Portland General Electric: Transmission Overview

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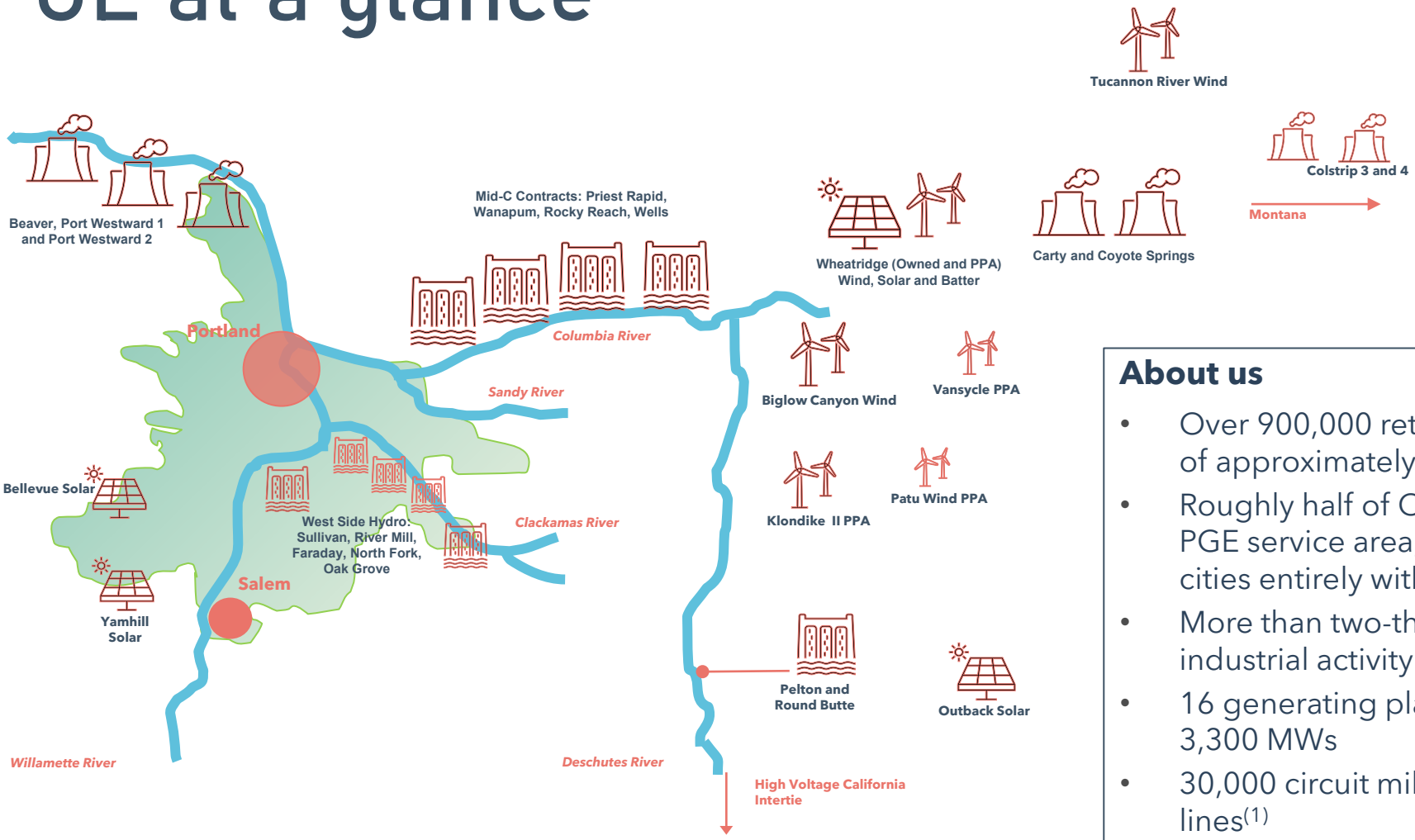
PGE at a glance



