

NYISO 2019/2020 ICAP Demand Curve Reset

Initial Modeling Discussions

ICAP Working Group

November 6, 2019



Today:

- Review of Net EAS Revenue Model
- Process for Selecting Gas Hubs for Pricing
- Peaking Unit Technology Evaluation

Review of Net EAS Revenue Model

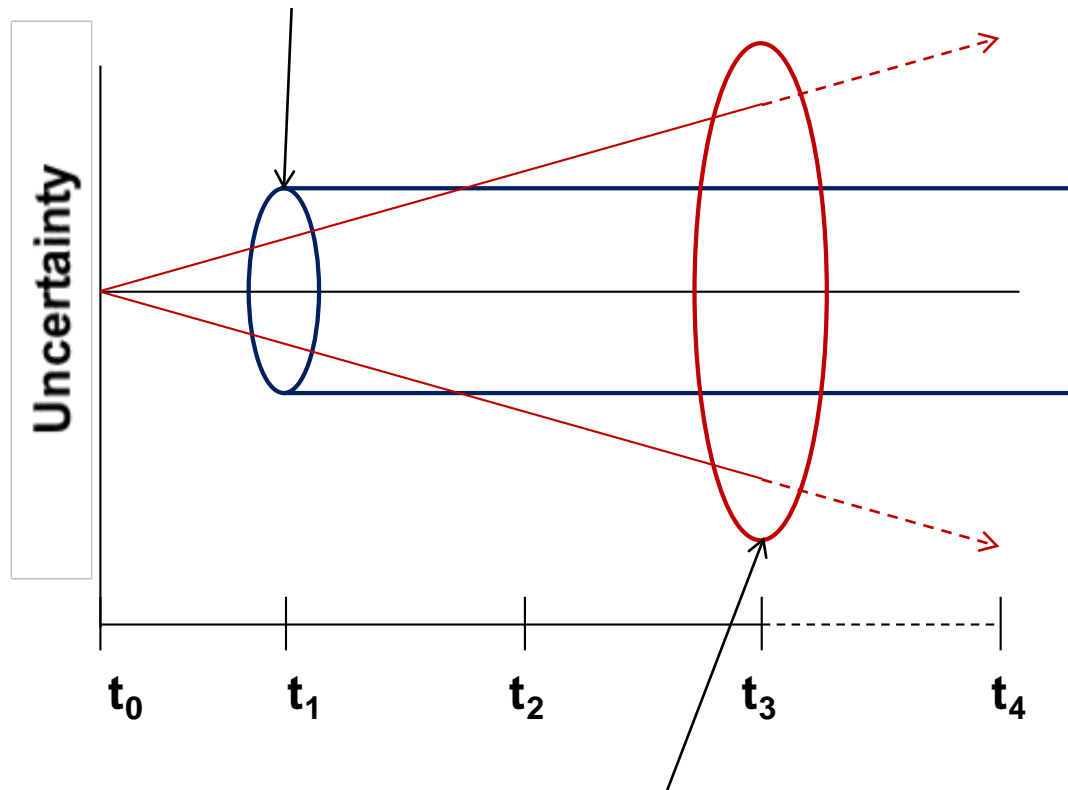
Review of Net EAS Revenue Model

Overview of approach

- The 2016 ICAP Demand Curve reset (DCR) introduced a historical forecast approach which used three years of historical price data to estimate net Energy and Ancillary Services (EAS) revenues for the various peaking plants.
 - Previous DCRs had used an econometric forecast approach, where forecast prices and net EAS revenues were based on a statistical model.
- We intend to assess the experience to date with the current net EAS revenue approach. However, the appropriate methodology for conducting such an assessment remains under review.
 - One potential approach (as further described in the following slides) would be to conduct a “backcasting” analysis similar to what was performed in the 2016 DCR.

Advantages of Historical Forecast Approach

Historical forecast approach used in 2016 DCR allows for annual update of market prices: forecast error is minimized by reducing the lag between data and forecast.



Econometric forecast approach used previously was limited to three year forecast: tradeoff between precision (functional form) and future uncertainty in underlying parameters.

Review of Net EAS Revenue Model

Review of potential approach through backcasting analysis

- Evaluation could be performed by comparing, for each Capability Year and zone, net EAS revenues estimated using two different approaches:
 - A) “Forecast revenues” estimated using the historical forecast approach – that is, the approach adopted in the 2016 DCR based on prices from a moving 3-year historical period; and
 - B) “Actual revenues” estimated using actual prices (adjusted to account for the “level of excess” (LOE) using the current LOE adjustment factor values) for corresponding 12-month period (see next slide).
- In both cases, net EAS revenues would be estimated using the dispatch logic from the net EAS revenue model adopted in the 2016 DCR.
 - Dispatch model assumes profit-maximizing dispatch of the approved peaking plants from the 2016 DCR (SGT6-PAC5000F(5) SC) in NYISO zones F, G, J, and K.
 - The peaking plant design for zones G, J, and K includes dual fuel capability with selective catalytic reduction (SCR) emissions control technology, while the peaking plant design for zone F is gas-only without SCR.
 - Prices reflect an adjustment for the LOE.

