

# GETs and Transmission

PSE's Environment & Experience

**Shaun Foster**  
Director, Transmission



# PSE has served the Puget Sound region for over 100 years

PSE



-  Combined electric and natural gas service
-  Electric service
-  Natural gas service

## PSE Employees:

- 3250 employees

## PSE serves approximately:

- 1,240,000 electric customers
- 881,000 natural gas customers
- 6,000 sq. miles in 10 counties, primarily in Western WA

# Washington's Clean Energy Transformation Act (CETA)

PSE



## Coal-free electricity

PSE eliminated coal-fired resources from PSE's allocation of electricity to Washington retail electric customers in 2025, **750 MW total capacity removed**



## Carbon-neutral electric supply

PSE is committed to achieving a **net zero carbon emissions** electric supply for our customers by 2030, consistent with Washington State's CETA



## 100% clean electricity supply

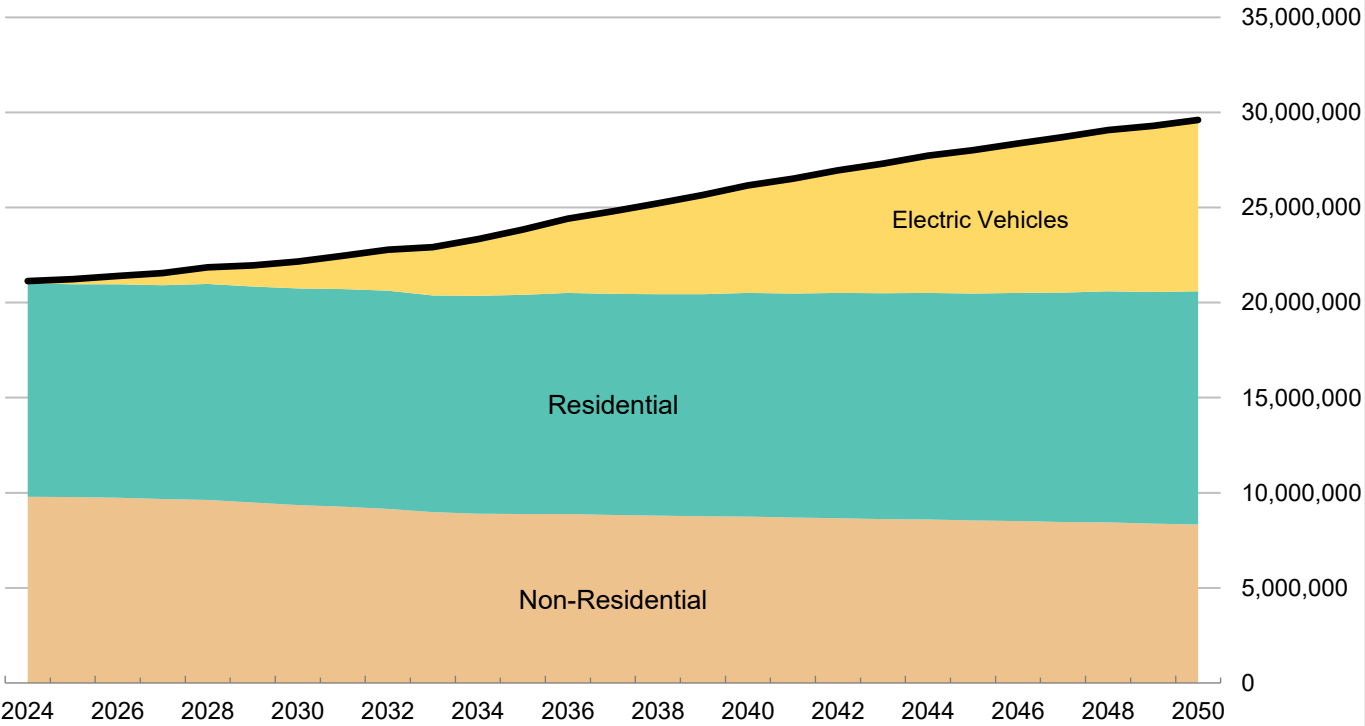
PSE is committed to achieving a **100% non-emitting electric supply** by 2045, consistent with Washington State's CETA

## PSE GROWTH TRENDS

- Electric load is forecasted to grow at an average annual rate of 1.4% over the next 20 years.
- Energy consumption from electric vehicle charging forecasted to grow 25% annually, from about 6% of total system load in 2030 to about 25% of system load in 2045.

**System Level Electric: Forecast of Delivered Load**

Units: MWh  
Data Sources: Load Forecast models



Source: PSE 2024 Load Forecast

# Not addressing capacity needs can lead to accelerated equipment failure, public safety concerns, wide-spread outages, & not meeting policy obligations



Operating equipment at its limits increases heat stress, accelerating wear and failure

