

TSR Study and Expansion Process (TSEP)

2019 Cluster Study Overview

June 20, 2019



Topics

- TSEP – Overview Reminder
- 2019 Cluster Study Overview – TSRs and Participants
- Cluster Study Areas
- Assumptions and Methodology
- Cluster Study Areas – Plans of Service
- Next Steps

Reminder – Process Overview

- TSR Study and Expansion Process (TSEP)
 - BPA's process for conducting required studies (system impact and facilities) for incremental requests for service
 - Follows sections 19 and 32 of BPA's tariff
 - Accomplishes BPA's obligation to study, identify and ultimately complete transmission plans of service if customers elect to proceed

TSEP Elements

Phase 1: Pre-study

- Customer TSR submittal and ATC assessment;
- Period between close of last TSR deadline and next TSR deadline for Cluster Study participation (typically June-May)
- \$ - TSR deposit and processing fee

Phase 2: Cluster Study

- BPA tenders Study Agreements after TSR submittal deadline;
- BPA commences and completes study (120-day study period);
- Results: preliminary plan of service scope, cost, and schedule;
- \$ - Customer's pro rata share of costs by MW

Phase 3: Plan of Service Validation and Preliminary Engineering

- Refinement of cost and scope of Cluster Study results;
- Estimation of Environmental Review scope and costs;
- \$ - Customer's pro rata share of costs by MW

Phase 4: Environmental Review

- Required NEPA review of environmental impacts based on identified plan of service
- Includes Record of Decision on preferred route, and whether to build the project;
- \$ - Customer's pro rata share of costs by MW

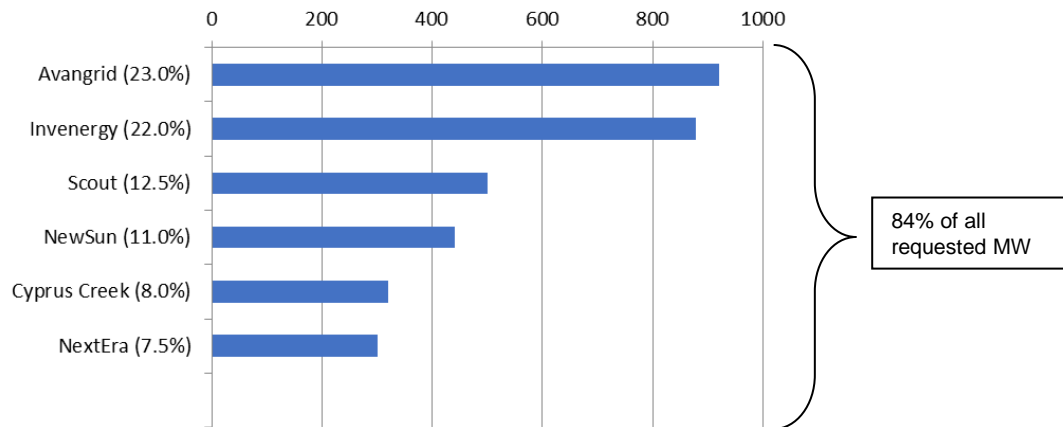
Phase 5: Project Construction

- Construction and Energization of identified transmission project;
- \$ - Customer secures its pro rata MW share of construction costs (letter of credit, etc.)

