

2019 CARIS Fuel Price Forecast with Proposed Methodology Revision for Natural Gas

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CARIS 2017 Forecasting Methodology: Nat. Gas

- NYCA is divided into 4 gas-regions – Zones A – E, Zones F – I, Zone J & Zone K
 - Each region proxied by a blend/weighted-average of hub prices
 - Weights based on 3-year averages of Summer DMNC totals per hub
- Adjoining Control Areas represented as gas-regions based on specific hubs
 - ISONE-N (Algonquin CG), ISONE-S (Iroquois Z2)
 - PJM-E (Transco Z6 – Non NY), PJM-W (Columbia/TCO), and
 - IESO (Dawn);
- Each regional weekly forecast is developed by applying a regional *basis* and a weekly calibration factor to the AEO* national annual delivered-price forecast.

* EIA's Annual Energy Outlook (AEO) is published each year.

Forecasting Methodology (cont'd)

- *Basis* = 3-year Weighted Average of $\left\{ \frac{9\text{-month}^{**} \text{ weighted average of Hub Price} \times (1 + \alpha)}{9\text{-month weighted average of STEO}^{***} \text{ prices}} \right\}$

where α = *burden* to reflect local delivery charges and taxes

- Calibration factor =

Monthly Seasonality Factor

 ×

Weekly ‘Spike’ normalized by month

where all calculations are based on averages across previous 5 years.

** *This calculation excludes volatile winter months (Jan, Feb, & Dec).*

*** *EIA publishes Short Term Energy Outlook (STEO) monthly.*

Structure of Weekly Forecast

Stage-wise Assembly of Weekly Forecast for Region ‘r’

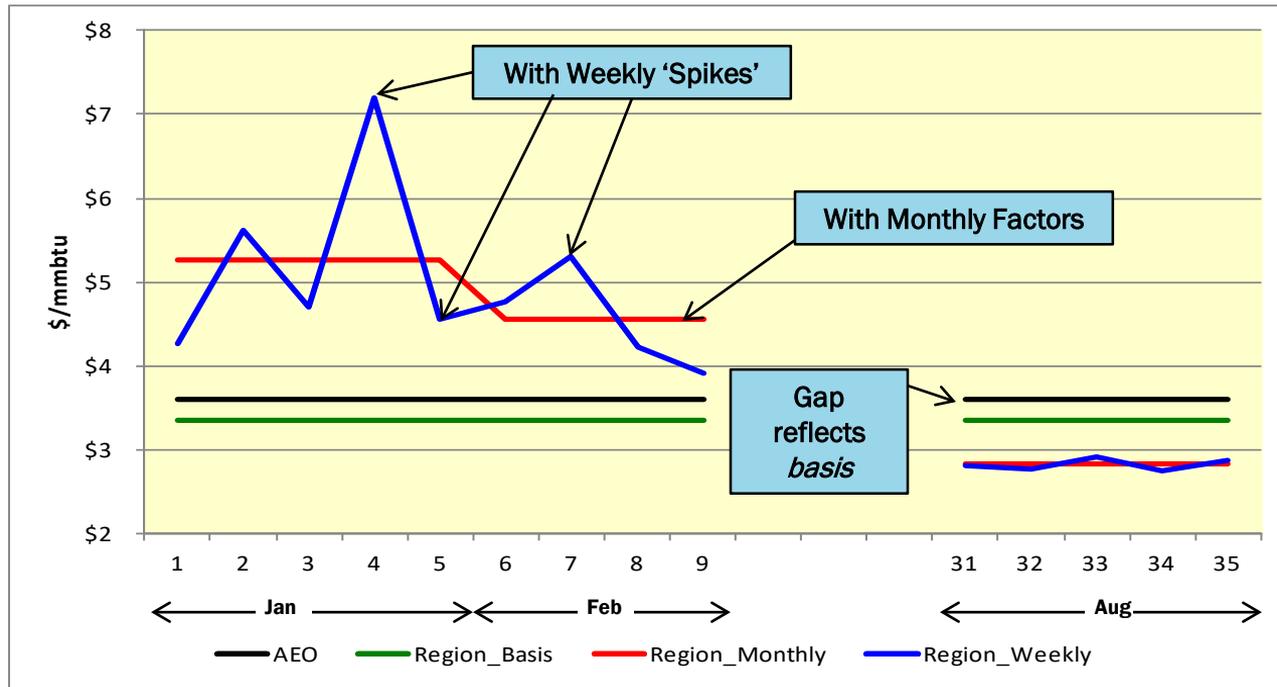
Stage 1. AEO_t (EIA’s AEO forecast of national delivered price for year ‘t’)