About us

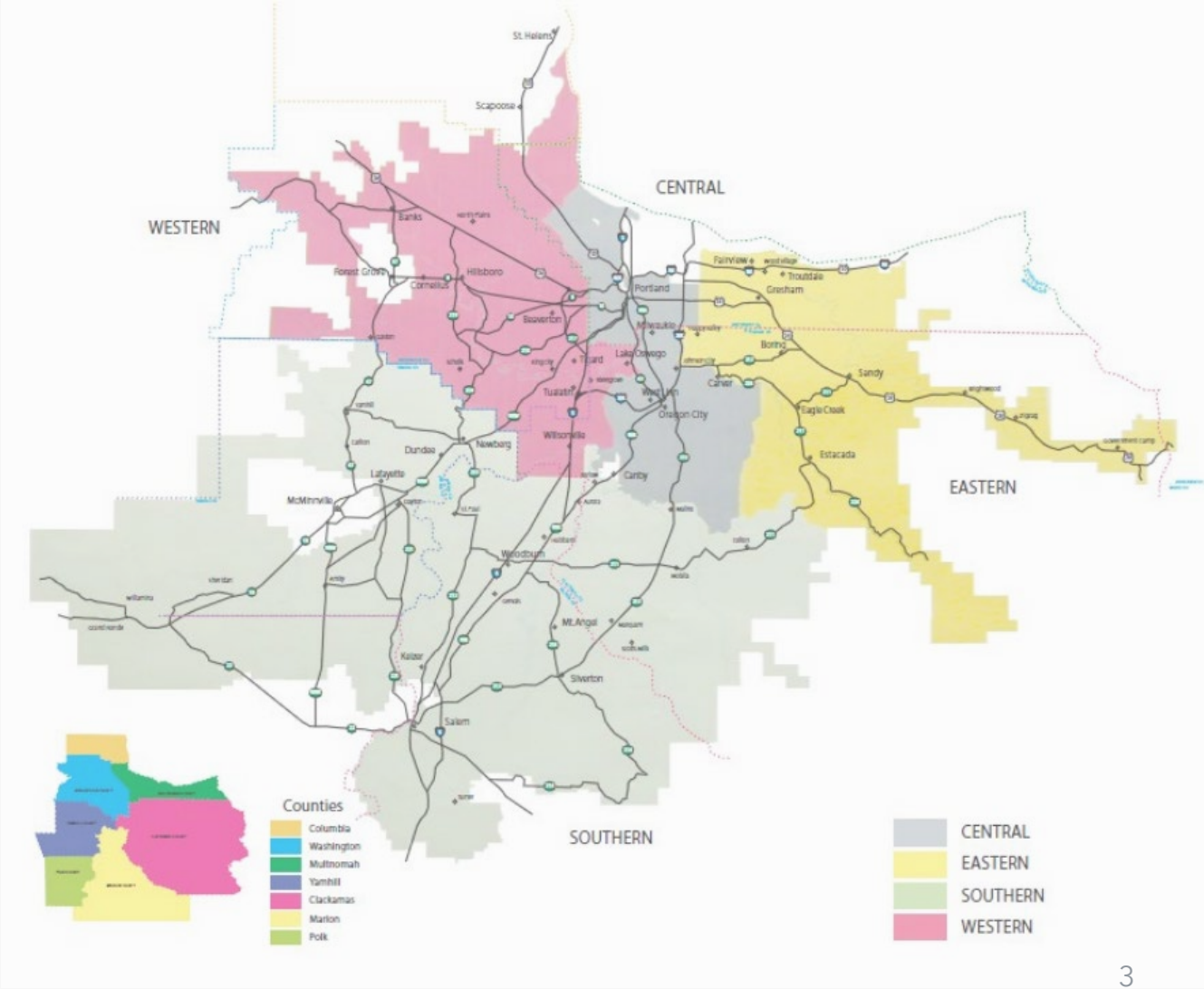
- Over 900,000 retail customers within a service area of approximately 2 million residents
- Roughly half of Oregon's population lives within PGE service area, encompassing 51 incorporated cities entirely within the State of Oregon
- More than two-thirds of Oregon's commercial and industrial activity occurs in PGE service area
- 16 generating plants, 14 of which are in Oregon; 3,300 MWs
- 30,000 circuit miles of transmission and distribution lines(1)
- $5.5M in charitable giving and 18,000 volunteer hours, with 69% employee participation (2022)
- Approximately 3,000 employees across the state of Oregon

