Generation and Transmission

The Pieces Of The Puzzle

Bonneville Power Administration

Offshore Wind Energy Roadmap

January 9, 2025

Overview of BPA

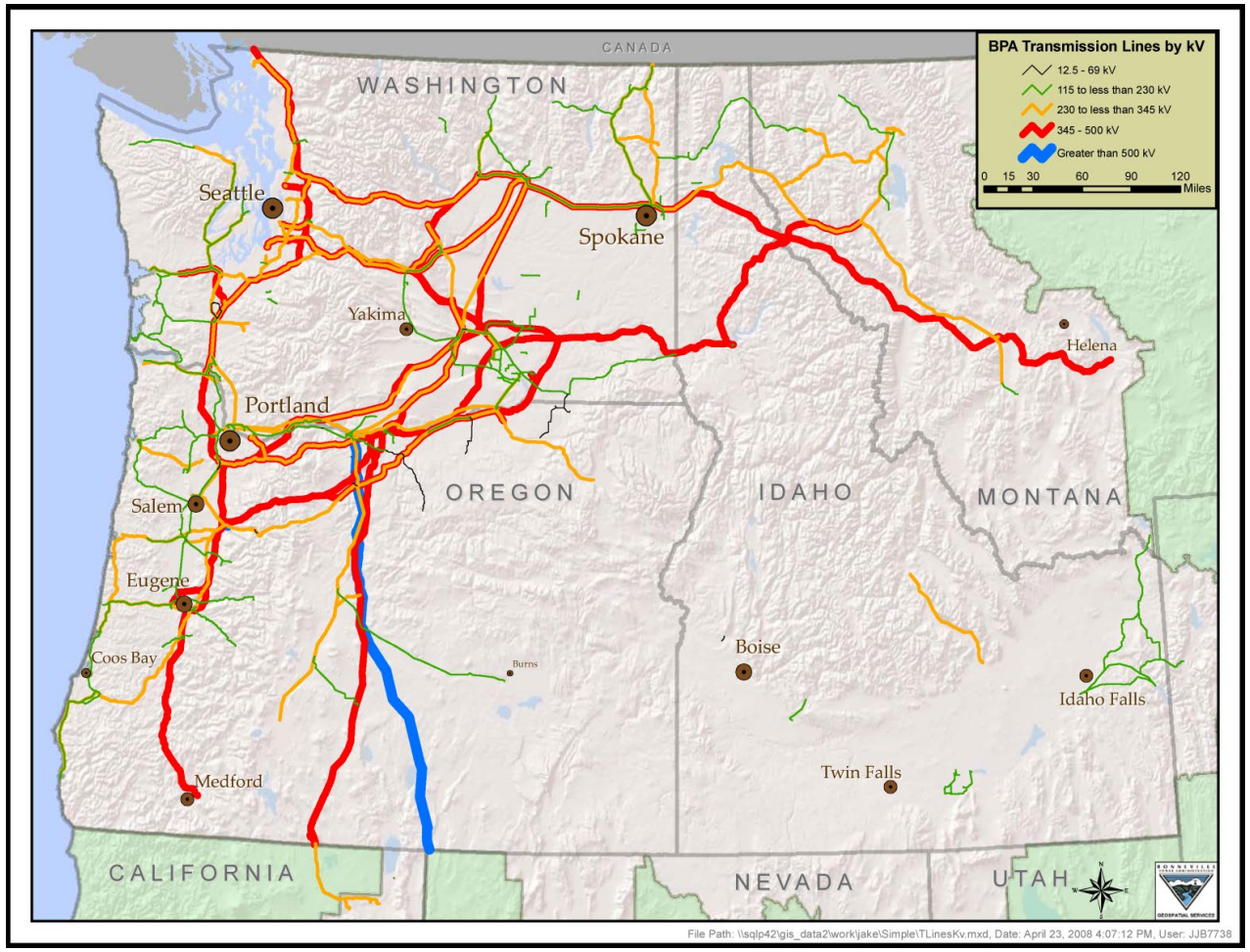
- BPA is one of four Power Marketing Administrations in the Federal Department of Energy (DOE).
- BPA markets power from 31 Federal hydro plants [US Army Corps of Engineers/Bureau of Reclamation], the Columbia Generating Station Nuclear Plant, and several small non-Federal power plants [BPA owns no power generators].
- BPA receives no Congressional Appropriations. If we are spending money, we are earning it with revenue from selling Power and Transmission Services at cost.
- Over 80% of the power BPA sells is hydroelectric.
- BPA accounts for about 28% of the electric power consumed within the PNW (2019 Numbers).
- About 20% of BPA's marketed power goes to Oregon.

BPA Transmission

- BPA owns and operates 15,000 miles of HV transmission lines = 75% of PNW HV transmission system – mostly 500, 230, and 115-kV.

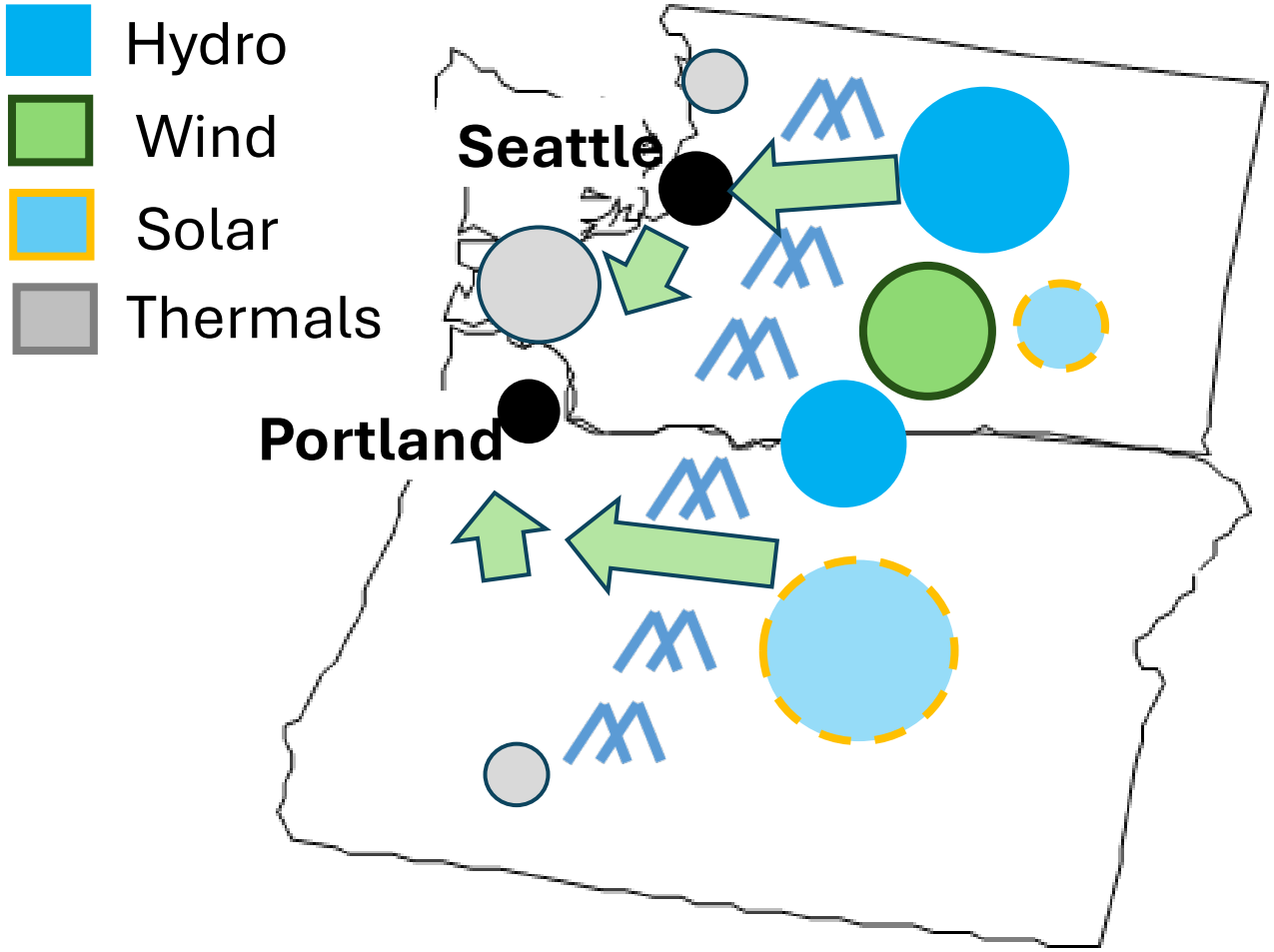
- BPA markets transmission service capacity on its HV Transmission system, providing pathways for the generation output to flow to local electric utilities serving customer loads.