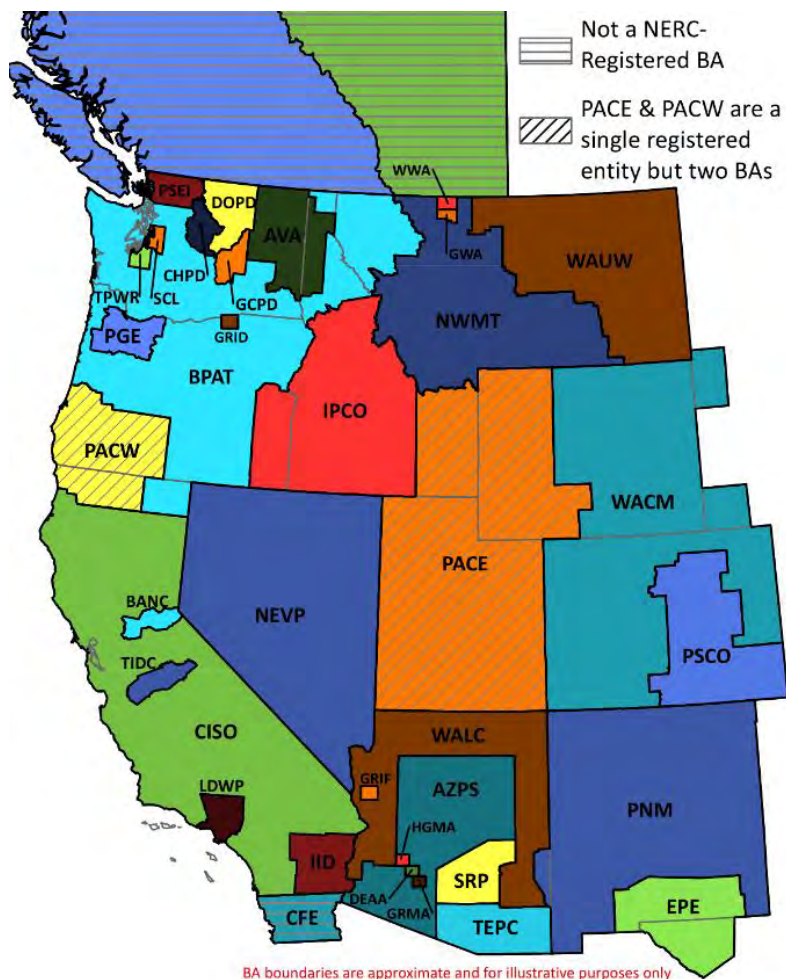


Higher loading conditions on warmer days can lead to additional line sag, elevating vegetation-related safety risks



The 2003 Northeast Blackout, where ~50 million customers were impacted, demonstrated how operating lines beyond their limits can contribute to cascading failures and widespread outages

# Challenge: plan for a reliable local system while acquiring transmission capacity for CETA compliant generation



- PSE has a relatively small territory, localized in NW Washington
- CETA compliant resources are scattered across the West
- PSE must work with neighboring transmission providers to secure transmission across the region