Stage 2. $AEO_t \times Basis_r$ (this provides the annual forecasts for Region ‘r’)

Stage 3. $AEO_t \times Basis_r \times Monthly Factor_m$ (this results in 12 monthly levels for year ‘t’)

Stage 4. $AEO_t \times Basis_r \times Monthly Factor_m \times Normalized Weekly Spike_w$ (this final step yields 52 weekly prices for a given year, where ‘w’ denotes a given week)

Structure of Weekly Forecast (cont'd)



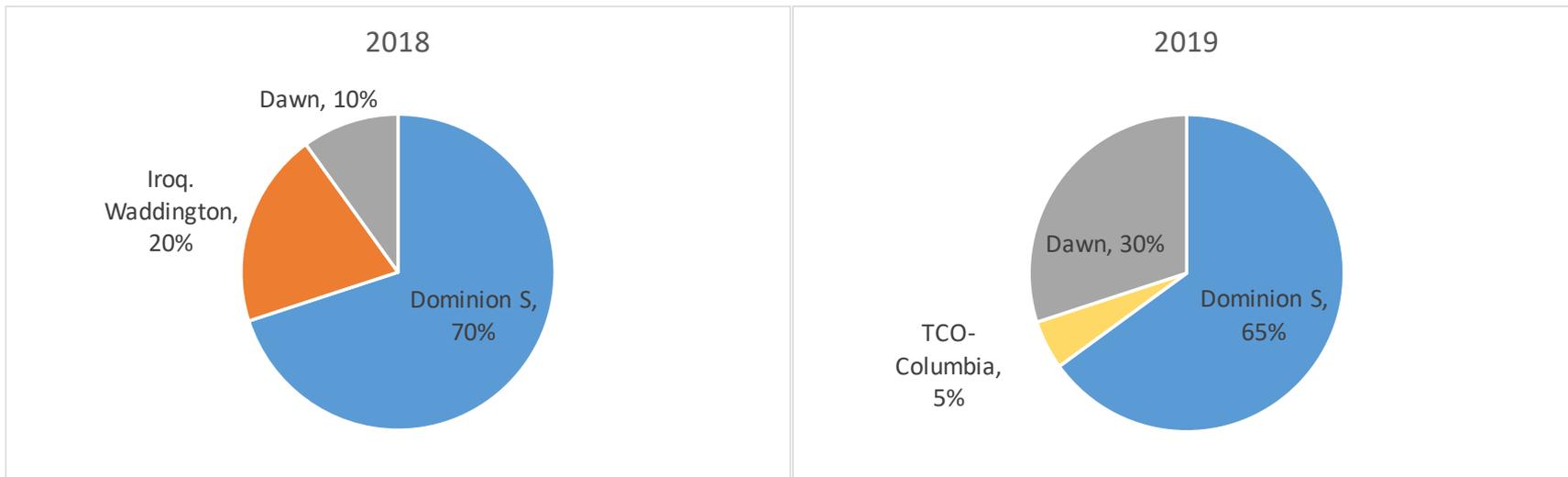
Revised Methodology for 2019 CARIS: Nat Gas

Use 3-year averages of Generation (MWh) as blending weights instead of 3-year averages of Summer DMNC (MW)

