

TSR Study & Expansion Process (TSEP) Update Summary of the 2023 Cluster Study

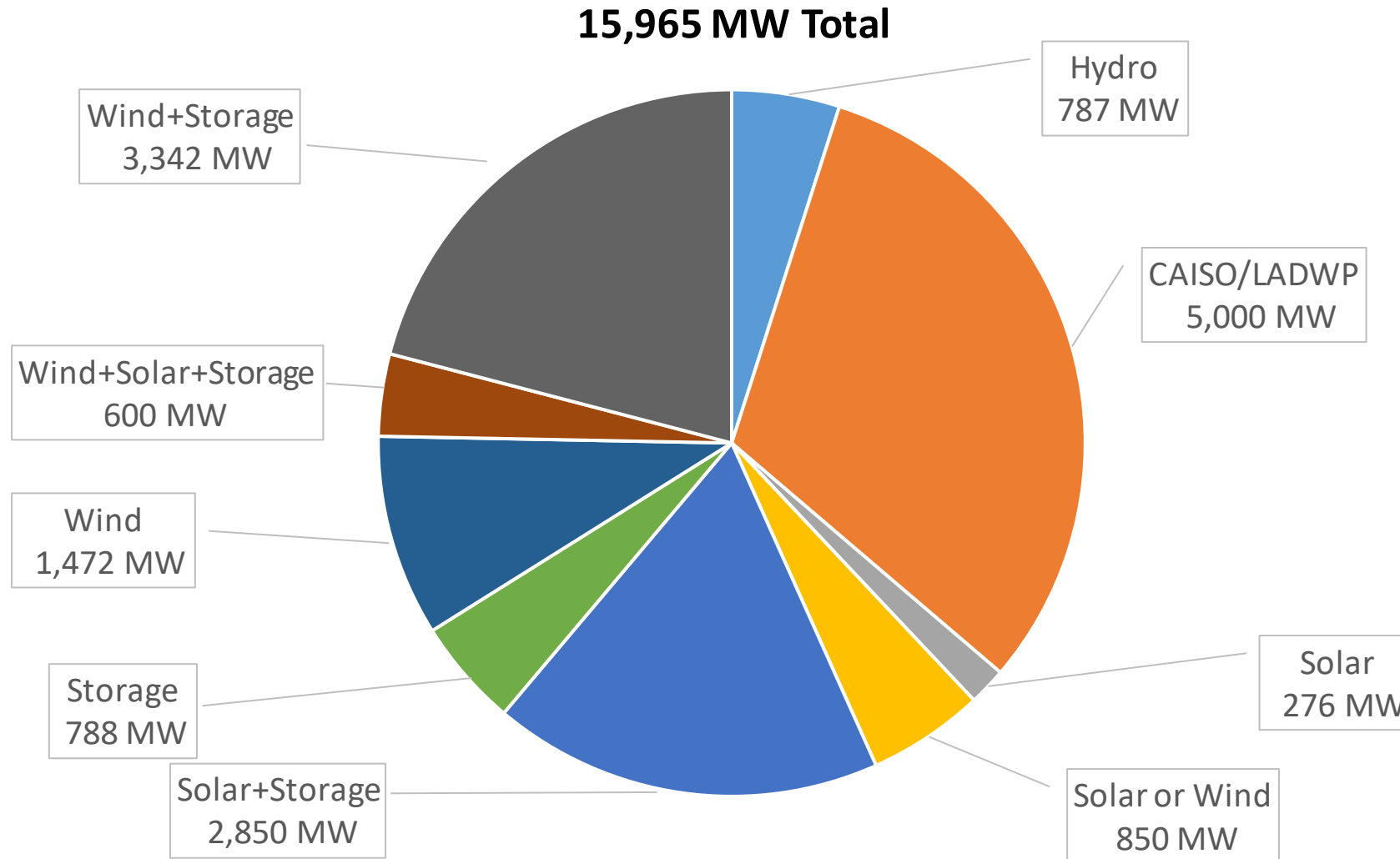
February 29, 2024



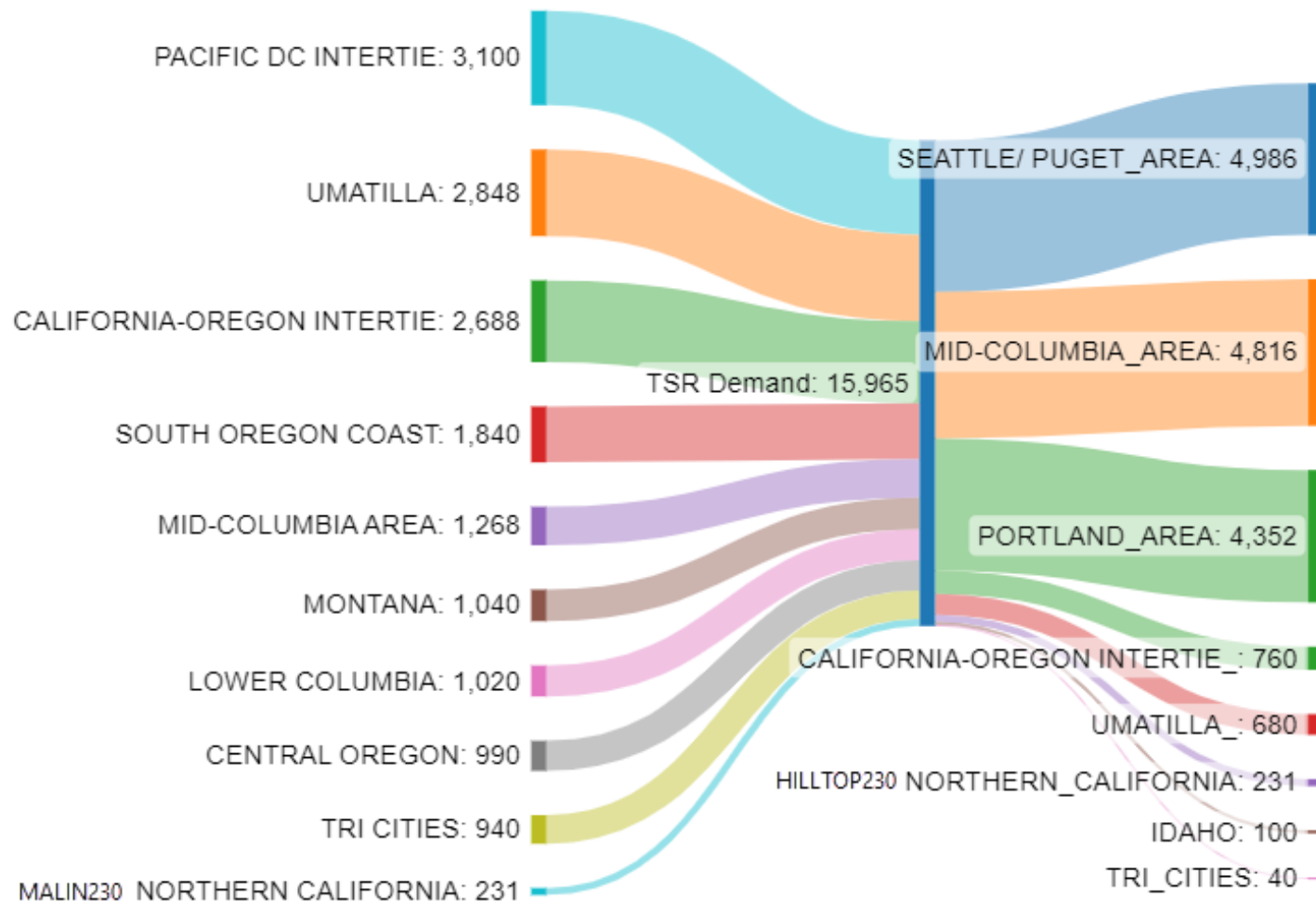
2023 TSEP Cluster Study (CS) Facts

- At the cutoff for participation there were 298 TSRs for 24,190 MW in the queue.
- 16,905 MWs signed Study Agreements
- 222 TSRs for 15,965 MWs finished the 2023 Cluster Study
- 2 TSRs for 88 MW were Awardable without Upgrades
- BPA identified 14 new projects totaling an estimated \$3.9B (Direct)
 - The 2023 TSEP projects are not just stand-alone projects, many build upon the previously identified projects from prior Cluster Studies (See the appendix for a list).