# We are interconnected and interface closely with our neighbors

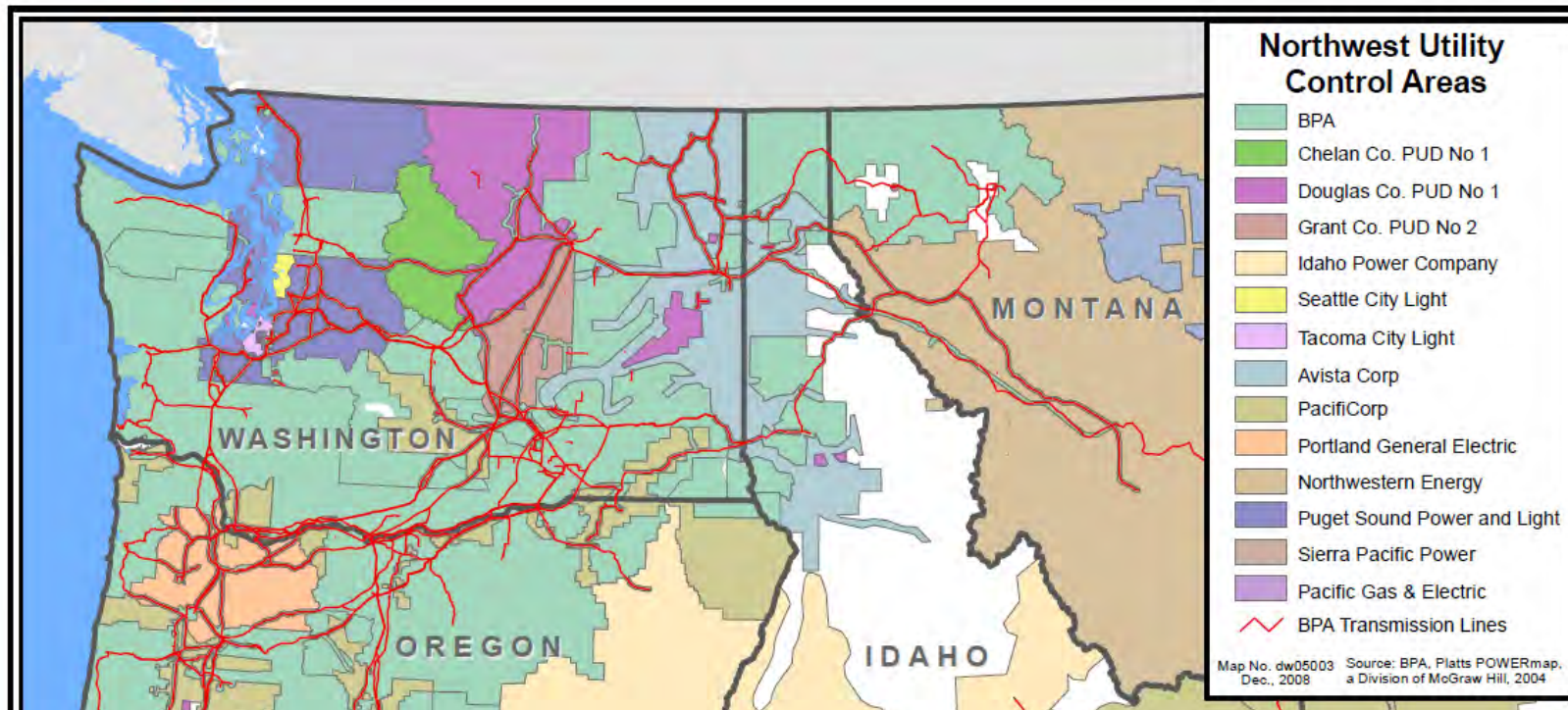
## Our Neighbors

### Balancing Authority/Transmission Operators (5)

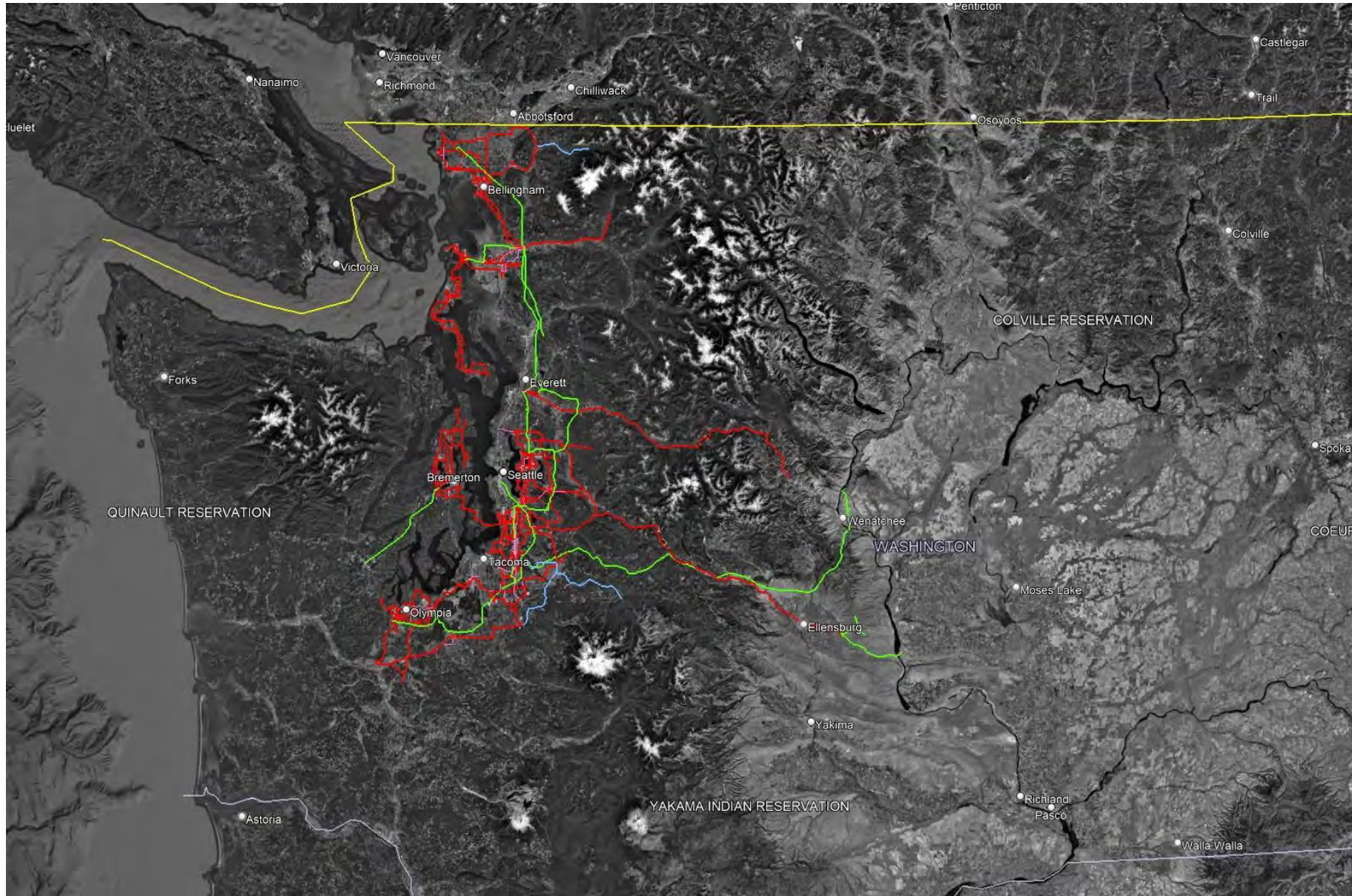
- Bonneville Power Administration
- Seattle City Light
- Tacoma Power
- Chelan County Public Utility District
- Grant County Public Utility District

