

# Methodology for Developing the Natural Gas Price Forecast

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KCC*

## Development of Gas Price Forecast

- ◆ **The starting point for the development of the Natural Gas Price forecast is EIA’s Annual Energy Outlook (AEO) that is published each year in January. The AEO provides a multi-year forecast of the annual average of the National Delivered Price in nominal dollars.**
- ◆ **Based on EIA Form 923 data, the National Average Delivered Price is, on average, 110% of Henry Hub price.**
- ◆ **To obtain a regional annual average delivered price, a multiplicative factor (i.e. a basis) is applied to the AEO forecast. This *basis* reflects local/regional delivery charges and taxes.**

## Calculating Annual Basis for Downstate

- ◆ **This Illustration outlines the development of Annual Basis for Downstate (relative to National Average Delivered Price)**
- ◆ **It is based on the last five years (2008-2012) of weighted-average prices for Henry Hub and Transco Zone 6 (NY)**
  - *Calculated using daily spot prices weighted by the mmbtu traded*
  - *A system of rising weights (2008: lowest & 2012: highest) is designed to capture recently observed structural shifts in the Transco Z6 price*
- ◆ **National Average Delivered Price proxied by 110% of Henry Hub price**
- ◆ **Downstate Delivered Price proxied by Transco Z6 price plus a burden representing tax & delivery**
  - *NYISO MMA applied a burden of 8.9725% on Transco Z6 price for calculations involving In-City reference prices till 2009; subsequently, the figure became 7.015%.*

