energy Information Administration, *Short-Term Energy Outlook*



Source: U.S. Energy Information Administration, *Short-Term*



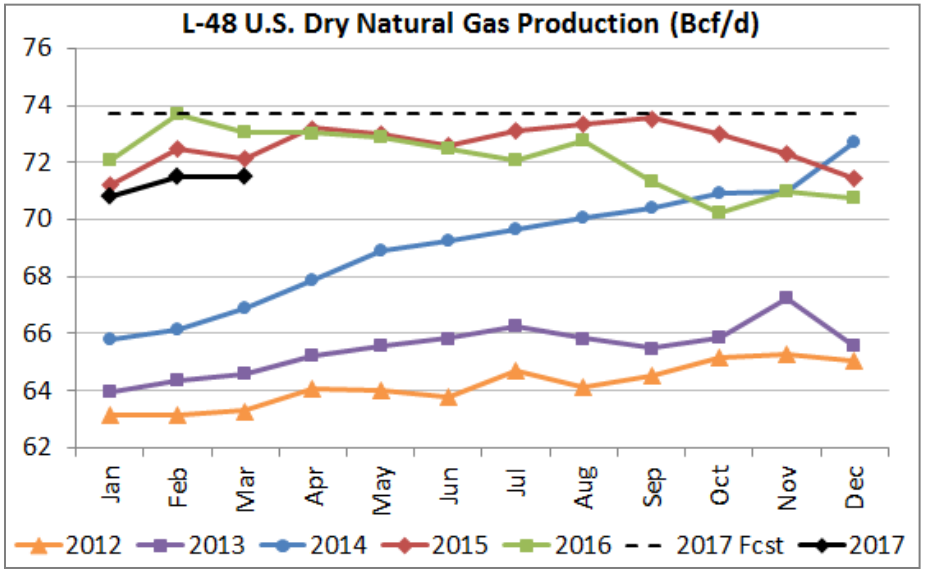
- According to the EIA's latest Short-Term Energy Outlook, the agency forecasts growth in domestic NG consumption, NG exports, and NG production over the next two years (2017-2018).
- Production is forecast to rise 2% in 2017 and 4% in 2018.
- Export demand is also expected to increase in the next two years via pipeline exports to Mexico and LNG exports
- The EIA projects natural gas prices will rise in the next two years as demand grows at a faster pace than supply.

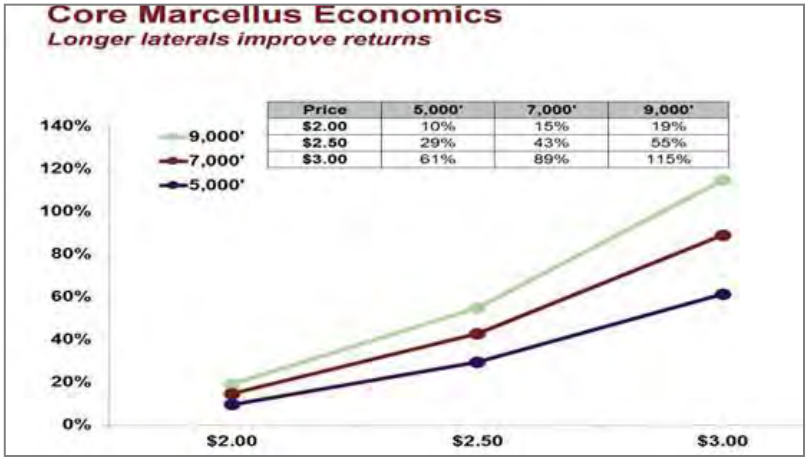
Customer Takeaway: The EIA expects demand growth to outpace supply growth in the next two years, providing support for higher NG prices compared to the multi-year lows achieved in 2016.

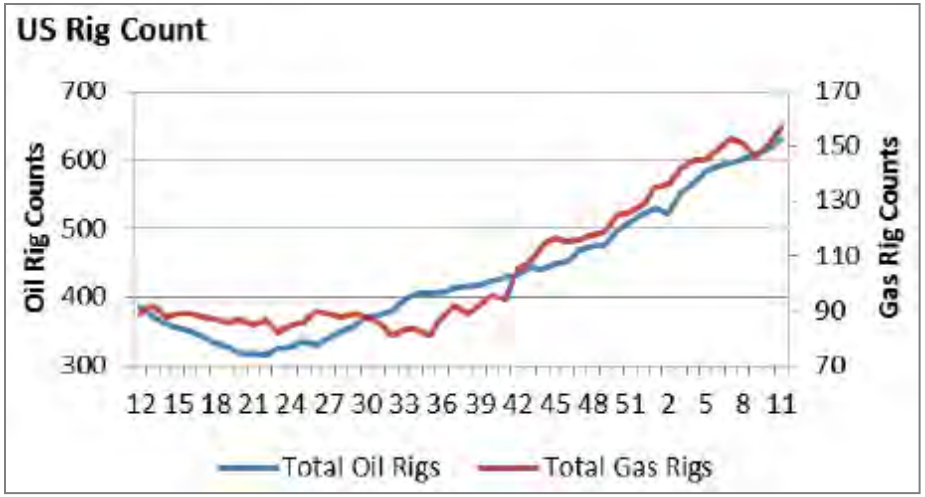
Data Source: EIA

Constellation. An Exelon Company

Natural Gas Production Poised for Rebound in 2017?







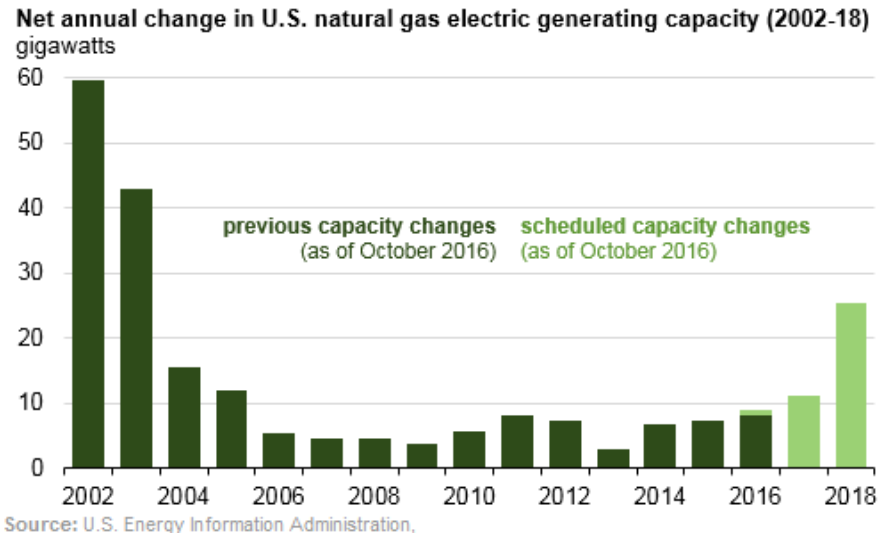
- Will production rebound in 2017? The evidence:
  - Drilling activity is up sharply from 2016 lows (~70%)
  - Drillers continue to show increasing efficiency
  - New pipeline projects allow greater production
  - Increasing oil production = "associated" natural gas
  - Drilled but uncompleted well inventory being rebuilt