### Transmission Operator (1)

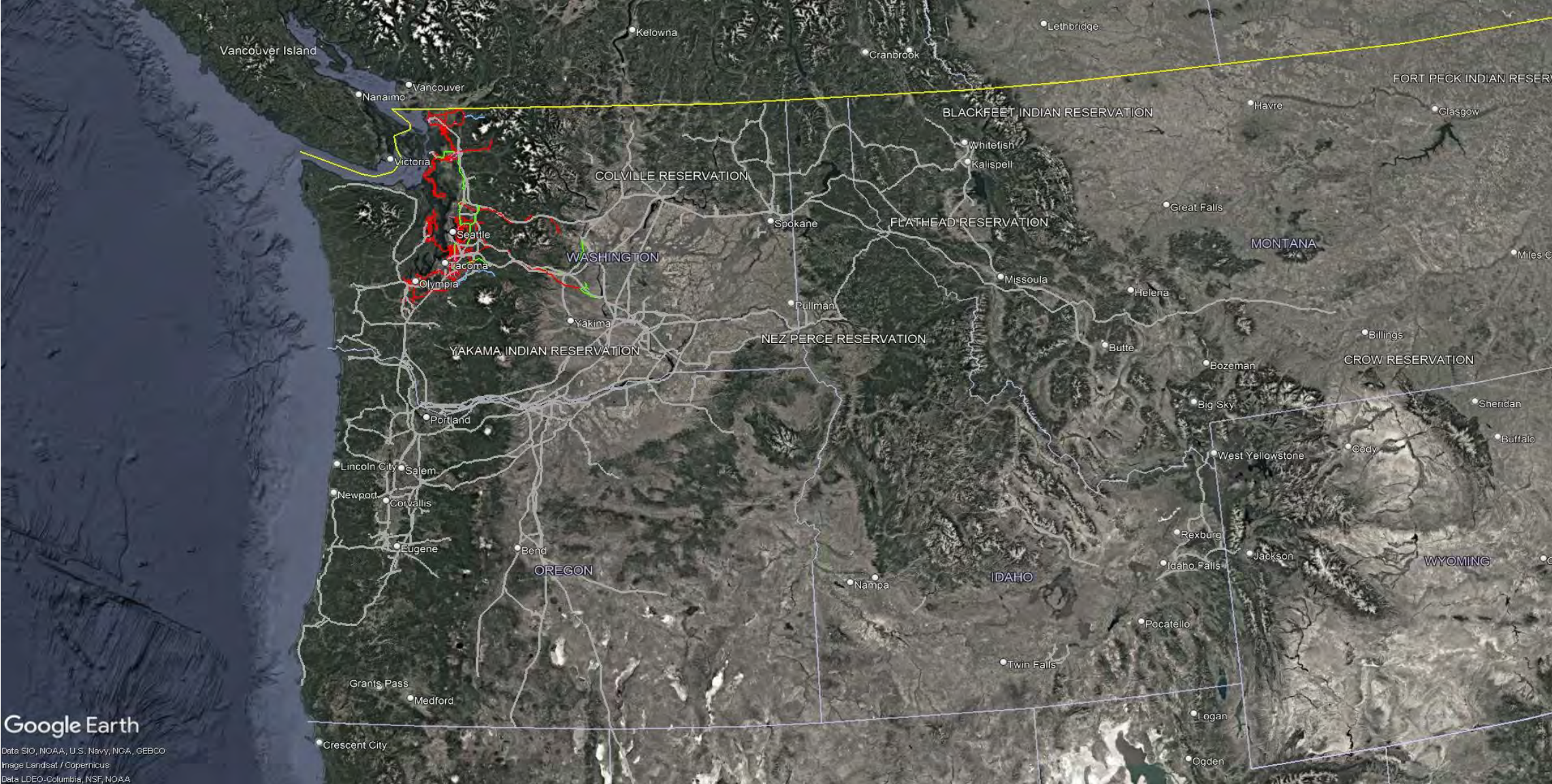
- Snohomish County Public Utility District



