

# Natural Gas Transmission and Distribution Module

*Major assumption changes for AEO2013  
Oil and Gas Working Group*

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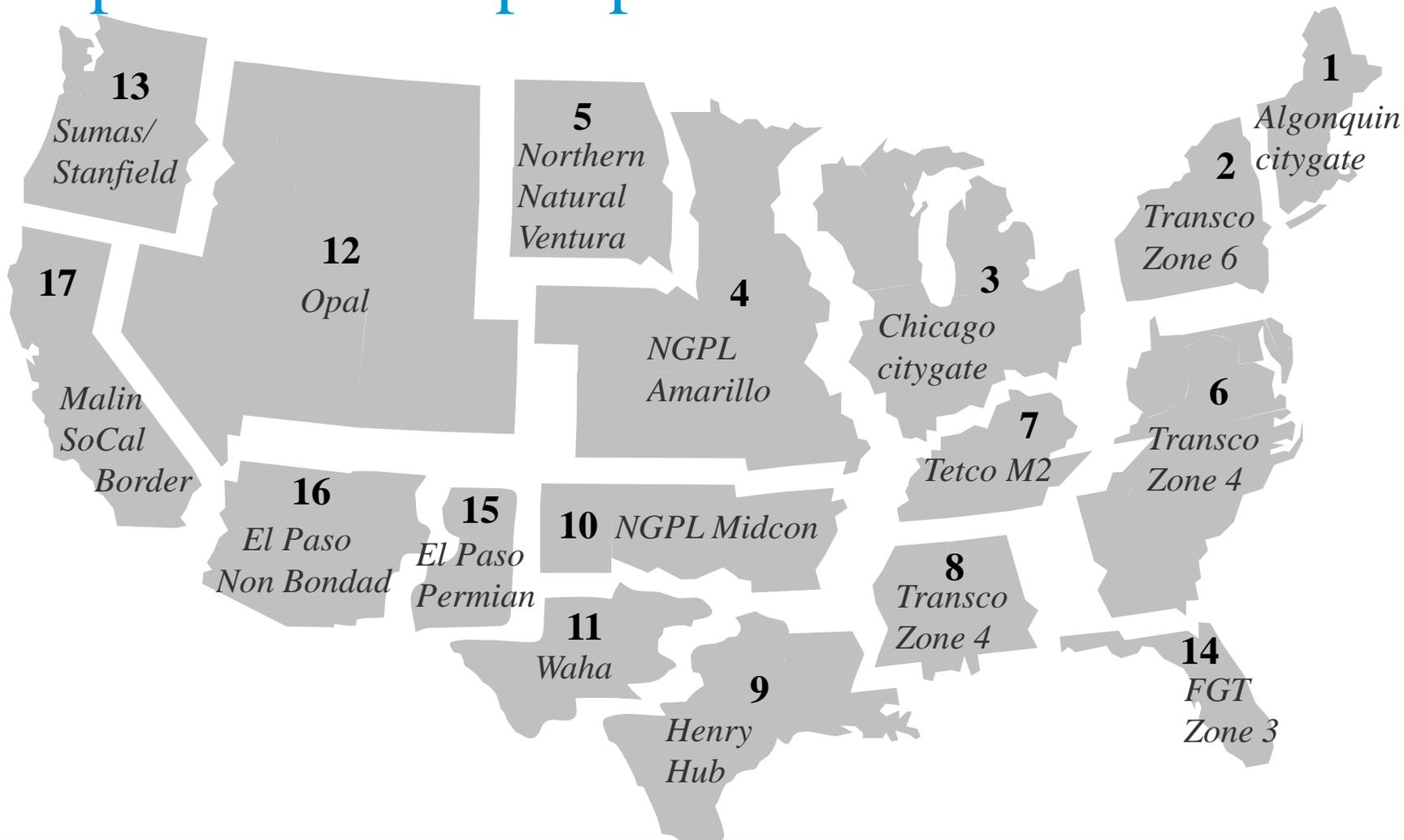
# Overview

- Replace regional natural gas wellhead price projections with regional spot price projections
- Pricing of natural gas vehicles fuels (CNG and LNG)
- Methodology for modeling exports of LNG
- Assumptions on charges related to LNG exports of domestic gas
- Other miscellaneous