- BPA connects generating resources into BPA's Transmission System in order to get the power to the local electric utilities serving the end users (residential, commercial, industrial).



BPA Transmission Service

Changing PNW Energy Landscape



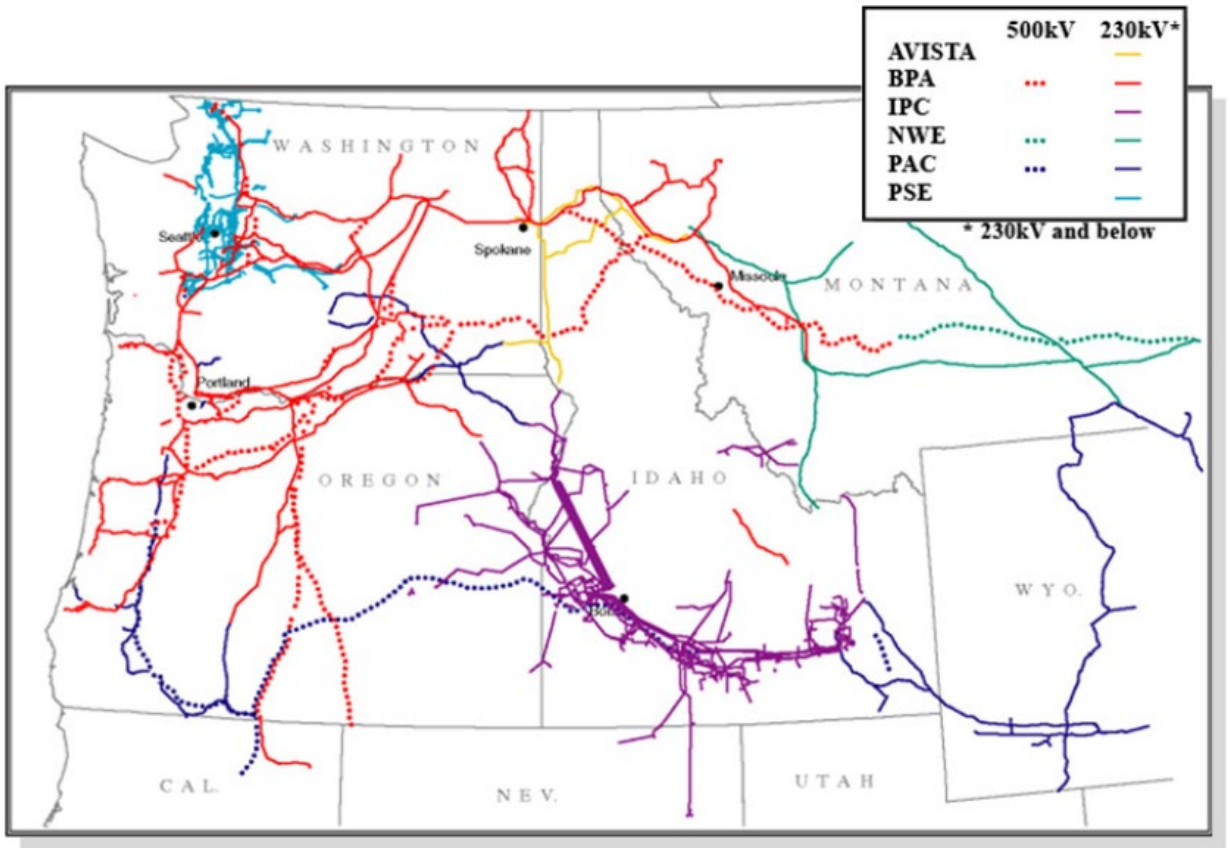
Drivers:

- Clean Energy Policies
- Electrification (transportation and buildings)
- Industrial load growth in Silicone Forest and data centers

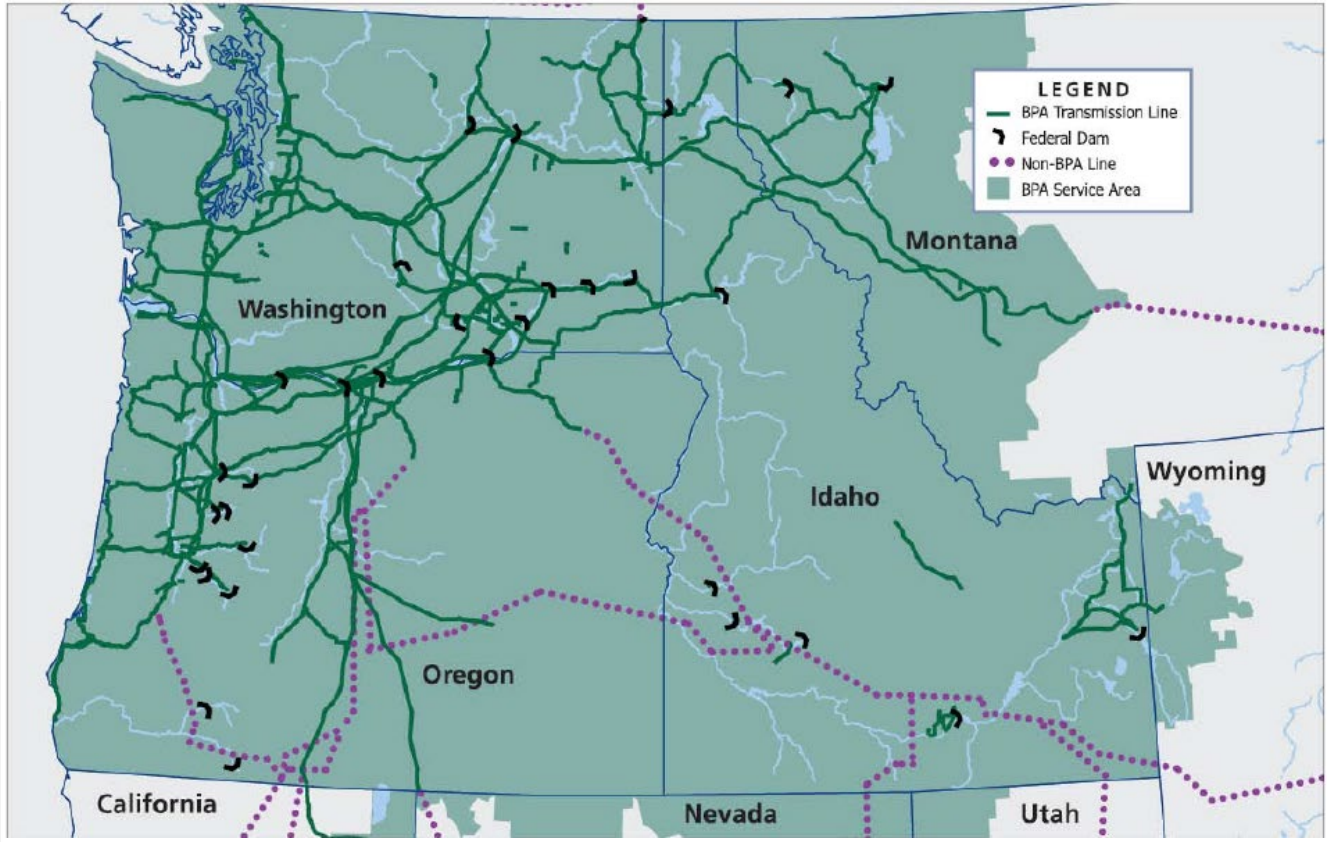
- Transmission to enable electric load growth (industrial and electrification)
- Transmission to deliver remote, clean resources to Load Centers
- Transmission to meet resiliency needs