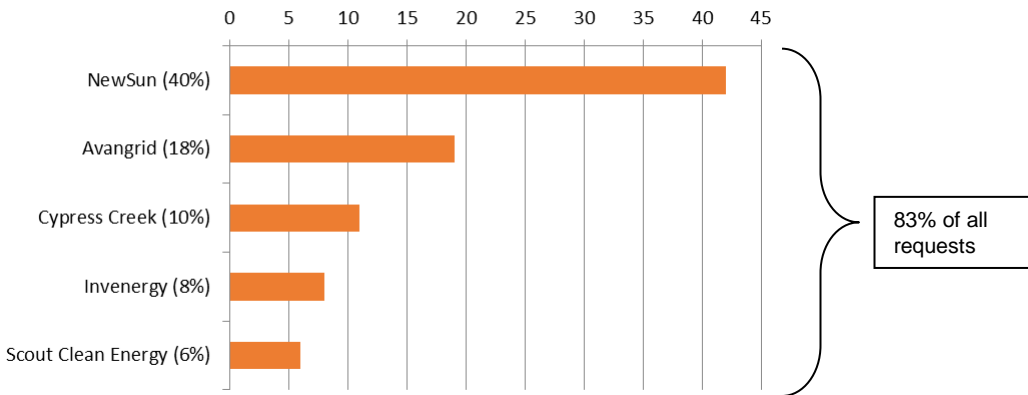
2019 Cluster Study Infographic

Customers		
16		
TSR Count		MW Total
104		3,965
Original	97	3,769
Redirect	7	196
Of the 104 TSRs, 103 are for Point-to-Point service		