# Regional natural gas spot pricing

- EIA has collected wellhead prices via a voluntary survey by states
  - the reported data were becoming more sparse
  - the concept of a wellhead price was becoming less well understood
  - EIA needed to address budget tightening issues
  - the survey was discontinued
- For AEO2013 replacing regional wellhead prices with representative spot prices
  - previous AEOs based on the wellhead price; Henry Hub price estimated equation
  - the inherent assumption forward is that producers in a region effectively respond to the going spot price in their area, with potential accounting for transportation differences
  - selected candidate spot price(s) in each region and compared against wellhead prices
  - align reasonably well, will fill in “missing” spot history with wellhead prices.
  - potential impact on historical industrial prices

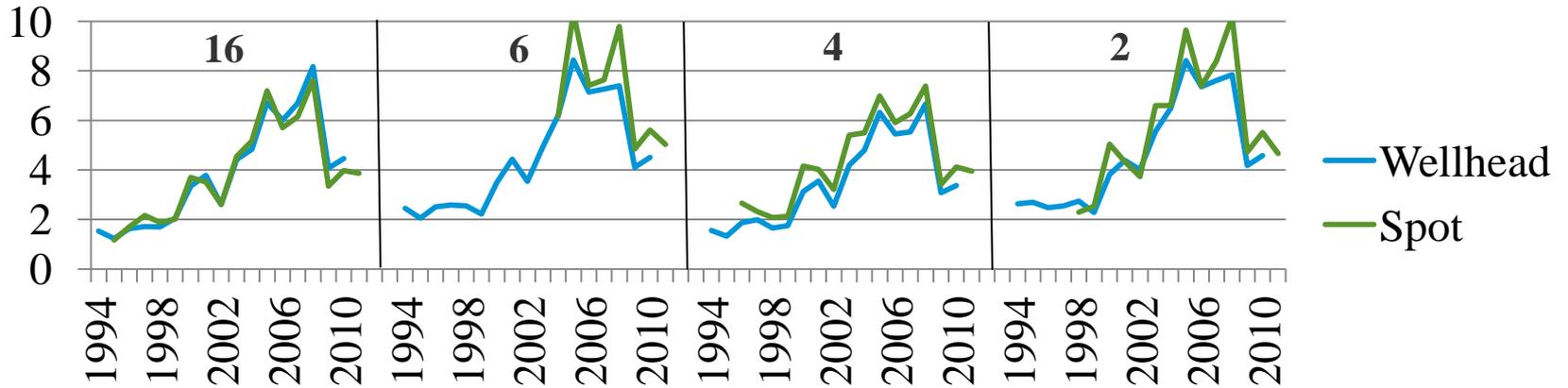
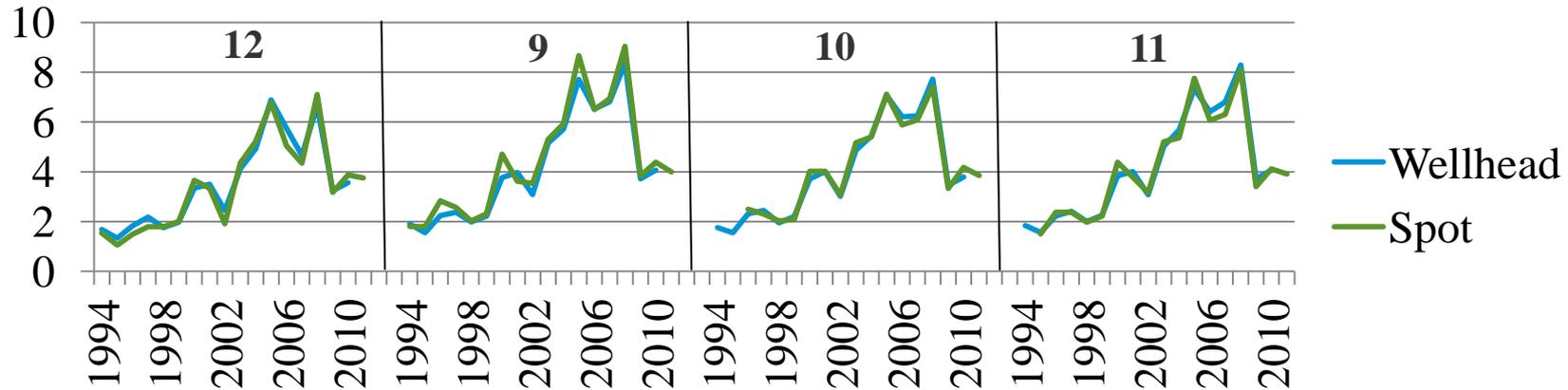
# Supply regions in the NGTDM with representative spot prices



