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

July 1, 2014

MEMORANDUM

TO: Power Committee

FROM: Steven Simmons

SUBJECT: Locational Value of New Generation in System Planning

Due to the increased linkage of the power, transmission and natural gas delivery systems, the location of new generating resources may become an important consideration for system planning in the Seventh Plan. For example, the power system could benefit from a more geographically diverse wind supply, which, as a whole may match up with load patterns better. However, locating wind generation in undeveloped locations may require additional transmission investments and incur greater transmission losses. In addition, potential gas infrastructure limitations may also factor into determining the value of generation location.

The ability to properly capture the planning benefits, costs, and constraints associated with the location of generation will require a more granular modeling approach. The Council planning staff is proposing to estimate transmission costs, losses and ancillary services for five zones within the region. The natural gas infrastructure, including pipelines and storage, is divided into two zones under the current modeling approach. Staff is proposing to keep the modeling to reflect two zones (East and West), but to add constraints or more refined cost estimates for additional gas delivery to better capture the capabilities and limits of the regional natural gas infrastructure.

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Locational Value of New Generation in System Planning and Coordination for the Seventh Plan

Ben Kujala
&
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Why Coordinate?

- Increasing linkages between the power, natural gas and transmission systems and their constraints
- Stakeholder feedback and Council Member guidance to coordinate with transmission planners
- Encouragement from stakeholders on more granularity in the Seventh Plan
- Questions about diversity benefits and the impact of losses on locating renewables in undeveloped regions

What Gets Missed without Coordination

- The most cost effective power system minimizes the cost of both power and transmission
- Estimates of transmission costs for new generation lack detail
- Indirect benefits and costs accrued to the transmission system due to generation location are missed, e.g. congestion relief
- Reliability can be over or understated when deliverability is not considered

PROPOSED COORDINATION WITH TRANSMISSION

Location of Generation

- Estimate for RPM:
  - Required / Deferred Capital Expense for Transmission by Generator for both Thermal and Renewable
  - Losses
  - Ancillary Services Provided
  - Gas Transmission Restrictions
  - Siting Expenses

EE and DR Transmission Impacts

- Estimate for EE and DR:
  - Deferred Capital Expense for Transmission
  - Reduction in Losses
    - EE and DR that occurs during times when the Transmission and Distribution system is heavily loaded avoids higher transmission losses that would otherwise occur during these times
  - Reduced Requirements for Ancillary Services

Granularity

- Propose developing estimates for zones based on:
  - Montana
  - Southern Idaho
  - East-Side of Cascades other than Montana and Southern Idaho
  - Puget Sound Region
  - West-Side of Cascades other than Puget Sound Region

Potential Data Sources

- TEPPC 2024
  - Montana Wind Study
  - Energy Efficiency / DSM Study
- ColumbiaGrid
  - Generation Location Congestion / LMP Study
- Western Wind and Solar Integration Study (NREL)

PROPOSED NATURAL GAS COORDINATION

Natural Gas Infrastructure – tale of two zones

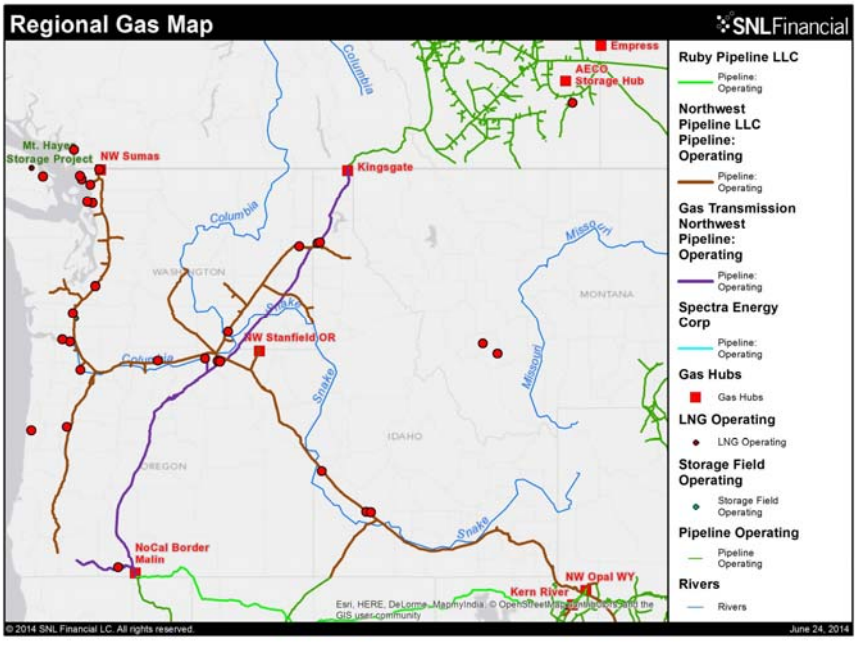
WEST SIDE

- Gas for power generation is delivered via Northwest Pipeline LLC (Williams NW) – includes Columbia River Gorge and I5 Corridor. Links to British Columbia, Rockies, and Alberta gas
- Capacity through the Gorge is fully subscribed
- Storage units include Jackson Prairie and Mist

Natural Gas Infrastructure

EAST SIDE

- Gas is delivered by the TransCanada GTN pipeline – with upstream links to Alberta
- Available capacity
- Storage at Plymouth (LNG)



Natural Gas Coordination

- E3 & DNV GL completed Phase I of a study for the Western Interstate Energy Board
  - With existing gas infrastructure, in ten years there is a 1 in 35 chance of curtailment of gas-fired generators on West side during a cold weather event
- Phase II to focus on adequacy of the gas infrastructure to balance variability from renewable generation
- PNUCC/NWGA Power & Natural Gas Planning Task Force – I5 Corridor Analysis

Potential Model Issues & Solutions

In the modeling, we want to limit unrealistic demands on the gas infrastructure for power generation – address in the GRAC

1. Set a hard limit on the number of gas-fired generator build-outs on west side?
2. Allow build-outs on west side but with an additional cost to reflect incremental pipeline or storage expansion?
3. Allow unlimited build-outs but with an additional new pipeline cost?