Northwest **Power** and **Conservation** Council

October 3, 2017

MEMORANDUM

TO: **Council Members**

FROM: **Steven Simmons**

SUBJECT: **Update to the Natural Gas Price Forecast**

BACKGROUND:

Presenter: Steven Simmons, Senior Economic Analyst

Summary: Work on the natural gas price forecast has been recently completed. This work provides an update to the forecast from the Seventh Plan forecast, which was completed in 2015. Prices for the next three to five years are expected to remain relatively low and stable as a result of an abundant and diverse supply. Growth in the consumption of natural gas for power generation is expected to continue as a result of low prices undercutting coal as a fuel. There is less certainty around long term natural gas prices. As the nation and the region become more dependent on natural gas fired generation, concerns around the gas and bulk electricity system interface have cropped up.

Relevance: Natural gas prices are an important component of the Council's Power Plan. The forecast of prices are used to inform many of the planning models, including AURORA$_{xmp}$, Micro-Fin, RPM, and Energy2020. The Natural Gas Advisory Committee also provides the region an important function by gathering natural gas experts to discuss the factors which may influence the regional gas system and prices in the short and long term.

Workplan: A.3 Forecasting and Economic Analysis

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Background: As part of the Council's planning process, a long term forecast of natural gas prices and characterizations of price volatility is required. The Council staff surveys members of the Natural Gas Advisory Committee for their unique expectations of future prices, and performs modeling and analysis to arrive at a natural gas price forecast. Prices are forecast on a monthly basis for several regional hubs and covers a twenty year time horizon.

More Info: Further information on the "shale gale" and natural gas extraction and hydraulic fracturing ("fracking") is available from presentations to the Council in July of 2016 and September 2016, and information from the June 2017 Natural Gas Advisory Committee meeting is available on our website.

Update to the Natural Gas Price Forecast

October 10, 2017

Columbia Falls, Montana

Steven Simmons

Northwest Power and Conservation Council

Today's Discussion

1. Results
2. Background
3. Fundamentals for this cycle
4. Themes from NGAC discussion
5. Volatility & Uncertainty
6. Wrap Up

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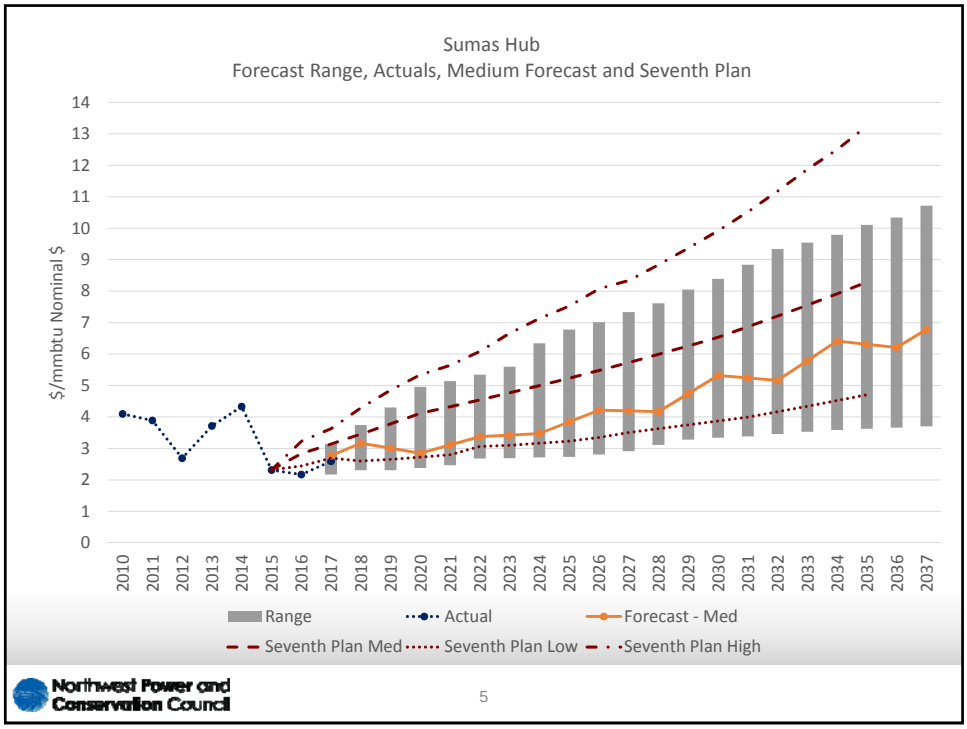
RESULTS

2017 Price Forecast Results

1. Prices are expected to remain relatively low and stable
   - Medium forecast: average prices at Henry Hub to remain under $4 through 2025
2. Results are comparable to Seventh Plan (7P) Forecast and RPM futures
   - Medium forecast is hitting the seam between the 7P low and 7P medium
   - Lower lows & lower highs