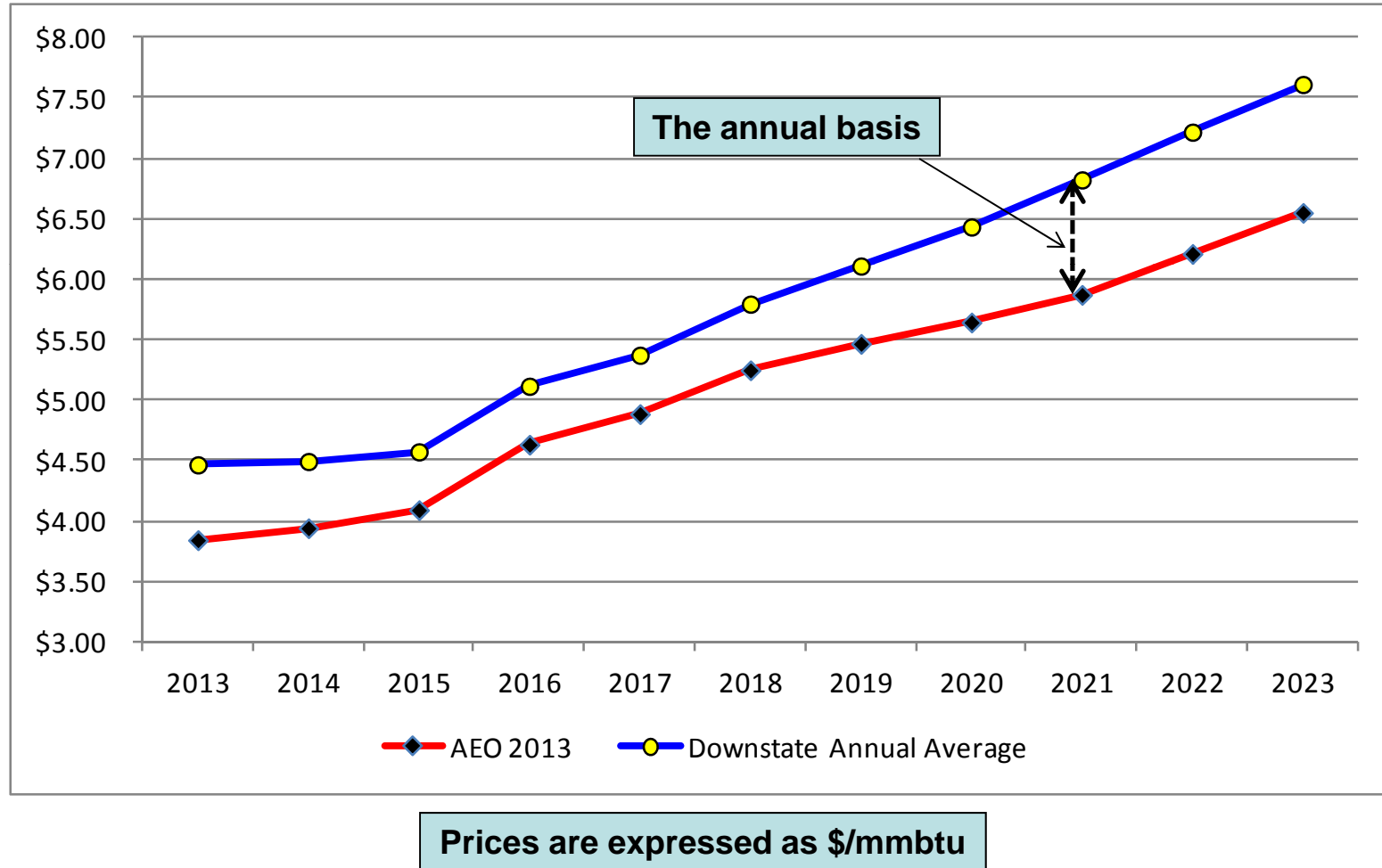
# Illustration: Annual Basis

	Henry Hub	Transco Z6 (NY)	Est. National Delivered Price	Est. Downstate Delivered Price	Annual Basis
	Col. A	Col. B	Col. C = 1.1 * Col. A	Col. D = ( 1 + Burden %) * Col. B	Col. E = Col. D / Col. C
2008	7	8	7.7	8.72	1.13
2009	9	10	9.9	10.90	1.10
2010	4	5	4.4	5.35	1.22
2011	4	5	4.4	5.35	1.22
2012	3	4	3.3	4.28	1.30
<b>Weighted Average Annual Basis for Downstate</b>					1.23
(Weights for 2008-12, respectively, 0.75, 0.12, 0.175, 0.255, & 0.375)					

**Burden = 9%**

**Burden = 7%**

# Development of Gas Price Forecast



## 3 Gas Price Zones for NYCA

- ◆ **Until Jun. 2012, CARIS deployed a 2-tier pricing system: an Upstate price for Zones A – I (proxied by the Tetco-M3 price) and a Downstate price for Zones J/K (proxied by the Transco Z6-NY price) .**
- ◆ **ESPWG requested a reexamination of Natural Gas Prices, especially in the context of Upstate**