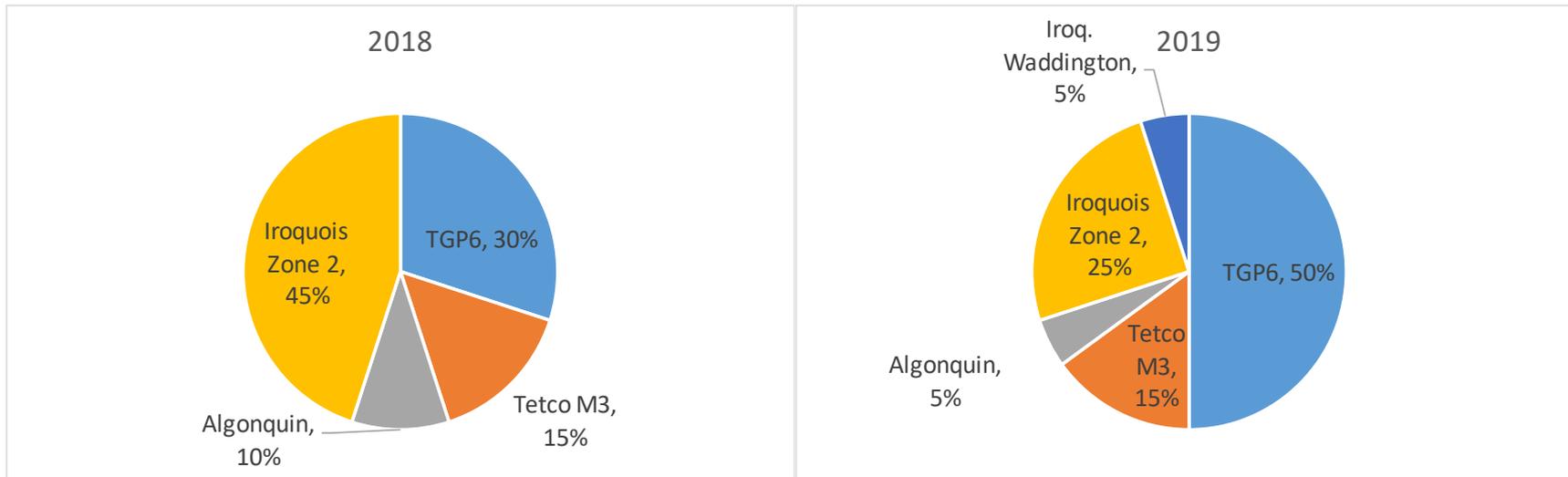
Salient features of proposed modifications :

- For plants with multiple potential sources, calculations are based on ‘default’ or primary hub instead of distributed weights for all alternative cases Changes in hubs reflected in blends;
- A better representation of hub-blend for a region because the MW-based calculations gave spurious weightage to plants with low Capacity Factors;
- Structure of blends continues to evolve with changing market realities.

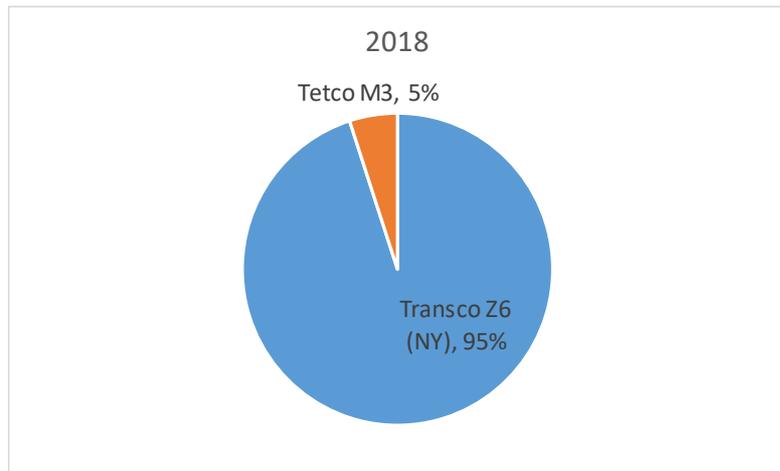
Comparison of Blend Structures: Zones A - E