PGE's transmission system

PGE serves approximately 4,000 square miles of service area, with 1,630 circuit miles of sub-transmission and transmission voltage (ranging from 57-500 kV).

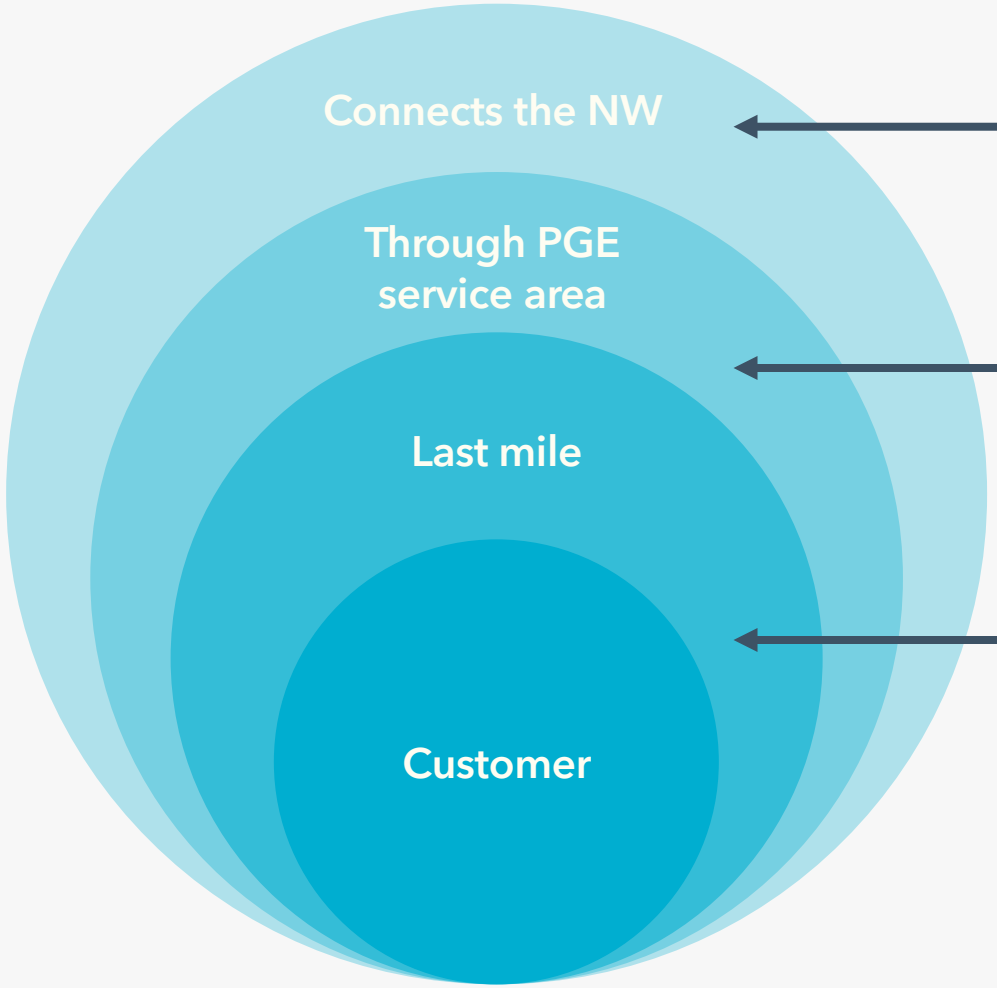
This system is generally used to deliver electricity wheeled via BPA.