## 3 Gas Price Zones for NYCA

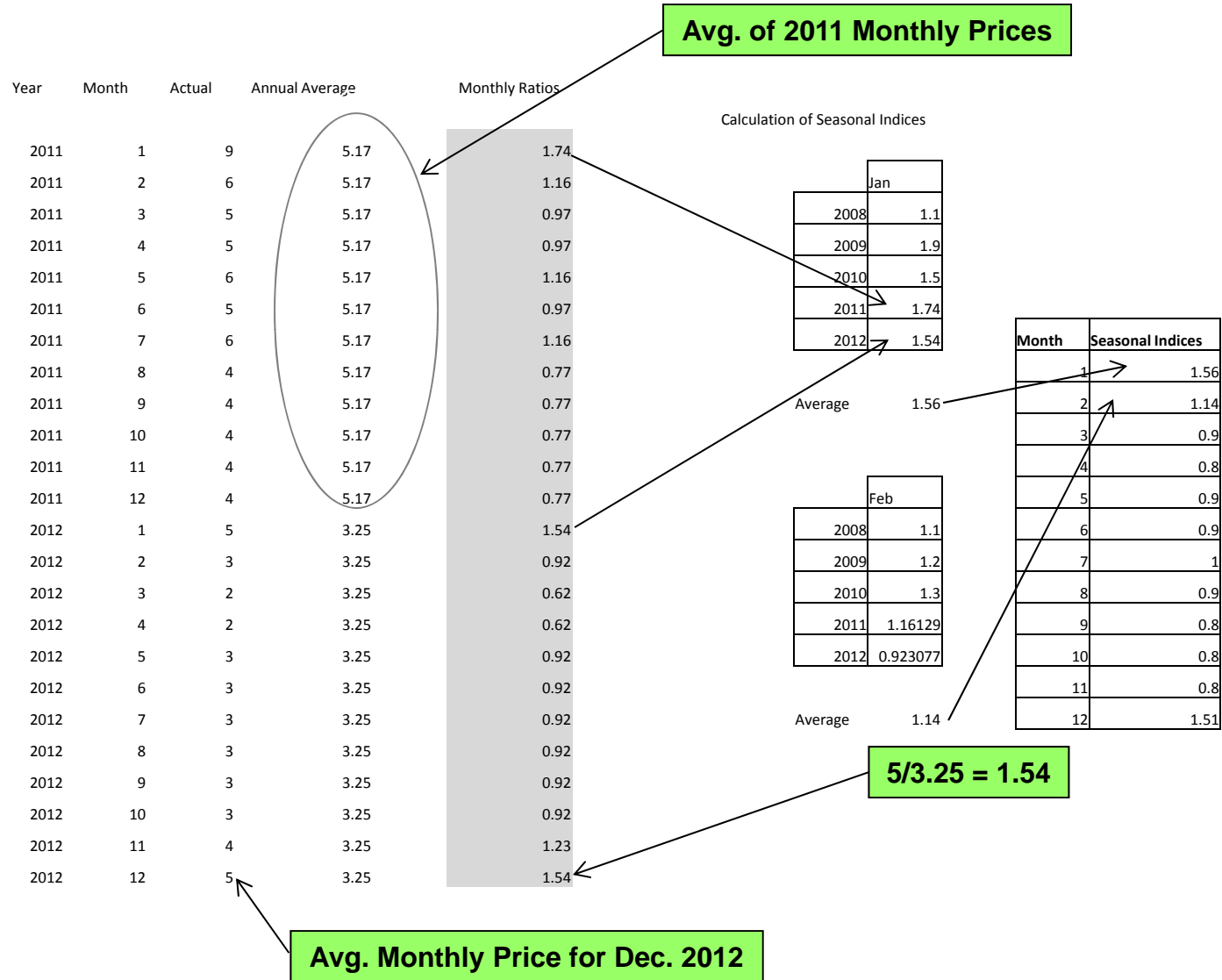
- ◆ **Review of publicly available information revealed that large units in the Mid/Upper Hudson Valley region (Zones F & G) acquired gas at prices higher than what was assumed in CARIS.**
- ◆ **The pipeline hub that is most appropriate for these units is the Tennessee Z6**
- ◆ **Historically, Tennessee Z6 prices have been greater than Tetco M3 (now used for Zones A-E) and less than Transco Z6 (NY)**
- ◆ **The new 3-tiered system makes for a more accurate representation: Upstate – Zones A – E; Midstate – Zones F – I; Downstate – Zones J & K.**