Review of Net EAS Revenue Model

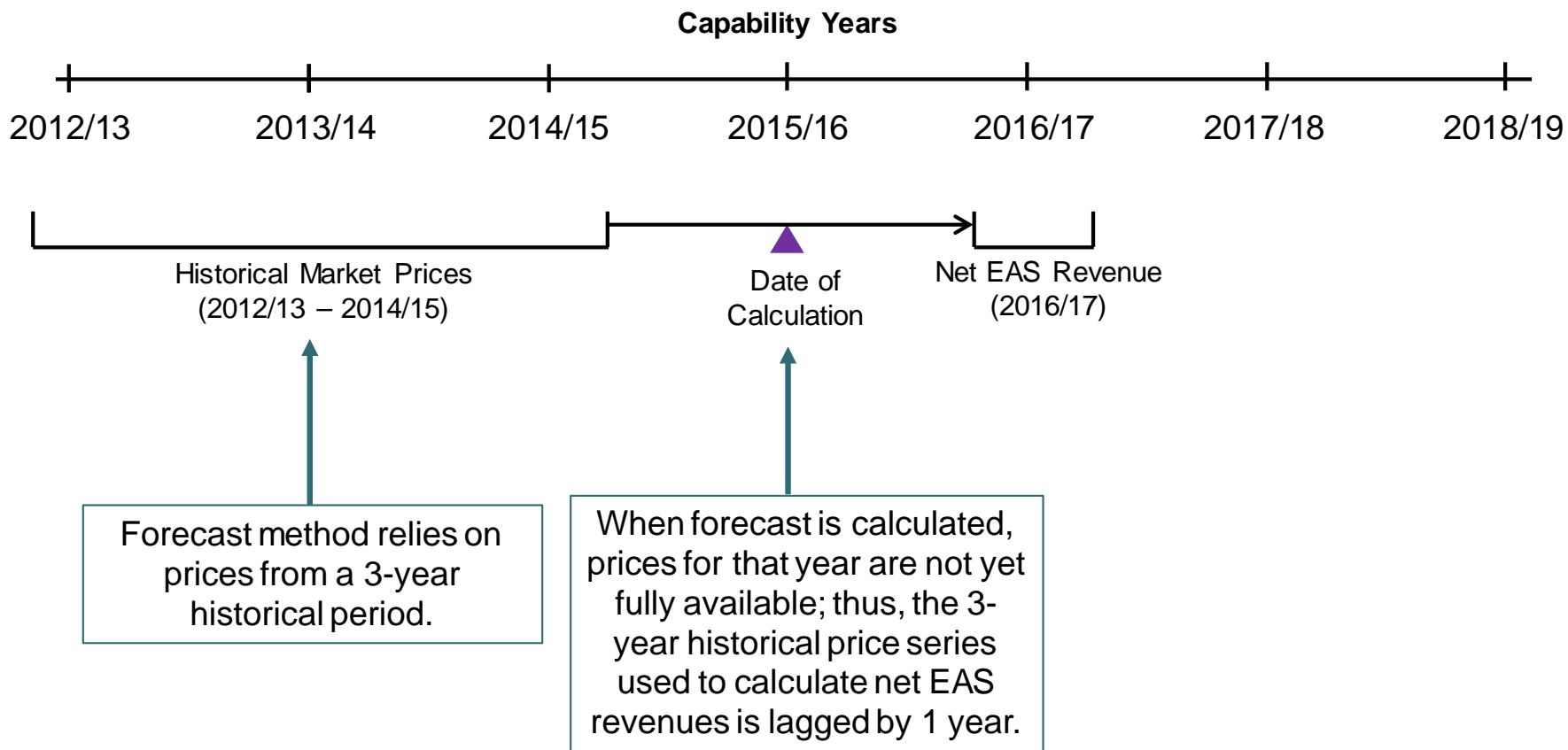
Review of potential approach through backcasting analysis

- The table below illustrates the relevant data periods for “forecast revenues” and “actual revenues” used under this potential approach.

	Current Reset Period	
	2017/18 Demand Curve	2018/19 Demand Curve
Forecast Net EAS Revenue using data from:	Sept. 2013 – Aug. 2016	Sept. 2014 – Aug. 2017
Actual Net EAS Revenue using data from:	Sept 2017 – Aug. 2018	Sept 2018 – Aug. 2019

Review of Net EAS Revenue Model

Timing of “Forecast” net EAS revenue inputs and outputs



Process for Selecting Natural Gas Hubs for Pricing

Natural Gas Hub Selections for Pricing

Review of approach used in the 2016 DCR

- In the 2016 DCR, the choice of natural gas hub in each zone was based on 4 factors:
 - Market dynamics (how closely LBMPs followed that hub's gas prices);
 - Liquidity of trading (hub has deep historical data);
 - Geographic location of the gas hub;
 - Precedent for the hub being used in other evaluations.