Comparison of Blend Structures: Zones F - I

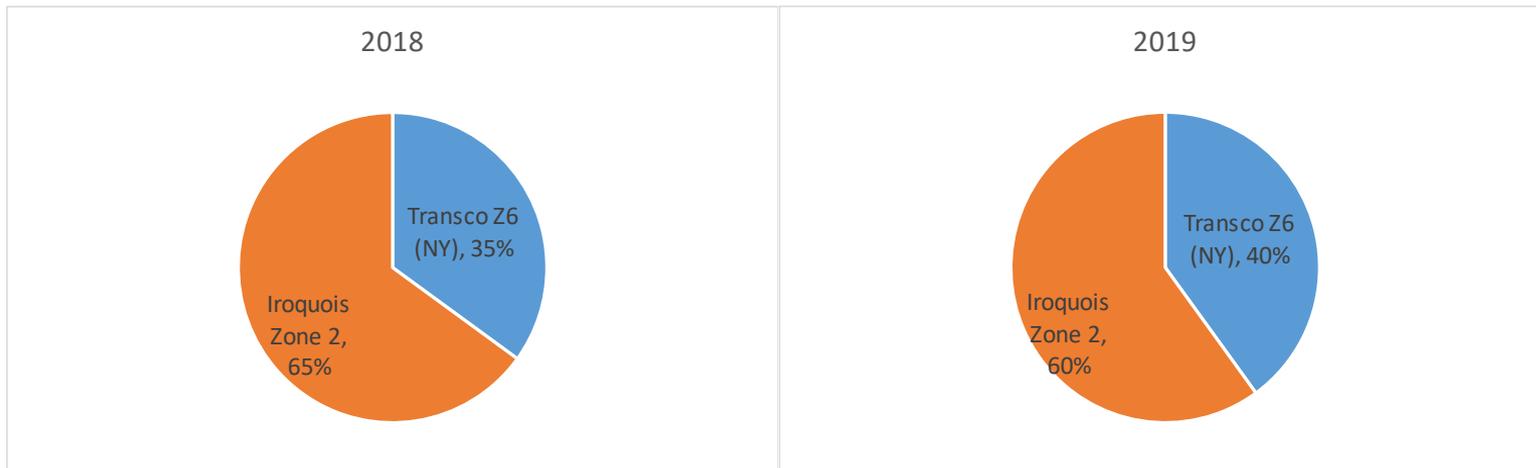


Comparison of Blend Structures: Zone J



For 2019, the Transco Z6 (NY) alone will proxy Zone J

Comparison of Blend Structures: Zone K

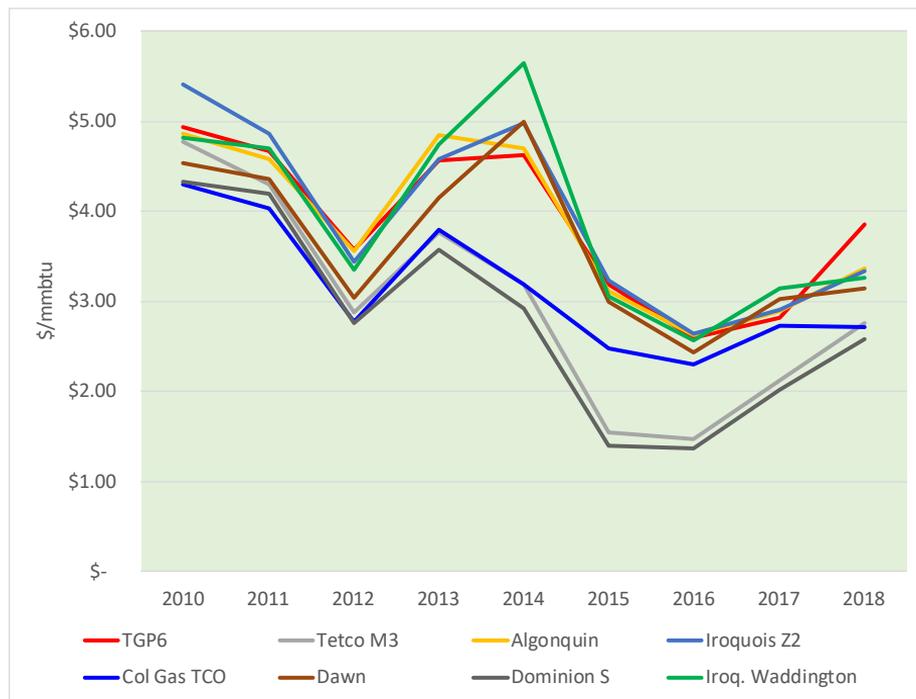


Comparison of Blend Structures (con't)

Replacing Capacity (MW) by Energy (MWh) as basis of weights resulted in no material difference in the regional blends with respect to forecasts of price levels as well as weekly ‘spikes’.

