December 5, 2023

MEMORANDUM

TO: Council Members

FROM: Steven Simmons and Tomás Morrissey

SUBJECT: 2023 Natural Gas Price Forecast

BACKGROUND:

Presenters: Steven Simmons and Tomás Morrissey

Summary: This presentation will cover the recent efforts to create the natural gas price forecast for the Northwest and other WECC regions. This work is needed to support the upcoming 2024 study of wholesale electric market prices and upcoming resource adequacy studies. The forecast includes:

1. A Henry Hub price forecast based on Fuel Advisory Committee member surveys, among other inputs
2. Updated hub price differentials based on historical data
3. Updated monthly hub price shapes based on historical data

Relevance: Natural gas prices influence many factors in power planning including power plant dispatch, electricity prices, gas consumption, and emissions. These updates are an important input to the Council’s annual studies on market prices and resource adequacy.


Background: The natural gas price forecast is constructed using a similar methodology to the 2021 Power Plan forecast. Fuel Advisory Committee members provided key inputs into the forecast and helped review it. A detailed
review of the natural gas work for the 2021 Power Plan is in the supporting materials:

https://www.nwcouncil.org/2021powerplan_sitemap/

More Info: Additional information, including the 2023 forecast, is available on the Fuels Advisory Committee webpage and the Energy Forecast webpage:

https://www.nwcouncil.org/energy/energy-advisory-committees/fuels-advisory-committee/

https://www.nwcouncil.org/energy/energy-forecasts/
2023 Natural Gas Price Forecast

Steven Simmons & Tomás Morrissey
December 12 2023
Portland, Oregon

Today’s Talk

1. Background & recent developments
2. Natural Gas – a historic perspective on use, prices and forecasts
3. Fundamentals
4. The Forecast
Fuels Forecast

Our work is primarily concerned with producing an outlook for each fuel that might be used in the region over the next 20 plus years:

- Availability of the fuel
- Price of the delivered fuel
- Potential disruptions and volatility of the fuel supply and delivery
- Estimates of the emissions resulting from the fuel use

We produce a forecast for each plan. In past power plans – this primarily involved forecasting prices for fossil natural gas, coal and oil.

These forecasts are used as inputs to many of our planning models – it’s a key input that comes in early to the power planning process.

The Fuels Advisory Committee (FAC) is a key player in the forecast development.

The Fuels Advisory Committee - FAC

The FAC is an expansion of the entity previous known as the Natural Gas Advisory Committee (NGAC)

The inaugural FAC was held October 23 in Portland – topics included

1. Natural gas fundamentals, prices, volatility, and outlooks
2. Hydrogen infrastructure and gas turbines – from Mitsubishi Power
3. Power to Gas – from Avista
Recent Developments

- New proposed Methane rules for the US and Canada
- WA State Building Code Council and natural gas in buildings

Recent Developments

- In the 90's we see strong steady growth in residential gas consumption
- Into the aughts - power generation from gas takes off

Today regionally - power is the largest consumer.

**National figures in (%)**

<table>
<thead>
<tr>
<th>Natural Gas consumption %</th>
<th>Power</th>
<th>Industrial</th>
<th>Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36 % (38 %)</td>
<td>24 % (32 %)</td>
<td>24 % (15 %)</td>
<td>16 % (11 %)</td>
</tr>
</tbody>
</table>

**Annual Natural Gas Consumption Indexes**
A Historic Perspective

Mr. Toad’s Wild Ride

A walk back through time
Natural gas fundamentals

1. NW infrastructure map
2. Price volatility and winter 2022/23 high price event
3. General supply and demand
4. LNG and the Northwest
Northwest natural gas infrastructure

- Westcoast Pipeline (Enbridge)
  - Over 9,000 MW of natural gas power generation (175 MW plant under construction in Laurel, MT)

- Gas Transmission Northwest (TC Energy), FERC recently approved capacity expansion plan

- Northwest Pipeline (Williams)

- Underground gas storage

Map does not include LNG storage, the Fortis BC system, and other gas infrastructure elements. Made with S&P Capital IQ maps

Price volatility at Northwest gas hubs

Historical spot prices, select hubs (monthly mean, SNL)