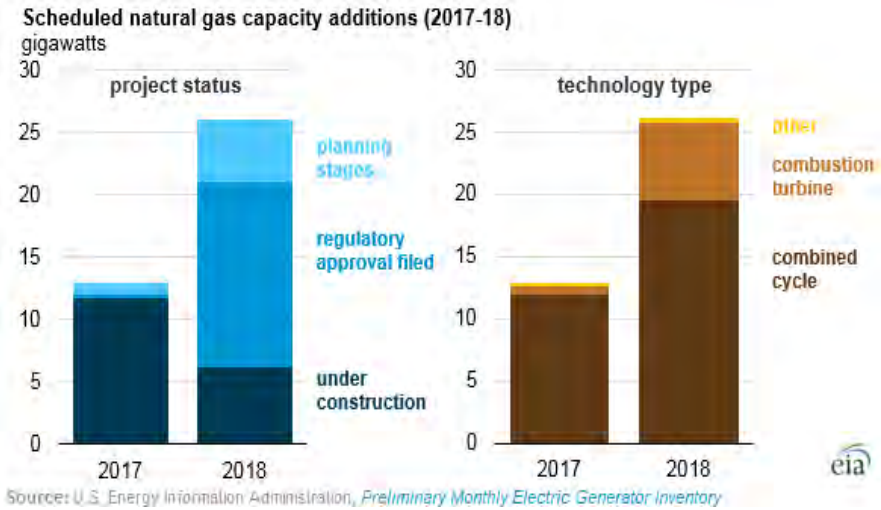
Customer Takeaway: After NG output declined for the first time in over a decade in 2016, evidence supports the EIA's forecast that production will bounce back in 2017. How fast production recovers this year will be a key price driver.

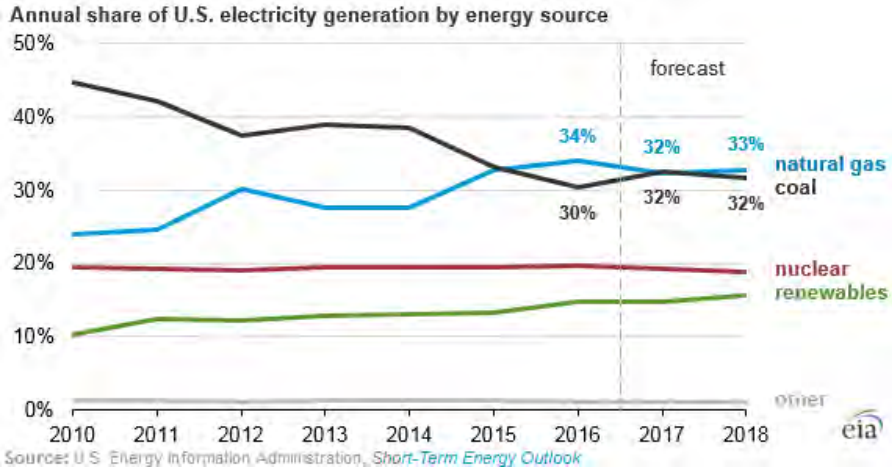
Data Source: EQT, EIA, Baker Hughes

Constellation
An Exelon Company

New NG-Fired Generation Projected to Ramp Up in 2017 & 2018







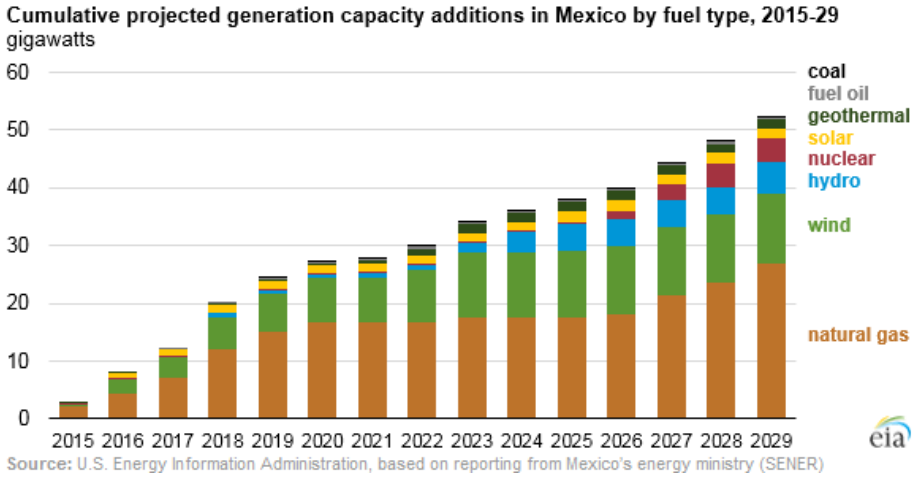
- EIA forecasts 11.2 GW of new NG-fired gen in 2017 and 25.4 GW in 2018, mostly combined cycle units (CCGTs)
- Projected new builds in 2017-2018 would increase NG capacity by 8% versus 2016.
- 50% of new projects are not yet under construction.
- The increase in NG gen follows the retirement of 47.2 GW (-15%) of coal-fired generation in 2012-2016.
- Coal is expected to regain market share from natural gas for power generation in 2017 due to the increase in natural gas prices.

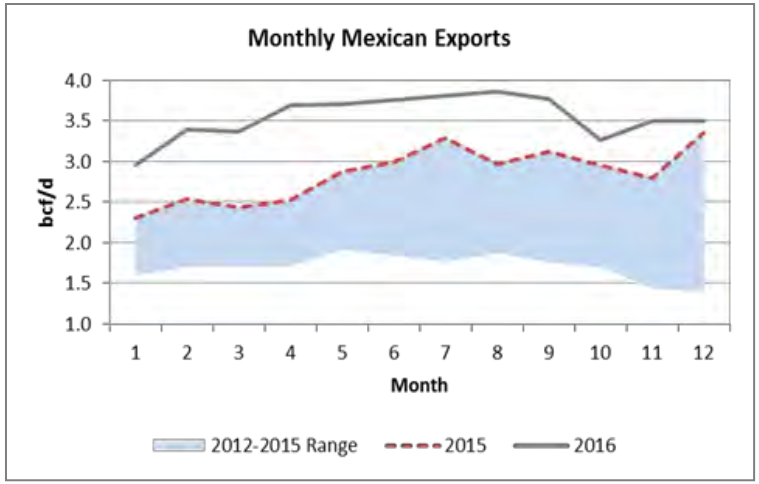
Customer Takeaway: Mexican demand for U.S. gas will continue to grow over the next several years as Mexico shifts its power generation from older oil units to new NG-fired units. Mexico will rely on U.S. NG to offset declining domestic production.