# Natural gas wellhead versus spot prices by NGTDM/OGSM region

nominal dollars per MMBtu

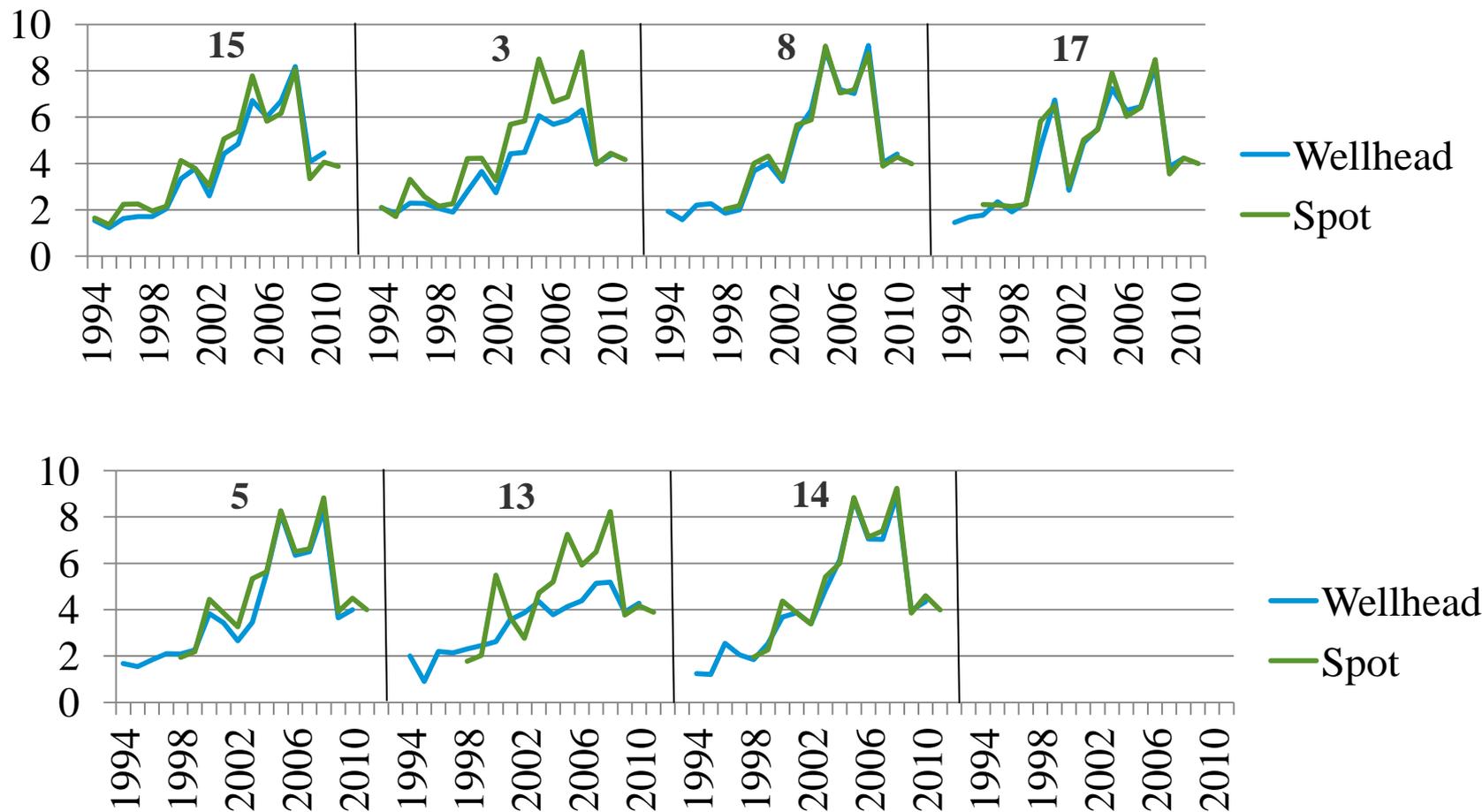
Shown from most to least production level



# Natural gas wellhead versus spot prices by NGTDM/OGSM region (cont)

nominal dollars per Mcf

Shown from most to least production level



# Pricing of natural gas for vehicles

- Had distinguished by fleet and retail, now also by CNG and LNG
- Reexamined assumptions for setting NGV fuel prices using following assumptions:
  - A refueling facility will be used at a “reasonable” level if it is added
  - Refueling capability will be added to existing stations
  - Prices charged will reflect the cost of service (i.e., no economic rent)
  - Estimated price markups will stay constant over time in real terms.
  - Motor fuels (excise) taxes will stay constant over time in nominal terms
- Natural gas price to CNG station based on “vehicle fuel” prices
- Natural gas price to liquefaction facilities same as electric generators.