# PSE's Transmission System



# PSE's + BPA's Transmission System




# PSE's transmission and distribution lines cover a large service territory

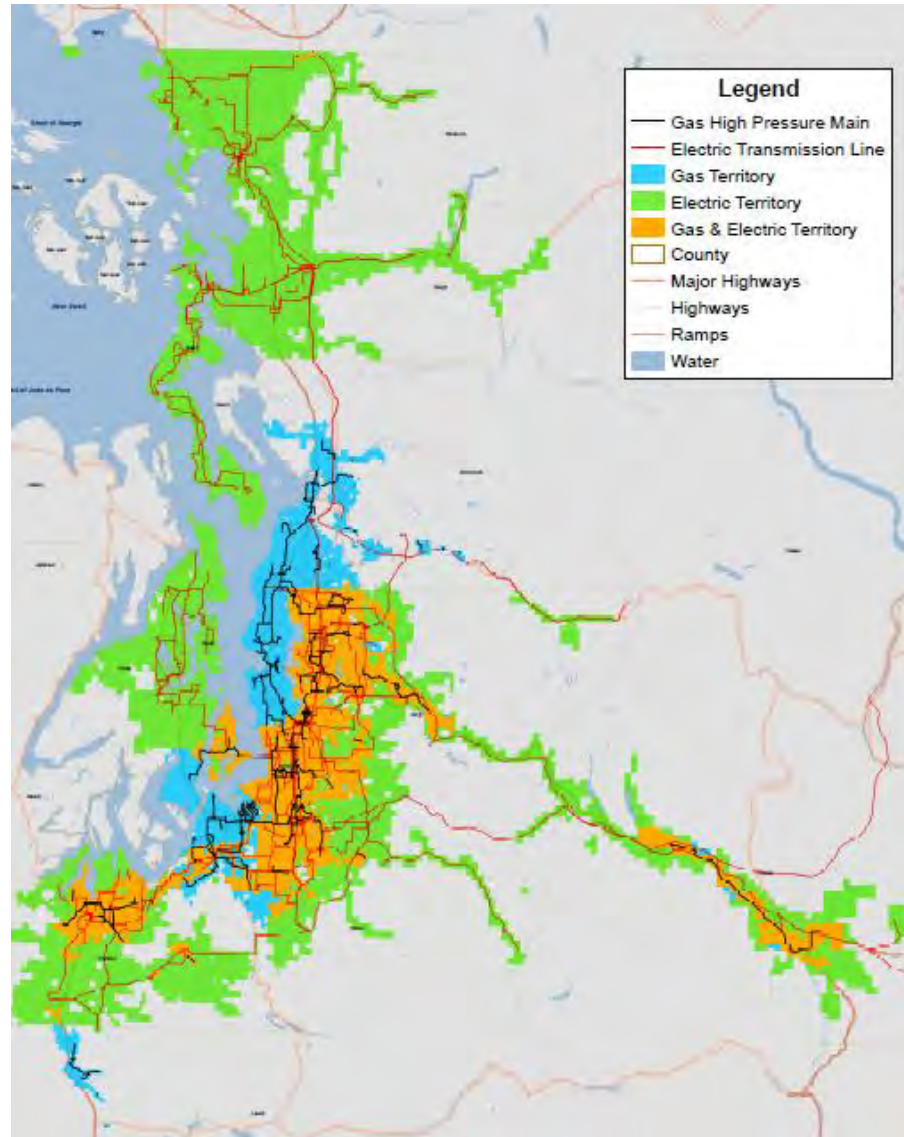


## ◆ Electric System

- 2,597 miles of transmission lines<sup>1</sup>
- 25,118 miles of distribution lines<sup>2</sup>



PSE's 2025 transmission planning studies indicates that capacity constraints are limited, affecting only **4% (~100 miles)** of PSE's existing transmission system over the 10-year horizon



# Transmission strategy requires a differentiated, multi-path approach to meet needs

## ◆ Transmission needs

- ◇ Delivery system reliability
- ◇ Policy compliance
- ◇ Capacity and interconnection demands
- ◇ Operational flexibility and efficiency

## ◆ Transmission planning complexities

- ◇ High investment, decades to develop/build
- ◇ Resources sited outside our footprint
- ◇ Complex, multi-party solutions
- ◇ New regulatory processes
- ◇ Rising competition (utilities, large loads)

## ◆ Inaction/delayed action carries tremendous risk

### LOCAL (L)

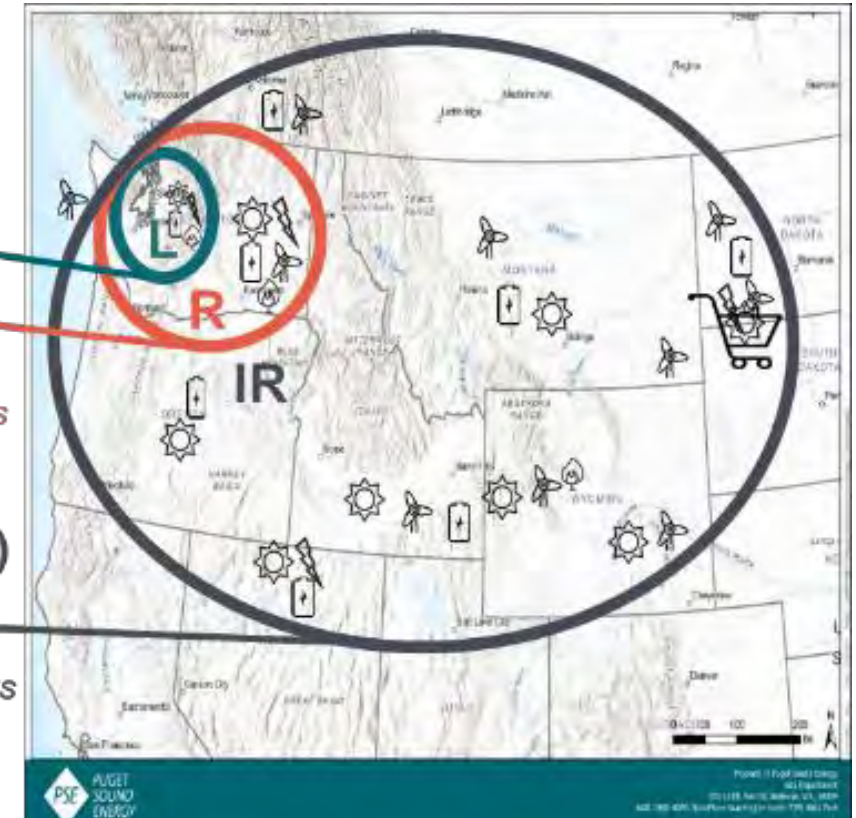
*Maintain a flexible, local backbone to reliably serve PSE's customers*

### REGIONAL (R)

*Leverage collaborations to enhance adjacent connections for greater access*

### INTERREGIONAL (IR)

*Build bridges to unlock diversified resources, optimized energy, and markets*



# What's the Industry 'Buzz?'

Utility Dive

## 21 states, DOE launch initiative to spur grid-enhancing technologies, advanced conductors

Twenty-one states will work with the federal government to expand the use of grid-enhancing technologies, called GETs, and advanced conductors.