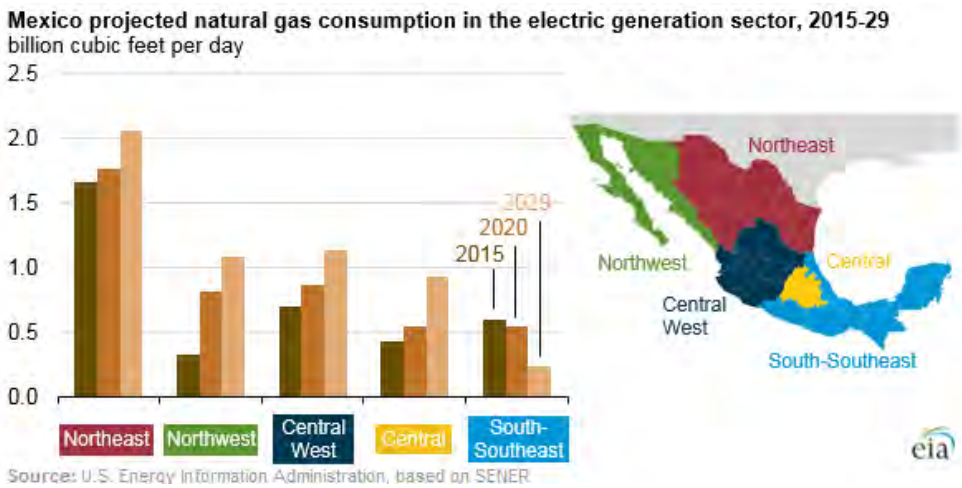
Data Source: EIA

Constellation. An Exelon Company

NG-Fired Generation in Mexico Stoking Demand for U.S. Gas Exports







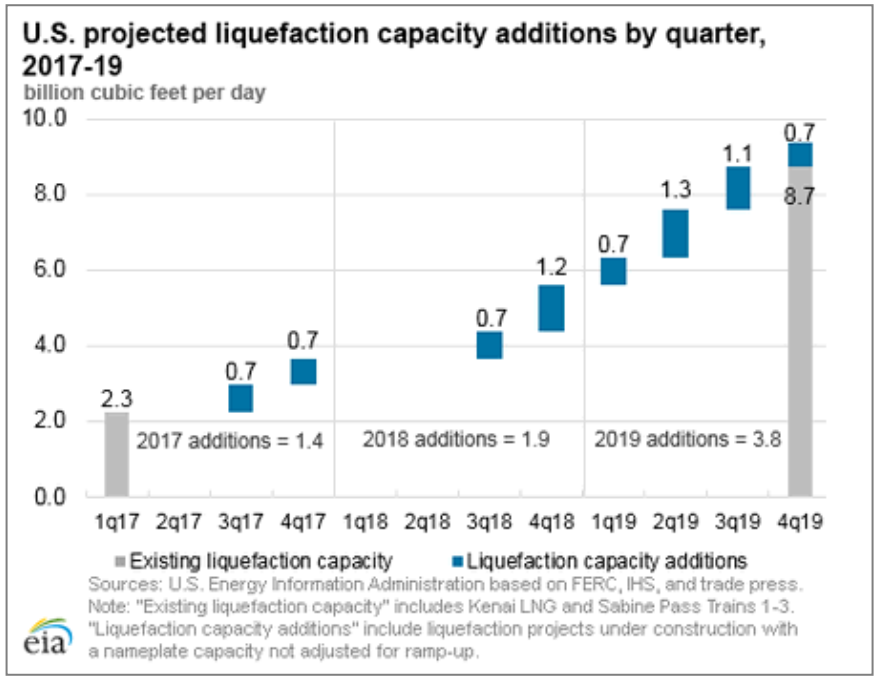
- U.S. exports to Mexico have almost doubled since 2012; averaging ~3.5 Bcf/d in 2016.
- U.S. gas is replacing imported LNG, as well as off-setting declining Mexican "associated" gas production as a result of lower oil production.
- Export capacity to Mexico will increase in 2017 by 3.3 Bcf/d from 7.3 Bcf/d in 2016 to 10.8 Bcf/d and will increase by another ~3 Bcf/d in 2018.
- Mexico's energy ministry (SENER) expects gas demand to grow 1.2% annually from 2016-'30 to meet growing power generation demand.

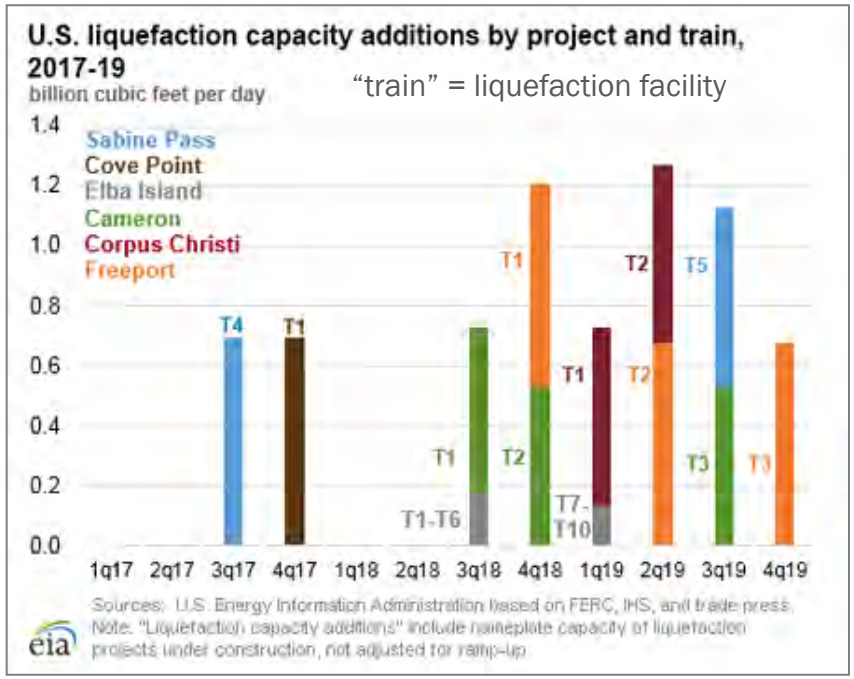
Customer Takeaway: Mexican demand for U.S. gas will continue to grow over the next several years as Mexico shifts its power generation from older oil units to new NG-fired units. Mexico will rely on U.S. NG to offset declining domestic production.

Data Source: EIA

Constellation. An Exelon Company

U.S. will have World's 3rd Largest LNG Export Capacity by 2020





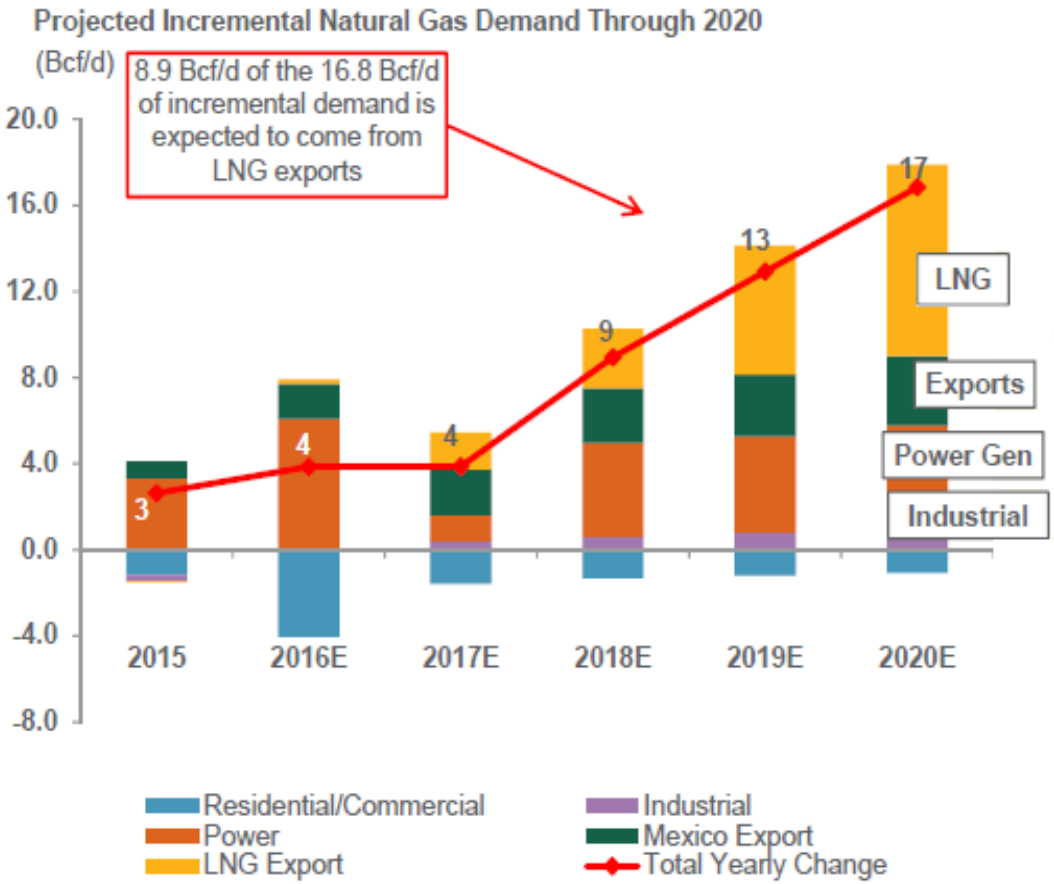
- Per EIA forecasts, the U.S. will have the third largest LNG export capacity in the world by 2020 (9.4 Bcf/d).
- U.S. currently has one operational LNG export facility in the Lower-48, with 5 others currently under construction.
- A majority of the new LNG export facility will come online in the 2018-2019 timeframe, with 1.4 Bcf/d added in 2017; 1.9 Bcf/d in 2018; and 3.8 Bcf/d in 2019.
- At current time, Sabine Pass LNG exports are adding ~2 Bcf/d of incremental gas demand to the market this winter, with the third of five liquefaction trains preparing for commercial operation next month.