PNW Transmission System

THE COMBINED PACIFIC NORTHWEST TRANSMISSION SYSTEM



BPA SERVICE AREA

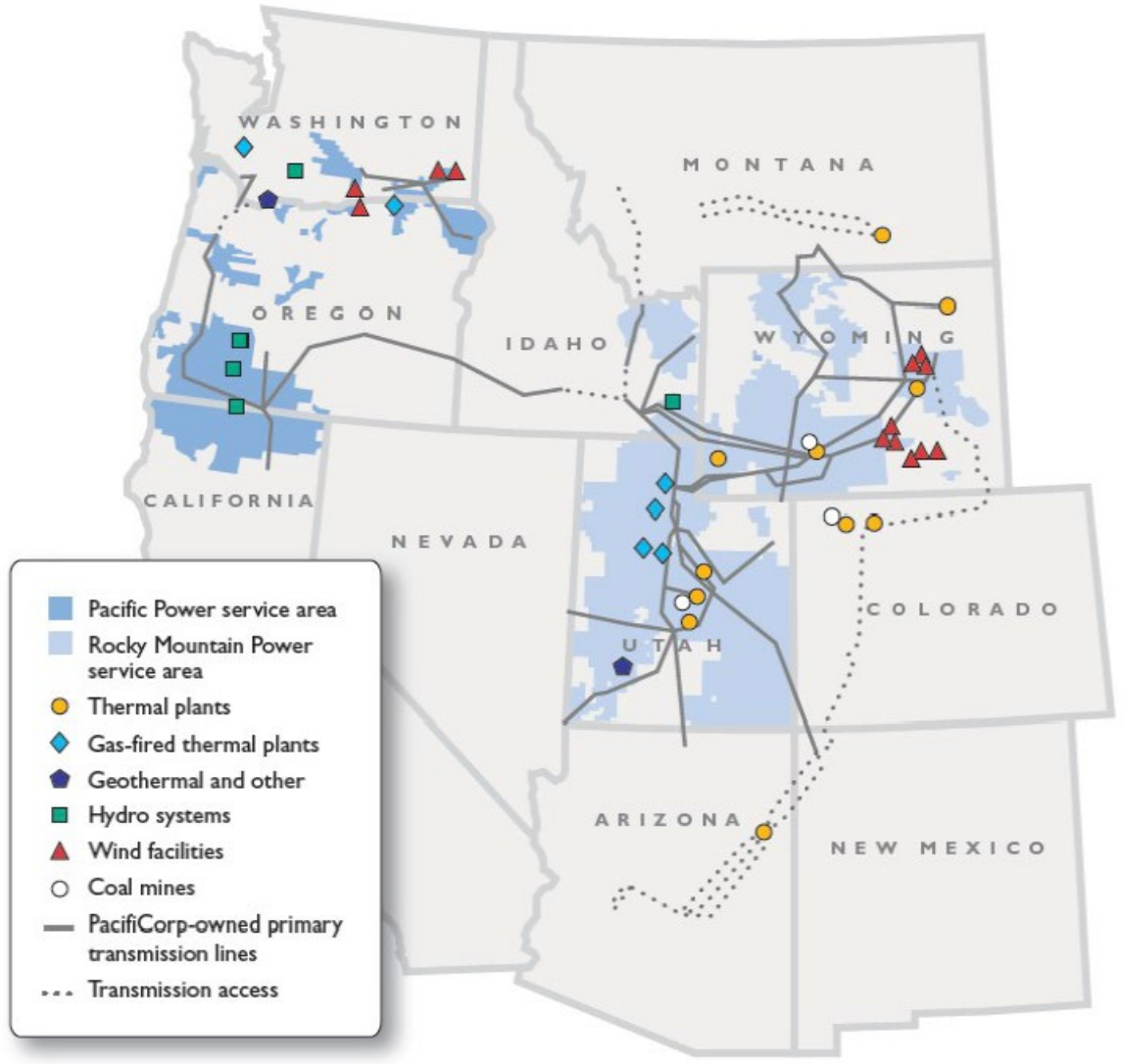


BPA Transmission Service

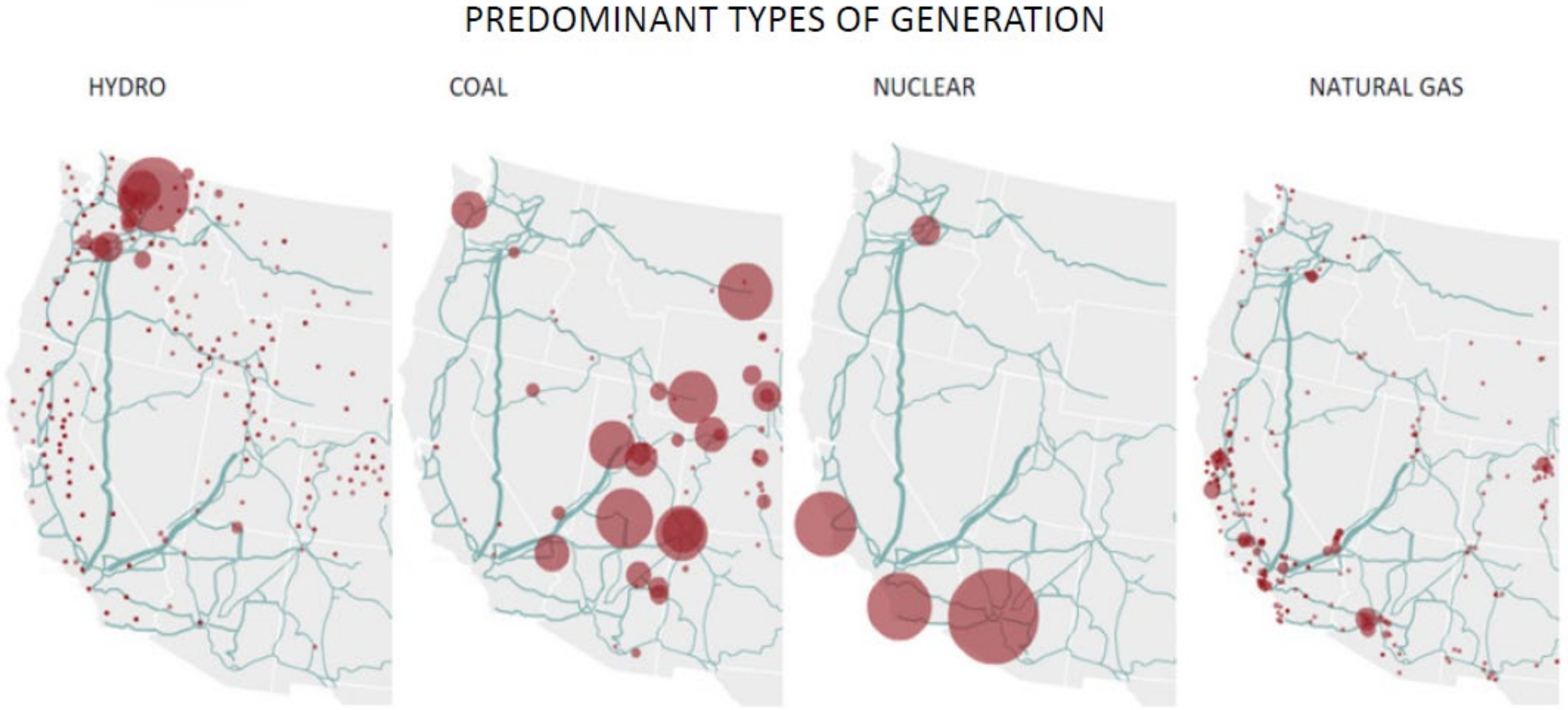
PacifiCorp - Transmission & Generation

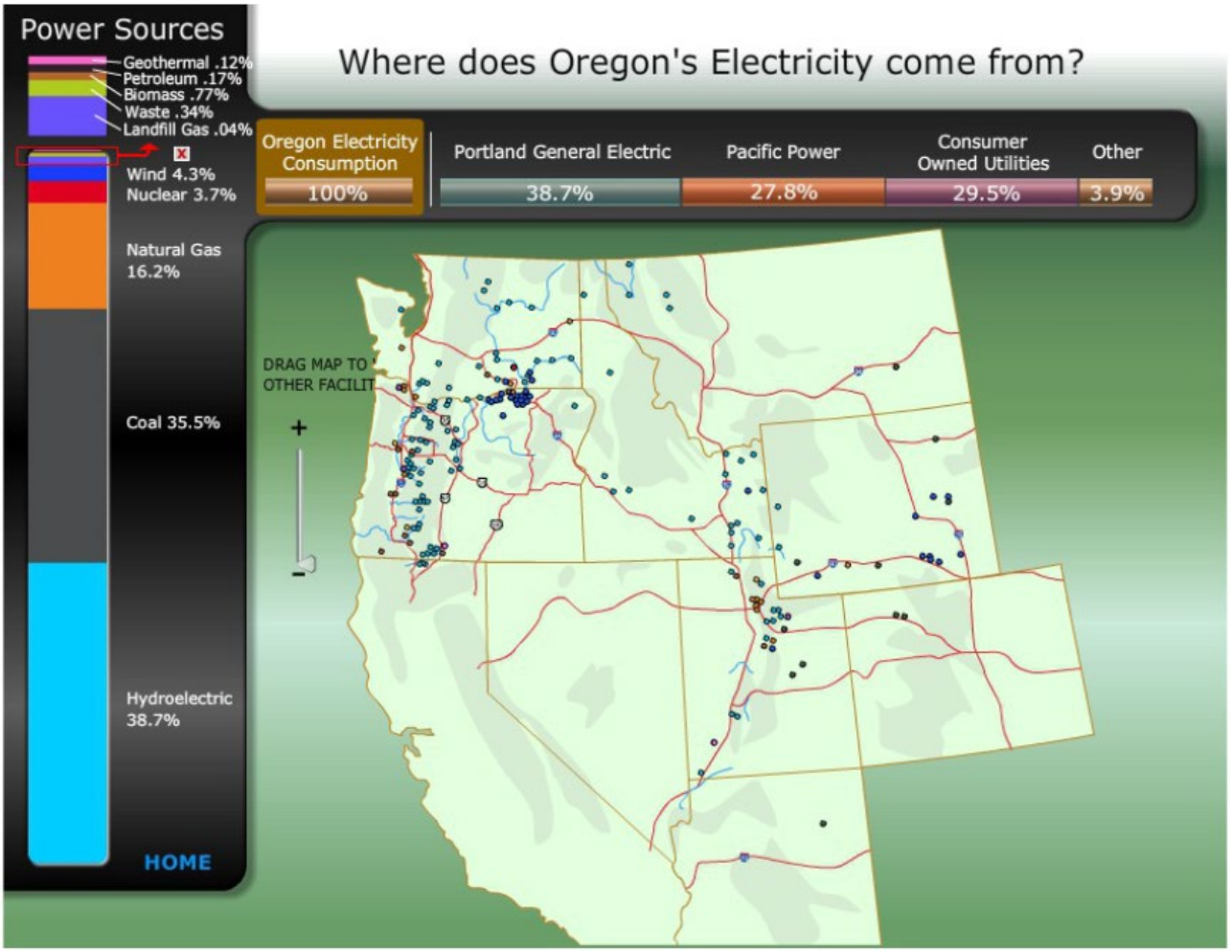
- PacifiCorp Geographical Locations
- PacifiCorp HV Transmission Lines
- PacifiCorp Generation Plants