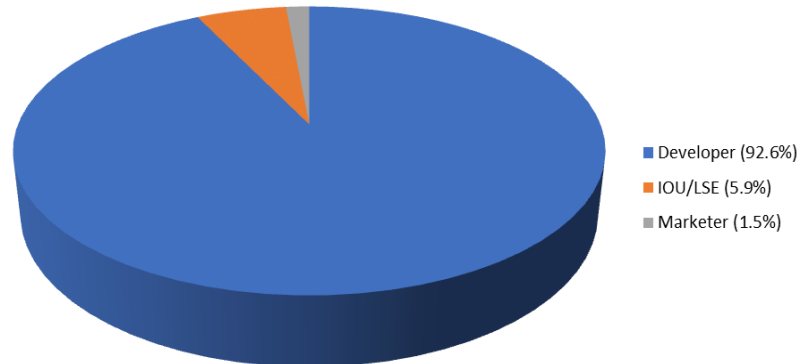
Top 6 Customer Demand



Top 5 TSR Count

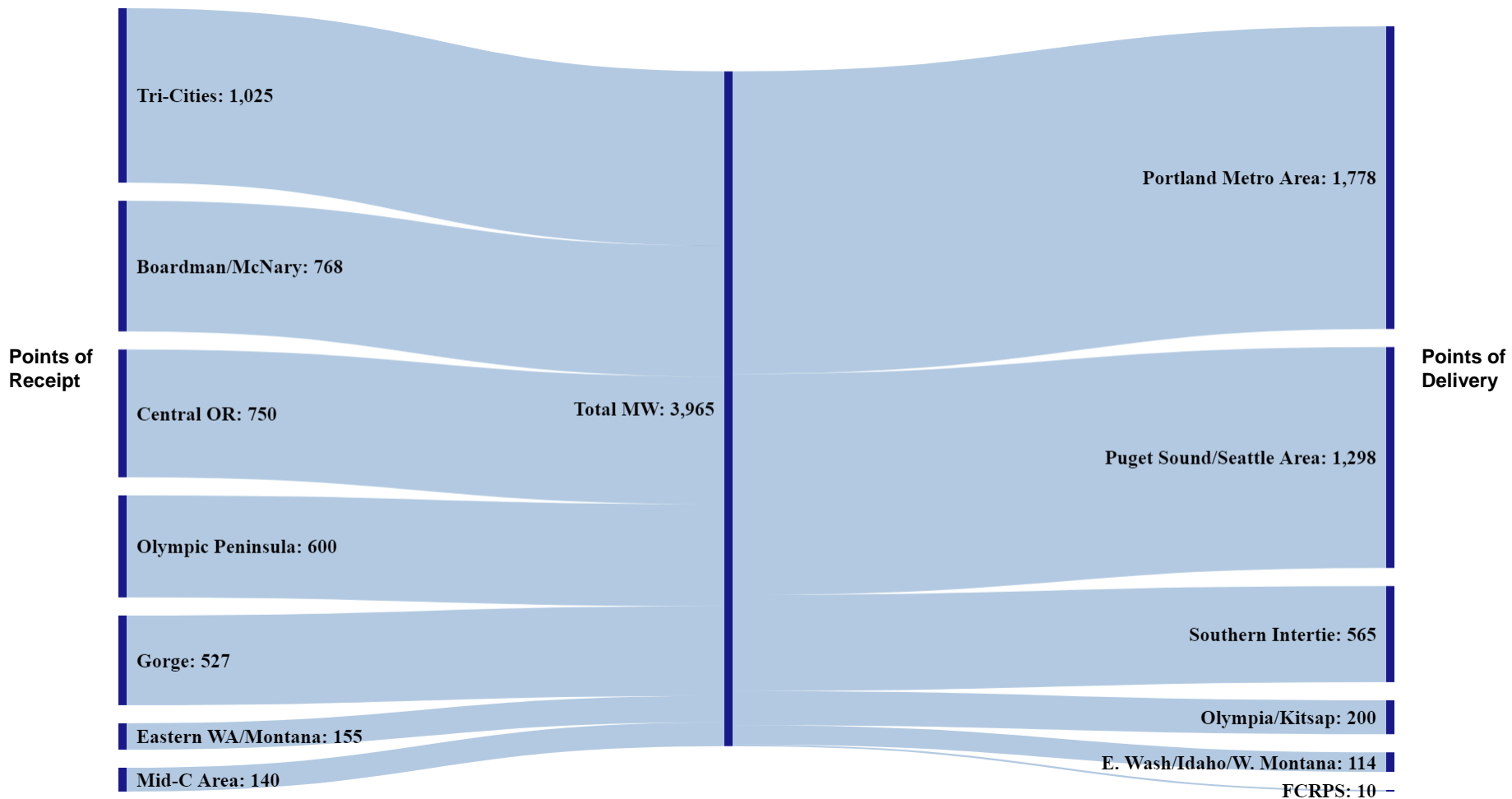


Composition, by Customer Class



Note – this presentation does not include previously-studied TSRs

Requested POR & POD Areas, by Proportionate MW