TSEP Cluster Study: MW Studied by Resource Type



TSEP Cluster Study: Geographic Source/Sink



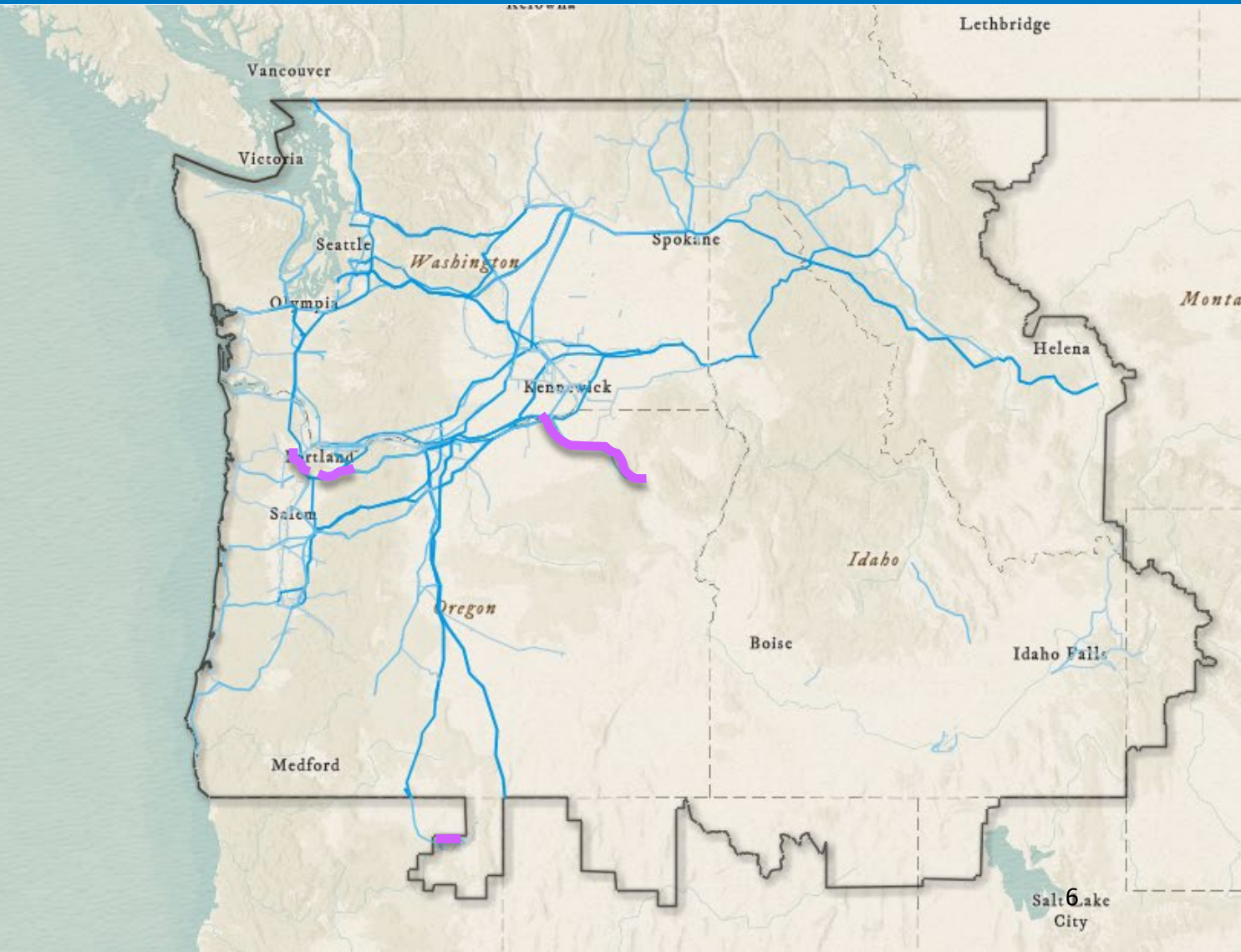
Conditional Firm Service (CFS)

- 220 TSRs totaling 15,701 MW of demand were studied for CFS
 - 208 TSRs totaling 14,610 MW requested to be studied for both Systems Conditions and Number of Hours
 - 8 TSRs totaling 750 MW requested to be studied for Number of Hours only
 - 4 TSRs totaling 341 MW requested to be studied for Systems Conditions only
- 1 TSR for up to 87 MW may be offered partial CFS
- System constraints impeding CF service offers include:
 - Paths
 - West of Garrison
 - Sub-Grids
 - Puget Sound Area
 - Portland area
 - Central Oregon Area
 - Hood River Area
 - MID-C Area Source
- As projects are energized, certain TSRs may become eligible for CFS.

Path Projects

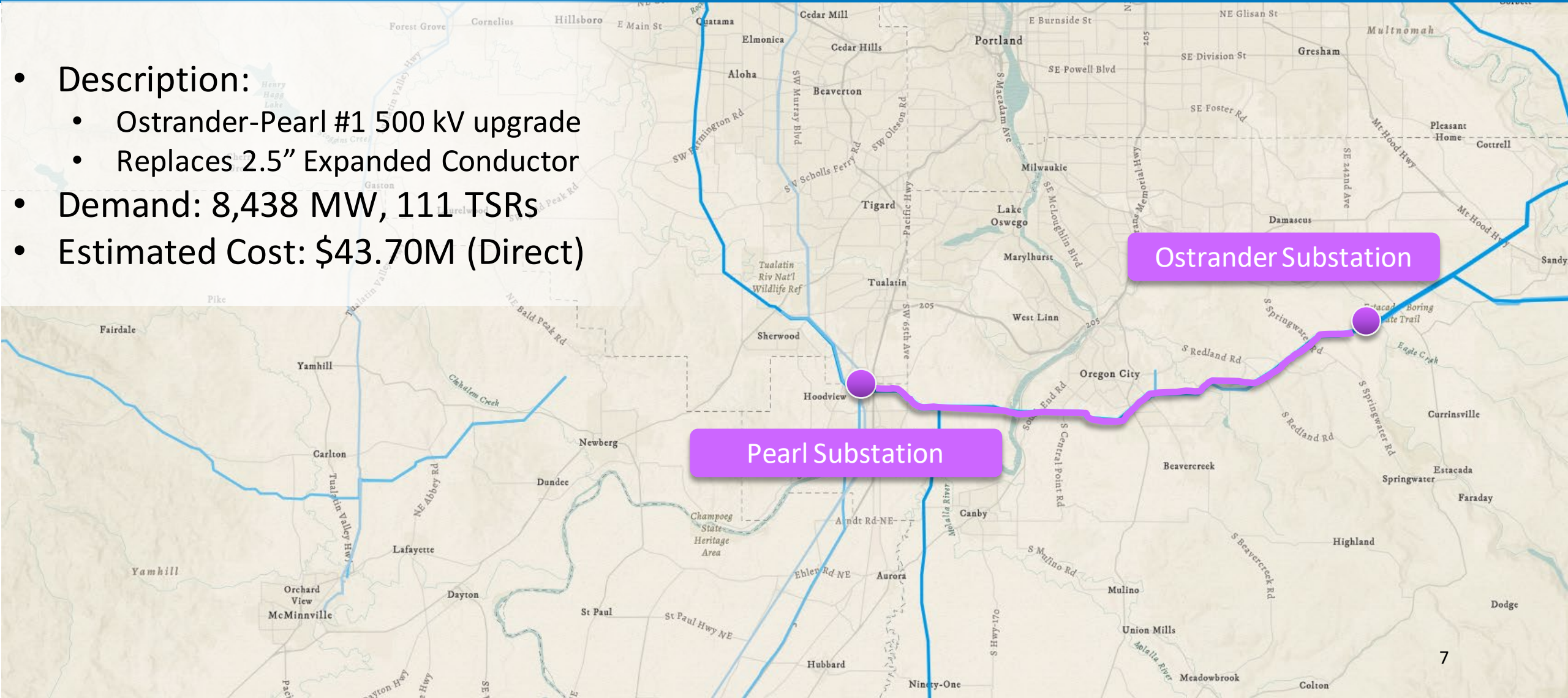
The following projects are needed in many future scenarios for reliability, expanded load service, and as renewable resources seek delivery to load:

- Cross-Cascades South
- North of Pearl
- West of Garrison/West of Hatwai/West of Lower Monumental
- Idaho – Northwest/La Grande
- Reno-Alturas (RATS)/Path 76



Cross-Cascades South

- Description:
 - Ostrander-Pearl #1 500 kV upgrade
 - Replaces 2.5" Expanded Conductor
- Demand: 8,438 MW, 111 TSRs
- Estimated Cost: \$43.70M (Direct)