- Pacific Power Service Areas

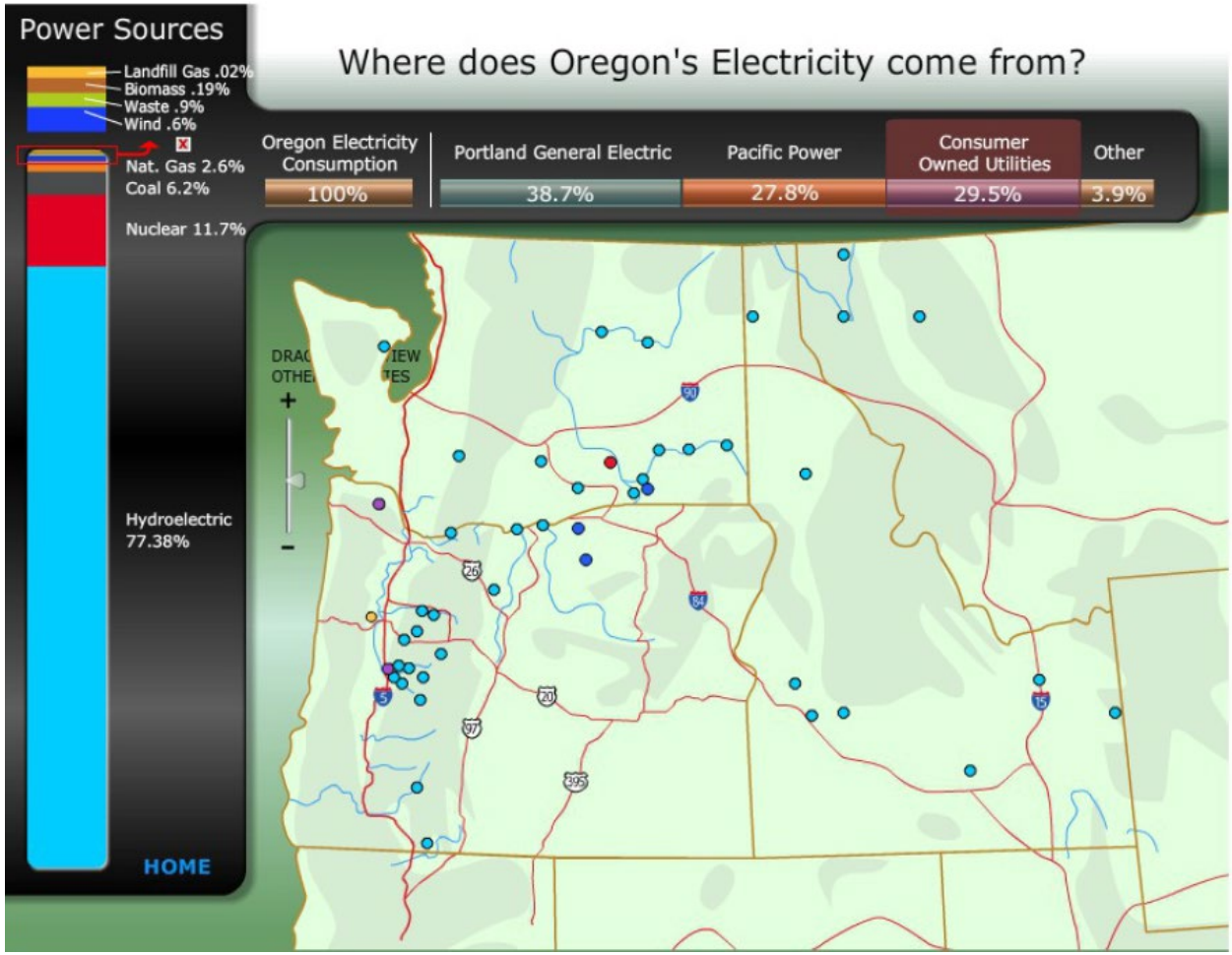


PNW - Generation Geographic Locations

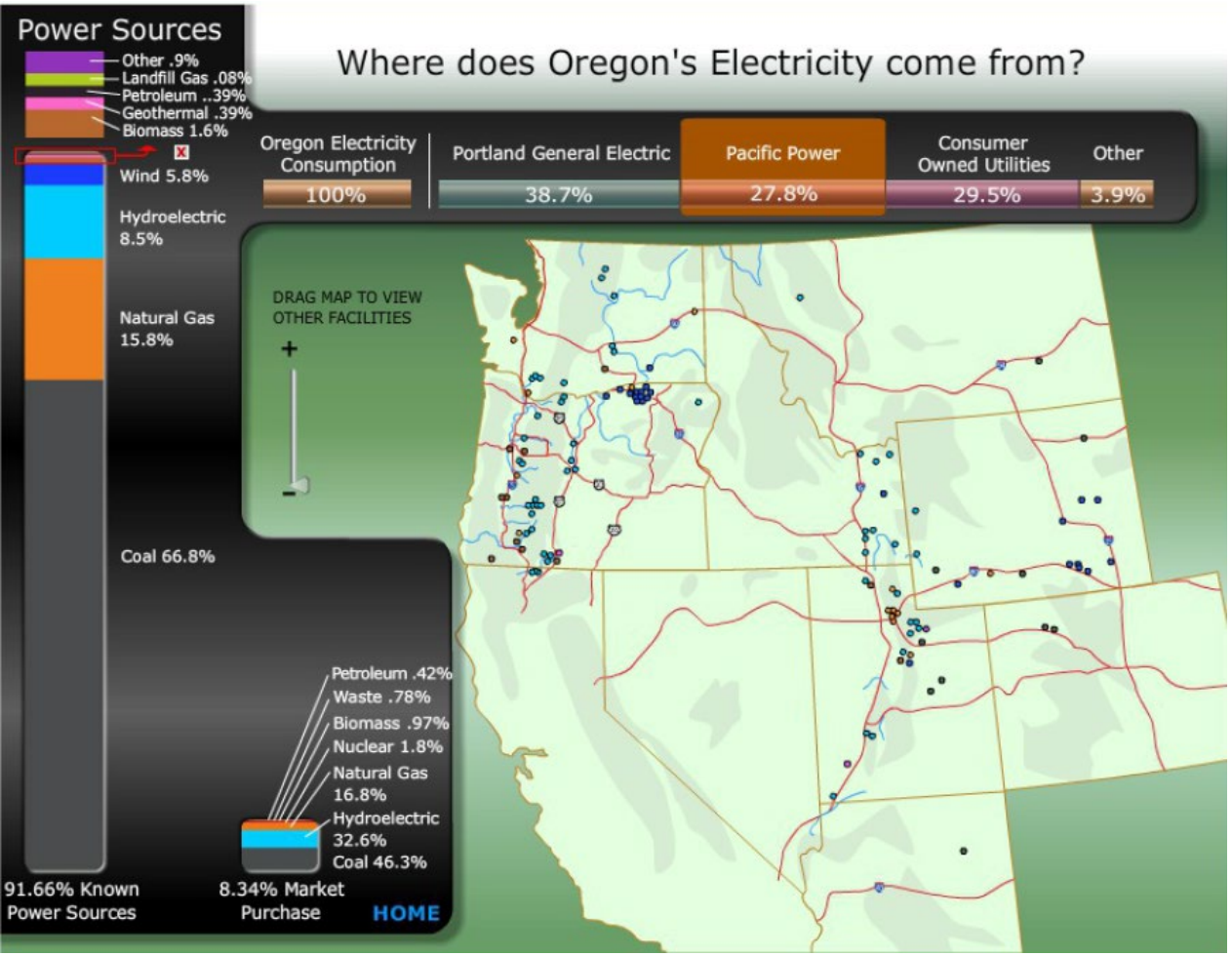




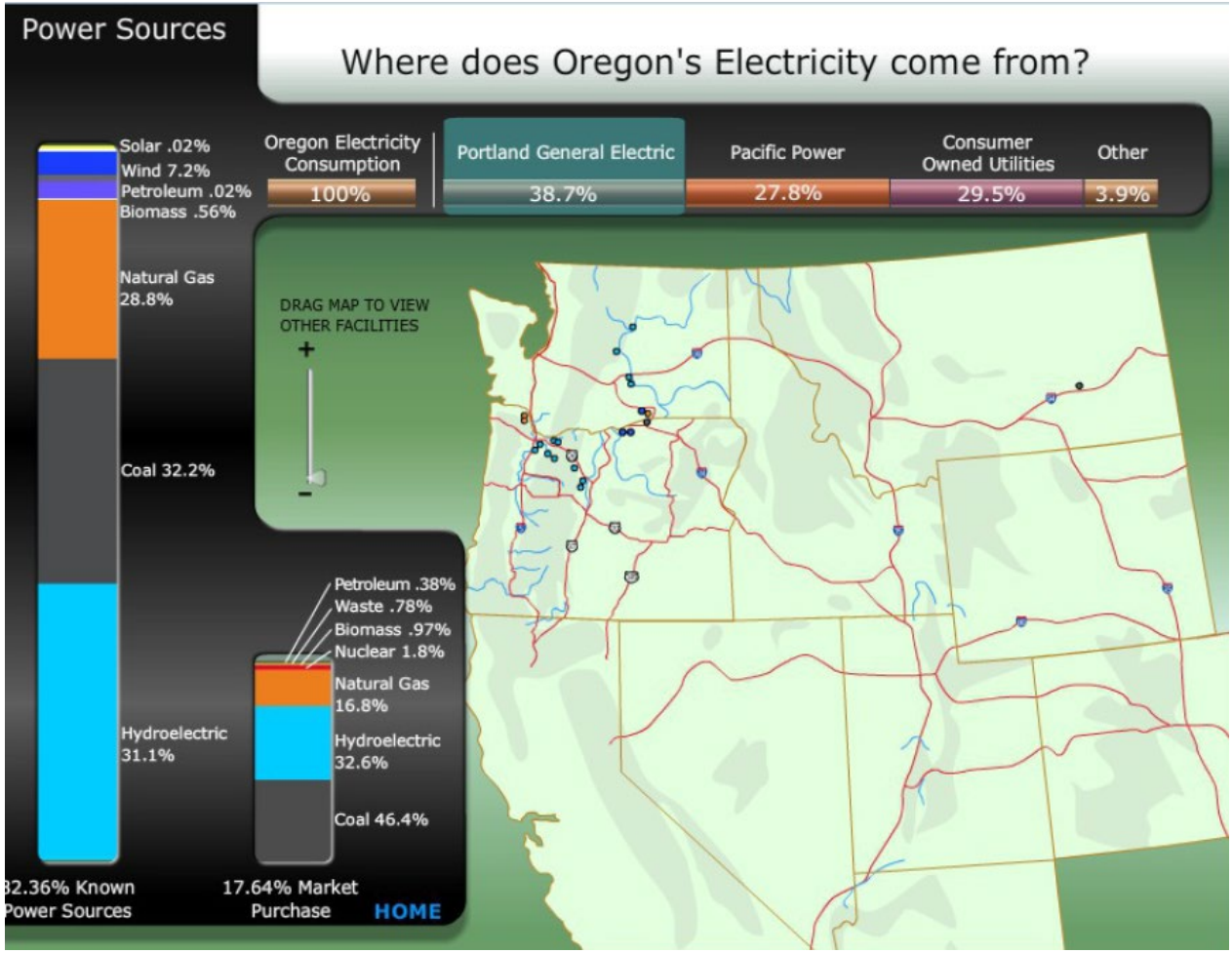
ALL OREGON UTILITIES COMBINED



CONSUMER-OWNED UTILITIES



PACIFIC POWER



PORTLAND GENERAL ELECTRIC