May 29, 2024



PG&E Corp

## PG&E, Nissan, Fermata Energy, and the Schatz Energy Research Center Demonstrate Vehicle-to-Grid Technology in California

Collaborative Effort Demonstrates the use of Previous Generation Electric Vehicles and Bidirectional Charging Technologies within a...



Solar Power World

## North American VPP market reaches 37.5 GW of flexible capacity

The virtual power plant (VPP) market grew rapidly over the last year, reaching 37.5 GW of behind-the-meter flexible capacity, according to a...

Sep 17, 2025

	2025
Behind-the-meter VPP capacity	37.5 GW
Behind-the-meter VPP capacity (flexible)	37.5 GW
Behind-the-meter VPP capacity (non-flexible)	0 GW
Behind-the-meter VPP capacity (total)	37.5 GW

Forbes

## Dynamic Line Rating: Grid Technology To Reduce Your Electric Bills

Dynamic Line Rating increases power grid capacity, reduces transmission congestion, and cuts electricity costs—all without building...

Mar 27, 2025



# Opportunities to address system capacity



## Physical Capacity Expansion



- *“Raising the ceiling of the grid’s baseline capacity”*



## Operational Flexibility & Grid Control



- *“Actively optimizing & managing constraints through automation and control”*

# Physical Capacity Expansion



This category increases the **physical** amount of power the grid can safely carry by upgrading transmission and distribution assets or using technologies that allow those assets to operate at higher ratings.

This is the most traditional and durable form of capacity—once implemented, it raises system limits. It is capital-intensive and slower to deploy, but it directly expands the grid’s baseline capability.

## Existing Technologies:

- New T&D conductors, substations, equipment
- Ambient Adjusted Ratings

## Pilot/Demo:

- **Dynamic Line Ratings**



## Aware/Considering:

- Advanced Conductors\*
- Phase Shifting Transformers
- Smart Wires
- HVDC

*PSE partnered with Heimdall Power on a DLR pilot, deploying 75 advanced monitoring devices, called “neurons”, covering 100 miles of 115kV transmission lines.*

*DLR technology can provide up to 30-40% increase in capacity gains, utilizing more of our existing transmission infrastructure.*

# Operational Flexibility & Grid Control



This category improves how the grid is **operated** by dynamically redirecting power flows, managing DERs, and using localized resources to relieve feeder, substation, or area constraints.

Rather than building new assets or reducing demand, these technologies **actively manage constraints in the operations horizon**, allowing PSE to use existing infrastructure more efficiently and selectively defer upgrades.

## Existing Technologies:

- Topology Optimization
- Substation & Field Telemetry/Control (SCADA)
- Community Microgrid (Samish Island)