Geography of Requested Delivery (91% of Demand)

Primary Delivery Points (Sinks)

Requests to Deliver to the Portland metro area

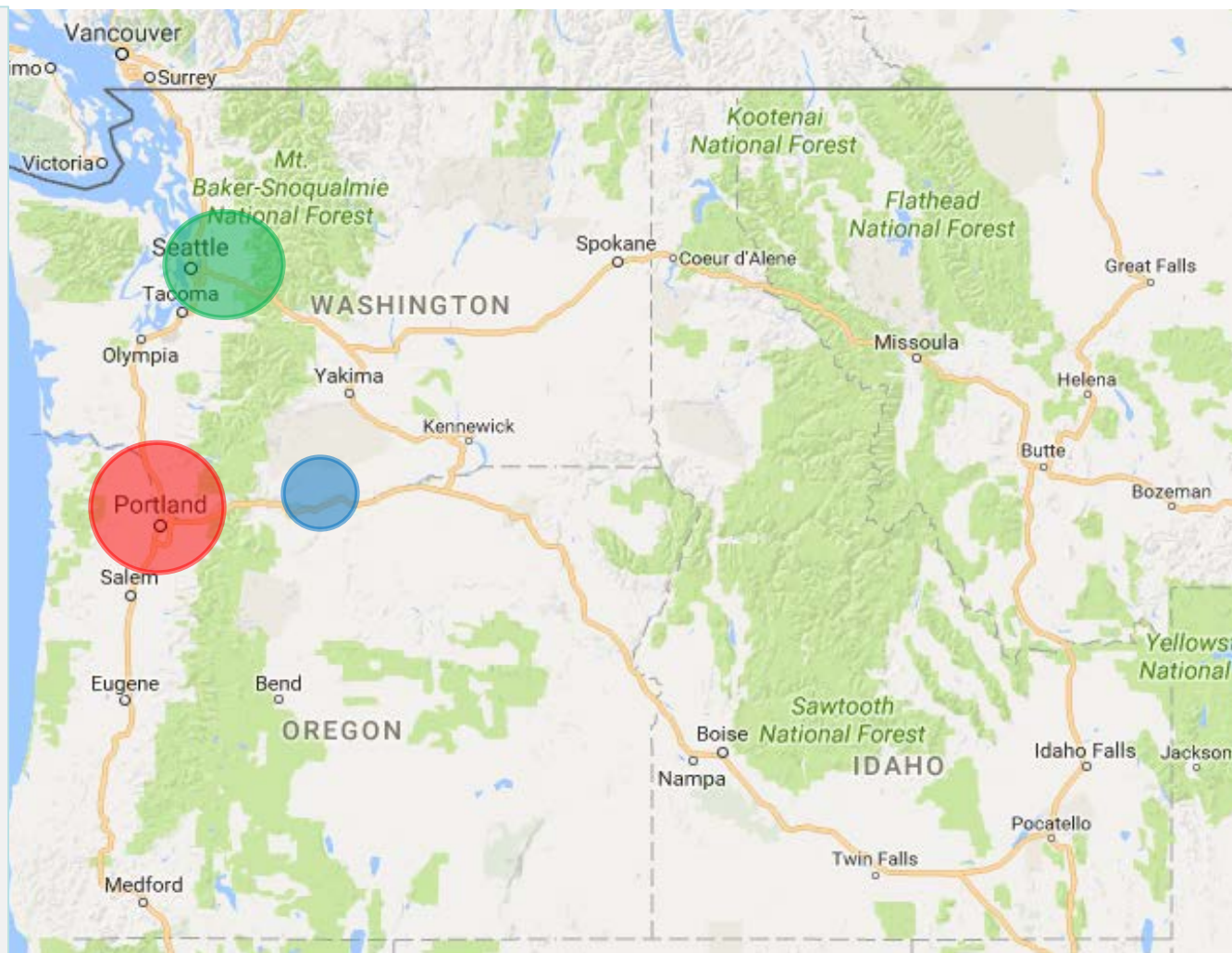
- 1,778 MW of requested demand (approximately 45% of all studied demand)

