Northwest Power and Conservation Council

March 5, 2013

MEMORANDUM

TO: Power Committee

FROM: Steven Simmons

SUBJECT: Transmission Zones in Council Models

Regional transmission zone definitions are included in several of the Council planning models, including the AURORAxmp Electric Market Model, GENESYS, and RPM. How the zones are defined can play a role in the performance of the models. Currently, a three-zone topology is used to represent the Power Act Region in AURORAxmp and RPM, while a two-zone definition is used for GENESYS. At this time, staff intends to keep the AURORAxmp topology the same while updating the GENESYS model to make it consistent with the other two models. Going forward, the RPM model zone definition will at least match the three-zones, but may break out further zones as needed. If necessary, the zone definitions for all three models may be re-visited in future.

Staff will present further details on the AURORAxmp topology at the Power Committee meeting.

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Transmission Sub-zones in the Pacific Northwest

How Council Models Address Transmission Zones

Steven Simmons

Power Committee Meeting

March 12, 2013

Model Summary

- AURORAxmp Model – Forecast electricity prices
- Regional Portfolio Model (RPM) – Resource strategies
- GENESYS – Resource adequacy
- Sub-zones are used to define and separate areas based on loads, resources and transmission characteristics
  (also referred to as topology)

Default AURORAxmp Topologies

- WECC
  - Least granular option
  - Region is divided into 2 zones
    - OWI (Oregon, Washington, Northern Idaho, NW Montana) – represents Mid-Columbia pricing
    - ID South
  - 15 zones overall westwide
- West_Interconnect
  - Most granular option
  - Region is divided into 11 zones
  - 32 zones overall westwide

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3

AURORAxmp Topologies Used in the NW

- Default WECC Topology – 2 NW sub-zones
  - EWEB
  - PGE
  - PSE
- Default West_Interconnect – 11 NW sub-zones
  - BPA
  - Idaho Power Co

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4

Topologies in Council Models

- AURORAxmp Model – Hybrid with 3 sub-zones
  1. PNW Westside (Western Oregon & Washington)
  2. PNW Eastside (Eastern Oregon & Washington, Northern Idaho, Western Montana) is the Mid-Columbia pricing point
  3. ID South (Southern Idaho)
- Regional Portfolio Model (RPM) – Currently a single zone
- GENESYS – Currently using only 2 sub-zones, PNW Westside and PNW Eastside

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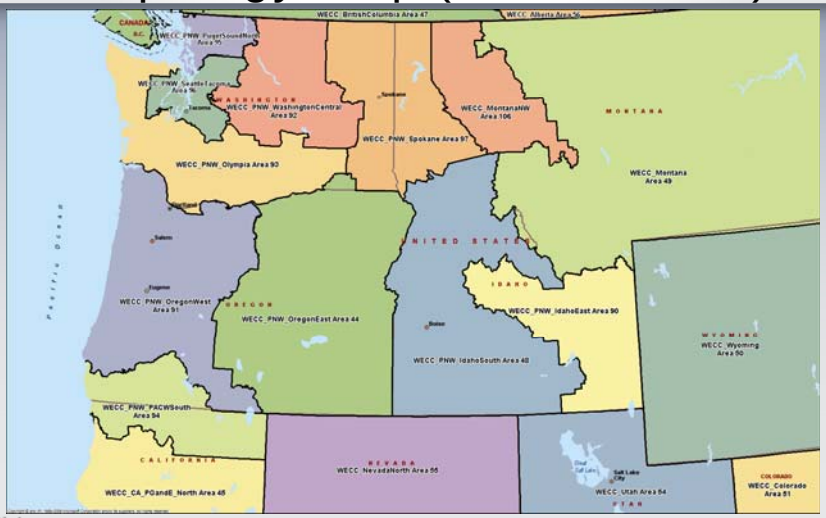
5

AURORAxmp West_Interconnect Topology Map (11 Sub-zones)



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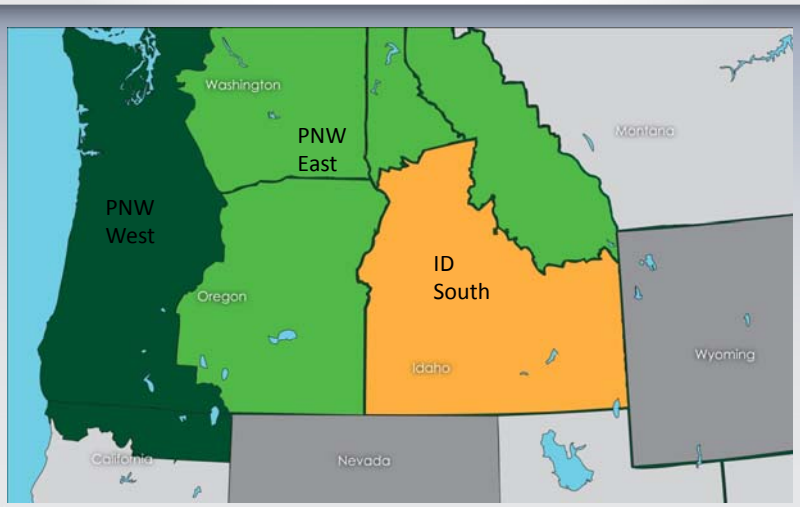
6