Customer Takeaway: Continued growth in U.S. LNG exports will be a primary support for natural gas prices in coming years. This winter, LNG exports have added nearly 2 Bcf/d of incremental demand to the U.S. market.

Data Source: EIA, FERC

Constellation. An Exelon Company

EIA: U.S. to Become a Net Exporter of NG by 2018

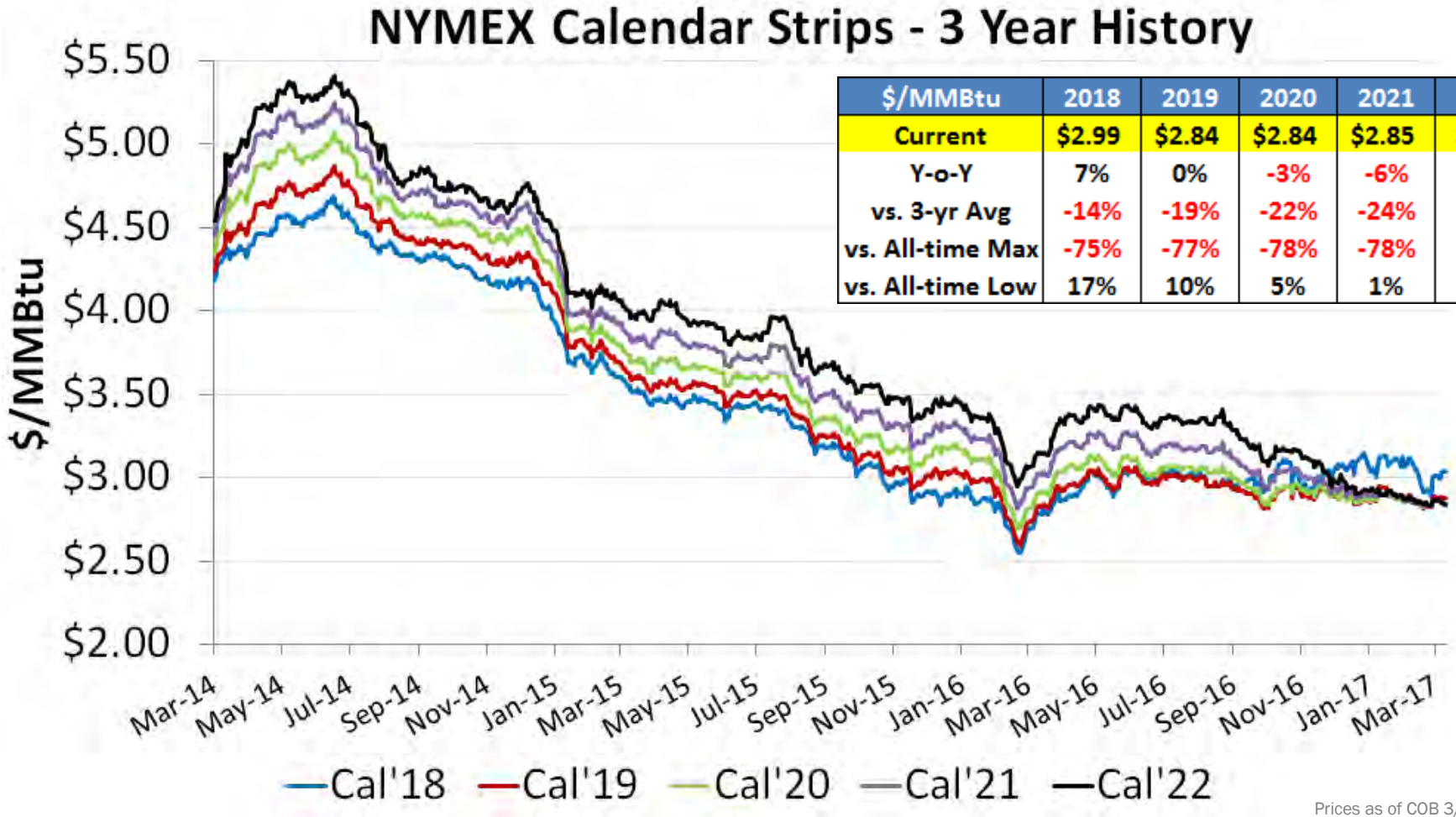


Customer Takeaway: The United States will become a net exporter of natural gas by 2017 according to the EIA. Exports via LNG and pipeline to Mexico will be primary drivers of upside price risk in long-term energy prices.

Source: Tudor Pickering & Holt Research, Antero Resources, Constellation, EIA

Constellation. An Exelon Company

NYMEX Forwards



$/MMBtu	2018	2019	2020	2021	2022
Current	$2.99	$2.84	$2.84	$2.85	$2.87
Y-o-Y	7%	0%	-3%	-6%	-9%
vs. 3-yr Avg	-14%	-19%	-22%	-24%	-26%
vs. All-time Max	-75%	-77%	-78%	-78%	-78%
vs. All-time Low	17%	10%	5%	1%	1%