Requests to Deliver to the Seattle/Puget Sound area

- 1,298 MW of requested demand (approximately 32% of all study demand)

Deliveries to Big Eddy/John Day

- 565 MW of requested demand (approximately 14% of all study demand)

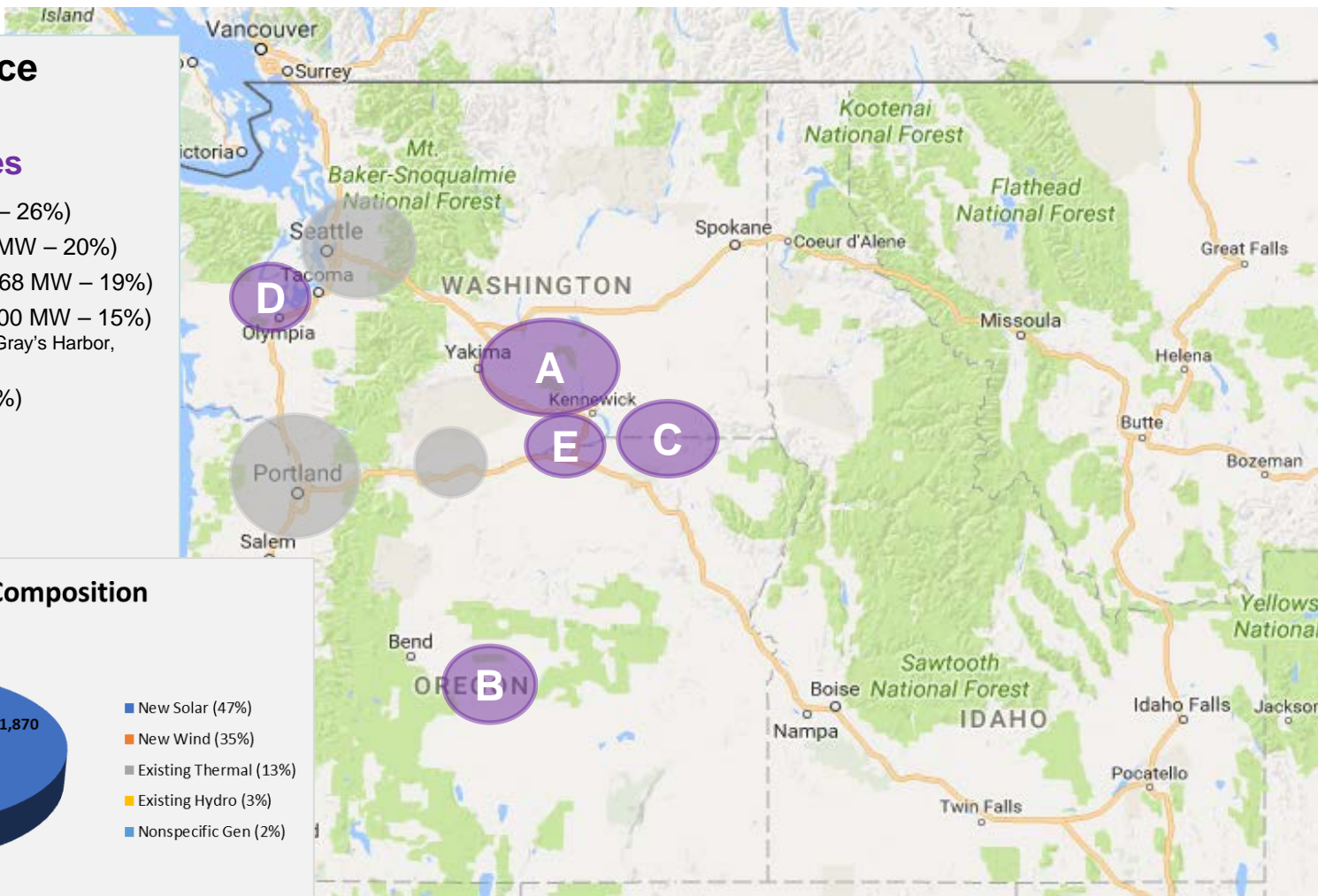


Geography of Resource Location (93% of Demand)

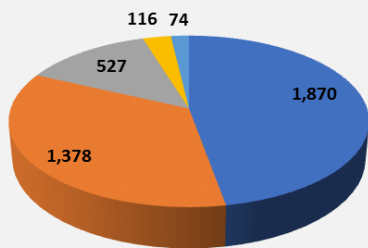
Primary Resource Locations

1. Generation Zones

- A. Tri-Cities (1,025 MW – 26%)
- B. Central Oregon (750 MW – 20%)
- C. Boardman/McNary (768 MW – 19%)
- D. Olympic Peninsula (600 MW – 15%)
-All existing resources (Gray's Harbor, Tacoma resources)
- E. Gorge (527 MW – 13%)



Resource Composition



- New Solar (47%)
- New Wind (35%)
- Existing Thermal (13%)
- Existing Hydro (3%)
- Nonspecific Gen (2%)

2019 Cluster Study: High-Level Results

- As a result of the 2019 Cluster Study, BPA concluded:
 1. 32 TSRs, totaling 1,475 MW, could be authorized on the existing transmission system with no further system enhancement beyond any requirements identified in Small or Large Generator Interconnection Procedures;
 2. 49 TSRs, totaling 1,382 MW, could be offered assuming that required projects and other reliability-based projects identified above are completed as planned, and that do not require mitigation of impacts to identified 3rd-party Transmission Providers;
 3. 23 TSRs, totaling 1,108 MW, could be offered assuming that required projects and other reliability-based projects, plus impacts to identified 3rd-party Transmission Providers are also mitigated.

Assumptions & Methodology

■ Seasonal Scenarios

Developed to stress all of the BPA flowgates, with consideration of TSRs participating in the Cluster Study.

Scenario #	Season	Load Level	Wind	Solar	Stress Zone	Notes
1	Summer	80% of Peak	Off	Off	Upper C	Sunset hour (scaled 2023 Peak)
2	Summer	Peak	Off	On	Upper C	2023 Peak hour
3	Summer	Peak	On	On	Upper C	2023 Peak hour
4	Spring	Off-peak	On	On	Lower Snake	Mid-day hour
5	Spring	Off-peak (lighter)	On	Off	Lower Snake	Night hour with runoff, dual exports
6	Winter	Peak	On	Off	Lower Snake	2023 Peak hour
6a	Winter	Peak	On	On	Lower Snake	2023 Peak hour
7	Winter	Peak	Off	Off	Lower Snake	2023 Peak hour