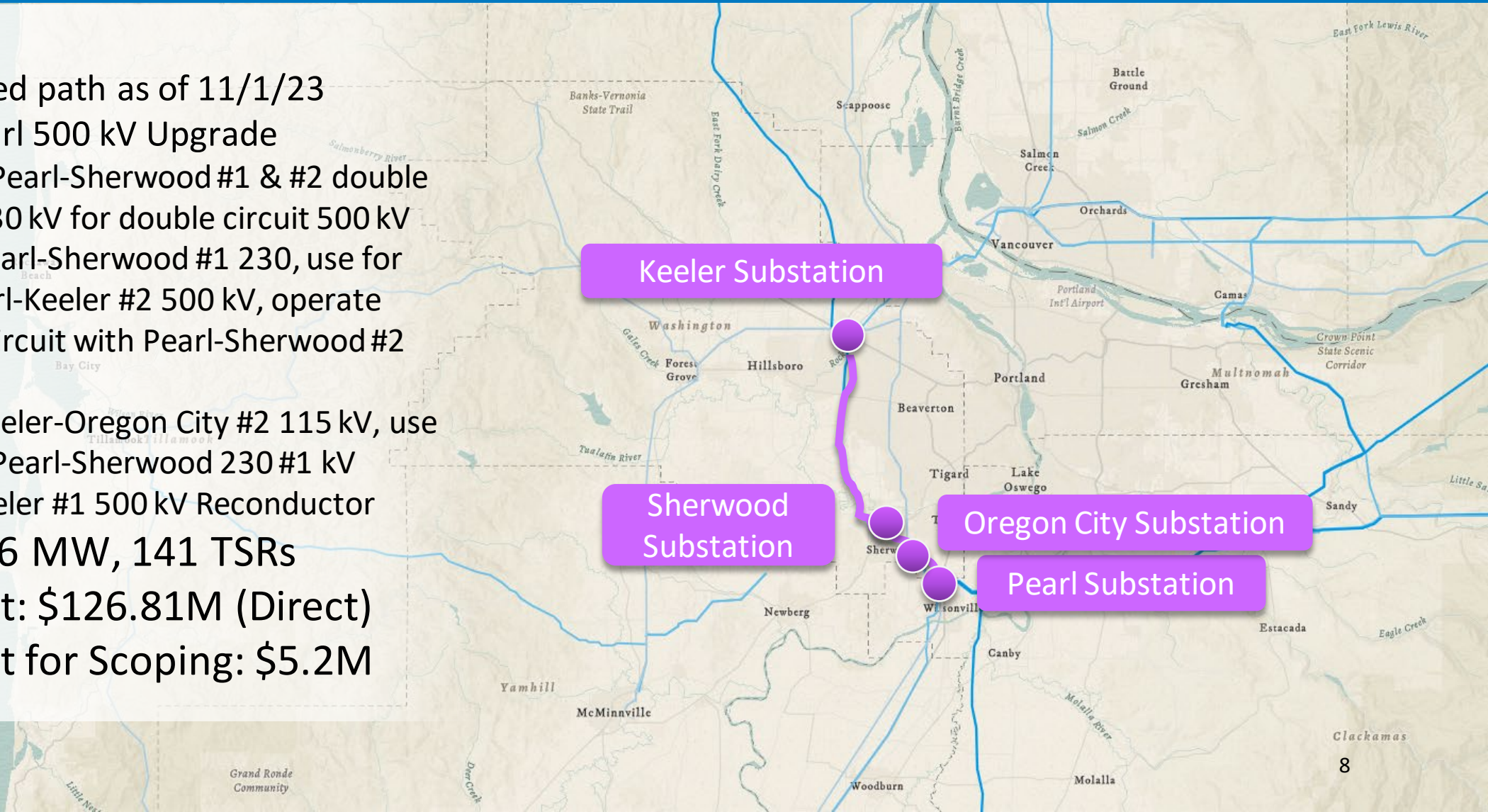


North of Pearl

- Description:

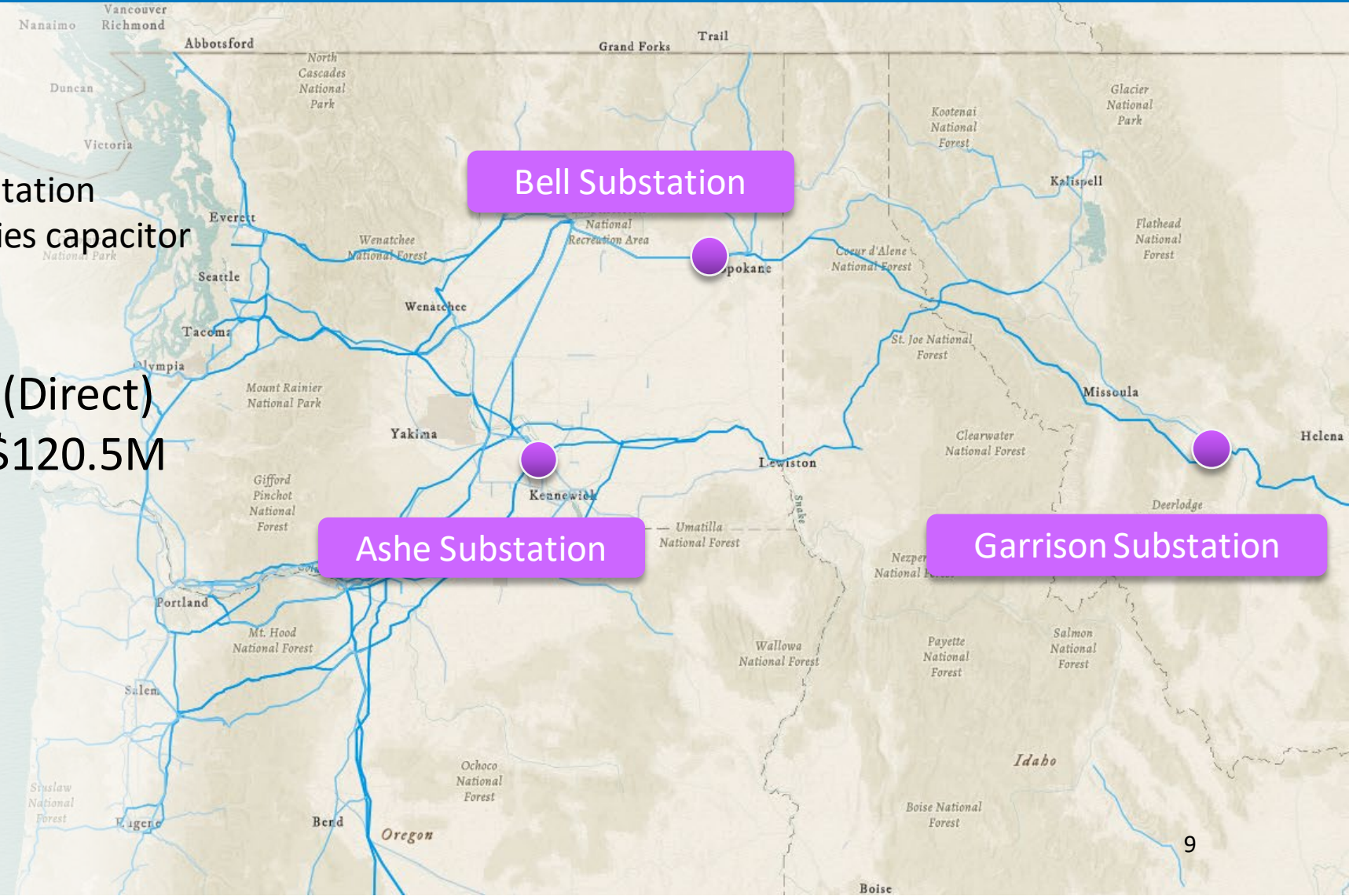
- New managed path as of 11/1/23
- North of Pearl 500 kV Upgrade
 - Rebuild Pearl-Sherwood #1 & #2 double circuit 230 kV for double circuit 500 kV
 - Retire Pearl-Sherwood #1 230, use for new Pearl-Keeler #2 500 kV, operate double circuit with Pearl-Sherwood #2 230 kV
 - Retire Keeler-Oregon City #2 115 kV, use for new Pearl-Sherwood 230 #1 kV
 - Pearl-Keeler #1 500 kV Reconductor

- Demand: 9,776 MW, 141 TSRs
- Estimated Cost: \$126.81M (Direct)
- Estimated Cost for Scoping: \$5.2M



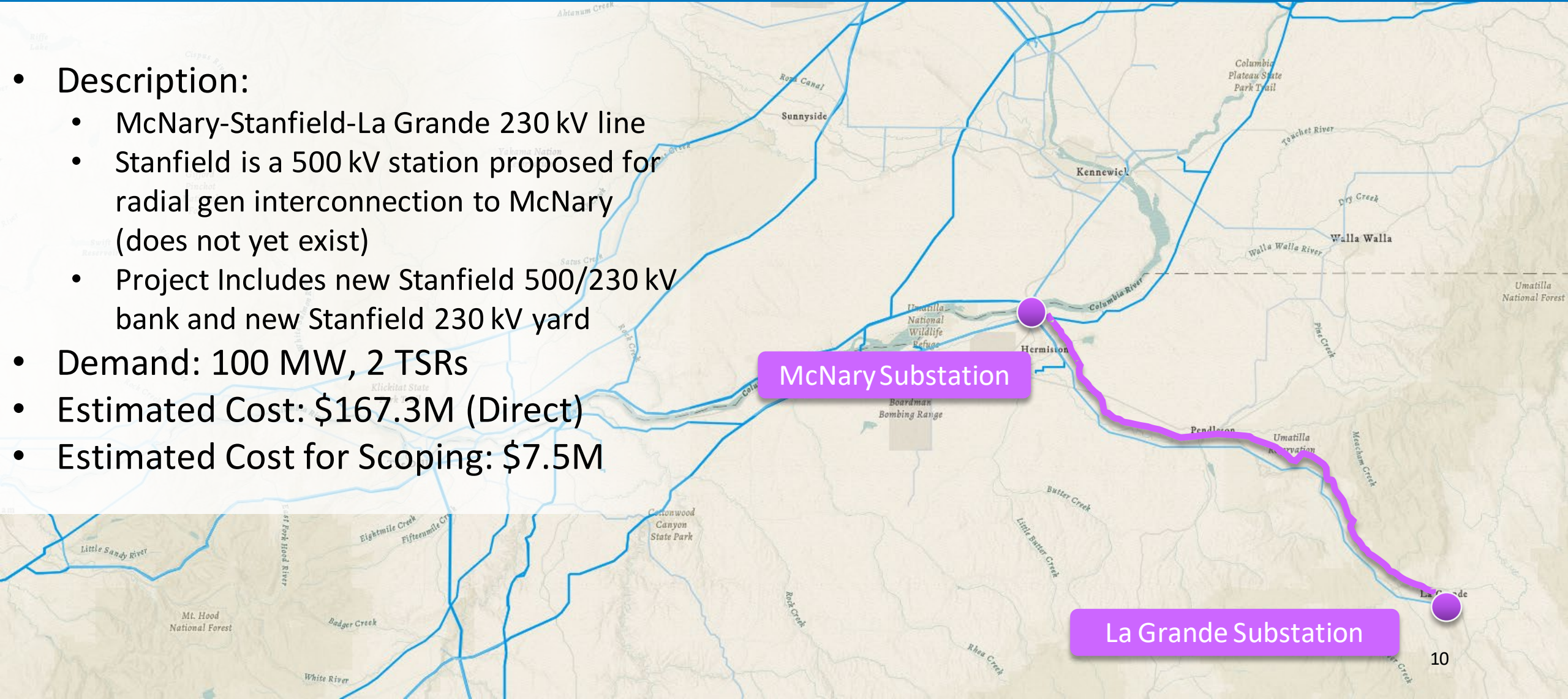
West of Garrison/Hatwai/Lower Monumental