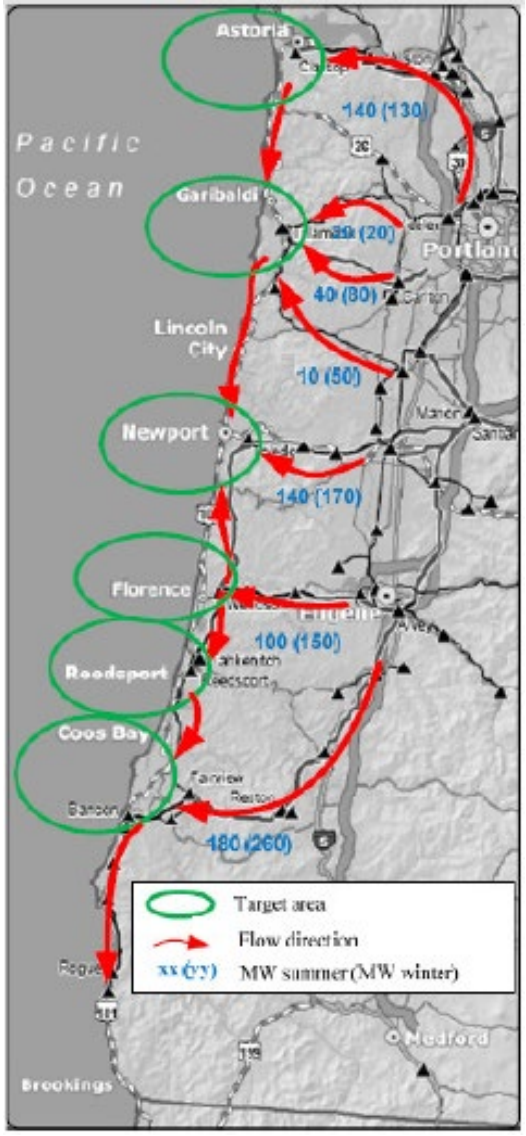
Oregon Energy Policy Drivers

- Oregon's **Renewable Portfolio Standard** requires that 50 percent of the electricity Oregonians use come from renewable resources by 2050 State of Oregon: Energy in Oregon - Renewable Portfolio Standard