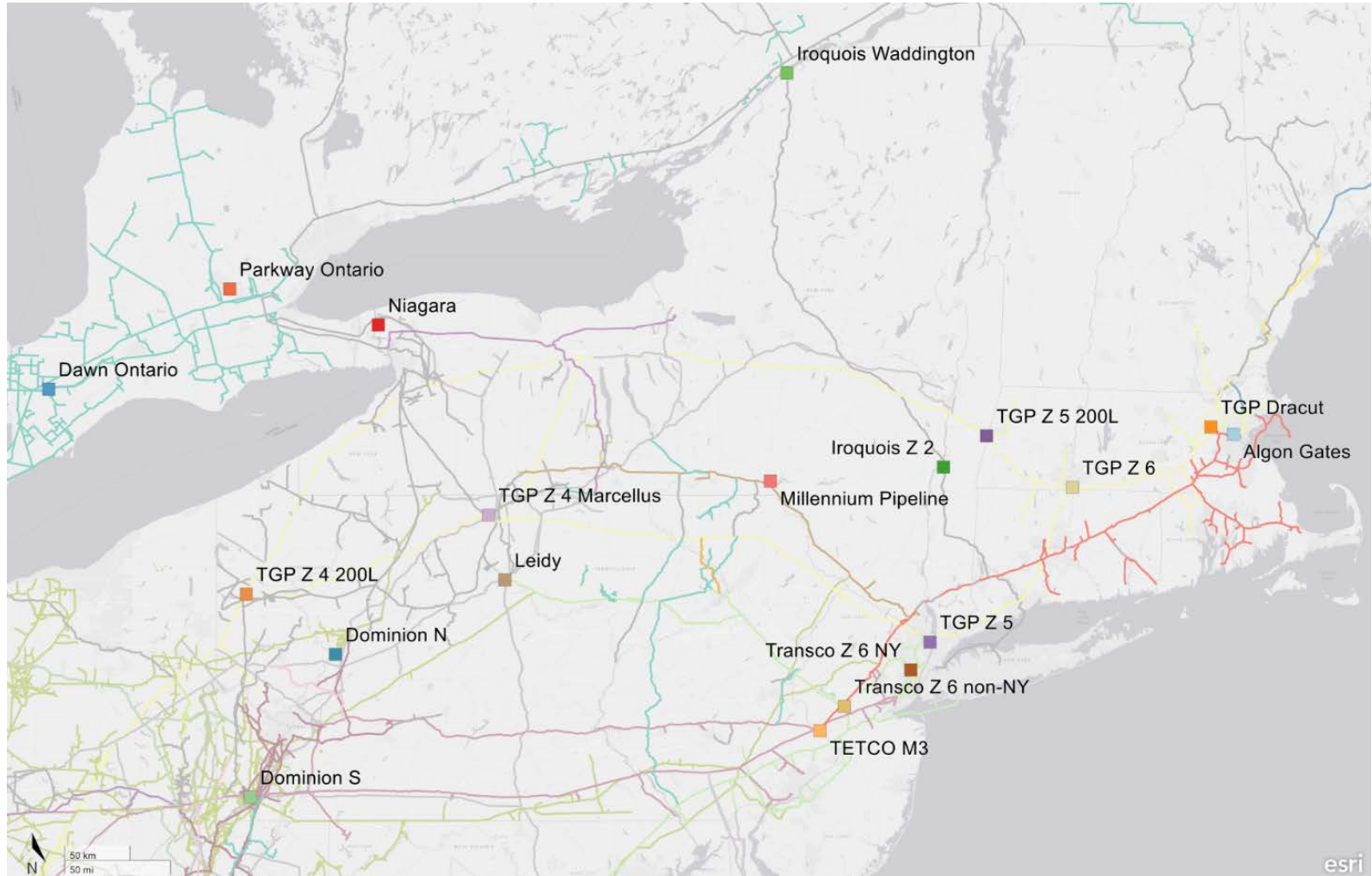
Zone	2016 DCR Gas Hub
NYCA - C	TETCOM3
NYCA - F	Iroquois Zone 2
LHV - G	Iroquois Zone 2
NYC - J	Transco Zn 6 NY
LI - K	Transco Zn 6 NY