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5

BACKGROUND

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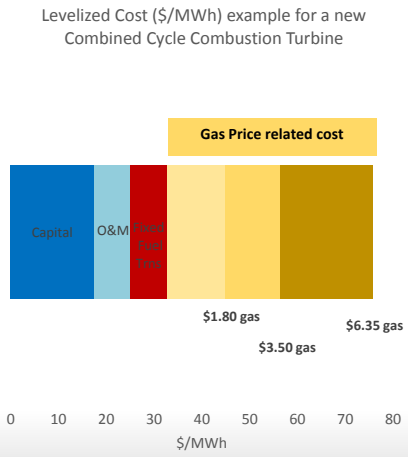
6

Why Natural Gas Prices Matter

- Gas power plants provide year round baseload power, peaking capacity in the winter and summer, and help with wind integration
- Fuel is a large cost component for a gas-fired power plant
- Prices can influence dispatch of existing plants and new resource build decisions
- Also important as a direct use fuel for residential and commercial heating in the winter and industrial processes



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7

Natural Gas Price Forecast Process

1. Previous price forecast was done in 2015 for the Seventh Plan Final
2. Work with the Natural Gas Advisory Committee (NGAC) to update the forecast took place over this summer
   a. We surveyed the members on short and long term price expectations – as well as low and high ranges
   b. Compiled survey results, themes and issues
3. Incorporate member input with analytics to produce a long term price forecast (including high and low range) by gas hub (monthly and annual)

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8

Natural Gas Price Forecast

The **Forecast** is informed by historic data, trends and the NGAC

1. Typically a range of forecasts are developed
2. Prices benchmarked to Henry Hub, but also statistically fit to regional hubs
3. Henry Hub prices are not directly used

HH $2.51 → $ 1.89 AECO
→ $ 2.27 SUMAS
→ $ 2.29 OPAL

Prices are used in many of the Council's **modeling tools** including

1. AURORA$_{xmp}$ (electricity market model)
2. Micro-Fin (finance cost model for generating resources)
3. Regional Portfolio Model (RPM)
4. Pro-Cost conservation supply assessment tool
5. Long Term Load Forecast Energy2020

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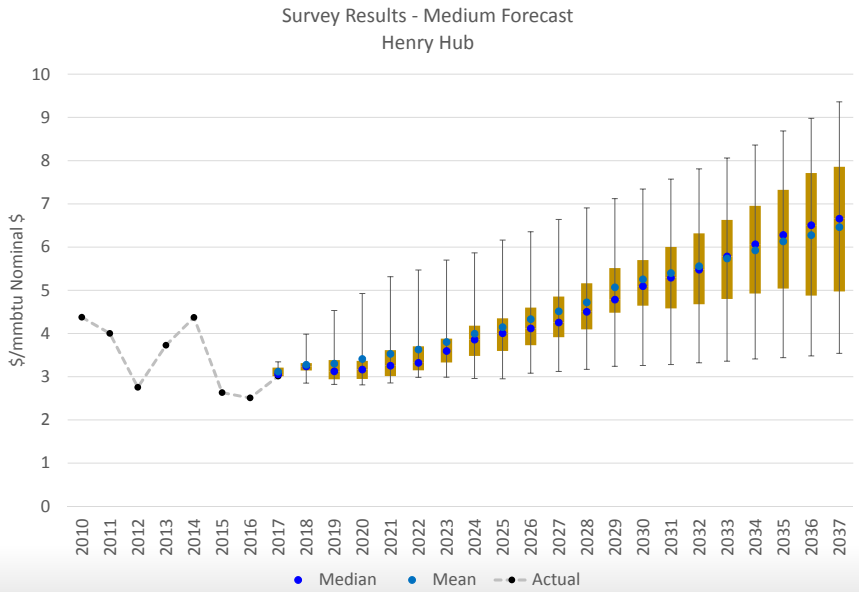
9



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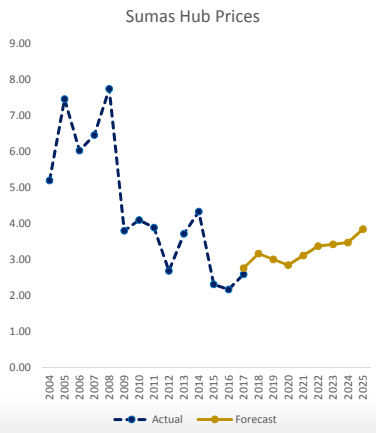
10

FUNDAMENTALS

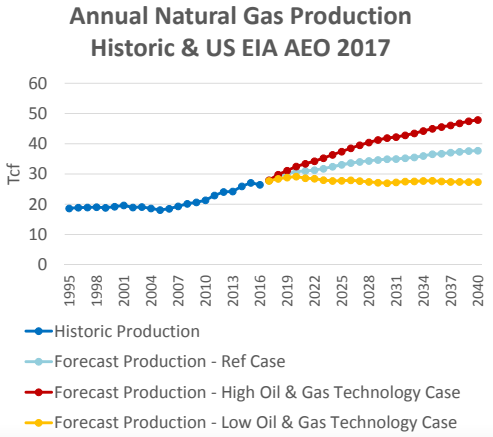
Fundamentals in a Nutshell

So how did we get here?