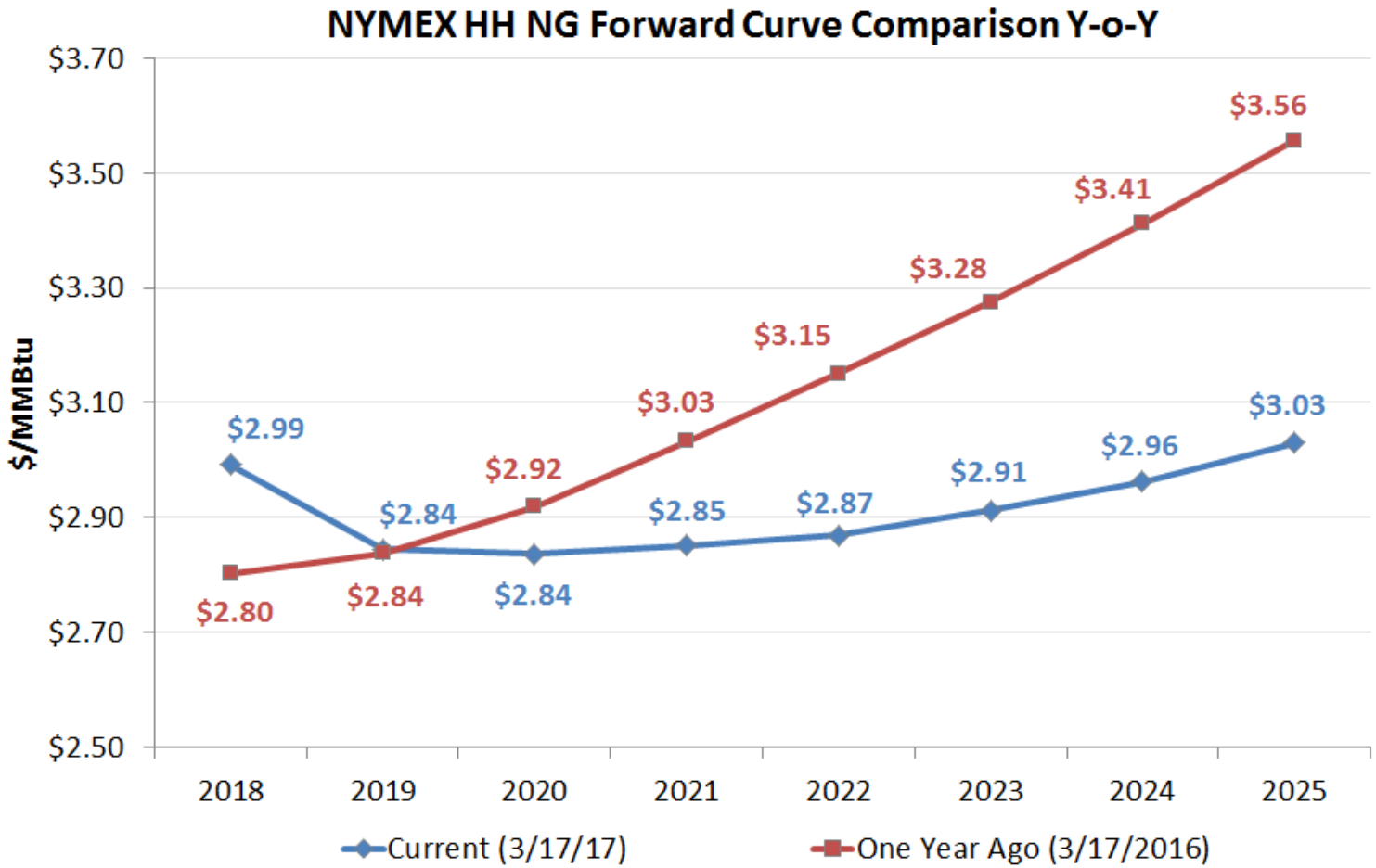
Data Source: Constellation

Prices as of COB 3/17/2017

Customer Takeaway: NYMEX forward calendar strips have seen significant volatility on the front-end of the curve this winter while the back-end has been fairly stable and has even moved down during that period amid optimism about long-term supply growth. Export growth presents an upside price risk.

Constellation
An Exelon Company

NYMEX NG Forward Curve: Today versus One Year Ago



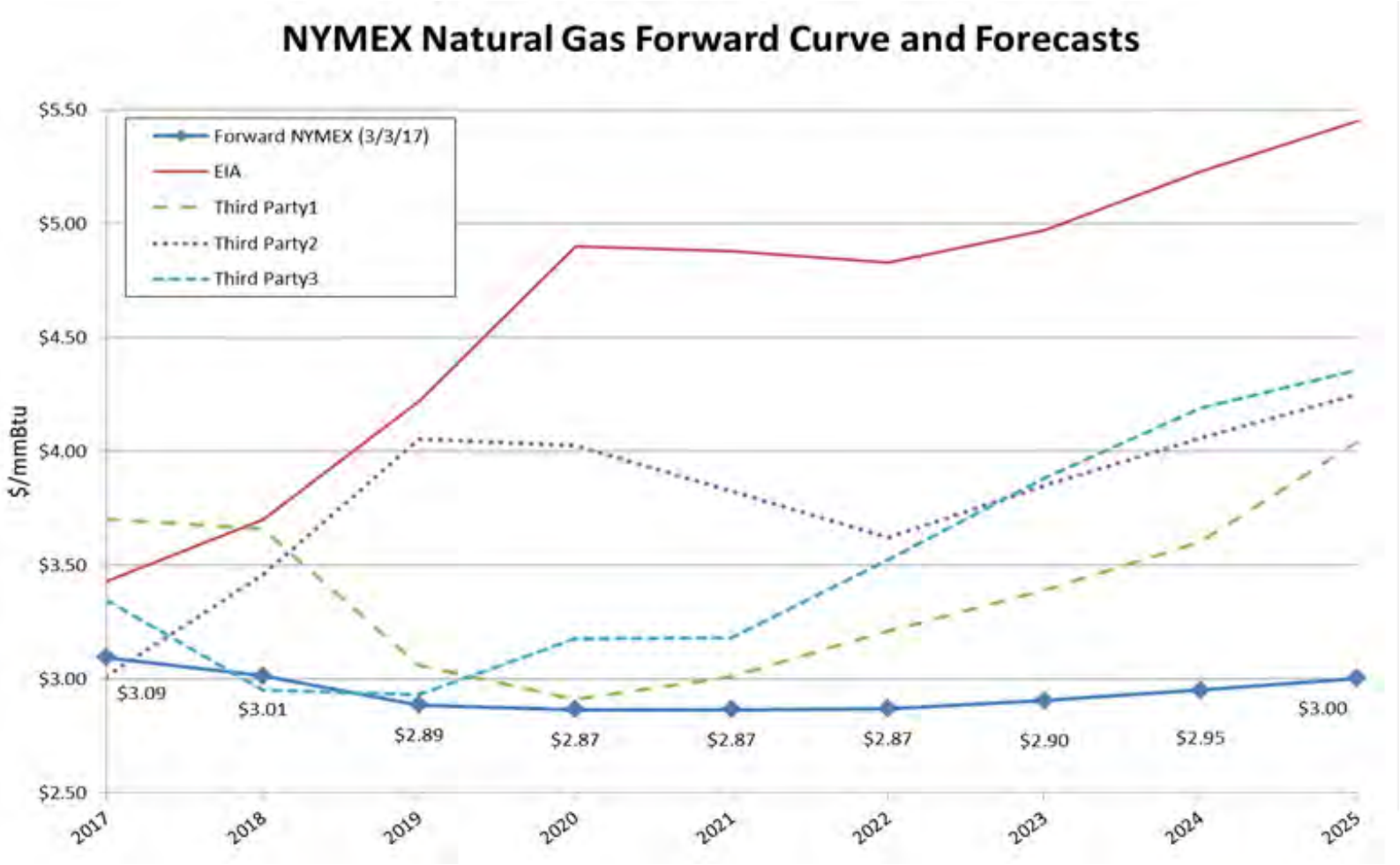
Customer Takeaway: A tightening supply-demand balance has pushed NYMEX Cal'17 and Cal'18 prices well above year-ago levels. Outer year prices have fallen significantly as the market expects a rebound in production growth to keep the market well supplied, despite projected increases in long-term demand.