Gas Hub Choices for Various Studies

Gas hubs used for pricing in previous studies

Zone	2016 DCR	2018 State of the Market Report (Market Monitoring Unit)	CARIS Phase I (2017)
NYCA - C	TETCOM3	Dominion North	Zones A-E: Dominion South (70%) Iroquois Waddington (20%) Dawn (10%)
NYCA - F	Iroquois Zone 2	Iroquois Zone 2	Zones F-I: Iroquois Zone 2 (45%) Tennessee Zone 6 (30%) TETCOM3 (15%) Algonquin Citygate (10%)
LHV - G	Iroquois Zone 2	Iroquois Zone 2 (50%) Millennium East (50%)	
NYC - J	Transco Zn 6 NY	Transco Zn 6 NY	Transco Zone 6 (95%) TETCOM3 (5%)
LI - K	Transco Zn 6 NY	Iroquois Zone 2	Iroquois Zone 2 (65%) Transco Zone 6 (35%)

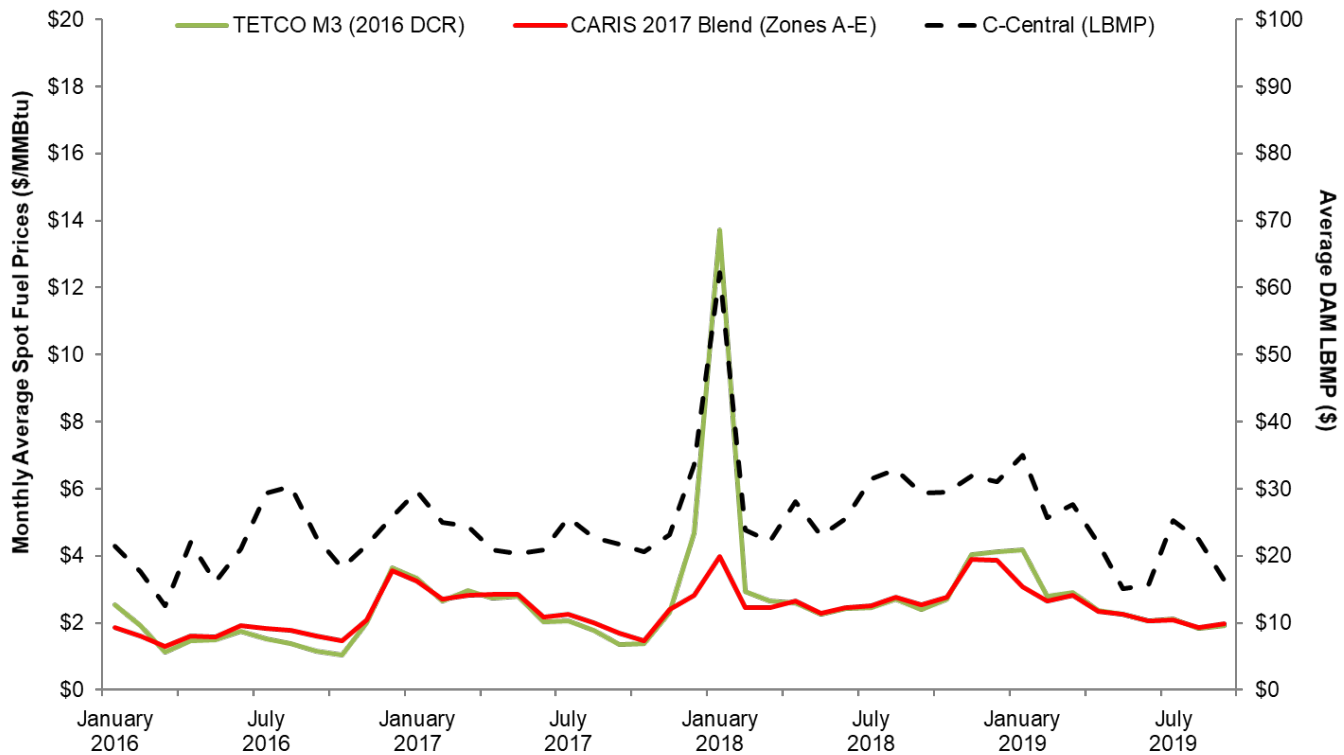
Geographic Locations of New York Natural Gas Hubs