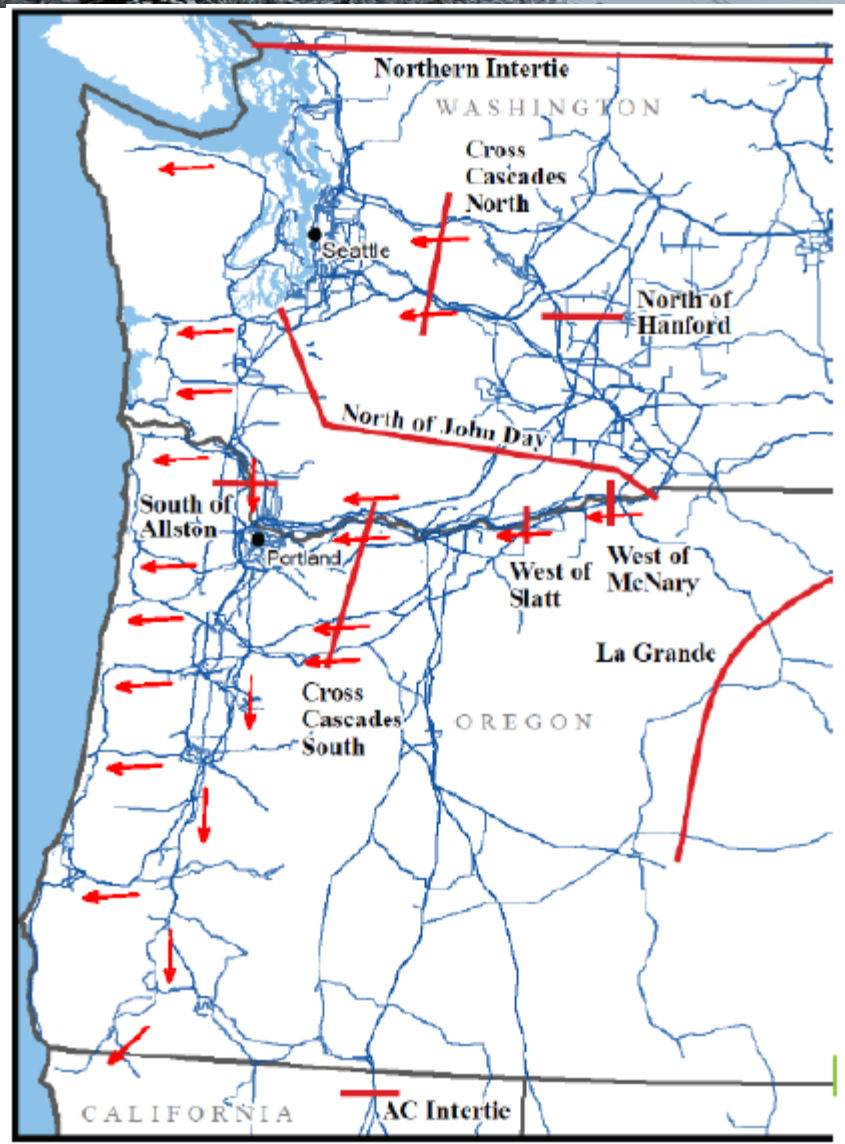
- **HB2021**: In 2021 Oregon State Legislature passed the Clean Energy Targets bill. This bill requires Portland General Electric, PacifiCorp and Electricity Service Suppliers to reduce greenhouse gas emissions from the electricity they provide. The bill also created targets for these companies to reduce the greenhouse gas emissions from electricity sold in Oregon to:

    - 80 percent below baseline emissions levels by 2030;
    - 90 percent below baseline emissions levels by 2035;
    - 100 percent below baseline emissions levels by 2040