Source: NYMEX

Prices as of COB 3/17/2017

Constellation
An Exelon Company

NYMEX NG Forward Curve vs. Third Party Forecasts

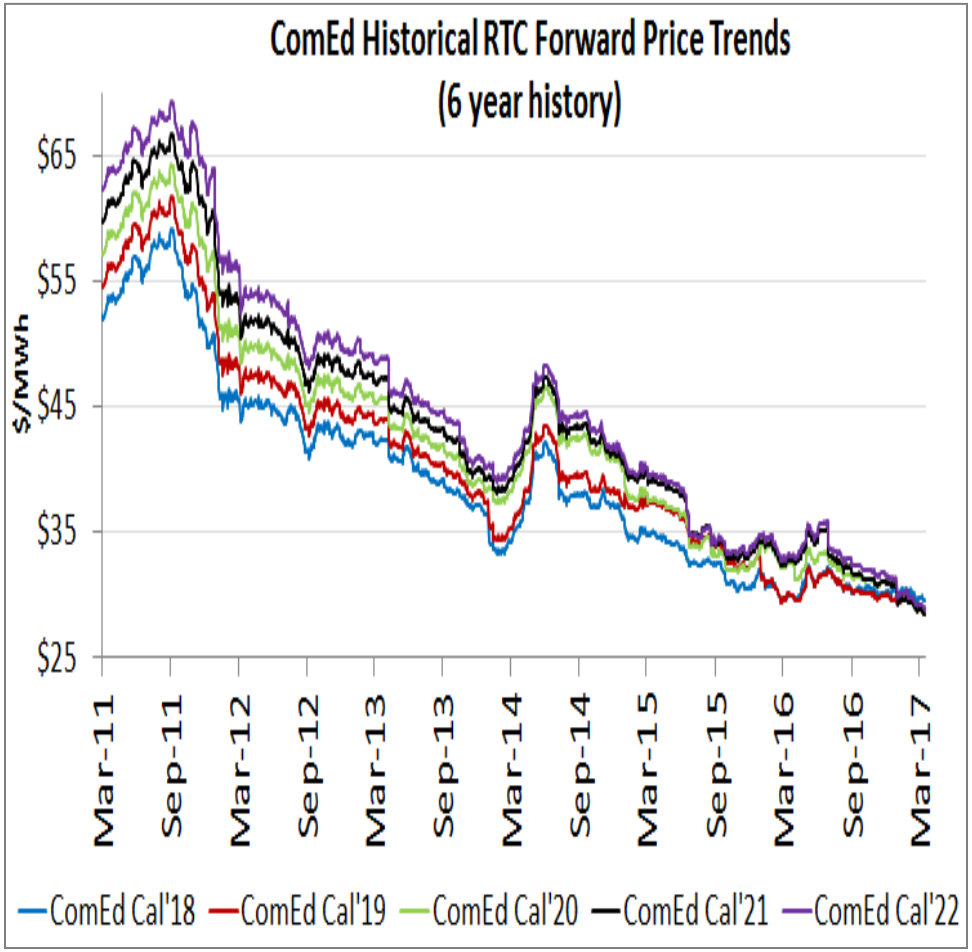


Customer Takeaway: The NYMEX natural gas forward curve shows little to no forward premium risk into the outer years despite robust demand growth projections. Third party price forecasts suggest there is significant upside risk as supply may require higher prices to accommodate incremental demand growth.

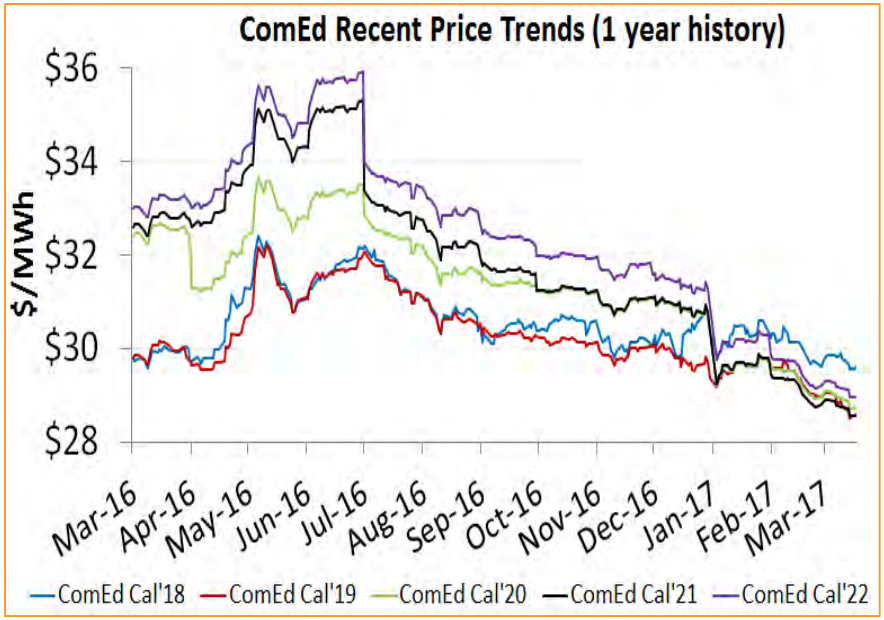
Source: NYMEX, EIA

Constellation.
An Exelon Company

ComEd Forward Power



Year	Current vs 6-year Max	Current vs 6-year Low	Y-o-Y	M-o-M
2018	-50%	0%	-1%	-1%
2019	-54%	0%	-5%	-2%
2020	-55%	0%	-12%	-2%
2021	-57%	0%	-13%	-2%
2022	-58%	0%	-13%	-2%