Natural Gas Hub Market Dynamics

Review of natural gas pricing trends since 2016

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
NYISO Load Zone C**

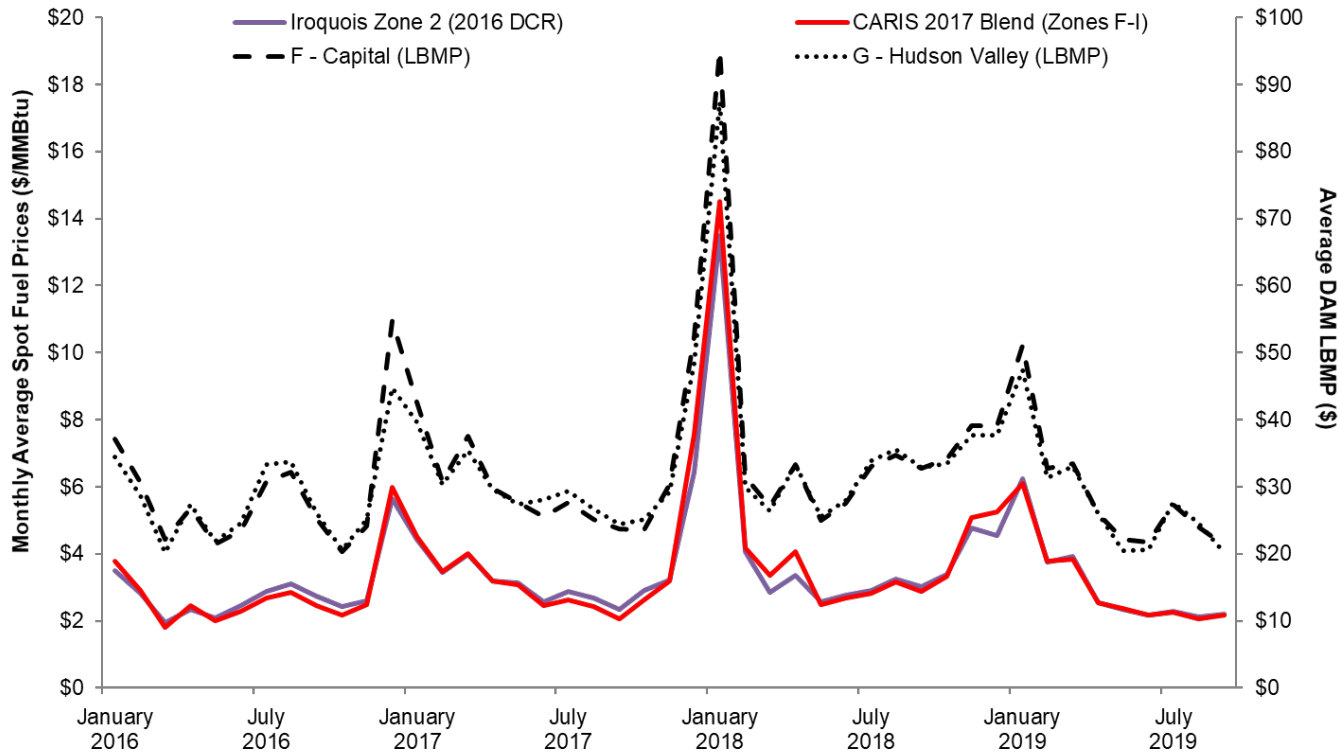


Note: CARIS Blend (Zones A-E) is comprised of a weighted average of spot prices at Dominion South (70%), Iroquois Waddington (20%), and Dawn Ontario (10%).
Sources: SNL (Fuel Prices); NYISO (DAM LBMPs).