Winter 2022/23 price event

Westcoast pipeline rupture

SNL spot prices from S&P Capital IQ
High price factors in winter 2022/2023

- Pipeline constraints
  - Reduced ability for California to import gas from the Texas area increased prices across the West
- Low gas storage levels
- Colder than average weather
- Event demonstrates the linkage between gas hubs in the West

EIA: https://www.eia.gov/todayinenergy/detail.php?id=55279

US gas production continues to grow

The Northwest imports its natural gas from Canada (BC and Alberta) and states to the east (like the US Rockies area)

EIA: https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_VG_Mmcf_m.htm
Northwest gas consumption

Annual Northwest gas consumption by sector

- Residential
- Commercial
- Electric power
- Industrial

Total consumption in ID, MT, OR, WA
EIA: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_swa_m.htm

Northwest natural gas electric power generation

There is over 9,000 MW of gas nameplate capacity in the NW, over 5,000 MW was built between 2001 and 2008
Power Plant Carty (newest gas plant in NW) online

Natural gas total electric power generation in ID, MT, OR, WA
EIA: https://www.eia.gov/electricity/data/state/
Liquified natural gas (LNG) exports

- US LNG exports expected to increase, LNG exports today are from the Gulf of Mexico and the East Coast
- Woodfibre LNG (British Columbia) expected online in 2027, could put increase Northwest gas prices (a pipeline expansion may occur in 2029, alleviating some pressure)
- LNG Canada likely online in 2025 (BC), has a dedicated pipeline from production areas
- Costa Azul, in BC Mexico, projected online in 2025, may pressure Western prices as well

EIA: https://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm
**Why natural gas prices matter**

- Power and gas prices are positively correlated.
- Other factors impact power prices too, but in general, higher gas prices lead to higher power prices.
- In modeling, gas forecasts impact the projected cost/value of new gas power plants, and the dispatch of existing plants.

*Annual Northwest gas and power prices*

- Mid-C on-peak power
- Stanfield gas

2023 actuals are year-to-date, data from SNL (spot prices), nominal $

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**Fuels Advisory Committee forecast process**

1. Henry Hub forecast is created using an aggregation of Committee member forecasts, IRP forecasts, EIA & CEC forecasts, and price futures (NYMEX).

2. The Henry Hub forecast is translated into hub level forecasts (Sumas, AECO, etc.) using historical price differences.

3. The hub level forecasts are made monthly using historical pricing patterns.

4. For some processes additional volatility is added into the forecast.
2023 mid-case forecast comparison

The next few slides are in $2022$ dollars (not nominal)

2023 actuals are year-to-date, actual data from SNL (spot prices)

2023 mid-case forecast for select Northwest hubs

Other Northwest hubs, like Stanfield, not shown for graphical clarity. The forecast for all hubs is available online.
2023 forecast low/mid/high cases

Low/mid/high Henry Hub forecasts

Next steps
Next steps

- 2023 Price forecast
  - Planning to use this forecast in year 2024 power price and adequacy studies
  - Full forecast available online at: https://www.nwcouncil.org/energy/energy-forecasts/

- Fuels Advisory Committee in 2024
  - Continue to develop create price forecasts for natural gas and other fuels
  - Continue to discuss nascent fuel development, like hydrogen, ammonia, and RNG

Extra slides
2023 forecast low/mid/high cases (nominal)

Low/mid/high Henry Hub forecasts

Hub price comparison to the 2021 Plan

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<tr>
<th>Hub</th>
<th>2023 forecast</th>
<th>2021 Power Plan</th>
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<tbody>
<tr>
<td>Henry Hub</td>
<td>$3.83</td>
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<tr>
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Forecast construction for 2023

Mid case Henry Hub price forecast

Forecast (median of inputs plus a NYMEX blend for 2024 & 2025, median for all other years)

NYMEX (annual average price)

Forecast inputs (5 committee members, IRP forecasts, forecasts from the EIA and CEC)

Made with S&P Capital IQ maps
EIA US natural gas projections

Production expected to increase

Flat/declining domestic consumption due to growth in renewables for electric generation

Exports expected to increase

US annual natural gas production, exports, supply

2023 EIA AEO. Dry gas production tends to be lower than marketed production (shown in earlier slides).