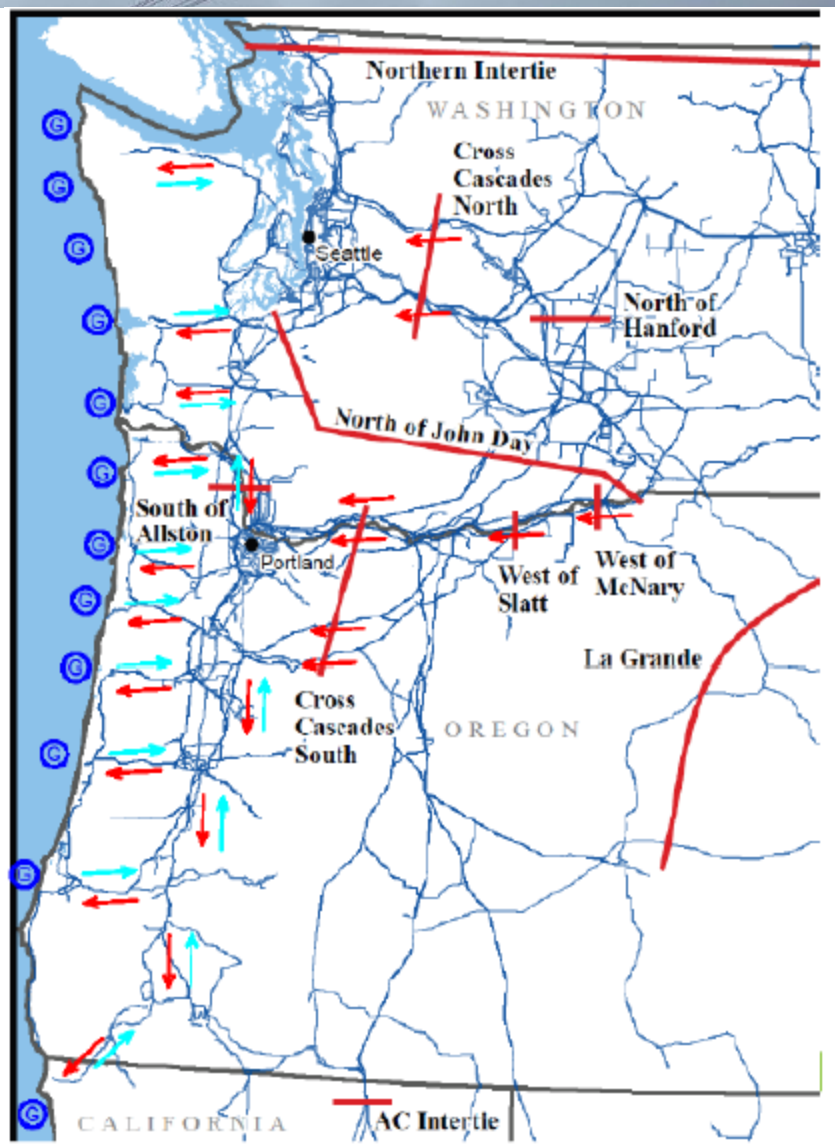
Oregon Coastal Transmission System



BPA CONSTRAINED TRANSMISSION PATHS



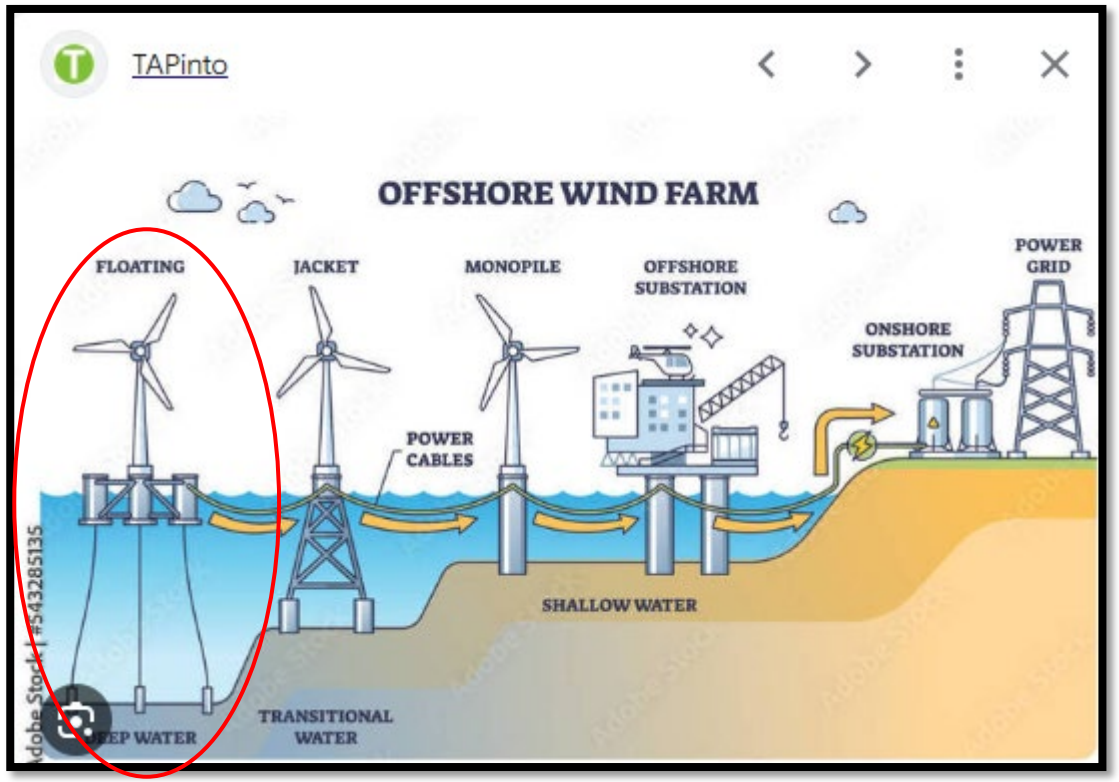
Offshore Generation serves Local Coastal Loads first and reduces Power Flows on BPA's East-West Transmission lines, thus freeing up additional capacity on the Cross Coast Range Transmission system.



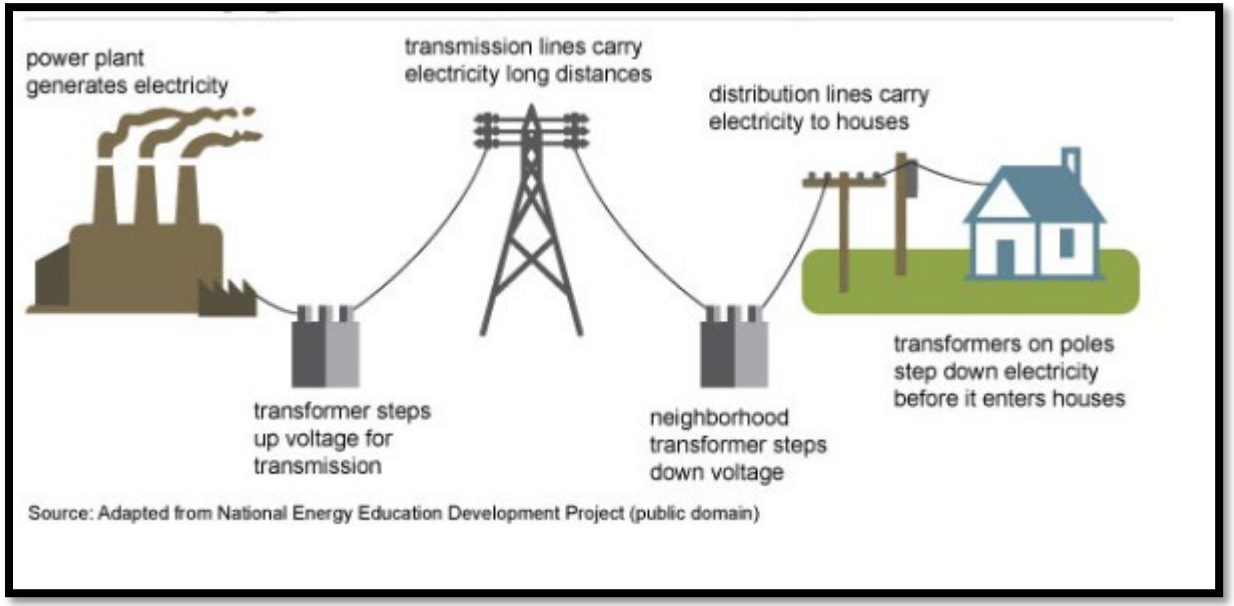
Electric Utility Power Resource Planning

- **Load Forecasting** – Each electric utility has an ongoing Load Forecasting process, as loads served tend to grow over time.
- **New Large Loads** – Each electric utility receives requests to provide electric service to new large commercial/industrial loads that occur outside of the load forecasting process.
- **Power Generation Resource Planning** – Electric utilities work separately and together to develop long-range plans to acquire new generation resources to serve their forecasted load growth and to serve new large loads.
- **Power Purchase and Transmission Services Agreements** are developed by which each electric utility contracts for the required new generation resources and transmission capacity to carry it.

How It All Connects



From the Ocean to Land



From Land to Homes and Businesses

Southern Oregon Transmission Needs

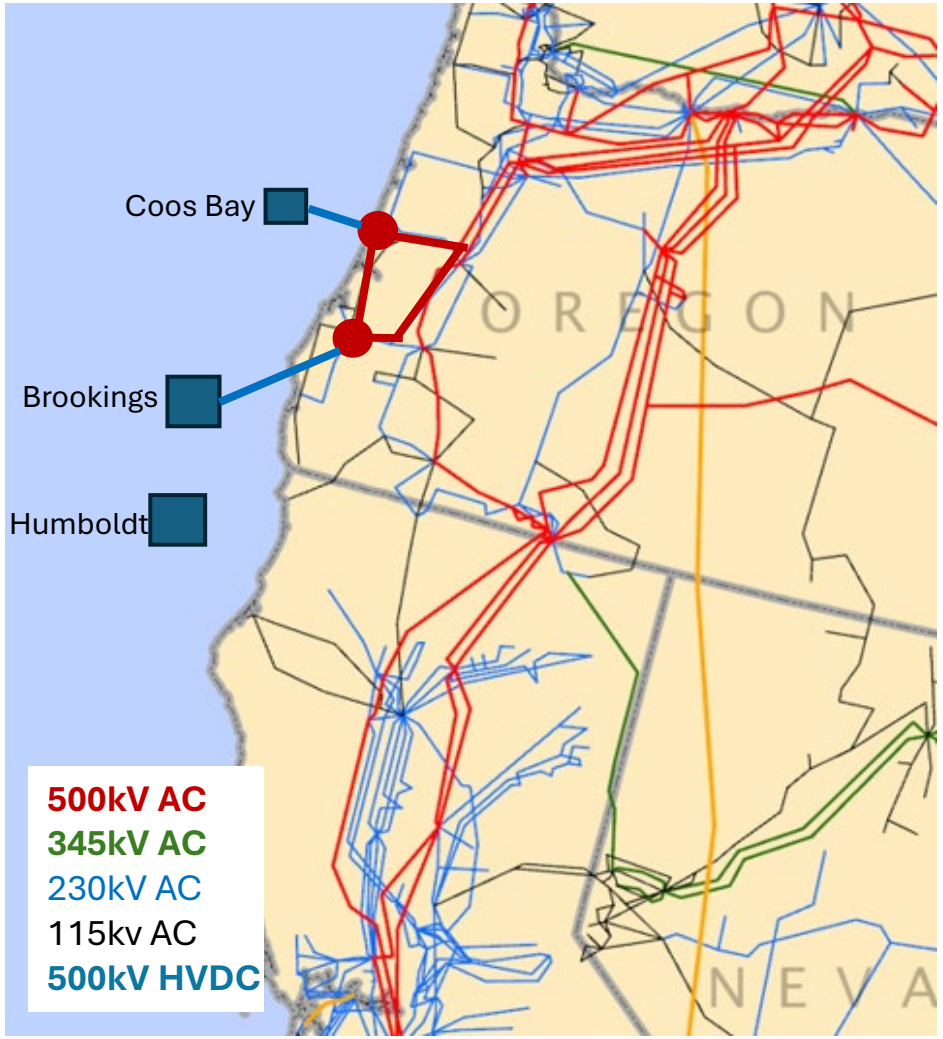
- BPA has 2,750 MW of active transmission service requests from Southern Oregon coast to Portland area