Natural Gas Hub Market Dynamics

Review of natural gas pricing trends since 2016

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
NYISO Load Zones F and G**

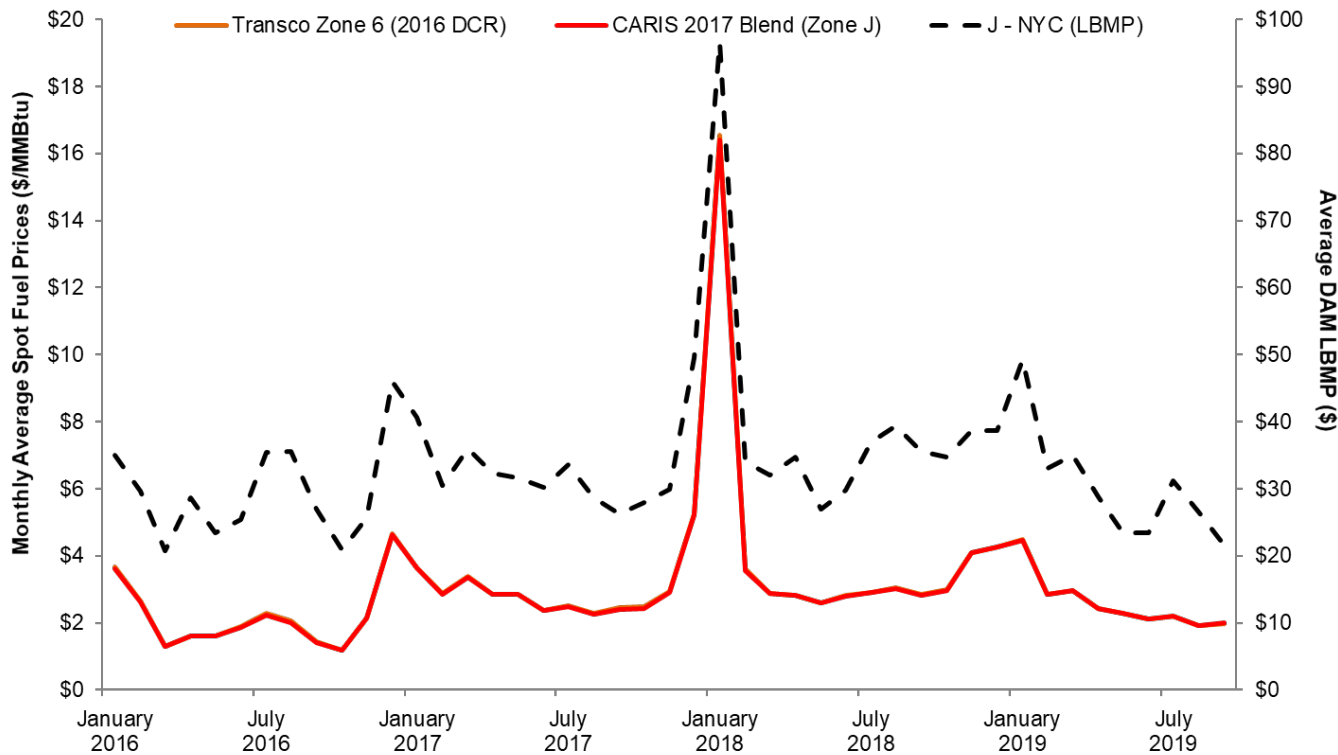


Note: CARIS Blend (Zones F-I) is comprised of a weighted average of spot prices at Iroquois Zone 2 (45%), TGP Zone 6 (30%), TETCO M3 (15%), and Algonquin Citygate (10%).
Sources: SNL (Fuel Prices); NYISO (DAM LBMPs).

Natural Gas Hub Market Dynamics

Review of natural gas pricing trends since 2016

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
NYISO Load Zone J**

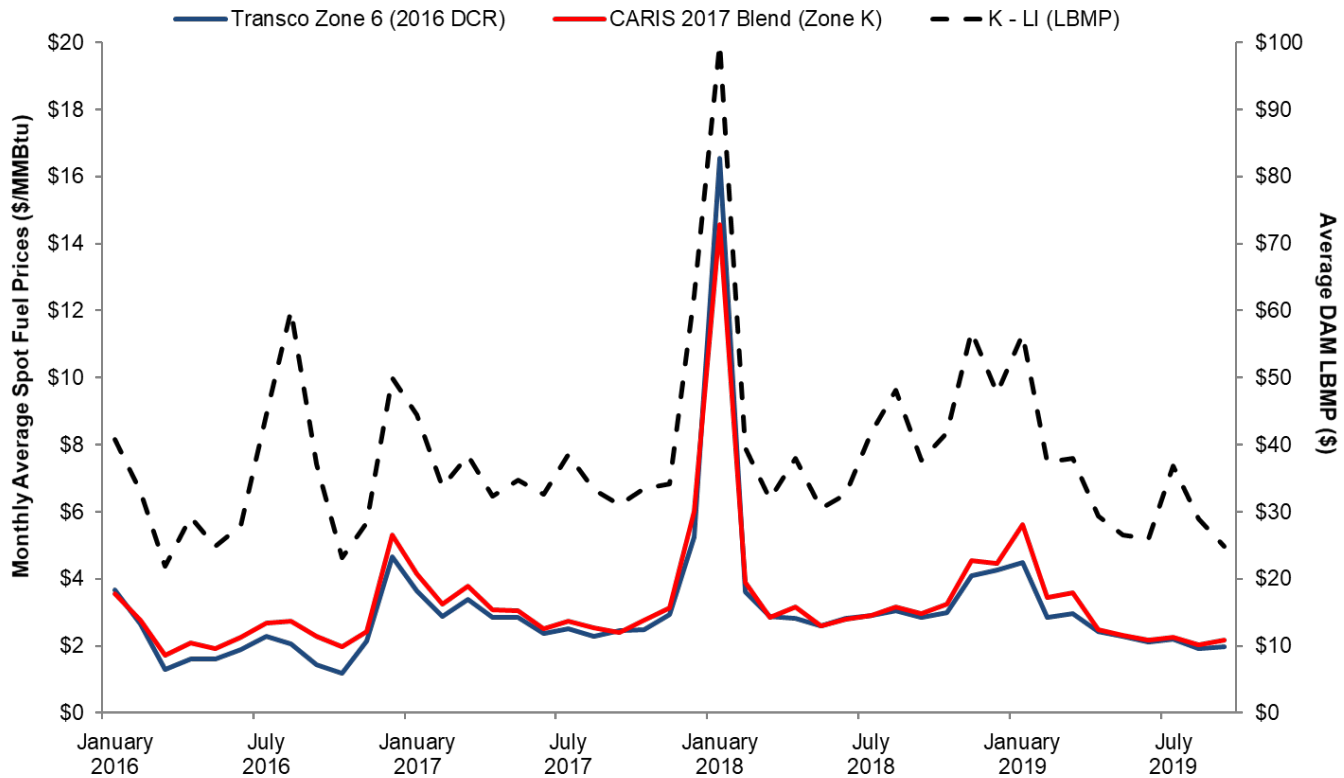


Note: CARIS Blend (Zone J) is comprised of a weighted average of spot prices at Transco Zone 6 NY (95%) and TETCO M3 (5%). The time series for Transco Zone 6 is hidden behind the time series for the CARIS 2017 Blend.
Sources: SNL (Fuel Prices); NYISO (DAM LBMPs).