Assumptions & Methodology

▪ Load/Resource Balance

- Dispatch order of resources specific to each scenario
- Intertie flows and other “economic merit order” dispatch groupings
- Only flexible hydro units varied (Grand Coulee, Chief Jo, John Day, The Dalles) with minimum gen levels respected, and only in Spring

▪ Additional Sensitivities

- Capacity increase at Dworshak
- Montana wind projects with POR at Garrison
- Portland metro area load addition

▪ Based on the seasonal scenarios, the flowgates identified for further study and possible reinforcement are listed in the table below

Limiting Flowgate Name	Limiting Scenario
Raver-Paul (N>S)	Summer (1)
South of Allston - BPA (N>S)	Summer (1)
Cross Cascades North (E>W)	Winter (6a)
Cross Cascades South (E>W)	Winter (6a)
West of Garrison (E>W)	Spring (4)

Proposed Plans of Service Raver-Paul and South of Allston

- **TSRs requiring capacity on Raver-Paul and/or South of Allston:**
 - **Series Capacitor Project on the Schultz – Wautoma 500 kV line**, at Wautoma substation
 - BPA Initiated project: Costs to be included in Network rates
 - Projected energization: Fall 2023
- **TSRs that require capacity on Raver-Paul:**
 - **Covington – Chehalis 230 kV line reconductor** (South Tacoma tap to Chehalis)
 - Cost: \$12.1M
 - Energization*: Fall 2024
 - **Modification to BPA’s Network Remedial Action Scheme (RAS)**
 - Cost: BPA project
 - Energization*: BPA will implement in a timely manner as requestors take service.
- **All Raver-Paul descriptions above are successive upgrades to the “Raver-Paul” project identified in the 2016 Cluster Study (which is now referred to the South Tacoma-St. Clair Project)**

*Projected energization dates based on construction feasibility, and do not account for BPA’s NEPA obligations or Integrated Program Review/Capital Investment Review processes

Proposed Plans of Service Satsop

- **BPA Aberdeen Tap-Satsop Park 115 kV upgrade**
 - Re-sag or reconductor several spans
 - Cost: \$0.5M
 - Energization*: Fall 2024

- **Identified Affected Third-Party Impact: Gray's Harbor PUD (GHPUD)**
 - Additional GHPUD 115 kV limiting circuits are impacted
 - Requestors will be required to coordinate with the identified affected third party in order to determine what requirements will be necessary to mitigate the impacts from the requests for service.
 - The identified affected system may identify additional impacts that will need to be addressed.

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Proposed Plans of Service La Pine

- **La Pine Project (The below upgrades are incremental to La Pine-area upgrades identified in the 2016 Cluster Study)**
 - LaPine 230/115 kV #1 Transformer Replacement
 - Cost: \$7.1M
 - Energization*: Fall 2025
 - LaPine-Fort Rock 115 kV #2 new radial circuit
 - Cost: \$70M
 - Energization*: Fall 2027

*Projected energization dates based on construction feasibility, and do not account for BPA's NEPA obligations or Integrated Program Review/Capital Investment Review processes

Proposed Plans of Service Walla Walla

- **BPA Tucannon River - Hatwai 230/115 kV Transformer-Terminated Line**
 - New Tucannon River-Hatwai 115 kV circuit (~8 miles)
 - At Hatwai Substation a new 115 kV yard, new 230/115 kV transformer and new 230 kV terminal equipment
 - Cost: \$15.2M
 - Energization*: Fall 2027

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Proposed Plans of Service Montana to Washington

- **Montana to Washington Project (M2W)**
 - \$138 million
 - Projected Energization*: Fall 2025
 - Includes participation in BPA's Remedial Action Scheme (RAS)
 - The M2W project includes upgrading reactive compensation between Garrison, Hatwai and Bell 500 kV substations
 - The M2W project refers to only upgrades on the BPA Network – facilities west of BPA's Garrison Substation plus BPA's share of harmonic filtering at the Colstrip Generating Station → Facilities identified here exclude any additional facilities that may be required east of Garrison needed to deliver generation associated with the requests to BPA's Network

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Proposed Plans of Service Garrison to Ashe

