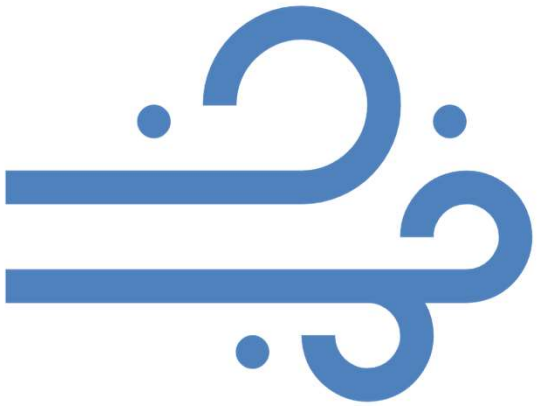


Offshore Wind for Washington State

January 30, 2024
Northwest Offshore Wind Conference

Includes information from E3 Study
Commissioned by Trident Winds Inc. (May 2023)

WA State Energy and Climate Goals

Clean Energy Transformation Act of 2019 (Senate Bill 5116)	**Carbon neutral electric supply by 2030 and zero CO2 emissions by 2045**
Climate Commitment Act (2021) Zero Emissions Vehicles Act (2020)	**Increased demand for clean electricity**
WA Policies	**Require fundamental shift from fossil fuels to clean energy**

NW Power Council (NWPC) Projects Electricity Winter Shortfall

The 2021 NWPC Reference Resource Strategy

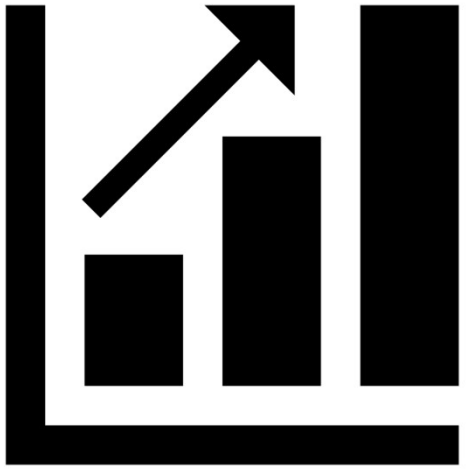
- Calls for 5.4 Gigawatt (GW) of renewables between 2020 and 2027 (Power Council's Resource Adequacy Advisory Steering Committee, 12/5/22)
- As of December 2022, only 0.59 GW of new renewables have been put into operation

If the Reference Resource Strategy is not implemented

- The projected WA state winter shortfall could reach of 5.2 GW by 2027

If higher energy demand prevails, winter shortfall could grow to over 6 GW by 2027

- An addition of approximately one Grand Coulee Dam



WA State needs to add GWs of clean energy to meet its energy demand and climate goals