Natural Gas Hub Market Dynamics

Review of natural gas pricing trends since 2016

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
NYISO Load Zone K**



Note: CARIS Blend (Zone K) is comprised of a weighted average of spot prices from Iroquois Zone 2 (65%) and Transco Zone 6 NY (35%).

Sources: SNL (Fuel Prices); NYISO (DAM LBMPs).

Peaking Unit Technology Evaluation

Peaking Unit Technology Evaluation

Review of approach used in the 2016 DCR

- In the 2016 DCR, the choice of peaking unit technology was based on 6 screening criteria:
 - Standard generating facility technology - available to most market participants;
 - Proven technology - operating experience at a utility power plant;
 - Unit characteristics that can be economically dispatched;
 - Ability to cycle and provide peaking service;
 - Can be practically constructed in a particular location;
 - Can meet environmental requirements and regulations.
- Process underway for evaluating technologies for this DCR (to be further discussed in December 2019)
 - Determine screening criteria;
 - Determine which technologies meet screening criteria;
 - Identify specific models to evaluate for technologies that meet screening criteria.

Next Steps

Key issues for discussion in the coming months

- Analysis Group
 - Additional review of net EAS revenue model assumptions.
 - Discussion of potential consequences of NYISO and NY state policy changes for net EAS revenue approach.
- Burns & McDonnell
 - Approach to peaking plant technology screening and evaluation.

Contact

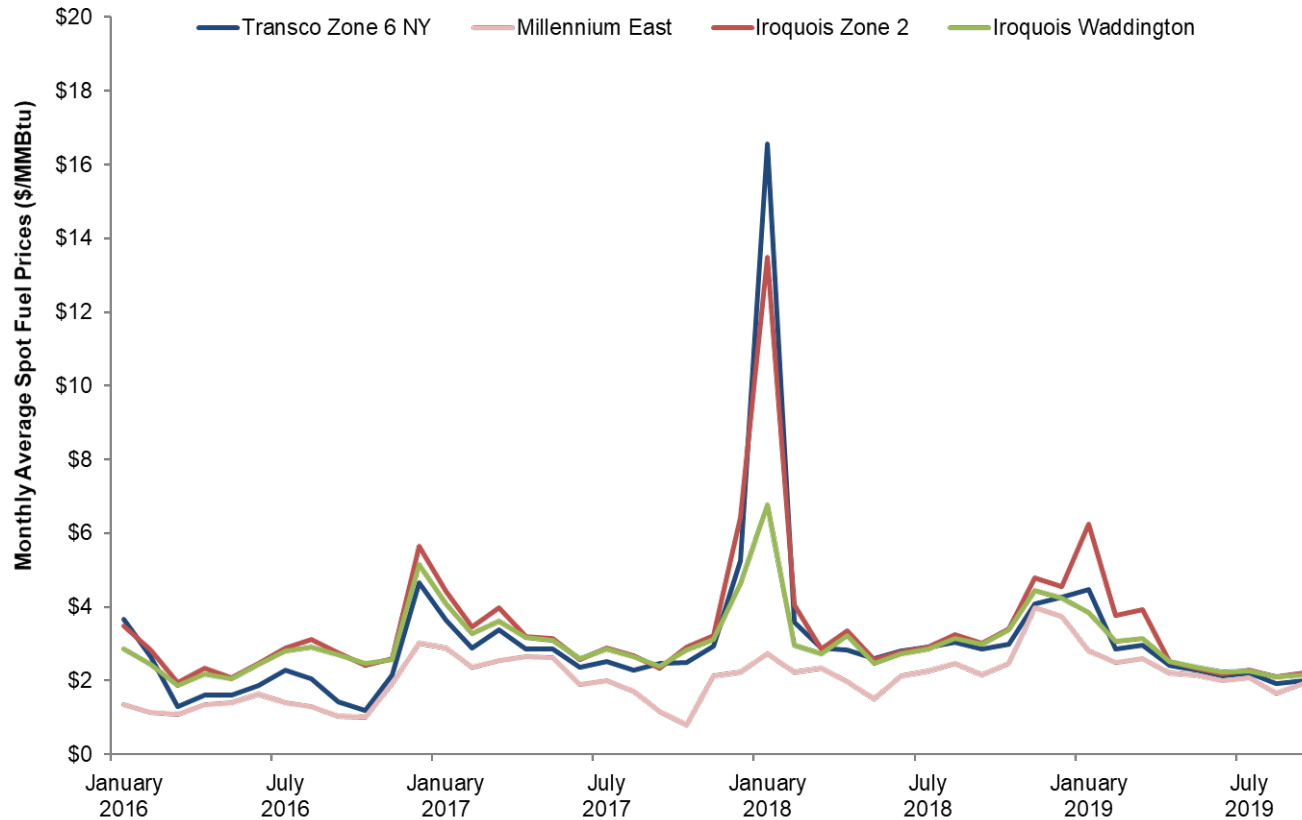
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Appendix: Natural Gas Hub Market Dynamics