- **Description:**
 - Garrison – Ashe 500 kV New Line
 - Includes a loop-in at Bell 500 kV station
 - Includes multiple new 500 kV series capacitor stations
- **Demand: 710 MW, 7 TSRs**
- **Estimated Cost: \$1,204.60M (Direct)**
- **Estimated Cost for Scoping: \$120.5M**



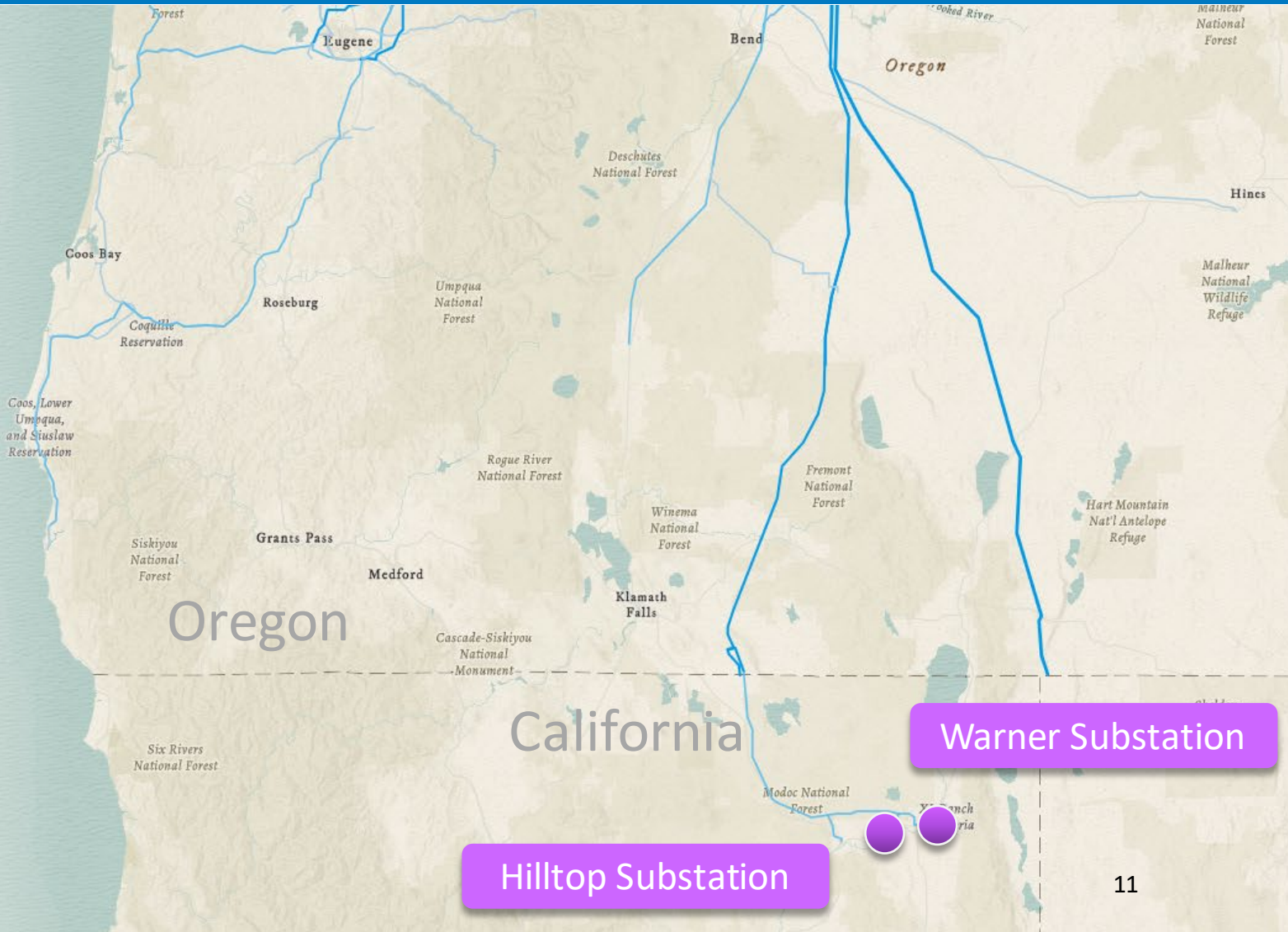
Idaho – Northwest/La Grande

- Description:
 - McNary-Stanfield-La Grande 230 kV line
 - Stanfield is a 500 kV station proposed for radial gen interconnection to McNary (does not yet exist)
 - Project Includes new Stanfield 500/230 kV bank and new Stanfield 230 kV yard
- Demand: 100 MW, 2 TSRs
- Estimated Cost: \$167.3M (Direct)
- Estimated Cost for Scoping: \$7.5M



Reno-Alturas (RATS)/Path 76

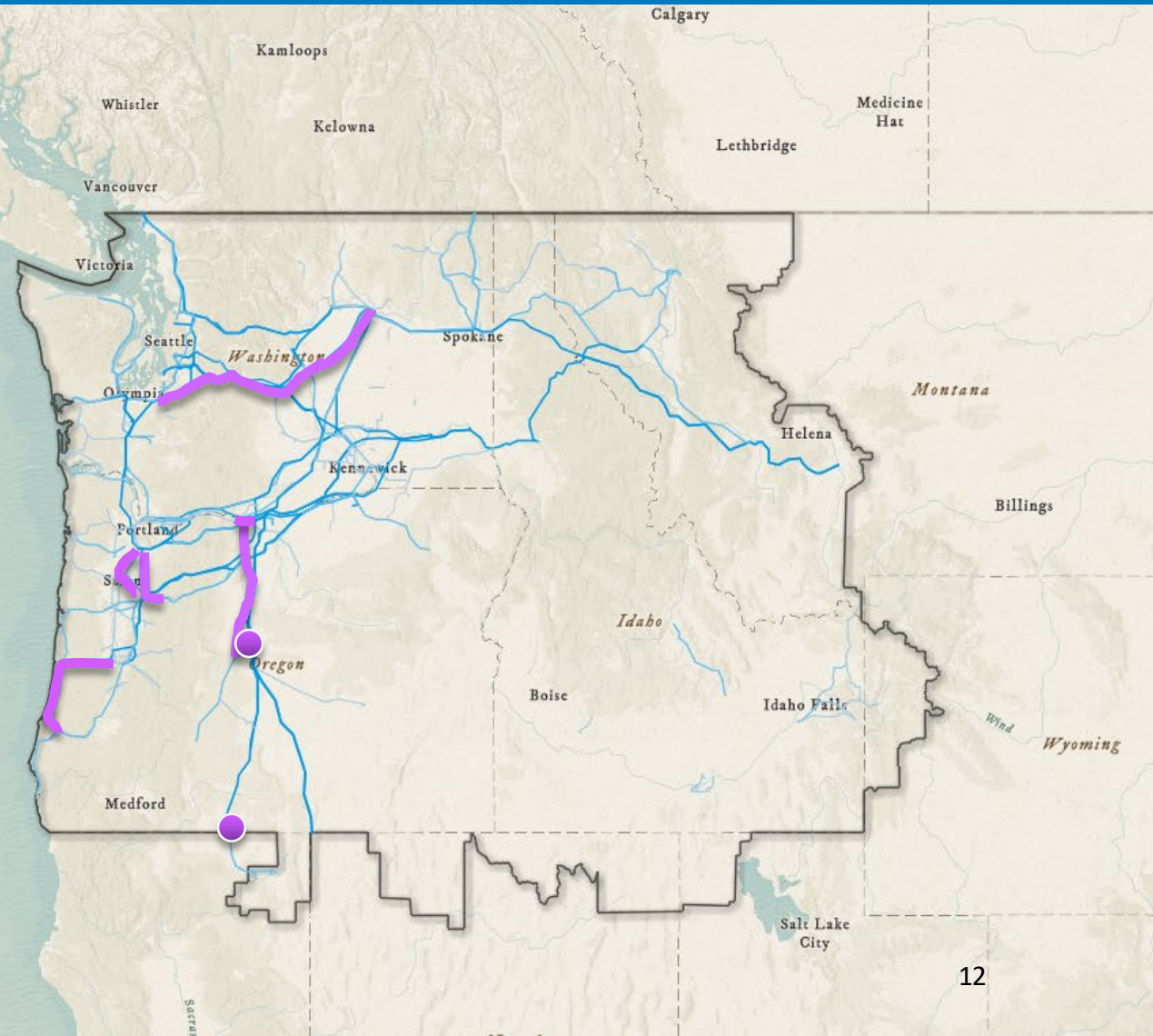
- Description:
 - RATS Reactive Addition (STATCOMS)
 - Warner 115 kV +/- 150 MVAR device
 - Hilltop 230 kV +/- 150 MVAR device
- Demand: 153 MW, 1 TSRs
- Estimated Cost: \$80.2M (Direct)
- Estimated Cost for Scoping: \$105k