## Pilot/Demo:

- **Volt-Var Optimization (VVO)**
- DERMS
- Substation Batteries/Microgrids

## Aware/Considered:

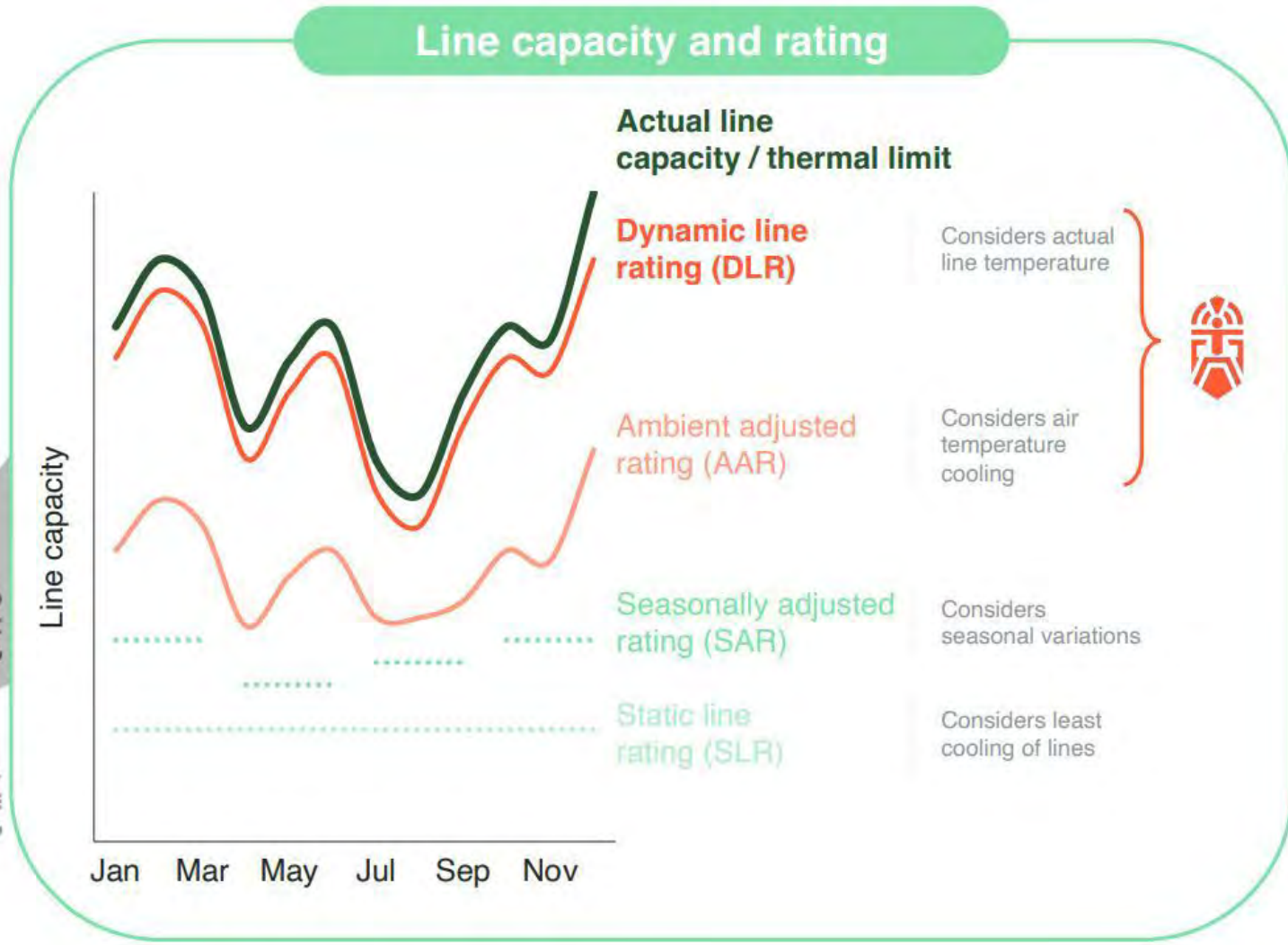
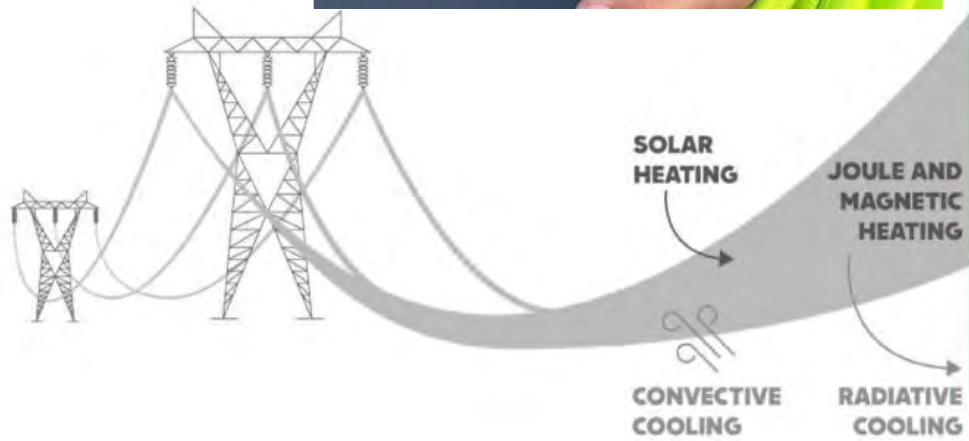
- Advanced Flow Control
- Phase Balancing Equipment
- Dynamic VAR Control



*Volt-VAR Optimization (VVO) reduces energy consumption and system losses, lowering customer bills while freeing up grid capacity and deferring future infrastructure costs.*

*Most utilities see 1-4% in energy reduction, however results will vary based on location. PSE's VVO Pilot in Hobart and Blumaer will provide case studies of validated benefits that can be used for other areas.*