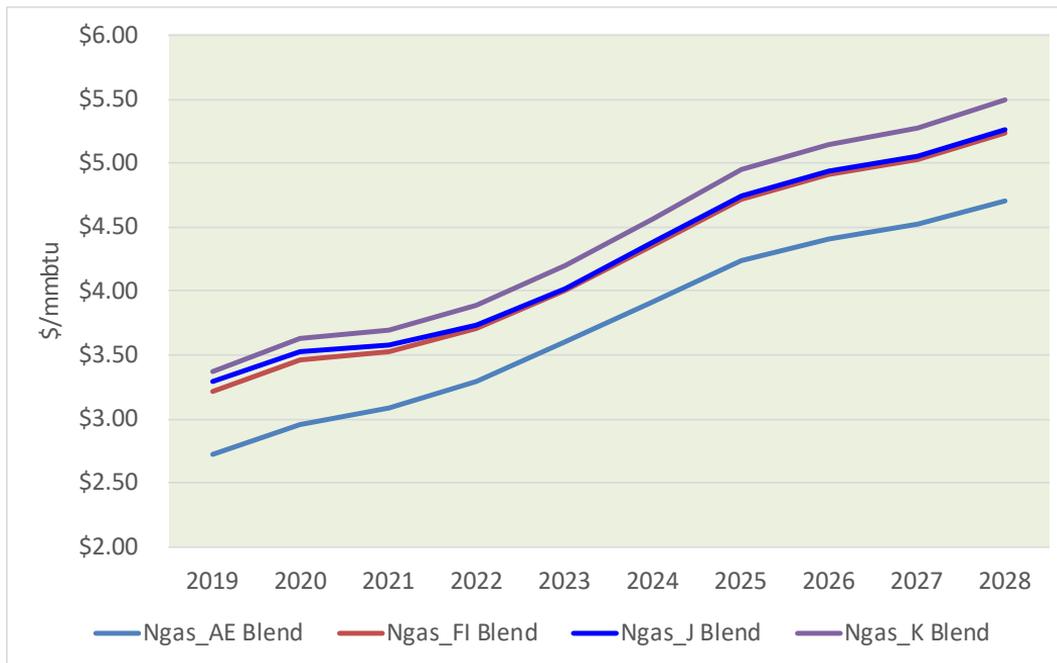
- For Zones A – E, the changes in hubs and weights amounted to mutually offsetting impacts;
- Even though Zones F – I shows a significant change in its blend, the lowered importance of some low Capacity-Factor plants was offset by the addition of new plants with similarly sourced gas;
- The changes to Zones J and K were relatively minor.