Sub-Grid Projects

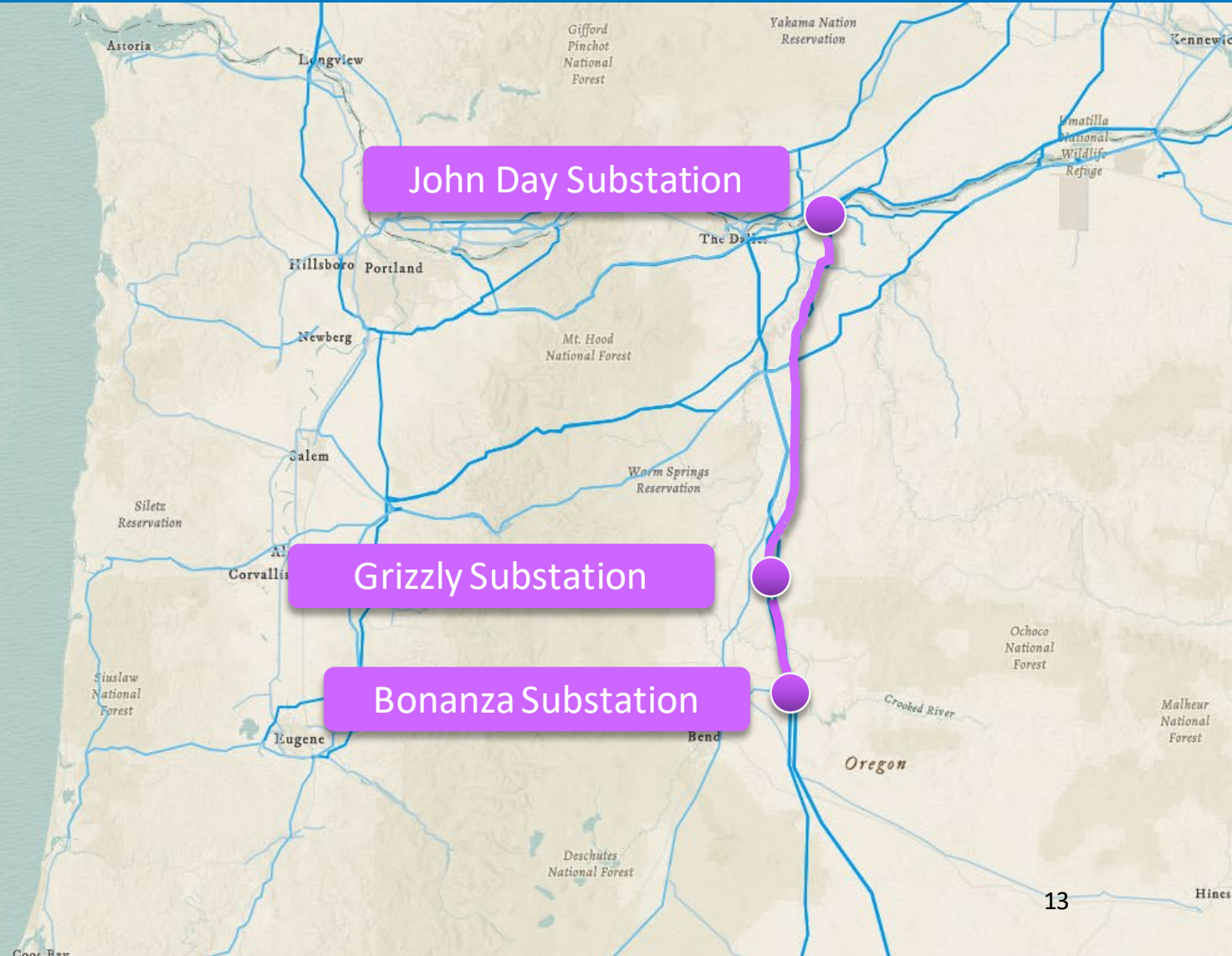
The following projects are needed in many future scenarios for reliability, expanded load service, and as renewable resources seek delivery to load:

- Central Oregon South
- Central Oregon – Big Eddy
- Central Oregon - Maupin
- Hood River/West of John Day
- Mid C (Mid-Columbia)
- Northwest Washington
- Southern Oregon Coast
- Southwest Oregon



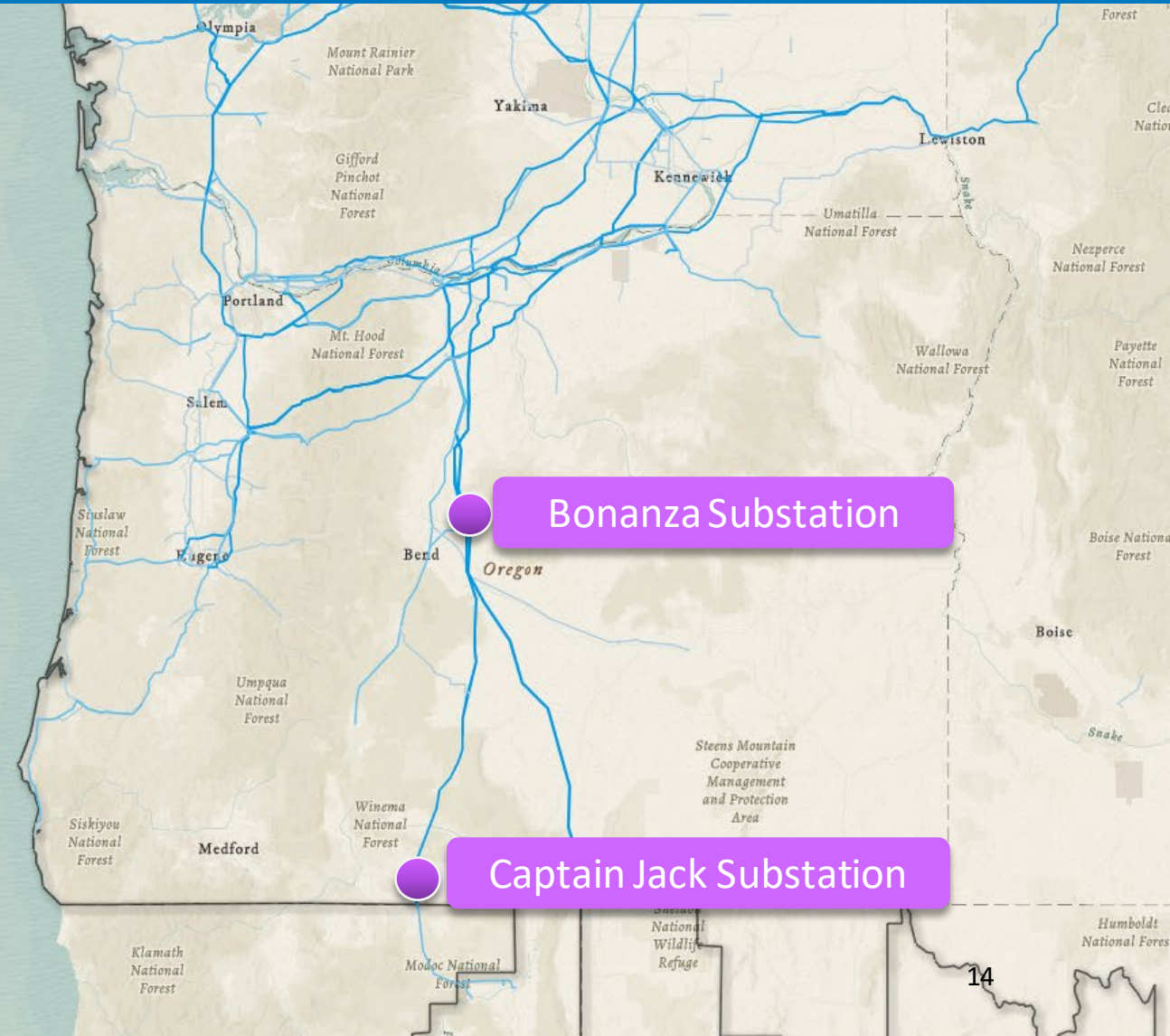
Central Oregon - South

- Description:
 - North of Grizzly 500 kV new line
 - New Grizzly-Bonanza (Ponderosa) #4 500 kV circuit
 - New John Day-Grizzly #3 500 kV circuit
 - Includes multiple new NWACI 500kV series capacitor stations
- Demand: 5,178 MW, 82 TSRs
- Estimated Cost: \$244.6M (Direct)
- Estimated Cost for Scoping: \$10M



Central Oregon – Big Eddy

- Description:
 - C.OR Dynamic Reactive upgrades
 - Bonanza (Ponderosa) 500kV +/- 300 MVAR STATCOM
 - Captain Jack 500 kV +/- 300 MVAR STATCOM
 - Required for TSRs originating from Big Eddy 500 (PDCI S>N)
- Demand: 2,400 MW, 29 TSRs
- Estimated Cost: \$169.4M (Direct)
- Estimated Cost for Scoping: \$5M