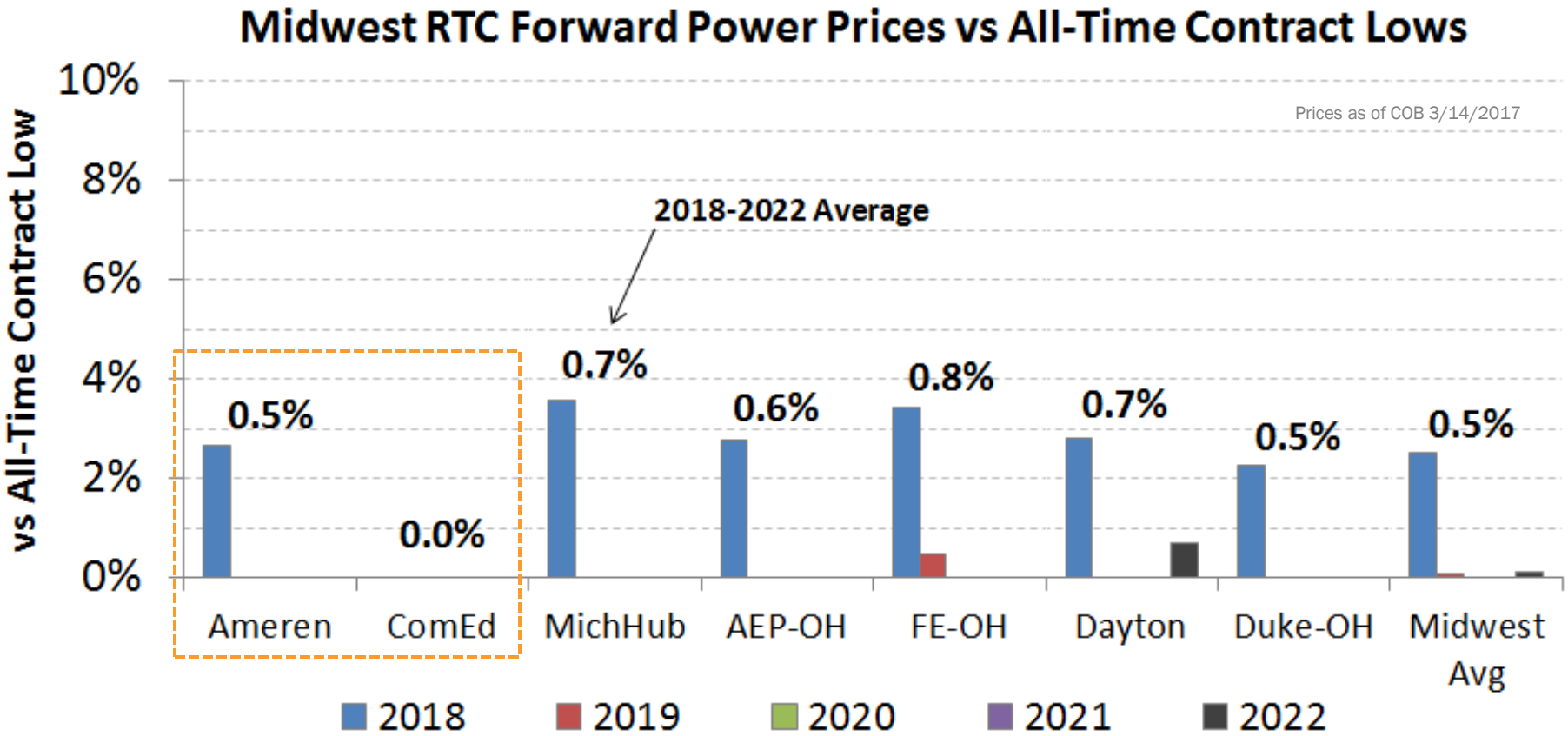
Data Source: Constellation

Note: Prices shown above are an indicative, non-transactable snapshot of the retail market as of COB 3/17/2017.

Customer Takeaway: Forward power prices in Illinois have declined to the lowest levels on record for 2018-2022 delivery amid fundamental weakness in the long-term gas market. The shoulder month period typically presents favorable buying opportunities, but summer forecasts will soon pose an upside risk for prices.

Constellation
An Exelon Company

Forward Power Prices vs. All-Time Lows



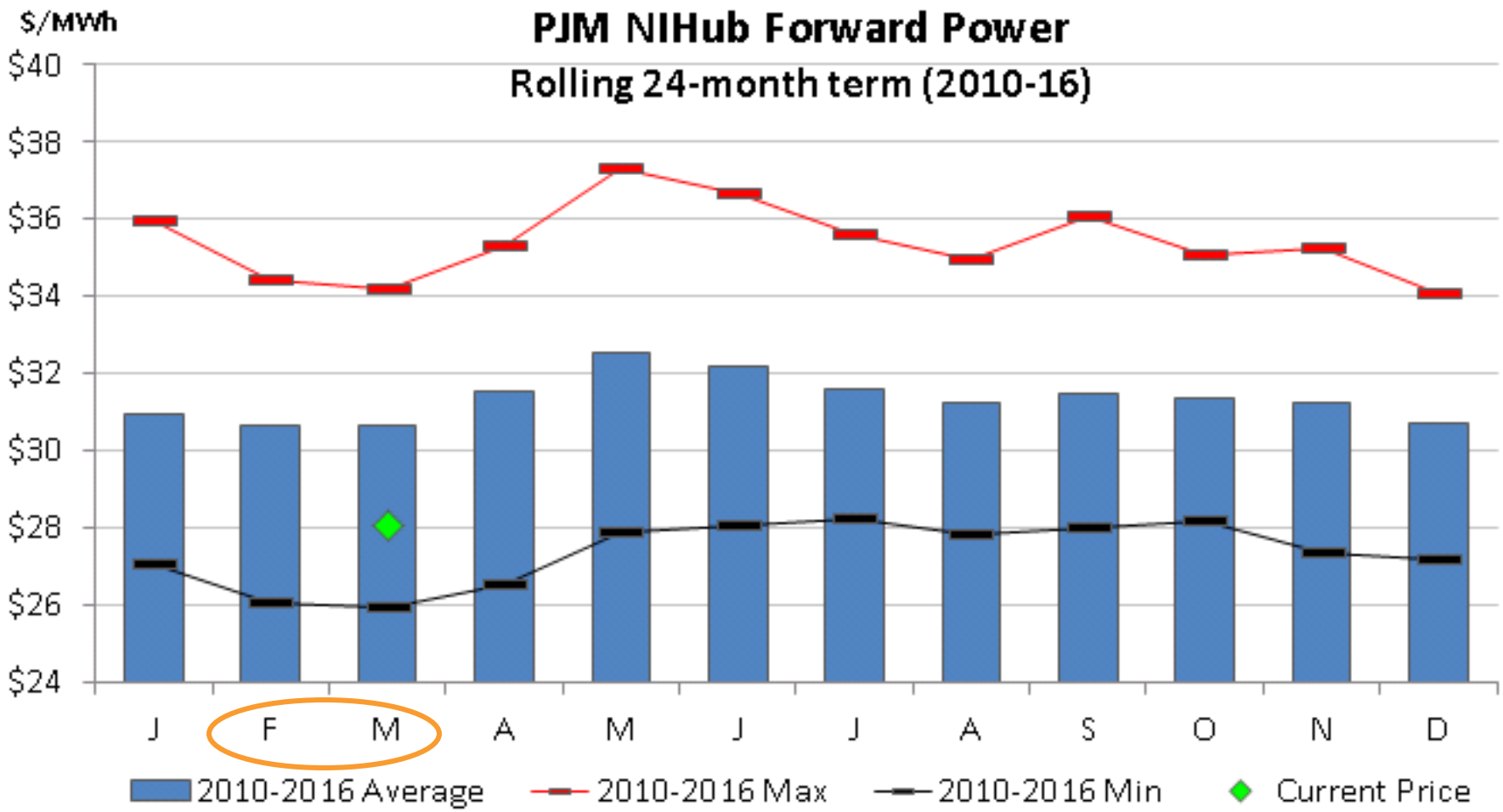
Notes: 0% implies forward calendar strip price is at an all-time, life-of-contract low. All prices are energy-only retail marks.

Customer Takeaway: While the recovery in short-term natural gas prices has kept 2018 power prices elevated versus previous lows, long-term forward power prices across the Midwest have never been lower for the years 2019 and beyond.