Hubs Used for Regional Blends

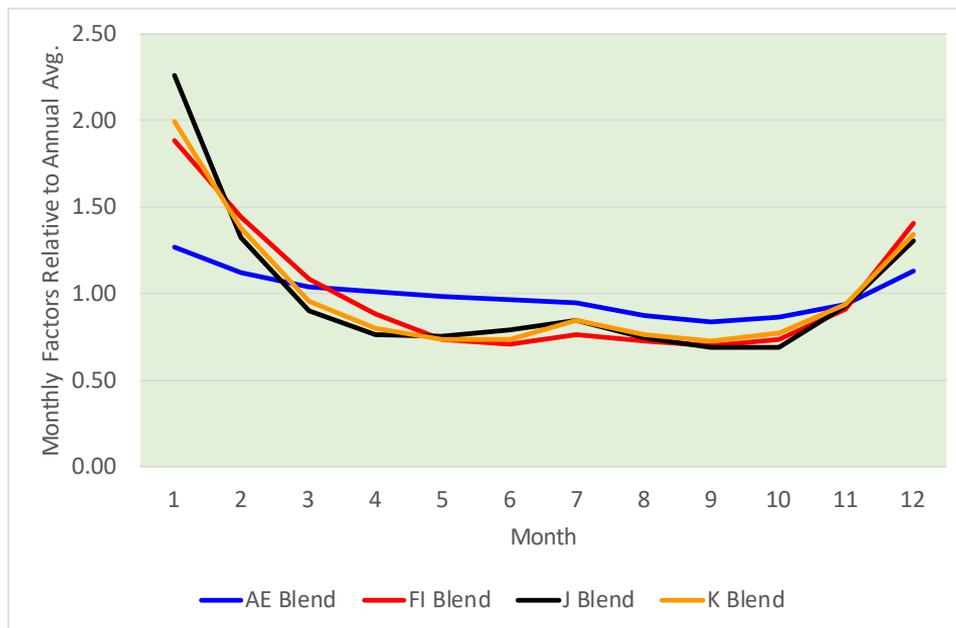


- Graph displays 9-month volume-weighted spot prices.
- After the extreme cold-weather induced increases during 2013-2014 followed by historic lows during 2016-17 all prices are showing recovery and trends toward convergence.