- **Garrison to Ashe Project (GASH)**
 - \$1,330 million
 - Projected Energization*: Fall 2027
 - Includes participation in BPA's Remedial Action Scheme (RAS)
 - New 500 kV single circuit AC transmission line between Garrison Substation and Ashe Substation, through Bell Substation (~430 Miles)
 - Addition of a new 500 kV substation between Taft and Hot Springs substation
 - Three 500 kV series capacitors
 - Facilities identified exclude any additional facilities that may be required east of Garrison needed to deliver generation associated with the requests to BPA's Network

- In light of the significant capital cost and lengthy timeline required to complete this plan of service, BPA-TS supports exploration non-wire service option alternatives with requestors, such as energy storage devices or generation redispatch, that could potentially enable service at a lower cost and shorter timeline.

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Proposed Plans of Service Conformance

▪ **Knight 500 kV Substation**

- Original request was with a POR of Alfalfa 230 kV
- Requestor elected to have their LGIA considered as interconnecting at Knight 500 kV; the 2019 Cluster Study, therefore, considered the impacts of the request to be at Knight 500 kV

▪ **John Day Wind**

- Identified Klondike Schoolhouse in their Transmission Service Request
- Identified resource with a 200 MW LGIA that actually interconnects at Biglow Canyon.
- Requestor to work with BPA to conform the request for service to Biglow Canyon (or other point as agreed between BPA and the requestor)

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Proposed Plans of Service

Third Party Fixes – Cross Cascades South

- The 2019 Cluster Study findings cite multiple TSRs that would cause BPA to exceed its capacity on the Cross Cascades South path. As part of the Cluster Study BPA determined that there was not a feasible plan of service which BPA could implement without participation from the affected parties.
 - Identified Affected Third Parties: **PacifiCorp (PAC) & Portland General Electric (PGE)**
 - Requestors will be required to coordinate with the identified affected third party in order to determine what requirements will be necessary to mitigate the impacts from the requests for service.
 - Additionally, the affected systems may identify additional impacts that will need to be addressed.
- Additional area with Third-Party Impacts: Bethel/Salem area
 - Requests for service plus existing commitments significantly exceed the capacity of the BPA interconnecting facility with PGE at Bethel.
 - PGE identified as an affected Third Party.

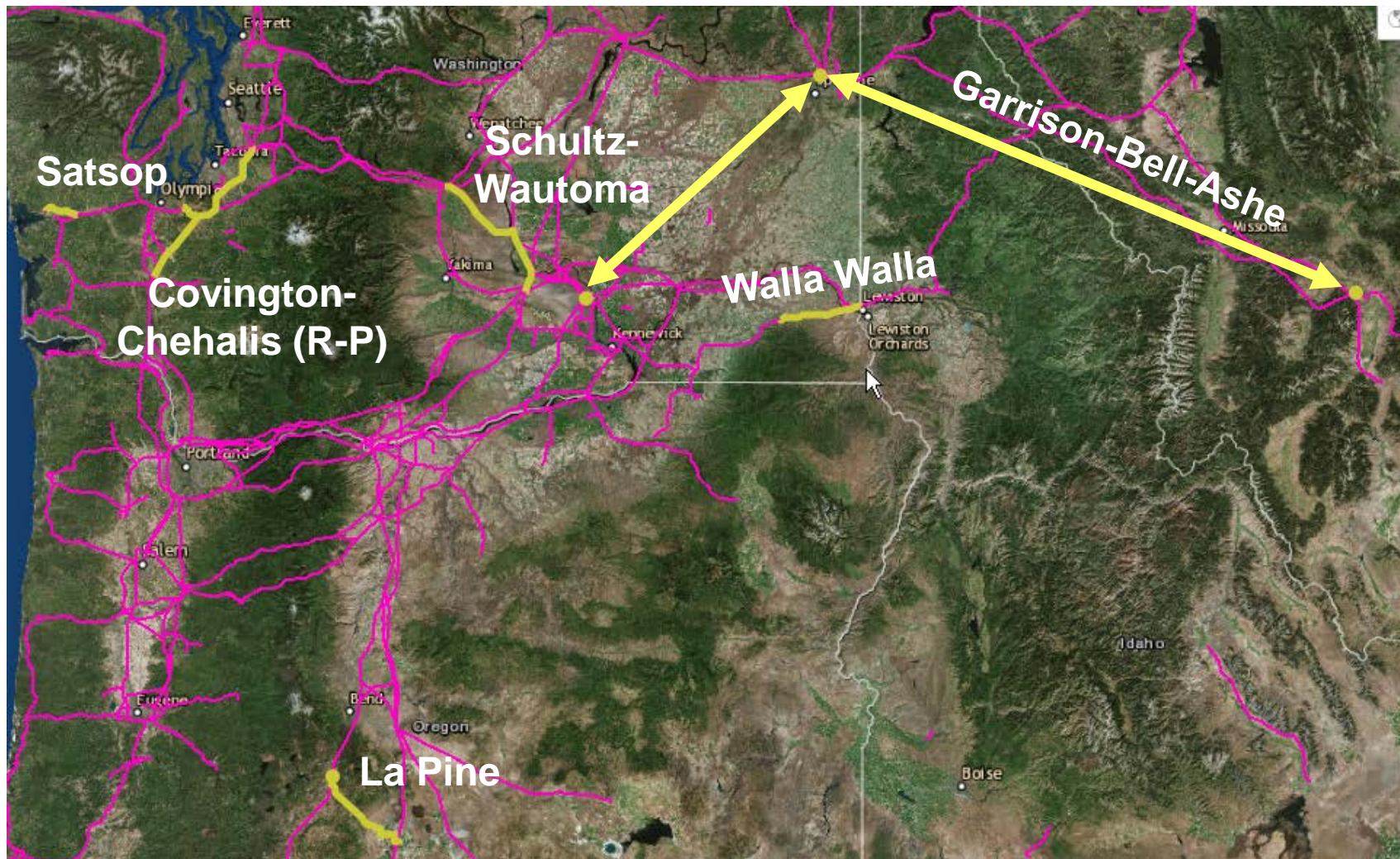
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Proposed Plans of Service