Data Source: Constellation

Constellation
An Exelon Company

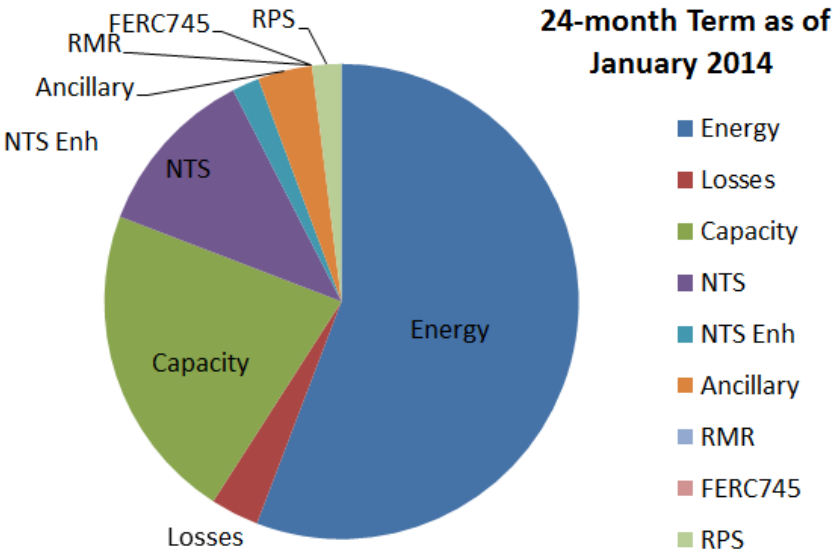
Forward Power Price Seasonality

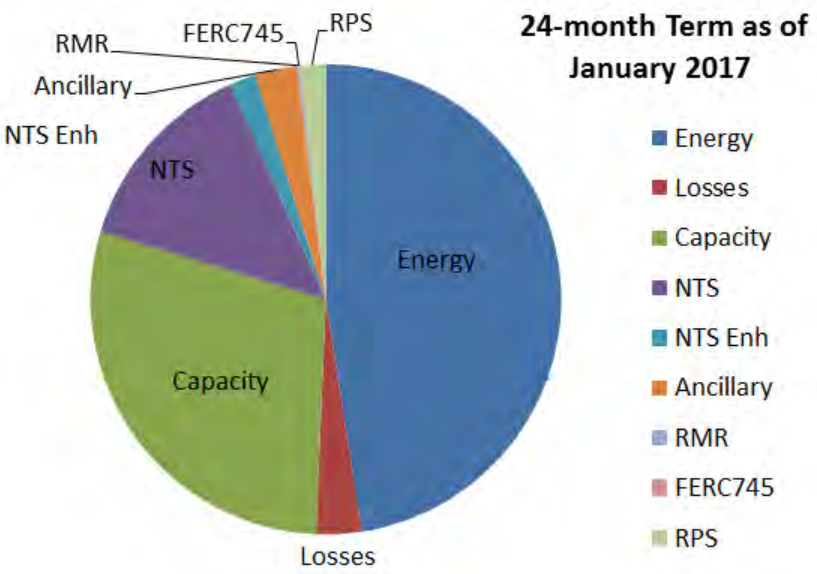


Customer Takeaway: On average, forward power prices hit seasonal lows in February through early April as winter comes to an end, but before summer forecasts gain a high level of clarity.

Constellation.
An Exelon Company

IL Capacity and Transmission Costs Rise as Energy Prices Fall





Energy = 58%

Capacity = 22%

Transmission = 14%

Other = 6%

Energy = 47%

Capacity = 30%

Transmission = 18%

Other = 5%

Note: Prices and percentages are for indicative and illustrative purposes only. Share of total cost may vary due to term, load shape, etc.

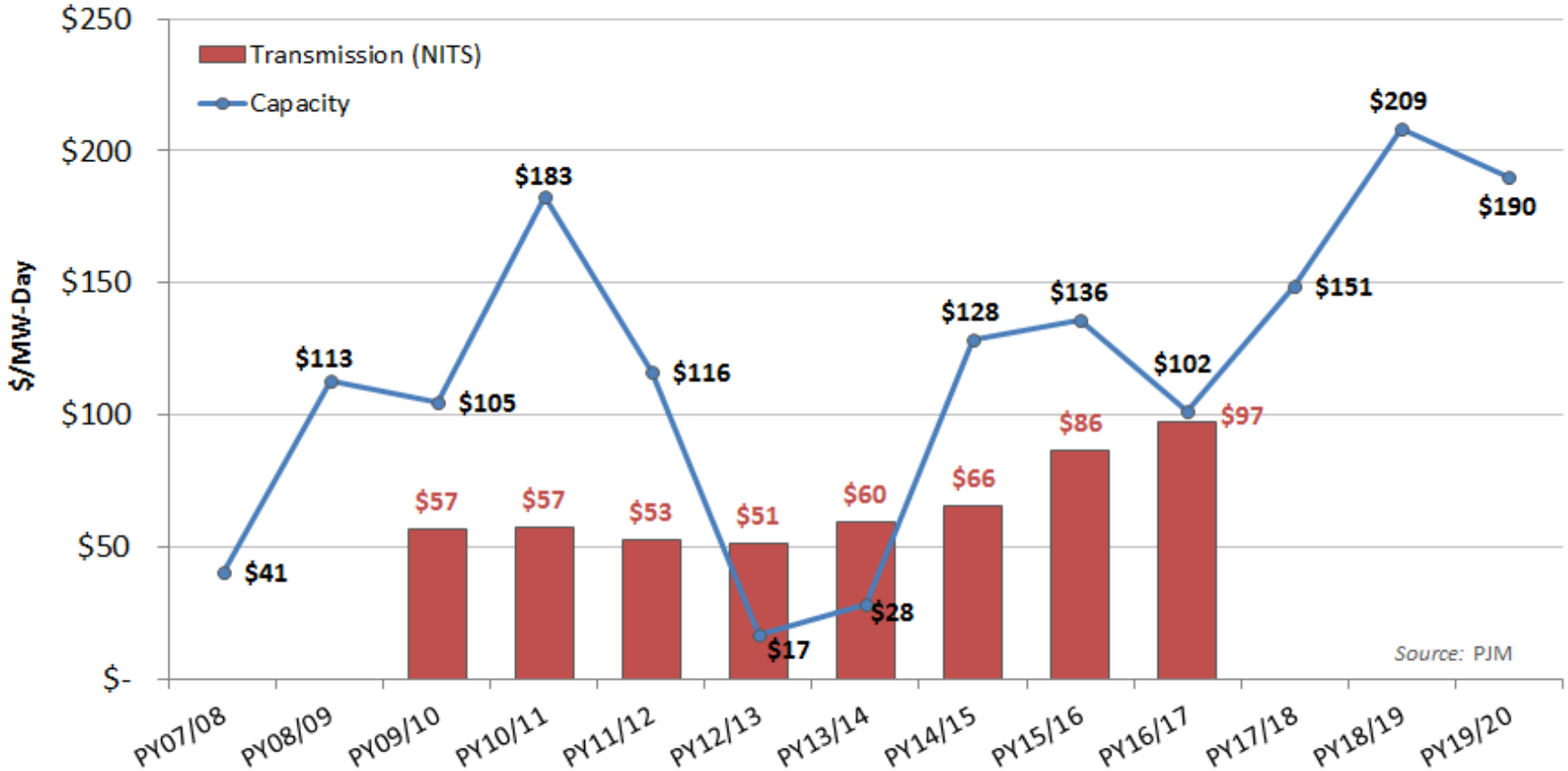
Customer Takeaway: As power prices have fallen over the past few years, ComEd customers have seen an increase in capacity and transmission costs. Fortunately, customers have control over the energy portion of their bill by choosing when and how to procure their power.

Data Source: Constellation

Constellation. An Exelon Company

Constellation
An Exelon Company

ComEd Capacity and NITS Rates by Planning Year ($/MW-Day)



Note: Capacity rates include results from all Base Residual and Incremental Auctions held to-date, as well as costs for base capacity and CP resources

Constellation
An Exelon Company

Spring Preview: Key Factors for Price Direction

- ✓ Time running out for sustained cold that could drive prices higher
- ✓ Summer forecasts will likely be a key price driver by April
- ✓ Natural gas production is down, but likely to increase later this year
- ✓ Significant value in long-term energy prices… for now
- ✓ Natural gas export growth a major upside risk for long-term energy prices
- ✓ Budget for higher capacity and transmission costs in Illinois
- ✓ Watch for buying opportunities during the "spring lull"

Customer Takeaway: Natural gas and power prices remain near multi-year lows as winter draws to a close; energy buyers should be on the look out for seasonal buying opportunities as there is more upside risk than downside potential in the current energy market.

Constellation.
An Exelon Company

Questions?

Steven W. Chambers
Principal, Commodities Management Group
steven.chambers@exeloncorp.com
(610) 765-6528

Constellation.
An Exelon Company