## Applying Monthly (Seasonal) Indices

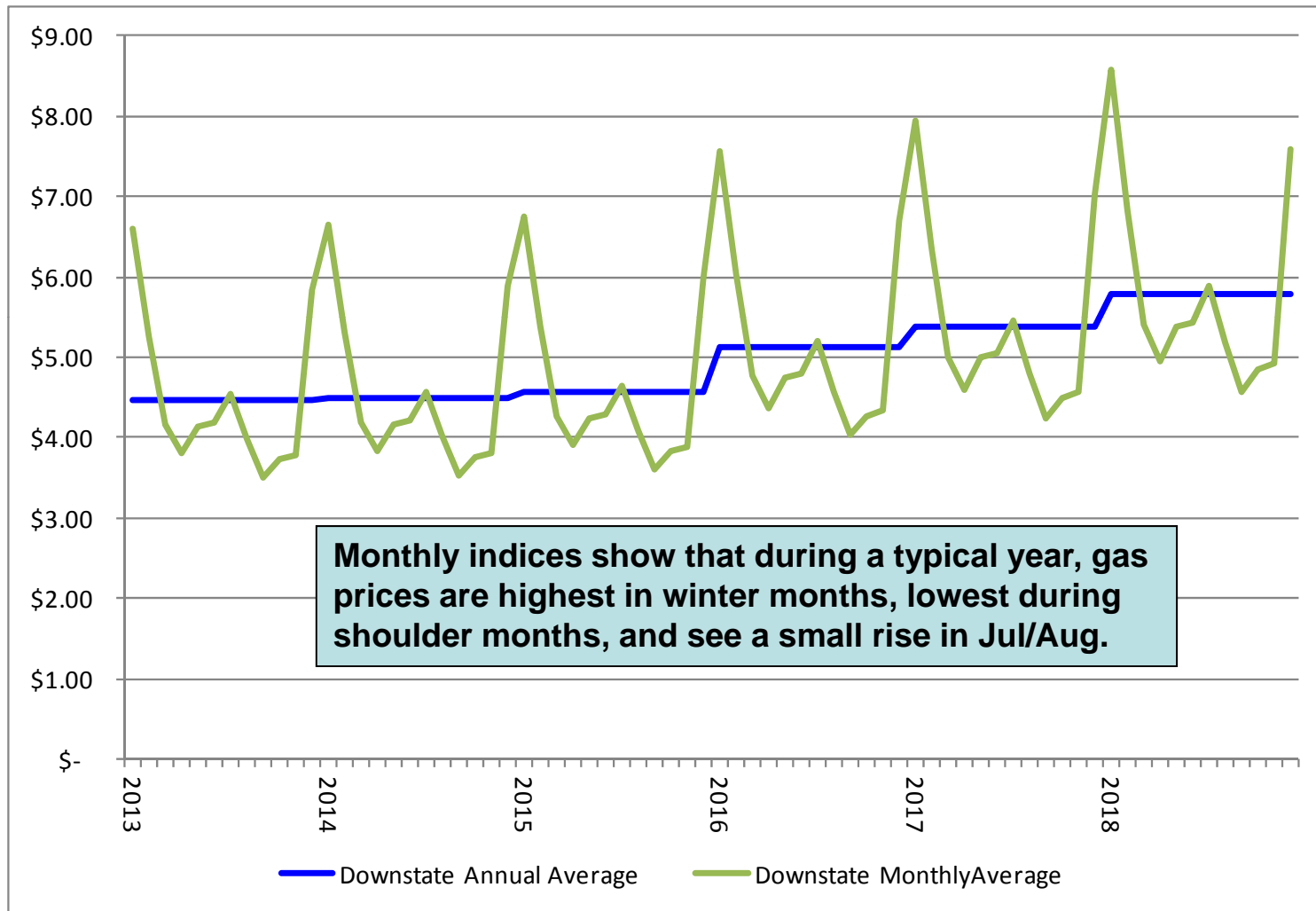
- ◆ **In order to reflect seasonal/monthly changes in market conditions that lead to intra-year volatility of Natural Gas Prices, multiplicative monthly indices are applied.**
- ◆ **Historical seasonal factors are calculated using the ratio of the observed monthly price to the annual average price based on data from last 5 years (2008-2012)**
- ◆ **For a given month, the average of the actual seasonal factors from the last five years is the forecasted raw seasonal index.**
- ◆ **The 12 raw seasonal (monthly) indices are normalized such that they average to 1.**