NPCC AURORAxmp Model Topology Map (3 Sub-zones)



7

Why a different AURORAxmp Topology for NPCC (3 sub-zones)?

- Consistent with GENESYS East and West side hydro representation
- Captures pricing difference between East and West sides of the Cascades, as well as Southern Idaho – especially during periods of heavy generation from hydro and wind
- Captures the impact of natural gas sourcing and transportation differences within the region
- Captures cross Cascade transmission congestion
- Maintains model simplicity with a limited number of zones

8

AURORAxmp Topology for NPCC: Pros and Cons

- PRO:
  - A more granular topology may better capture transmission and generation constraints that affect market prices
  - Using a default topology such as the West_Interconnect would make the Council model more standardized
- CON:
  - A more granular topology would require a significant investment in time and effort to modify model parameters such as demand, fuel prices, transmission links, and RPS assumptions
  - It is not clear a more granular approach would improve wholesale electricity pricing accuracy, but would add complexity

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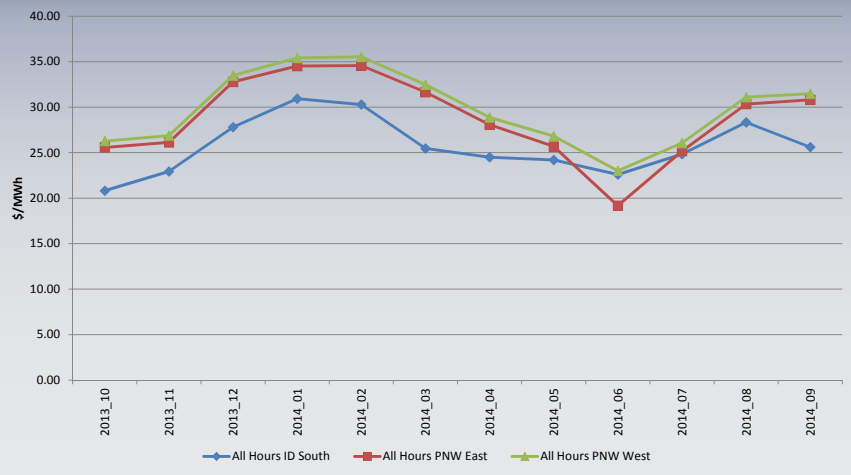
9

Within Region Electric Pricing Results Using the NPCC Topology



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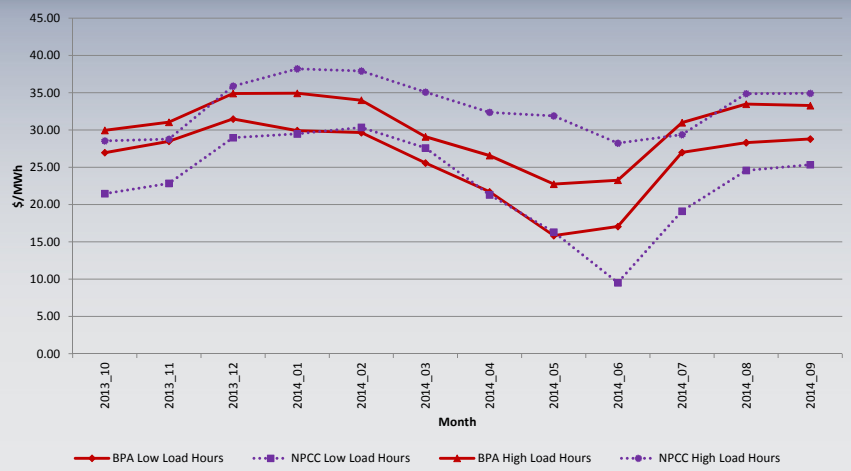
10

Comparison between NPCC and BPA price forecasts at Mid-Columbia



* from BPA-14

11

Conclusions

- The Council's AURORAxmp 3-zone topology appears to adequately capture high and low pricing conditions
- Keep the current NPCC AURORAxmp topology
- Modify GENESYS to incorporate 3 zones as used in AURORAxmp
- RPM model may use an addition breakout if necessary
- Zone definitions may be re-visited in the future as needed

12