Voltage	Circuit Miles
500 kV	268
230 kV	329
115 kV	570
57 kV	463



System data per PGE OASIS: Near-term local transmission plan, December 2022

Transmission systems essential to PGE



Regional, Interregional Projects

Expand access to least cost intermittent resources, such as wind in Wyoming and sun in the desert Southwest

BPA & PGE Interface

Incremental capacity is needed to bring power through our region via BPA's system, which encapsulates our service area. Transfer capability is needed to get the power into PGE's area

PGE's System

Essential for last-mile transmission to serve load from assets on and off our system

PGE's approach to transmission is evolving

PAST

BPA's transmission system largely fulfilled PGE resource import needs.

PGE's transmission planning primarily focused on localized NERC reliability needs.

Generation resources were largely located near existing transmission footprint.

PRESENT

BPA's transmission system is fully subscribed.

PGE is forecasting 3500-4500 MW of new resource need to meet the HB 2021 decarbonization target.

Additional transmission is needed to ensure reliable and affordable service from new locations.

FUTURE

Must expand capacity at BPA & PGE interface, preparing PGE transmission assets for additional resources.

Seeking transmission access existing rights to access renewable resource zones.

Address transmission constraints to rapid decarbonization per HB 2021 and enable region's economic development.

- North American Electric Reliability Corporation **(NERC)**
- Bonneville Power Administration **(BPA)**

Transmission study planning process

PGE's Transmission System is required to supply projected Firm Transmission Services over the range of forecast system demands.

Studies are performed annually to evaluate where transmission upgrades may be needed to meet the performance requirements per NERC and WECC standards.

Studies incorporate load forecast, forecasted resources, economic studies, public policy, stakeholder feedback.

PGE 2022 TPL-001 Transmission Planning Base Cases

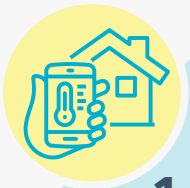
		Study Year	Origin WECC Base Case	PGE Case Name	PGE System Load (MW)
SUMMER	Year One/Two Case	2024	2022 HS3	24 HS PLANNING	4735
	Year Five Case	2027	2027 HS2	27 HS PLANNING	5157
	Year One/Two Sensitivity	2024	2022 HS3	24 HS SENSITIVITY	5104
	Year Five Sensitivity	2027	2027 HS2	27 HS SENSITIVITY	5685
	Long Term Case	2032	2032 HS1	32 HS PLANNING	5554
WINTER	Year One/Two Case	2024-25	2022-23 HW2	24-25 HW PLANNING	4563
	Year Five Case	2027-28	2026-27 HW2	27-28 HW PLANNING	4841
	Year One/Two Sensitivity	2024-25	2022-23 HW2	24-25 HW SENSITIVITY	5022
	Year Five Sensitivity	2027-28	2026-27 HW2	27-28 HW SENSITIVITY	5505
	Long Term Case	2032-33	2031-32 HW1	32-33 HW PLANNING	5296
SPRING	Year One/Two Off Peak Case	2024	2022 LSP1	24 LSP PLANNING	2696
	Year Five Off Peak Case	2027	2027 HS2	27 LSP PLANNING	3147
	Year One/Two Off Peak Sensitivity	2024	2022 LSP1	24 LSP SENSITIVITY	2696
	Year Five Off Peak Sensitivity	2027	2027 HS2	27 LSP SENSITIVITY	3147

Info per PGE OASIS: Near Term Local Transmission Plan, December 2022

PGE's study highlights upgrades needed to serve reliably.

Transmission is key to decarbonizing reliably and affordably

Clean Energy Plan and Integrated Resource Plan submitted to PUC March 31, 2023



1. Customer Actions

Energy efficiency and demand response.