- Initial Feasibility Study results show the following needed projects:
- "500-kV loop" - BPA plan of service which includes:

  - Two new 500-kV substations (Coos Bay and Brookings areas)

  - 197 miles of new 500-kV lines mainly along existing transmission rights of way

  - 230-kV upgrade of existing 115-kV line or add new 230-kV line



Off-Shore Wind Integration- Summary

- Utilities must be doing long term resource planning to meet clean energy goals and rising electrical demand.

- Large scale integration of off-shore wind in Southern Oregon will require **higher capacity 230 and 500-kV** HV transmission to reliably interconnect the proposed generation and get power from the coast to load centers.

- BPA does not generally expand the transmission system without a reliability need ore business case.

- To connect offshore wind generation into BPA's high voltage transmission system: A wind developer needs to apply for "generator interconnection service" as well as "transmission services" once a Power Purchase Agreement (PPA) is obtained from a power purchaser.

Supplemental Slides

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Generation Interconnection Process

BPA – GI Process Studies and Agreements Required

Interconnection Request Requirements: Nameplate - PEAK KW OUTPUT basis

1) Feasibility Study
2) System Impact Study
3) Facilities Study with (+/- 20% Cost Estimate)

1) Construction Agreements (+/- 5% Cost Estimate); NEPA Study Agreement
2) Design Schedule, Construction Schedule, Real-Time Communications System Agreements, Financial Terms/Conditions, Energization
3) Project Completion

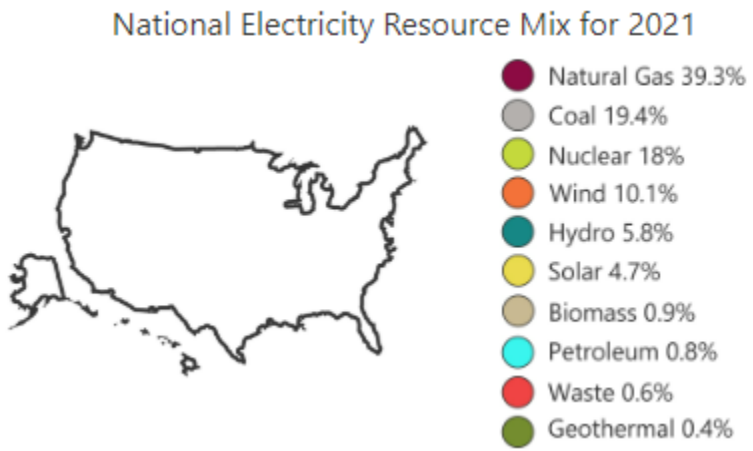
1) Power Purchase Agreement
2) Transmission Agreement
3) Balancing Authority Area Ancillary Services Agreement
4) 3-Way Ownership, Operation, and Maintenance Agreement
5) Other Misc. Agreements, as needed.

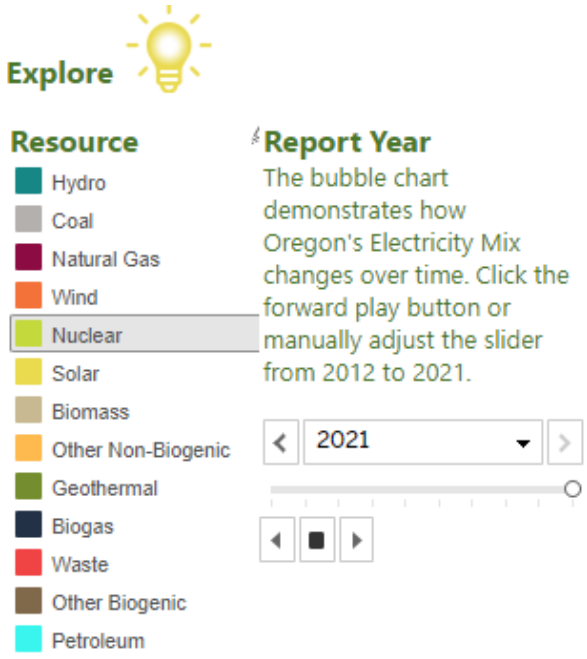
- Interconnection - Bonneville Power Administration

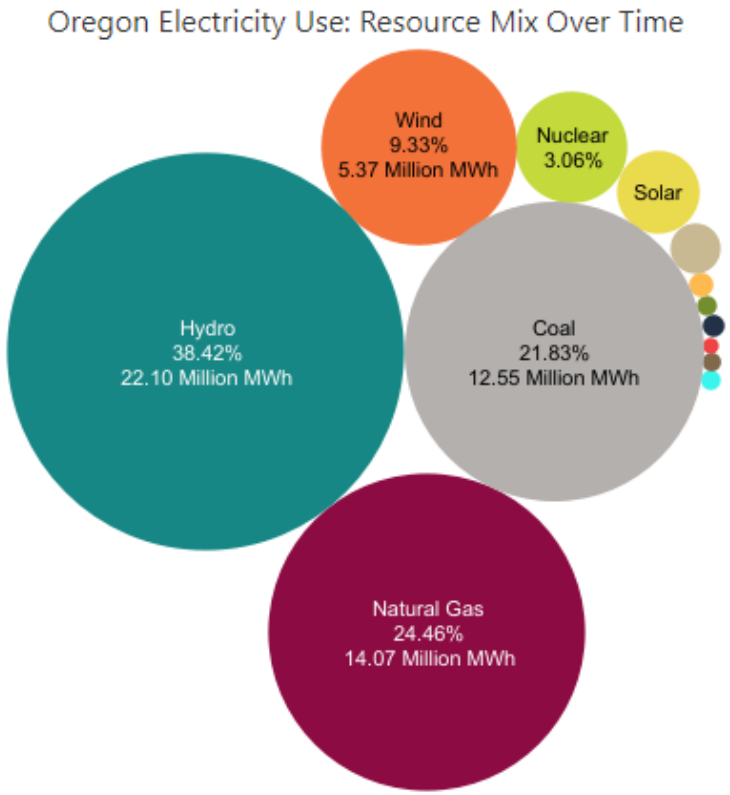
Electricity Mix in Oregon - 2021

Oregon Electricity Use: Resource Mix

This illustration shows the state level resource mix for investor and consumer-owned electric utilities serving Oregon from 2012 to 2021. The mix of resources generating electricity used in Oregon included in-state and out-of-state electricity generation. Most of the mix came from hydropower, coal, and natural gas. A smaller percentage of power in the region was provided from non-hydroelectric renewable resources, such as wind, biomass, and solar. See the *Data Info* button for more information. In 2021, Oregon used 57.5 million MWh of electricity.







[State of Oregon: Energy in Oregon - Electricity Mix in Oregon]

BPA – The FUTURE - continued

BPA has a proven track record of supporting and leading the Pacific Northwest through eras of transformation.

Between 2000 and 2023, BPA interconnected more than 8 gigawatts of renewable resources into the region's power grid. This included 7 gigawatts of wind and 525 megawatts of solar energy. To ensure its grid could allow the transfer of this energy, BPA completed six high-voltage projects.

The graphs included in the FACT SHEET linked below show a steady increase in demand for service on the BPA transmission system.

EVOLVING GRID FACT SHEET:

https://www.bpa.gov/-/media/Aep/about/publications/fact-sheets/fs-20230609-bpa-evolving-grid-update-on-the-State-of-Transmission.pdf