PNW Tx Needs

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LSI Conference

Electric Power Supply in the West

January 27, 2023

I. Current Situation

(1) WA/OR legislation requires IOUs to reach 80% clean energy by 2030

(2) E-W tx challenges

- Most wind/solar on Eastside
- Need additional tx capacity to reach Seattle/Portland on:
  - CCN (I-90 corridor) from Mid C to Seattle
  - CCS (I-84 corridor from Mid C to Portland

(3) PSE/PGE Resource Needs

- PSE = 1,500 MWa energy (2031)
  1,850 MW capacity (2027)
- PGE = 3,000 MWa energy (2030)
  1,000 MW capacity (2030)

II. BPA Recent Actions

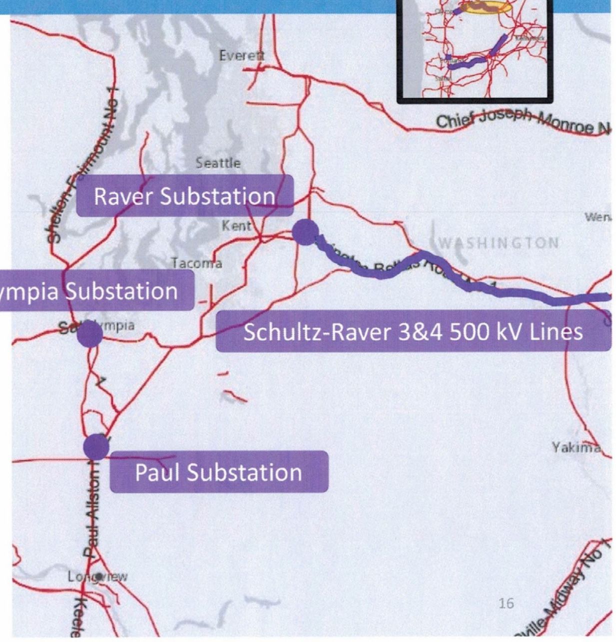
(1) 2021 tx Cluster Study (CS)
- CCN: Raver-Schultz SCPs enable 1,600 MW of new ATC by 2025/26
- CCS: Portland subgrid upgrades enable 500 MW of TTC by 2027

(2) 2022 BPA CS
- CCN: Additional SCPs/reconductor enable 1.1 GW of TTC by 2030
- CCS: Upgrade Big Eddy-Chemawa 230 kV line to 500 kV. Enables 1.2 – 1.6 GW of TTC. Not completed until 2035+
- Analyzed 11 GW of TSRs
  - 4.2 GW have signed PEAs for CCN/CCS tx

BPA 2022 CS

Cross-Cascades North

- Description:
  - Reconductor Schultz-Raver 3 & 4 500kV lines (100 mi total)
  - Schultz-Raver #4 500kV series capacitor upgrade (Phase 2)
  - Olympia 230kV 350 MVAR Statcom addition
  - Paul 500kV 221MVAR shunt capacitor addition
- Estimated Cost: $196M (Direct)

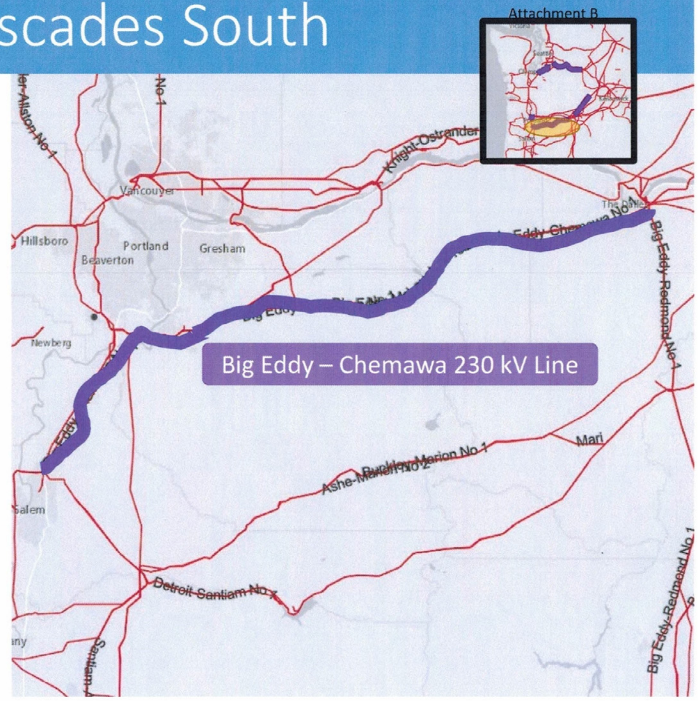


Pre-decisional, for discussion purposes only

BPA 2022 CS

Cross-Cascades South

- Description:
  - The existing Big Eddy – Chemawa 230kV line is under utilized and presents an opportunity for corridor optimization.
- Project:
  - Rebuild existing Big Eddy-Chemawa 230kV line as Big Eddy-Ostrander 500kV (70 mi), Ostrander-Pearl 500kV (20 mi), re-terminate the Pearl – Chemawa 230kV
- Estimated Cost: $233M (Direct)



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III. BPA Challenges

(1) GI / TSEP queues are enormous and growing

- GI queue – 150 GW
- TSEP queue = 19 GW for 2023
  - Up from 11 GW in 2022
- BPA has publicly acknowledged such queue amounts are <u>not</u> <u>sustainable</u>

(2) Possible BPA GI / TSEP Changes

- Move to first ready/first served approach
- Move off of 95% defacto subscription requirement
- Temporarily pause GI /TSR processing of new requests

B O N N E V I L L E   P O W E R   A D M I N I S T R A T I O N

Problem Statement

Current TSEP Cluster Study cycle has been experiencing multiple issues that impede a sustainable, repeatable, and acceptable quality study product. Key issues include:

1. Increased volume of requests
2. Increased complexity of requests
3. Increased speculation of requests
4. Increased physical TX system constraints

* From BPA September 20, 2022 public meeting

KEY TAKEAWAY: PRESENT STATE IS UNSUSTAINABLE.

Pre-decisional, for discussion purposes only

IV. PSE Situation

(1) Probably can meet its 80% 2030 goal
- Upgrades from 2021/2022 CSs will add roughly 2.7 GW of ATC/TTC to CCN by 2026 and 2030 respectively
- PSE's 2023 draft IRP eliminates 1.5 GW of market purchases from Mid C by 2028
  - Frees up that tx for wheeling renewables across CCN

(2) PSE's IRP also proposes building 2-4 biodiesel Westside CTs to handle extreme weather events

V. PGE: no current tx path (over CCS) to meet its 2030 80% decarbonization goals

(1) PGE needs 2.5 GW new tx capacity for load growth and meeting its 2030 goals
- Portland subgrid improvements should add 500 MW TTC by 2027
- Other upgrades possible but currently unclear

(2) Another possibility is the Cascade Renewable Tx Project, a proposed 500 kV DC line (under the Columbia River) from Big Eddy to Harborton. Completion date: 2028

(3) Unlike PSE, PGE must also contend with substantial high tech load growth in Hillsboro

VI. Conclusions

(1) Current lack of ATC on CCN/CCS is a major challenge for PSE/PGE, especially from 2026-2030 and beyond.

(2) In its 2021/2022 CSs (and subsequent actions) BPA identified potentially viable approaches to address such needs.

(3) PSE should be able to reach its 2030 clean energy goals.

(4) PGE, working with BPA, can possibly develop a viable tx strategy, but currently such a path is not clear.

(5) None of these tx challenges consider additional electrification driven load growth prior to 2030.