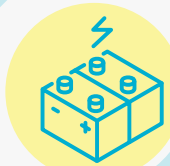
2. Community based renewable energy

Primarily small solar.

Virtual Power Plant Platform

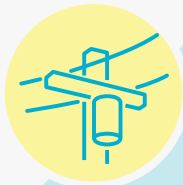
3. Large Renewables

Solar and wind throughout the West.



4. Storage

Primarily batteries.



5. Transmission

Both local and regional.

Increasing transmission capacity

We are using all the tools in our toolbox to increase transmission capacity

Advancing more than a dozen transmission projects with significant involvement of other jurisdictions, including the BPA.

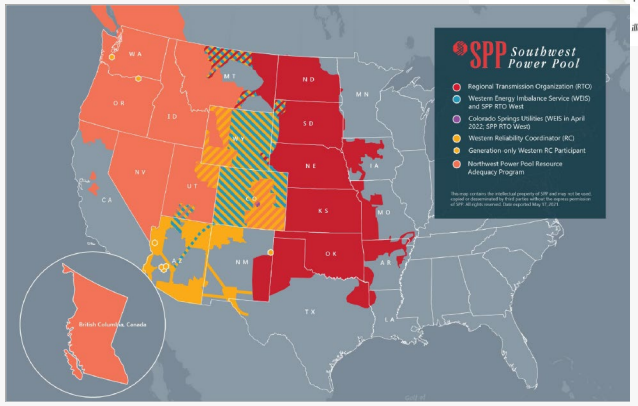
Actively engaging with BPA to increase transmission capacity by collaborating to accelerate upgrades and reinforce key substations and transmission lines along our 230kV and 500kV systems.

Engaging residential and commercial customers to add value to the grid by participating in programs that compensate customers for lending their demand flexibility to the operation of the grid.

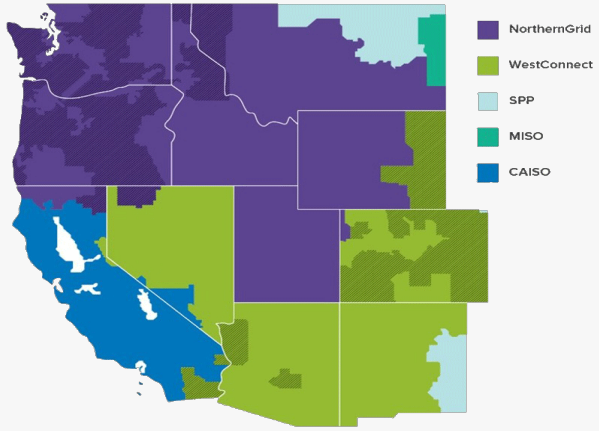
Deploying grid edge technology such as remote sensors, dynamic line ratings, and the use of advanced conductor materials that help increase capacity.

Current Regional Efforts

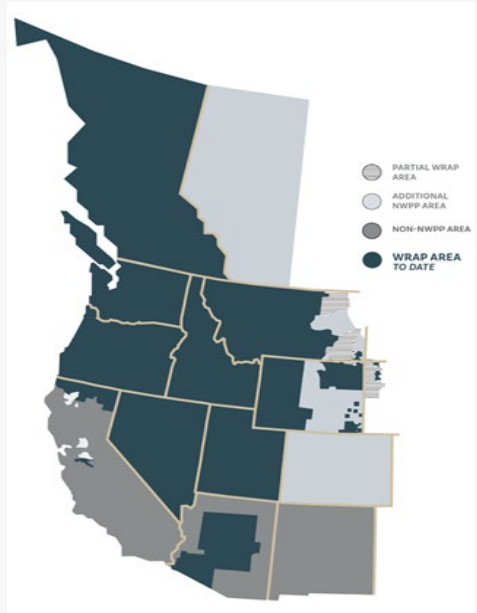
EDAM/Markets+



Western Transmission Expansion Coalition



Western Resource Adaquacy Program



Thank you.

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