Project	Cost	Schedule*
South of Allston (SoA) & Raver-Paul (R-P)		
Schultz - Wautoma 500 kV series comp; (SoA & R-P)	Network	Fall 2023
Covington – Chehalis 230 kV reconductor	\$12.1M	Fall 2024
WS-RAS modification	Network	As required
Satsop		
AberdeenTap-Satsop Park 115 kV re-sag/re-conductor	\$0.5M	Fall 2024
La Pine		
LaPine 230/115 kV #1 Transformer Replacement	\$7.1M	Fall 2025
LaPine-Fort Rock 115 kV #2 new radial circuit	\$70M	Fall 2027
Montana to Washington & Garrison-Bell-Ashe		
Montana to Washington 500 kV Series Comp station between Taft-Bell-Hatwai Line upgrade on Taft - Hatwai 500 kV RAS participation required	\$138 M	Fall 2025
New 500 kV line between Garrison-Bell-Ashe RAS participation required	\$1,330 M	Fall 2029
Walla Walla Wind		
Tucannon River - Hatwai 230/115 kV Transformer-Terminated Line	\$15.2 M	Fall 2027

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2019 Cluster Study: Geographic Overview



Next Steps

- Closeout of 2019 Cluster Study:
 - 2019 Cluster Study Summary Results were distributed to study participants in May, followed recently in June by the 2019 Cluster Study report
 - BPA has begun issuing 2019 Cluster Study Closeout Letters to the study participants
 - Outlines specific plan(s) of service required for each TSR, including initial economic analysis and next steps
 - BPA expects the majority of Closeout Letters will be issued by the end of June
 - BPA is currently drafting service agreements for TSRs that require no transmission upgrades
 - BPA expects to tender Preliminary Engineering Agreements related to TSEP projects and all relevant Third-Party Notices toward the end of July
 - BPA anticipates completing the true-up of actual 2019 Cluster Study costs around the end of July

Next Steps, continued

- Within the next two weeks – BPA expects to make public posting to notify Customers of BPA’s intent to conduct a 2020 Cluster Study
 - Consistent with previous cluster studies, will be posted on BPA’s OASIS and through Tech Forum
 - Will outline relevant information including eligibility requirements and deadlines associated with submitting TSRs and Data Exhibits