# Assumptions in setting NGV fuel markup

	CNG Fleet	CNG retail	LNG fleet	LNG retail
Retail Markup after dry gas pipeline delivery, with no excise tax (2010\$/dge)	0.80	0.93	1.39	1.58
Capacity (dge/day)	1600	1100	4000	4000
Usage (percent of capacity)	80	60	80	60
Capital cost (million 2010\$)	0.8	0.5	1.0	1.0
Capital recovery (years)	5	10	5	10
Weighted Average cost of capital (rate)	0.10	0.15	0.10	0.15
Operating cost (2010\$/dge)	0.34	0.51	0.41	0.59
Charge for liquefying and delivering LNG (2010\$/dge)	--	--	0.75	0.75
Federal excise tax (nominal\$/dge)	0.21	0.21	0.42	0.42
State excise tax (nominal\$/dge)	0.15	0.15	0.24	0.24
Fuel loss for liquefying and delivering LNG (% of input)	--	--	10	10
Fuel loss at station (% of input volumes)	0.5	0.5	1.0	2.0

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Source: U.S. Energy Information Administration, U.S. Tax Code and State Tax Codes.

Note: dge is diesel-gallon equivalent

# Basic approach for modeling LNG exports of domestically produced gas in AEO2013

- Minimum export levels set based on assessment of high likelihood of project going forward given reported project status.
  - Plan to set minimums at export levels assumed for AEO2012 (up to 2.2 Bcf/d in U.S.)
- Model will assess the economic viability of a project based on a 20-year net present value assessment of the difference between the fully loaded price for natural gas from the U.S. as delivered to the NBP and/or Japan versus the estimated market price in the two areas.
- Each project will consist of two 0.5 Bcf/d trains, with a limit of one train built in North America in a given forecast year.
- If a liquefaction facility is built by the model, it will be assumed that it is used to full operating capacity thereafter.

# Estimated market price of natural gas in Europe

$$\text{MarketPrice}_{\text{UK}} = C_{\text{UK}} + (\alpha_{\text{UK}} * \text{IRAC}) - (\beta_{\text{UK}} * \text{flexible LNG/OECD Europe consumption})$$

IRAC = Imported refinery acquisition cost

Flexible LNG = estimate of world LNG not tied to strict contract terms of delivery

Flexible LNG / OECD Europe consumption = indicator of whether the European market is generally tight or loose, thus driving the market price higher or lower.

Projection of OECD Europe consumption from IEO 2011. Flexible LNG based on IEO2011 with analyst judgment.

Some percentage of volumes of U.S. exports will be added to flexible LNG and result in lower Europe price

# Estimated market price of natural gas in Japan

$$\text{MarketPrice}_{\text{JP}} = C_{\text{JP}} + (\alpha_{\text{JP}} * \text{IRAC}) - [\beta_{\text{JP}} * (\text{flexible LNG} + \text{China prod}) / \text{Asia consumption}]$$

IRAC = Imported refinery acquisition cost

Flexible LNG = estimate of world LNG not tied to strict contract terms of delivery

Asia consumption = consumption in Japan, China, and South Korea

(Flexible LNG + China production) / Asia consumption = indicator of whether the Asian market is generally tight or loose, thus driving the market price higher or lower.

Projection of Asia consumption and China production from IEO 2011. Flexible LNG based on IEO2011 with analyst judgment.

Some percentage of volumes of U.S. exports will be added to flexible LNG and result in lower Japan price

# Assumed transportation, liquefaction, shipping, and regasification markups from N. America

(2010\$/MMBtu)	<b>Gulf</b>	<b>Northeast</b>	<b>Northwest</b>	<b>Alaska</b>
Transport from regional supply source	0.20	0.30	0.60	3.15
Liquefaction charge	3.00	3.00	4.20	3.70
% increase for fuel for liquefaction	8%	8%	8%	8%
Shipping to UK	1.40	1.00	4.40	4.50
Shipping to Japan	3.10	3.75	1.20	1.00
<u>Regasification</u>	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>
<b>Nonfuel markup to UK</b>	4.70	4.40	9.30	11.45
<b>Nonfuel markup to Japan</b>	6.40	7.15	6.10	7.95
Risk?				

# Other discussion items

- Other NGTDM changes
  - Historical updates
  - Change in industrial prices
  - Increased exports to Canada
- AEO2013 schedule streamlined
- Potentially reduce extra side cases – Suggestions?
- Any comments on AEO2012 results?