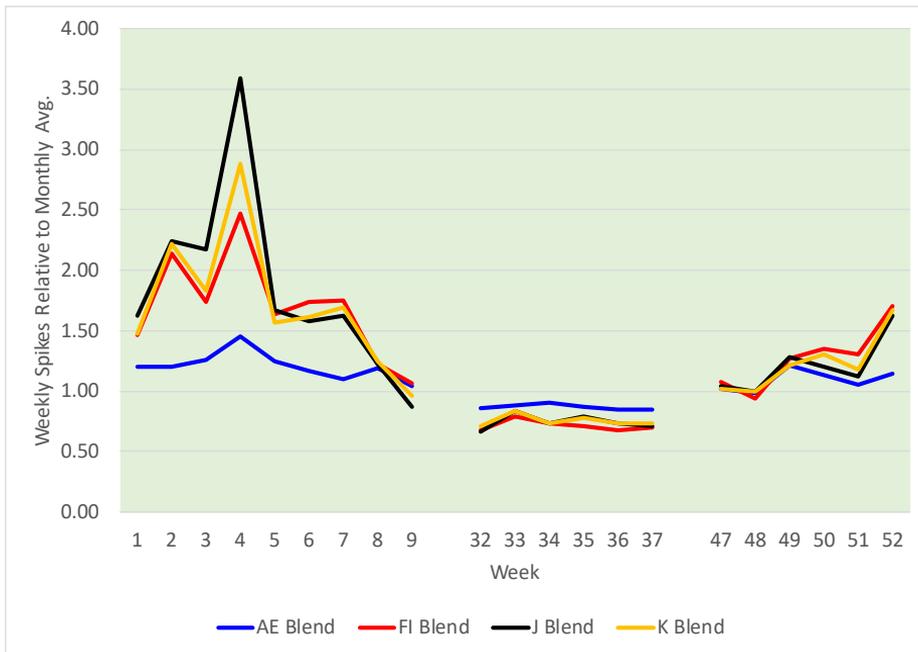
NYCA Gas Price Forecasts



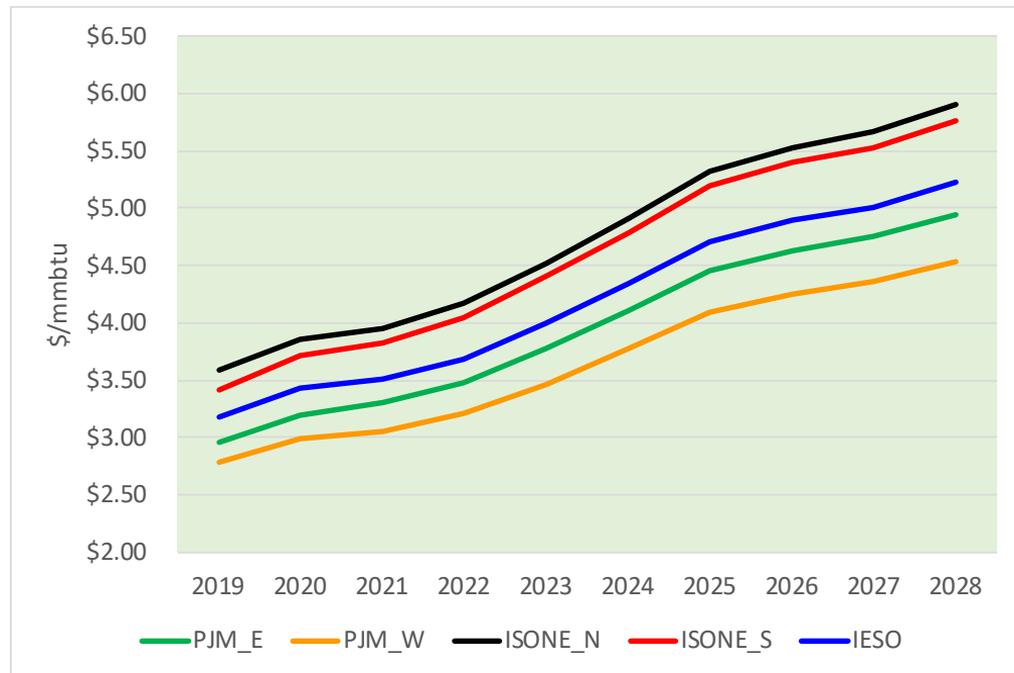
NYCA Gas Price Monthly Factors



NYCA Gas Price Spikes During Key Weeks

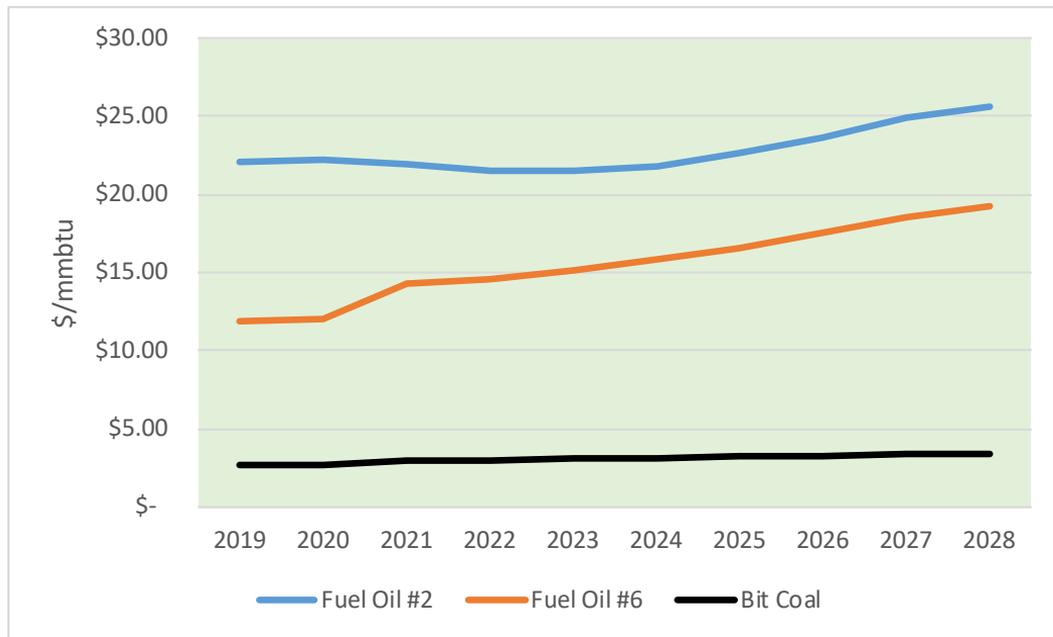


External Area Gas Price Forecasts



The relative *bases* reflected in these forecasts are consistent with the EIA's state-level Form 923 data published in *Electric Power Monthly*, e.g. Natural Gas prices, on average, are highest in ISO-NE North.

Forecasts of Fuel Oils & Coal: NYCA



Oil-price forecasts based on:

- EIA’s 2019 AEO forecast of annual national delivered prices,
- New York Harbor Ultra-Low Sulfur No. 2 Spot Prices (for seasonality), and
- EIA’s Form 923 state-level data on oil prices for electricity generation (for regional bases relative to national price).

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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