# Dynamic Line Rating Pilot



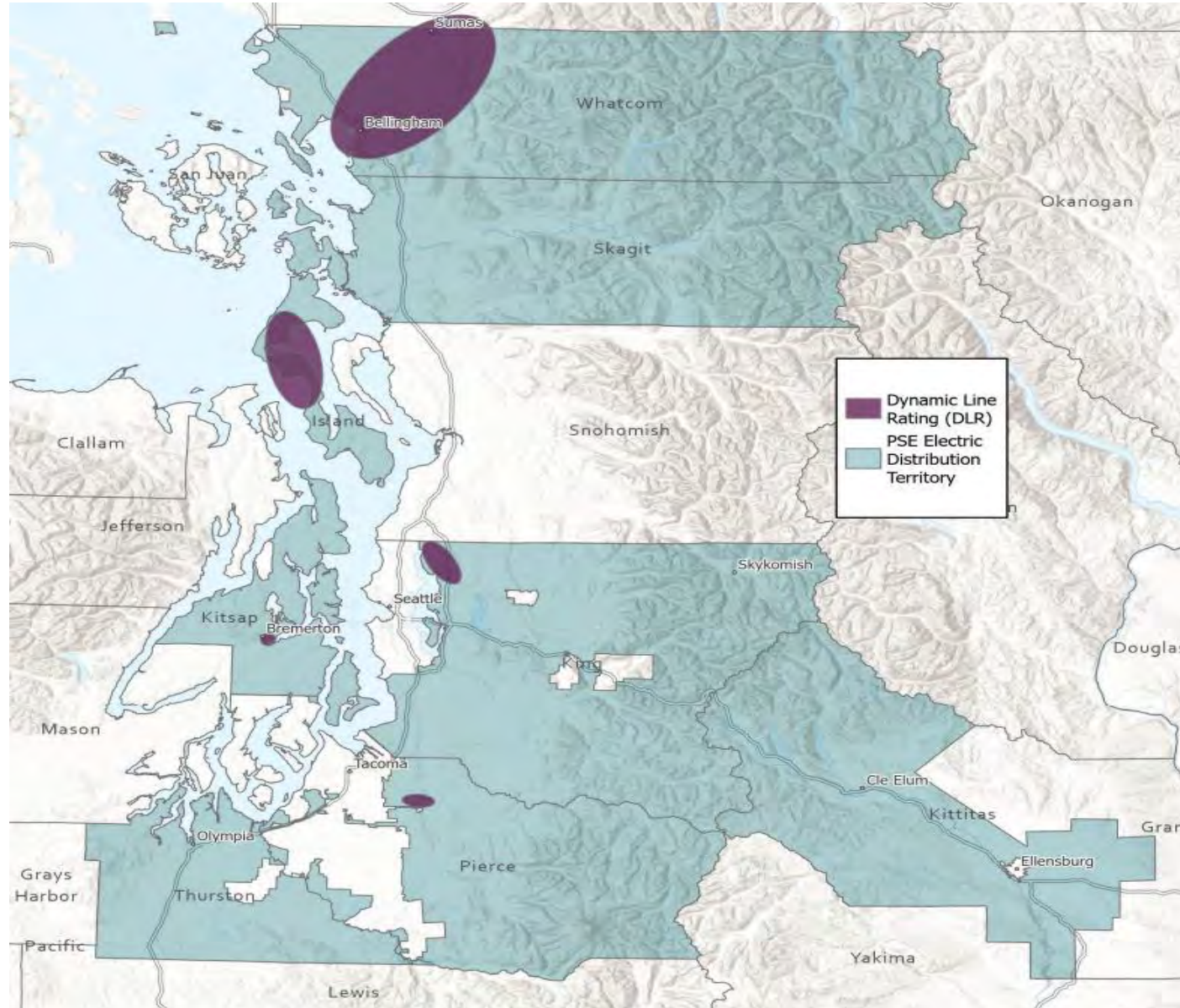
# Pilot Scope



**75 Devices**

## **6 Transmission Lines**

- Sammamish-Moorlands#1
- Sumas-Bellingham
- Fairchild-Alderton
- BPA Kitsap - S Bremerton#1
- Whidbey-Greenbank#1
- Whidbey-Greenbank#2



# What info can DLR nuerons provide?

## Capacity

Real-time Dynamic Line Rating

Forecasted Dynamic Line Rating

Transmission Chain Rating

Emergency ratings

Contingency analysis

## Asset Health

Fault localization

Clearance monitoring

Temperature monitoring

Ice monitoring

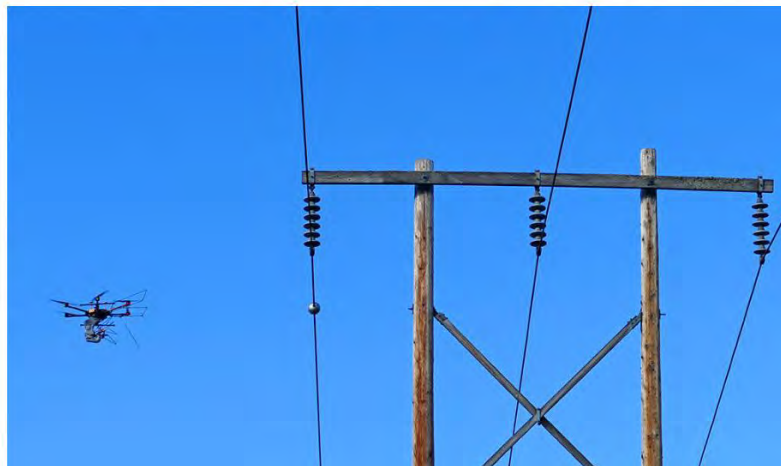
### + *built-in solutions to be enabled*

- Downed lines localization
- Electrical load monitoring
- Power quality analysis
- Blow-out monitoring
- Galloping line monitoring

# Installed By Drones



A drone installs the first DLR sensor on a transmission line in Pierce County, Sept. 2025.



A drone carries the Neuron sensor to a transmission line (*top*). After installing the sensor on the line, the drone flies away (*bottom*).



# Lessons Learned



## Logistical and Technical Challenges

- Weather delays
- Detailed site review
- Drone approach angle
- Drone repairs
- PSE data quality
- SSO



## Procedural Hurdles

- Long RFP/contracting process
- Land rights review
- Traffic control and permitting
- Co-marketing strategy and agreement



## Communication Missteps

- EFR awareness and training
- Customer notifications
- Media campaign overpromising

**Thank you!**