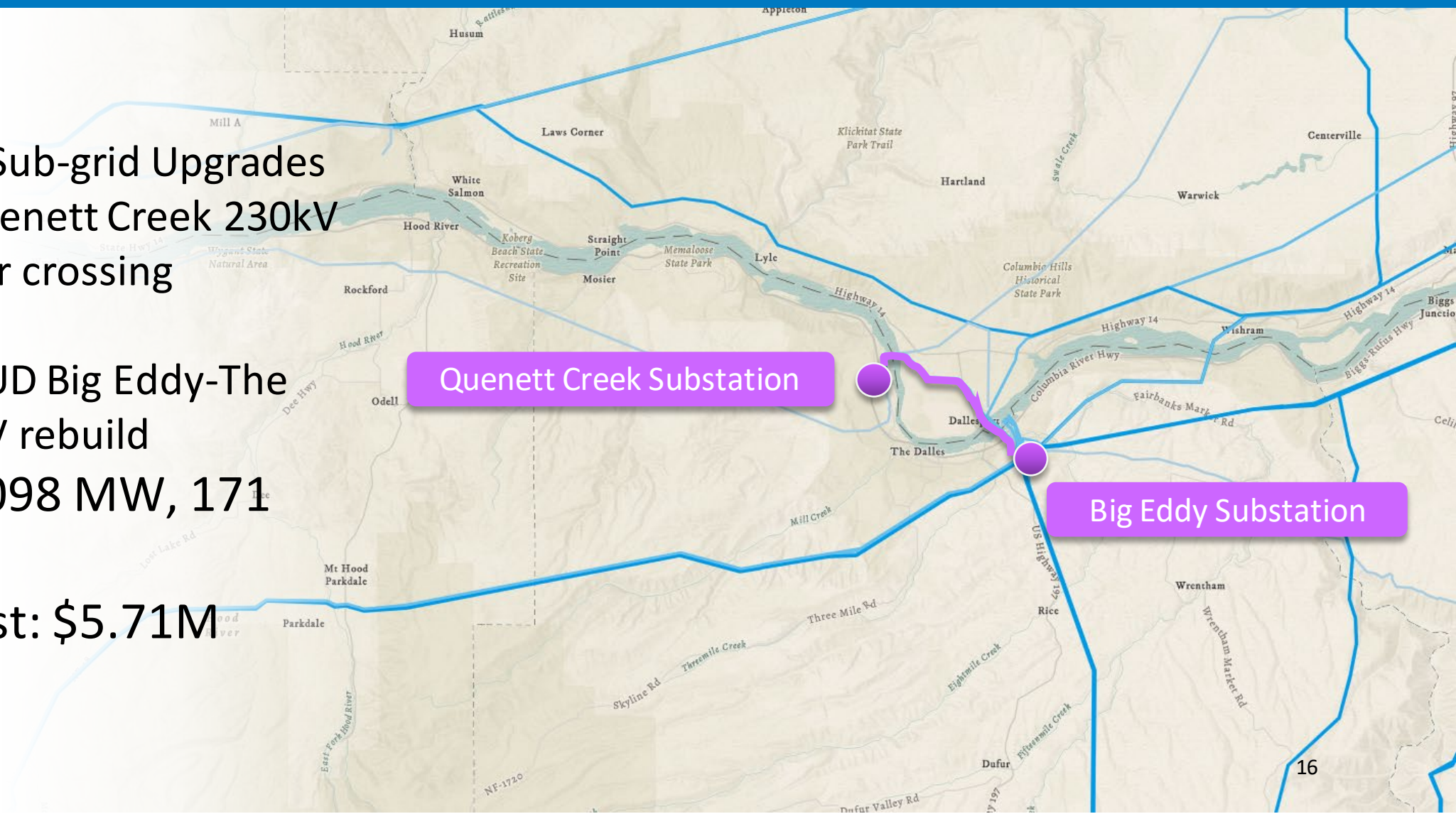
Central Oregon – Maupin

- Description:
 - Big Eddy-Redmond 230 kV upgrade
 - Rebuild Big Eddy-Boyd Ridge 230kV segment and Maupin-Redmond 230kV segments
 - Boyd Ridge 230kV is proposed GI POI midline station near Maupin
- Demand: 260 MW, 5 TSRs
- Estimated Cost: \$283.6M (Direct)
- Estimated Cost for Scoping: \$7.5M



Hood River/West of John Day

- Description:
 - Hood River Sub-grid Upgrades
 - Big Eddy-Quenett Creek 230kV rebuild (river crossing impairment)
 - N. Wasco PUD Big Eddy-The Dalles 115kV rebuild
- Demand: 12,098 MW, 171 TSRs
- Estimated Cost: \$5.71M (Direct)

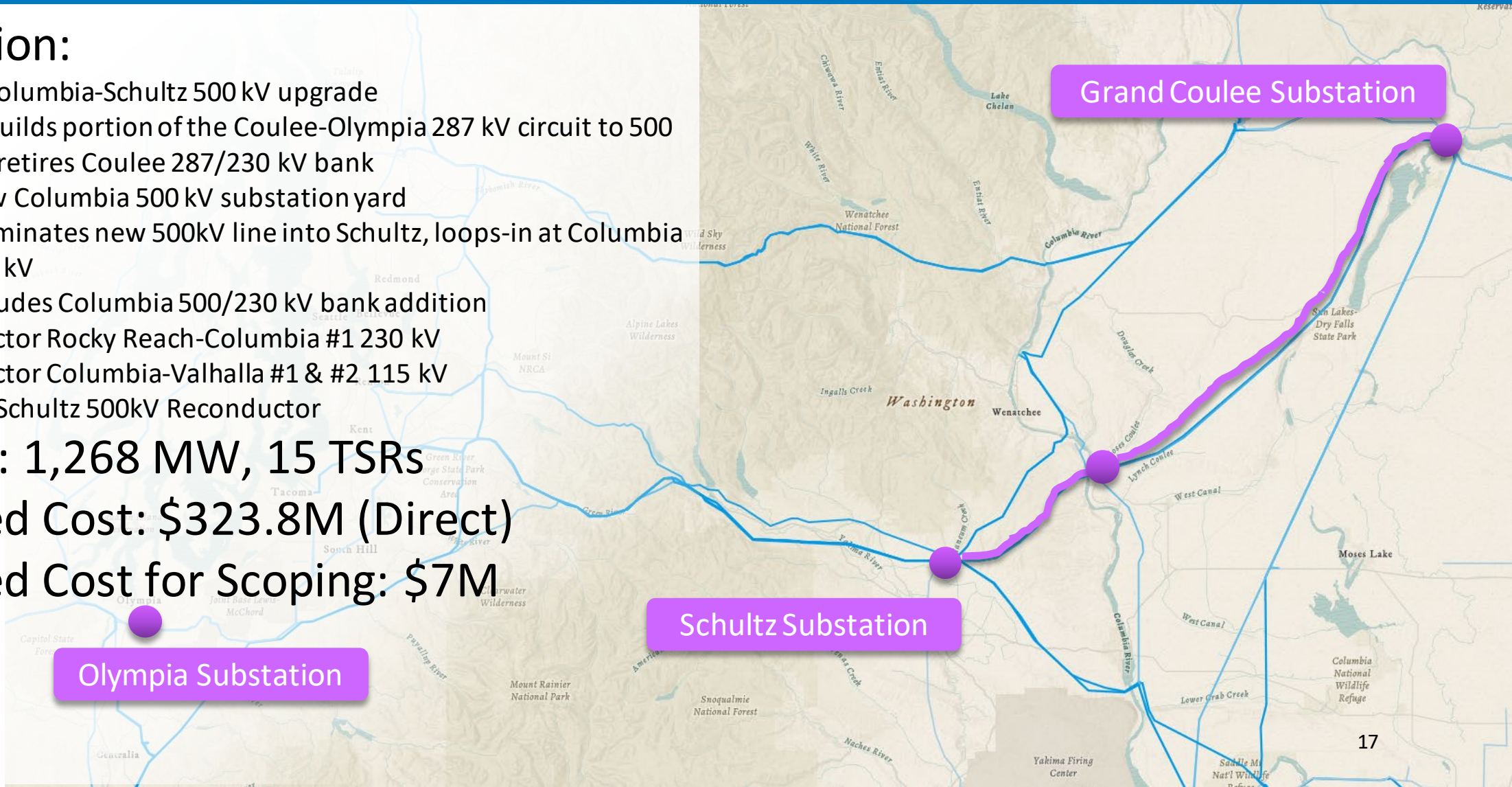


Mid C (Mid-Columbia)

Description:

- Coulee-Columbia-Schultz 500 kV upgrade
 - Rebuilds portion of the Coulee-Olympia 287 kV circuit to 500 kV, retires Coulee 287/230 kV bank
 - New Columbia 500 kV substation yard
 - Terminates new 500kV line into Schultz, loops-in at Columbia 500 kV
 - Includes Columbia 500/230 kV bank addition
- Reconductor Rocky Reach-Columbia #1 230 kV
- Reconductor Columbia-Valhalla #1 & #2 115 kV
- Vantage-Schultz 500kV Reconductor

- Demand: 1,268 MW, 15 TSRs
- Estimated Cost: \$323.8M (Direct)
- Estimated Cost for Scoping: \$7M