# Illustration: Seasonal Indices



# Seasonal Indices Applied to Annual Trend



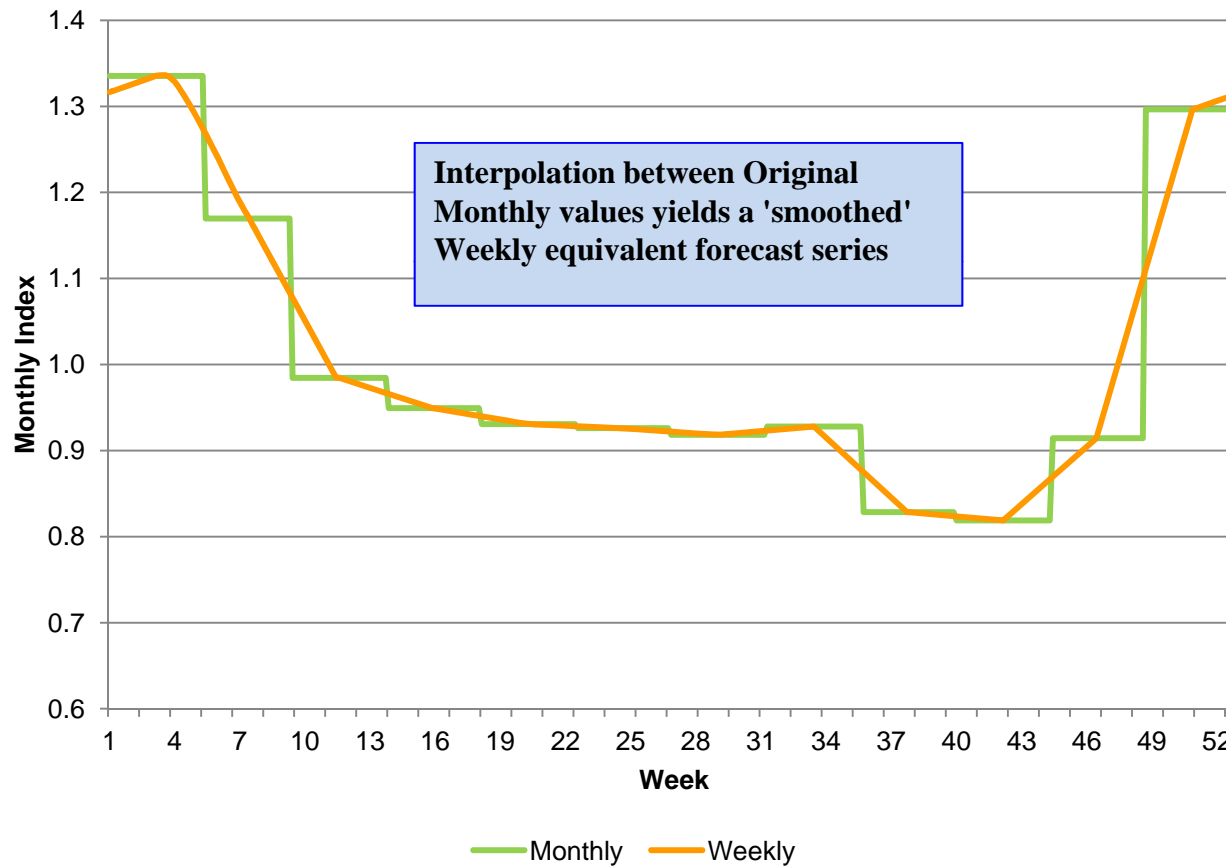
## From Monthly to Weekly Forecasts

- ◆ **Month-to-month variations/volatility in forecasted prices result from the application of monthly seasonal scalars. This assumes that prices are stable across any given month.**
- ◆ **However, there is considerable intra-month volatility, especially during Winter months.**
- ◆ **To reflect weekly price movements, the monthly factors need to be calibrated to capture intra-month changes.**