Raw Natural Gas Prices: New York Gas Hubs

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
Gas Hubs in New York State**

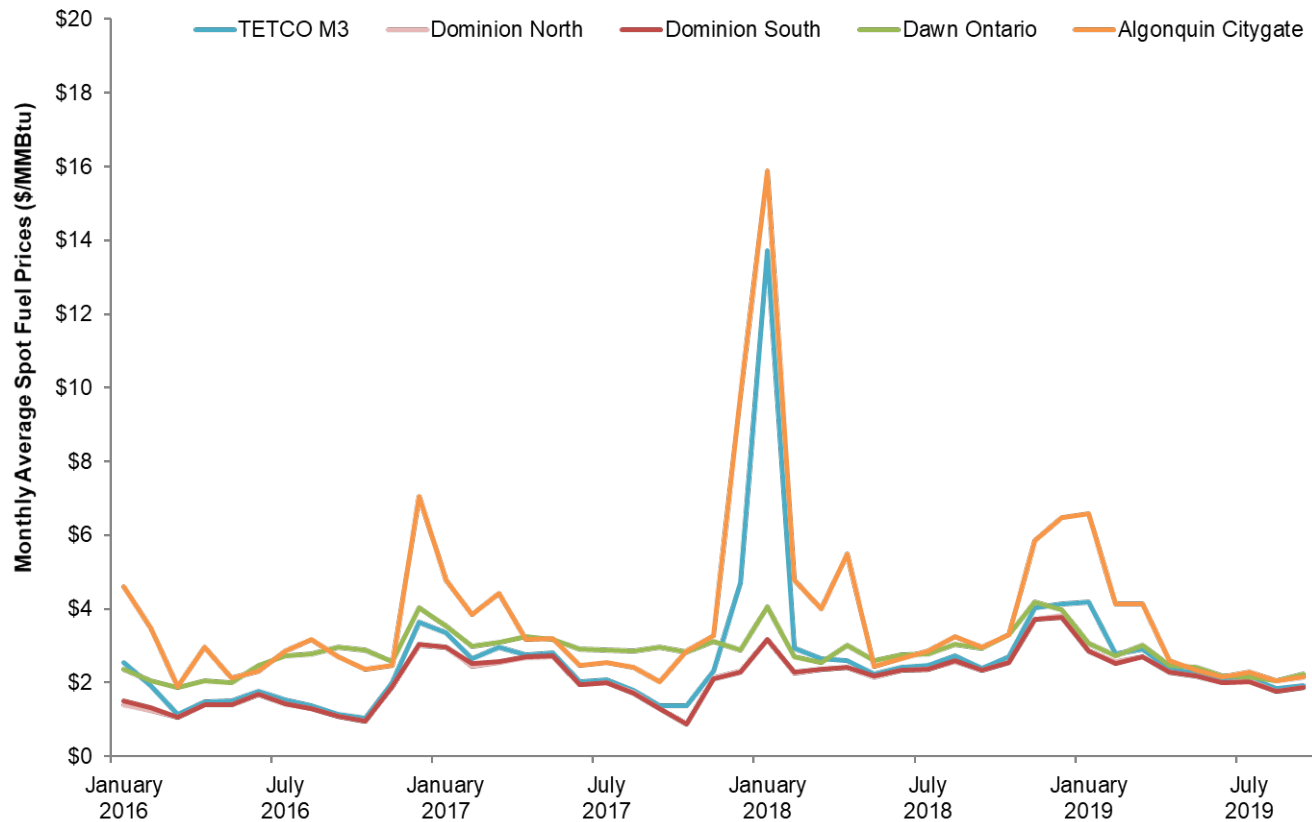


Sources: SNL and Bloomberg.

Appendix: Natural Gas Hub Market Dynamics

Raw Natural Gas Prices: Non-New York Gas Hubs

**Natural Gas Indices: Monthly Average Spot Fuel Price Comparison
Gas Hubs Near New York State**



Sources: SNL and Bloomberg.