1. Resource assessments continue to point to an abundance of supply
2. Extraction technology continues to improve
3. Consumption in several sectors is flat, though there is growth in the power sector
4. US has become a net exporter of gas – first time since 1957

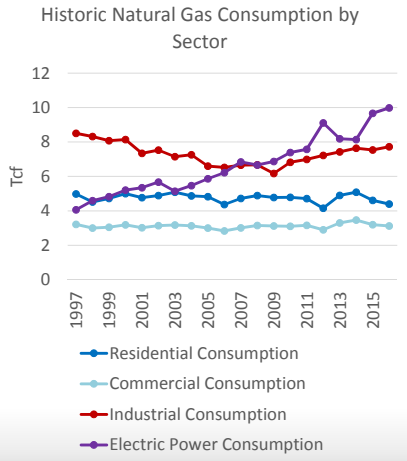


Supply

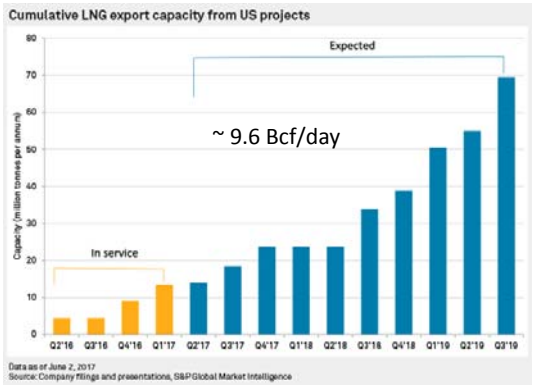


1. Production continues robust growth
2. Huge recent resource assessments - such as Mancos & Wolfcamp Shale
3. Improvements across the full drilling spectrum – well productivity has increased 300% in the past 4 years

Consumption – Growth in Power Generation



- Regional coal retirement announcements (Boardman, North Valmy 1&2, Centralia 1, Colstrip 1&2)
- Nationally, % of all new generation added in 2017:
  - Natural gas 46 %
  - Wind 37 %
  - Solar 16 %



LNG Exports

While the European market is generally flexible enough to absorb large volumes of LNG, low prices in the region would incentivize gas consuming countries to look closer to home for supplies. Feer said that scenario could play out "at some points of the year," as steep competition from Russia's state-owned Gazprom and top LNG producers such as Qatar push prices lower.

Other markets to watch include Japan, where the country is looking to restart its nuclear fleet following the 2011 meltdown of the Fukushima Daiichi plant, and China

Poland is set to receive its first cargo of U.S. LNG, a "turning point" in the country's move to lessen its dependence on Russian gas, Polish officials said in Washington, D.C.

But

Countries including Poland and Lithuania have built infrastructure to receive LNG, though many have wondered whether the import facilities will serve more as leverage to negotiate lower prices with Russia.

From Rachel Adams-Heard - SNL

ADVISORY COMMITTEE

Natural Gas Advisory Committee

- Recommended adding a supply demand cycle or "wave" to the medium forecast
- Transportation demand is not large nationally, but regionally, demand for marine transport fuel could have a impact
- Feeling relatively secure around prices for next 3 to 5 years
- Canadian gas differentials

Price Volatility

1. Weather – extreme cold events, always a factor
2. Infrastructure – potential deficiencies in pipeline infrastructure and/or storage
3. Shale and more efficient extraction technology – having a dampening effect
4. Hurricanes hitting the gulf coast may have less of a price effect across the US

Price Uncertainty

1. Carbon regulation and pricing policies
2. Infrastructure – difficulty getting new pipelines built
3. Methane emissions upstream & midstream
4. Methane Hydrates

Wrap Up

1. Prices for natural gas are expected to remain relatively low and stable
   a. Abundant and diverse supply
   b. Continually improving technology
2. Increasing consumption of natural gas for power generation – low prices are undercutting coal - while other sectors are seeing stagnant growth
3. Exports may see big growth in US, however the Northwest will continue to import from Canada
4. Infrastructure concerns with increased demand and interaction with the bulk electricity system