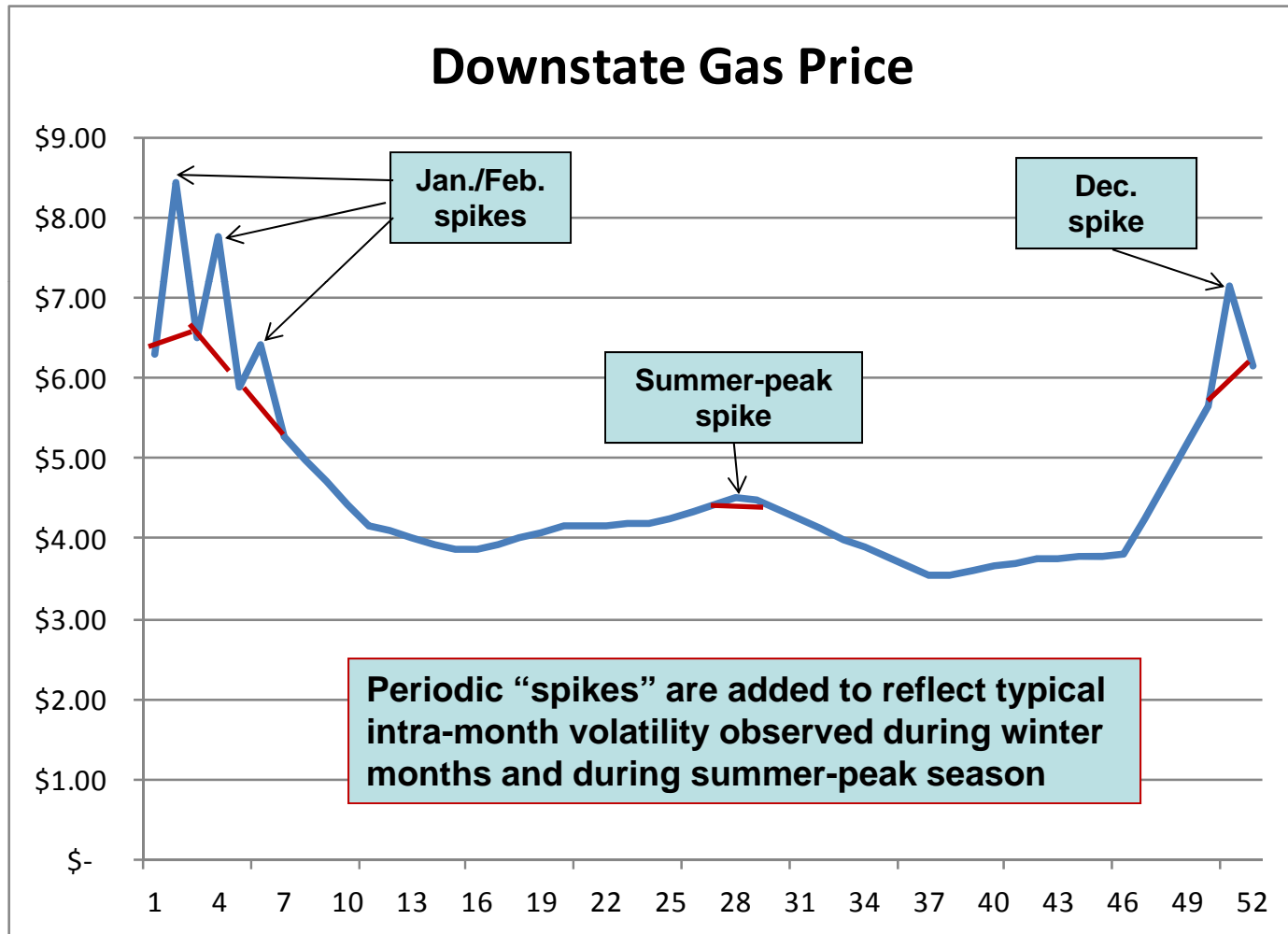
# Weekly Calibration Methodology

- 1. Assume current seasonal indices as monthly averages, i.e. the value of seasonal index at mid-month**
- 2. Interpolate scalars such that the last week of, say, March, more closely resembles the first week of April, than it does the first week of March**
- 3. The resulting dynamics are such that there is appropriate gradation not only between January and December, but also between the first and the last days of a month.**