Northwest Washington

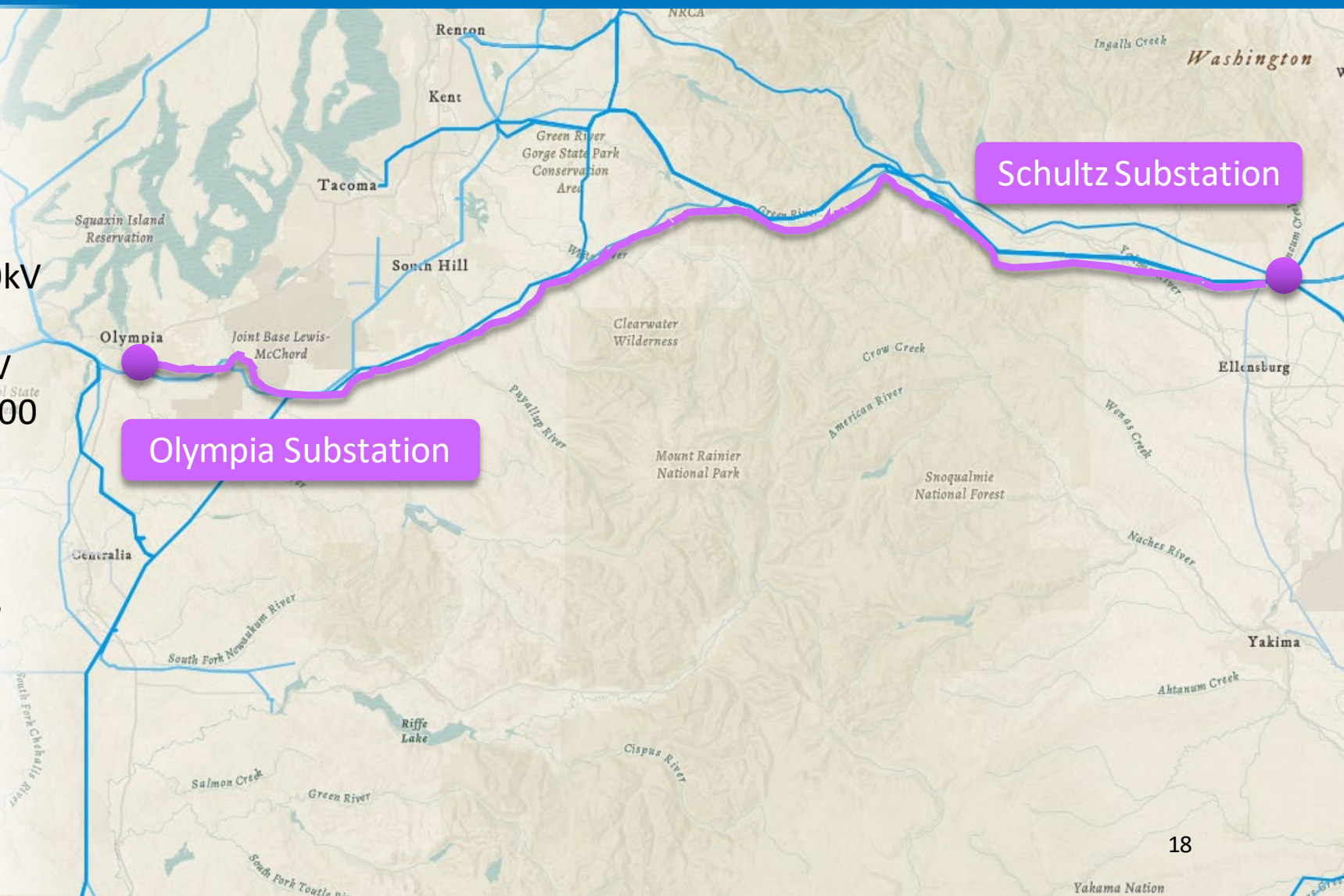
Description:

- Shultz-Olympia 500 kV upgrade
- Rebuilds portion of the Coulee-Olympia 287 kV circuit to 500 kV, retires Olympia 287/230 kV bank
- Creates new Schultz-Olympia 500kV circuit
- Includes new Olympia 500/230 kV bank and expansion of Olympia 500 kV yard
- Includes 3x new Olympia 500 kV shunt capacitors

• Demand: 6,446 MW, 90 TSRs

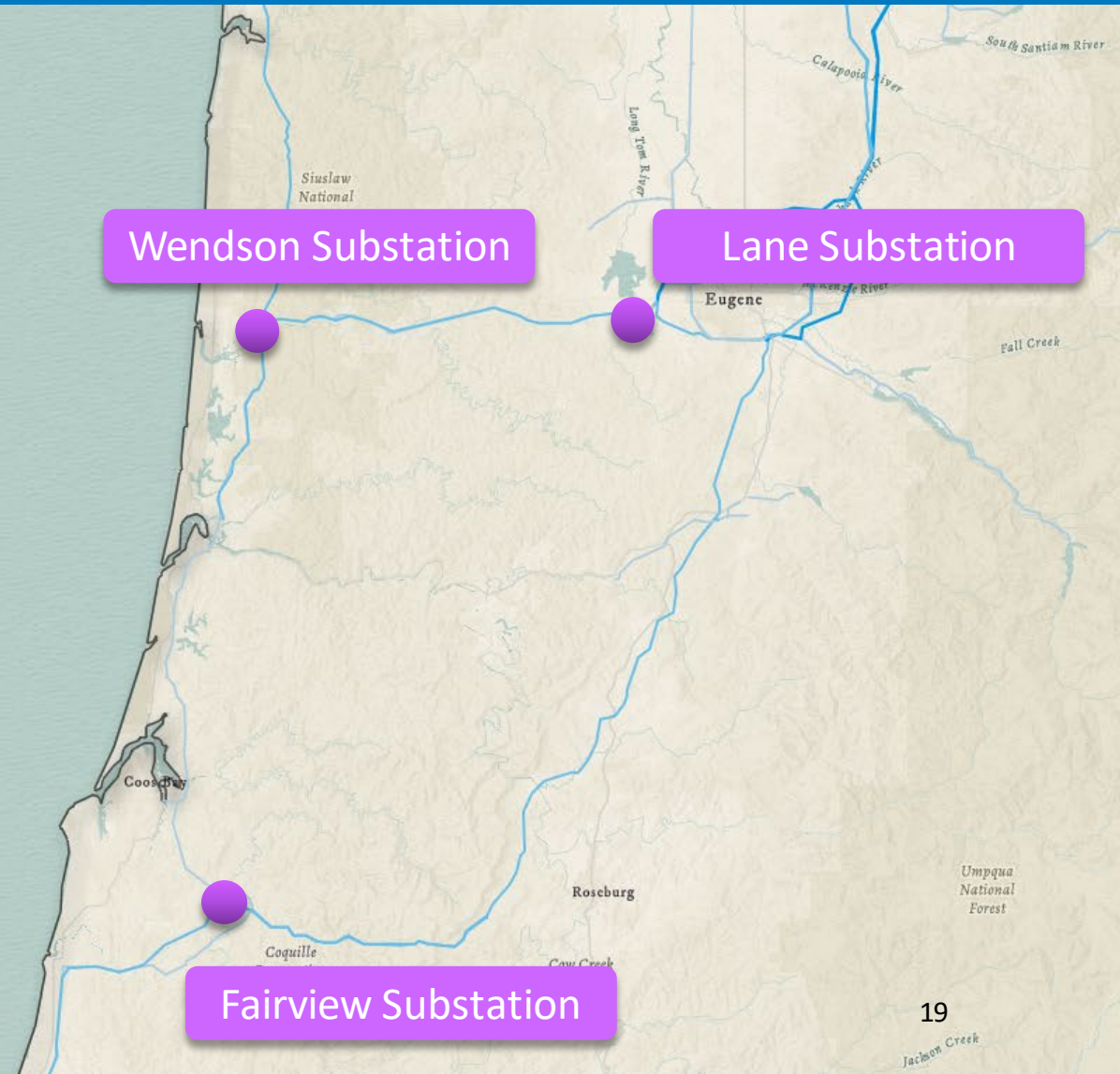
• Estimated Cost: \$852.6M
(Direct)

• Estimated Cost for Scoping:
\$9M



Southern Oregon Coast

- Description:
 - S.OR Coast 500 kV upgrade #2 (2023)
 - Includes complete tear down and rebuild of Wendson 230/115 kV station
 - Constructs new Wendson 500 kV yard with new 500/230 kV bank
 - Loops the proposed new Fairview-Lane 500 kV (from 2022 TSEP: S.ORC 500kV upgrade #1) into Wendson 500 kV
- Demand: 1,840 MW, 28 TSRs
- Estimated Cost: \$107.6M (Direct)
- Estimated Cost for Scoping: \$7.5M



Southwest Oregon

Description:

- North of Marion upgrade #1
 - Build new Chemawa 500 kV station, including new 500/230 kV bank
 - Rebuild Pearl – Chemawa 230 kV to 500 kV
 - Rebuild Chemawa – Santiam 230 kV to 500 kV
 - Swap multiple Pearl 500 kV line terminals
- North of Marion upgrade #2
 - Rebuild Pearl – Marion #1 500 kV (2.5" EXP conductor)
 - Rebuild Oregon City – Chemawa 115 kV river crossing
 - Add new Chemawa 230/115 kV #2 bank

Demand:

- North of Marion upgrade #1 – 9,586 MW, 132 TSRs
- North of Marion upgrade #2 – 7,796 MW, 94 TSRs

Estimated Cost: \$300.11M (Direct)

- North of Marion upgrade #1 = \$195.71M
- North of Marion upgrade #2 = \$104.40M

Estimated Cost for Scoping:

- North of Marion upgrade #1 = \$10M
- North of Marion upgrade #2 = \$25k

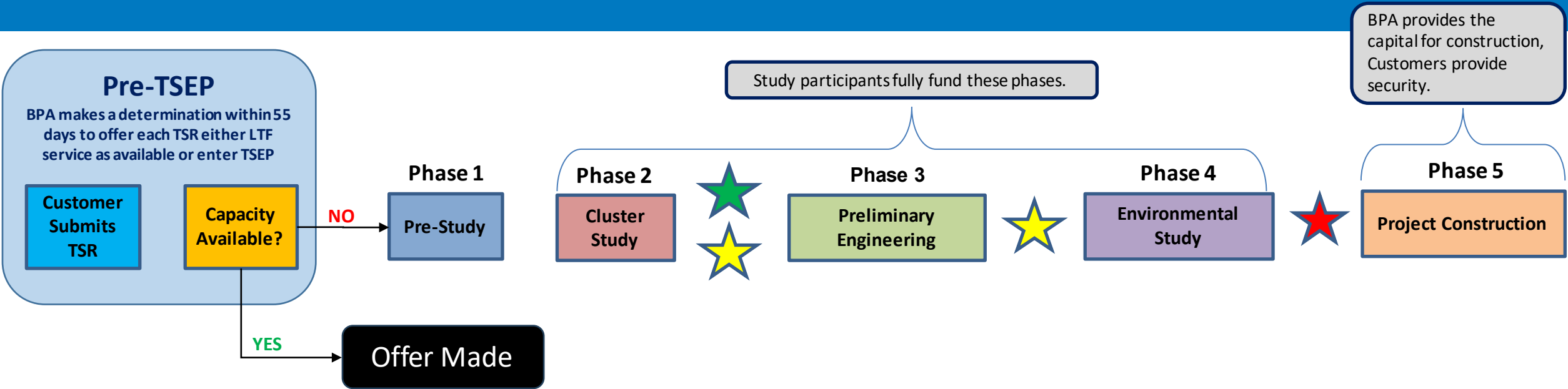


TSEP Cluster Study Status and Next Steps

- Participant Closeout Packages were released the week of Jan 8 – Jan 12
 - Cover Letter
 - Plans of Service
 - Preliminary Rate Analysis
 - Scoping Estimates per TSR
 - CFS Results
 - Election Forms
 - 2023 CS Report
- Jan 15 – Feb 2, 2024 - Held Participant Review Meetings
- Currently processing the Election Forms
- Issue Next Step Agreements by March 28th
 - Preliminary Engineering Agreements (PEA)
 - Environmental Study Agreements (ESA), if applicable
- Next Update will be May 2024

Appendix

TSR Study & Expansion Process (TSEP) Overview



At each of these points, BPA refreshes project-specific information, and the customers may decide whether to proceed. Therefore, these steps must be completed sequentially for each project, rather than in parallel.

While BPA does not have any “off ramps,” the decision to build lies with the Administrator and BPA can influence the customers’ decision via the rate selected.

	Customer Closeout Package – Study participants are provided with a study report, a closeout letter detailing the requirements for each of their TSRs to obtain service, and an election form to determine the next steps for each of their TSRs. If applicable, the customer may be tendered an offer for LTF service.
	Next Step Agreements - Prior to the commencement of a next phase, BPA will provide customers with updated information on the rate treatment, percentage shares of projects, other non-binding information, such as estimated project costs or timelines. An offer of CFS, if applicable, maybe be made at this time. BPA will provide the customer with a Preliminary Engineering agreement and/or Environmental Study agreement as appropriate.
	Service Agreement - Prior to the Administrator’s construction decision, BPA will determine whether to offer the requested service at an embedded or incremental rate (subject to a 7(i) process) . BPA will offer the Customer a service agreement for the requested service. Customers will provide security.

Path Projects

2023 CS Path Projects		TSRs	Demand	Direct Costs (millions \$)	Estimated Energization
Cross Cascades South (CCS)	<ul style="list-style-type: none"> Ostrander-Pearl#1 500 kV upgrade 	111	8,438 MW	\$43.70	2032
North of Pearl	<ul style="list-style-type: none"> North of Pearl 500 kV upgrade 	141	9,776 MW	\$126.81	2032
West of Garrison/ West of Hatwai/ West of LoMo	<ul style="list-style-type: none"> Garrison-Ashe 500 kV new line 	7	710 MW	\$1,204.60	2038
ID-NW/ La Grande	<ul style="list-style-type: none"> McNary-Stanfield-La Grande 230 kV line 	2	100 MW	\$167.30	2038
RATS / Path 76	<ul style="list-style-type: none"> RATS Reactive Additions (STATCOMs) 	1	153 MW	\$80.20	2032

Sub-Grid Projects

<u>2023 CS BPA Sub-grid Projects</u>		TSRs	Demand	Direct Costs (millions \$)	Estimated Energization
C.OR-South	<ul style="list-style-type: none"> North of Grizzly 500 kV new line 	82	5,178 MW	\$244.60	2038
C.OR-BIGE POR	<ul style="list-style-type: none"> C.OR Dynamic Reactive upgrades 	29	2,400, MW	\$169.40	2032
C.OR-Maupin	<ul style="list-style-type: none"> Big Eddy-Redmond 230 kV upgrade 	5	260 MW	\$283.60	2035
Hood River/ West of John Day	<ul style="list-style-type: none"> Hood River Sub-grid upgrades 	171	12,098 MW	\$5.71	TBD
Mid-C	<ul style="list-style-type: none"> Coulee-Columbia-Schultz 500 kV upgrade and other 230 kV & 115 kV upgrades 	15	1,268 MW	\$323.80	2038
NW WA	<ul style="list-style-type: none"> Shultz-Olympia 500 kV upgrade 	90	6,446 MW	\$852.60	2038
S.OR Coast	<ul style="list-style-type: none"> S.OR Coast 500 kV upgrade #2 (2023) 	28	1,840 MW	\$107.61	2034
Southwest Oregon	<ul style="list-style-type: none"> North of Marion upgrade #1 	132	9,586 MW	\$195.71	2038
	<ul style="list-style-type: none"> North of Marion upgrade #2 	94	7,796 MW	\$104.40	2032

Other Required Projects (Contingent or Past TSEP)

Path	Other Required Projects	TSEP Study Cycle	Estimated Energization
South of Allston	· BPA/PGE Ross-Rivergate 230 kV rebuild	2022	2030
	· Schultz-Wautoma 500 kV series capacitor	2019	2024
Raver-Paul	· BPA Chehalis to Cowlitz Tap 230 kV Rebuild	2022	2028
	· Schultz-Wautoma 500 kV series capacitor	2019	2024
Cross Cascades North	· BPA Schultz-Raver 3 & #4 500 kV series cap additions (phase 1)	2020	2030
	· BPA Schultz-Raver #3 & #4 500kV Reconductor	2022	2030
	· BPA Schultz-Raver #4 500 kV series cap upgrade (phase 2)		
	· BPA Olympia 230 kV +350/-300 MVAR SVC		
	· BPA Paul 500 kV 221 MVAR shunt cap		
Cross Cascades South	· BPA Big Eddy-Chemawa 500 kV re-build & reconfiguration	2022	2030
	· BPA Pearl-Ostrander #1 500kV upgrade (2.5" EXP reconductor)	2023	2032
North of Pearl	· BPA/PGE Pearl-Sherwood-Mcloughlin Reinforcement	2021	TBD
	· BPA Pearl-Keeler #1 500kV upgrade (2.5" EXP reconductor)	2023	2030
North of Marion	· BPA Pearl-Marion #1 500kV upgrade (2.5" EXP reconductor)	2023	2032

Other Required Projects (Contingent or Past TSEP)

Sub-grid	Other Required Projects	TSEP Study Cycle	Estimated Energization
C.OR-500 kV Upgrade (2022)	• BPA Grizzly-Captain Jack 500 kV re-sag (100C MOT)	2022	2033
	• BPA Bonanza 500kV station additions		
	• BPA New Bonanza 500/230 kV new transformer bank		
	• BPA New Bonanza-Captain Jack 500 kV circuit, with Series Compensation at Sand Springs, Fort Rock & Sycan		
C.OR-230 kV Upgrade (2022)	• BPA Bonanza 230 kV station additions	2022	2033
	• BPA New Bonanza 500/230 kV new transformer bank		
S.OR Coast	• BPA Alvey-Rogue-Fairview-500 kV (ARF500)	2022	2033
	• BPA Santiam 230 kV series BSB		
	• BPA Chemawa-Santiam 230 kV rebuild		
	• PGE Santiam-Bethel 230 kV rebuild/reconductor	2022	TBD
Hood River Sub-Grid	• BPA Big Eddy-Quenett Creek #1 & #2 230 kV upgrade • N. Wasco PUD Big Eddy-The Dalles 115kV rebuild	2023	TBD
NW WA Sub-Grid	• Covington #4 & #5 500/230 kV transformer bank upgrades	2023	2028
MidC Sub-Grid	• Vantage-Schultz 500 kV line reconductor	2023	TBD