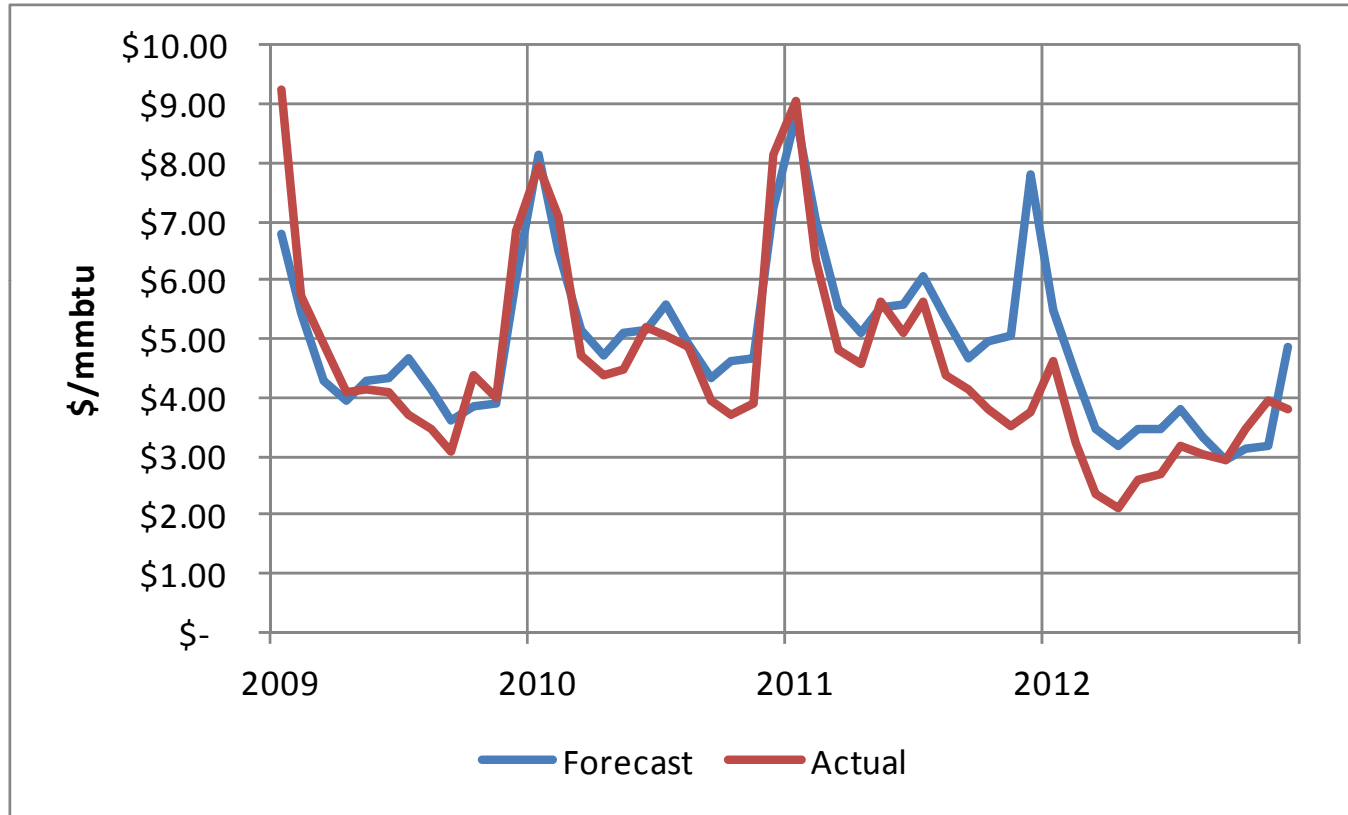
# Weekly Calibration Methodology



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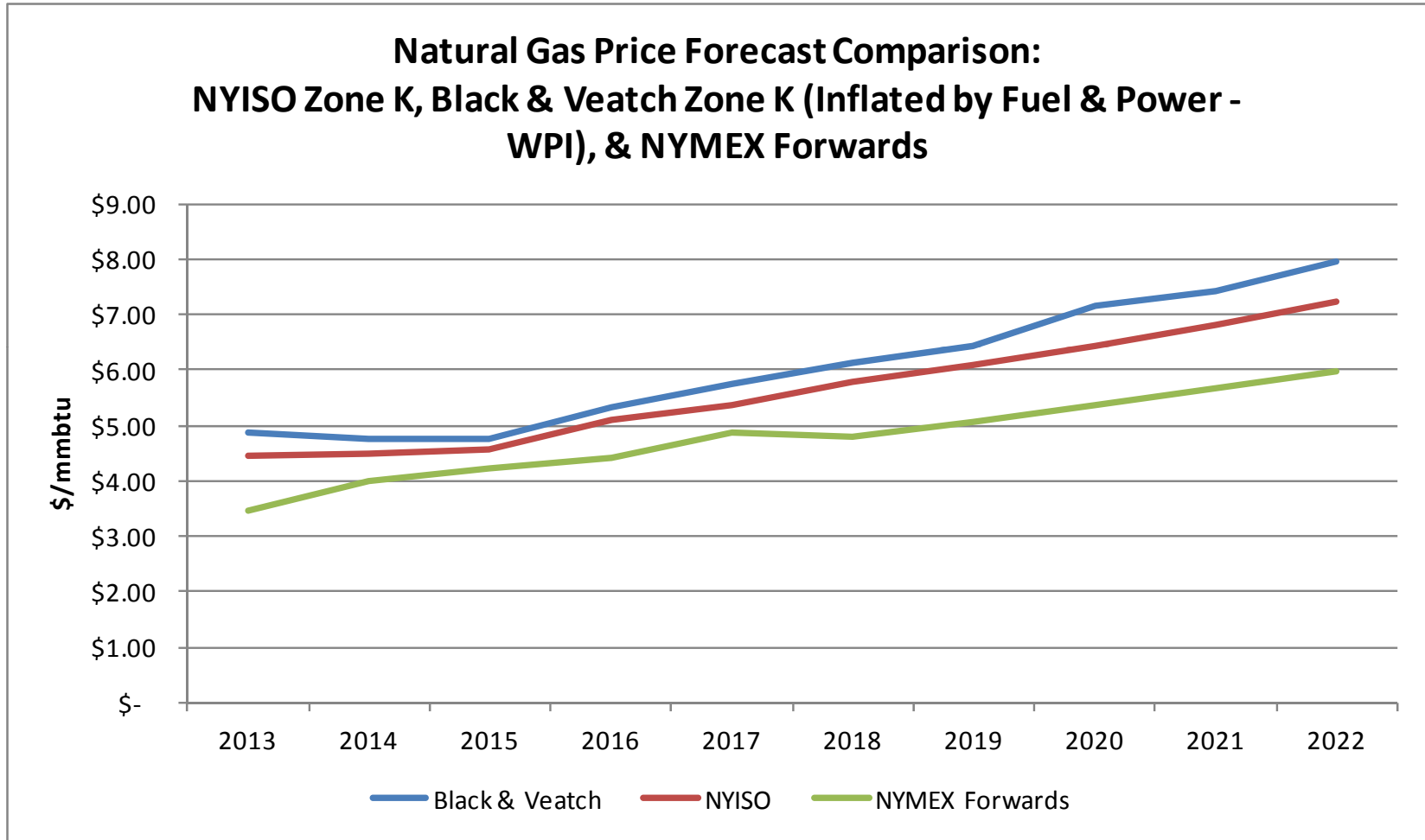


# Backcast Using Forecasted Annual Prices



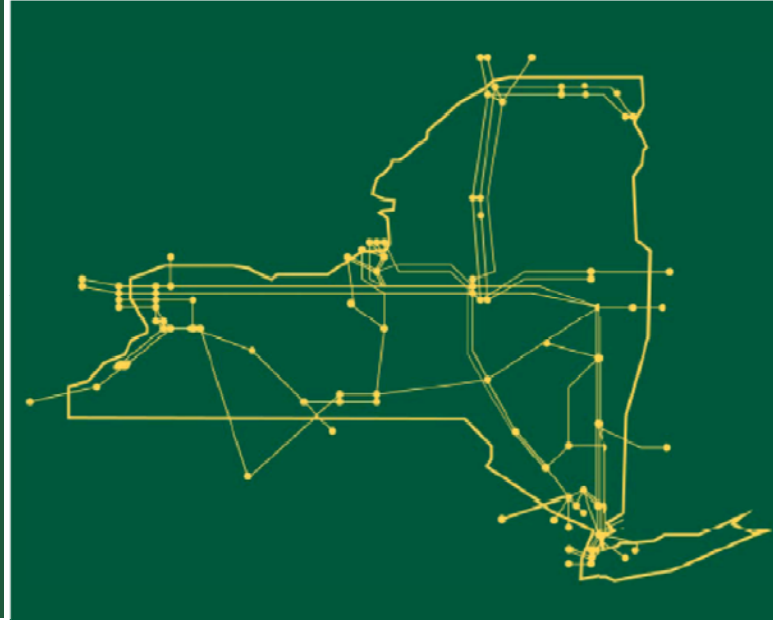
**Backcast of Transco Zone 6 (NY) based on forecasted annual average prices (based on AEO 2012 & basis calculated using 2007-11 data) and the forecasted Seasonal (Monthly) Indices**

### Natural Gas Price Forecast Comparison: NYISO Zone K, Black & Veatch Zone K (Inflated by Fuel & Power - WPI), & NYMEX Forwards





The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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