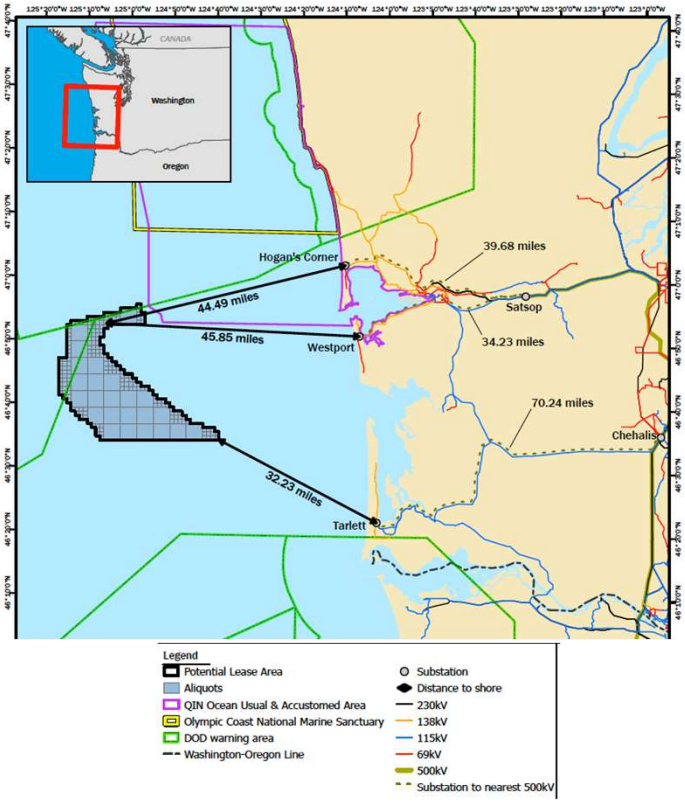
Offshore Wind for WA State

March 2022

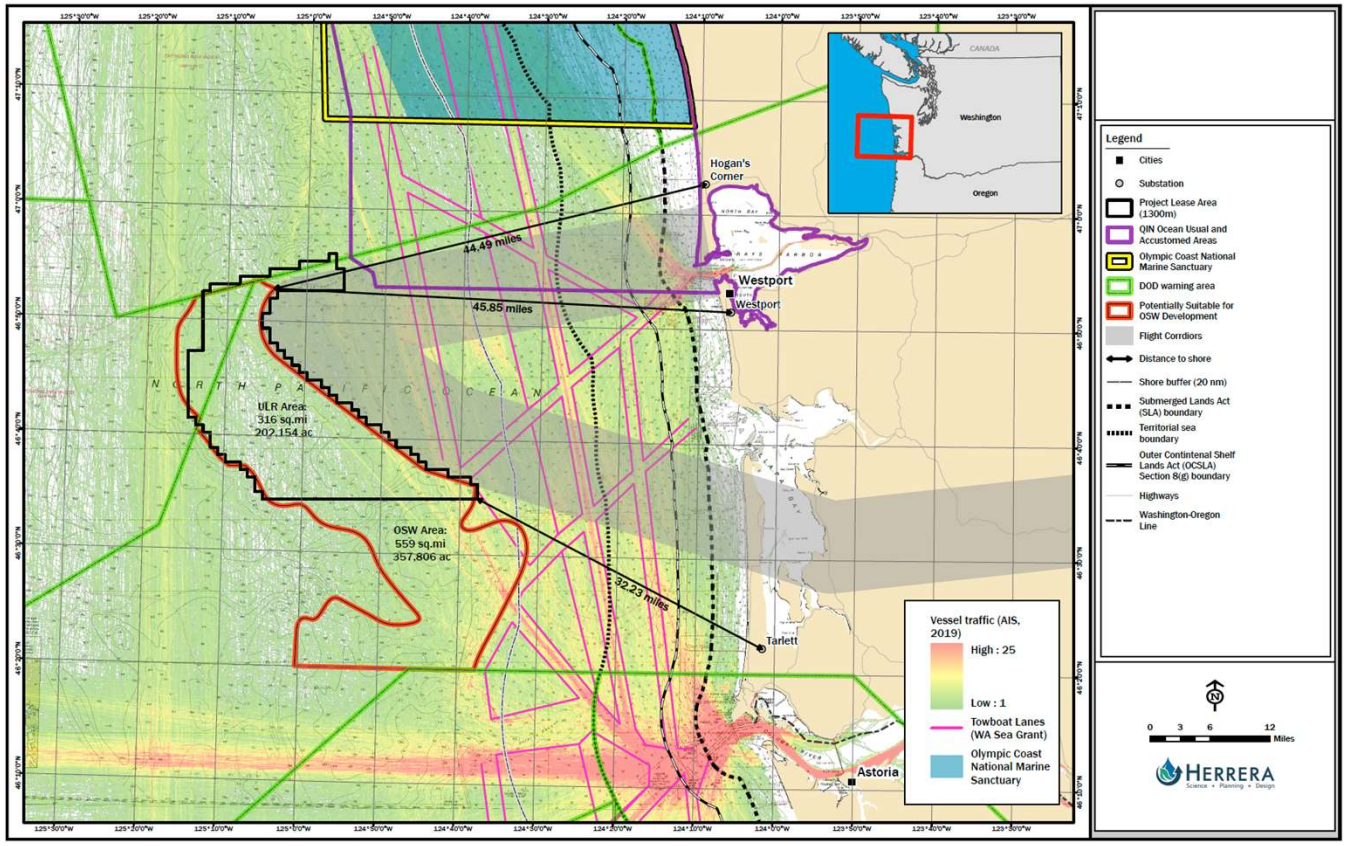
- Trident Winds submitted unsolicited lease request for 2-3 GW site off the coast of WA

May 2023

- Trident Winds commissioned E3 to determine System Value of OSW using RESOLVE, the least cost Capacity Expansion model



WA Sea Space Limitations for OSW Development



- Wind resource:
  - Uniform at 14-16 knots (7-8 meters/sec)
- Area outside OCNMS, QIN U&A and DoD constrains:
  - **~ 560 sq miles or 7 GW**
  - 300 to 711 fathoms (550-1300 meters)
- Distance to shore is over 30 miles miles
  - DoD flight corridors
  - Fishing activities
  - Boat traffic

System Value of Offshore Wind in Washington

Prepared for Trident Winds Inc.

May 2023

Arne Olson, Senior Partner
Sam Faries, Managing Consultant
Anthony Fratto, Managing Consultant
Sierra Spencer, Managing Consultant
Michelle Mann, Consultant

Energy+Environmental Economics

https://tridentwinds.com/wp-content/uploads/2023/11/for-website-system-value-of-offshore-wind-in-washington-v3.pdf

E3 Study Results

Energy+Environmental Economics

- 30 years of energy policy, economics, and engineering
- Cutting edge work and modeling of the PNW system plans/forecasts
- 100% renewable and resource adequacy modeling for NW Utilities
- E3's "Resolve" is a Capacity Expansion model that estimates the cost-effectiveness of various resource acquisition strategies

Study Approach

- Using RESOLVE, modeled energy needs, goals and economics with and without WA Offshore Wind (OSW)

Study Results

- In winter months WA OSW is more valuable resource than OR OSW to WA state electrical system
- Leveraging NW OSW showed large system benefits to the electrical system
- WA needs to include OSW in its energy mix to meet its energy and climate goals at **least cost**
- 7 GW of WA OSW (due to sea space limitations) could save ratepayers over $5B

Key Inputs to E3's RESOLVE Model

Load Forecasts

- 2021 NW Power Council Plan, with adjusted boundaries for the "NW Core" study area
- WA State Energy Strategy high electrification scenario

Projected build outs

- WECC 2020 Anchor data set
- 2021 NW Power Council Plan

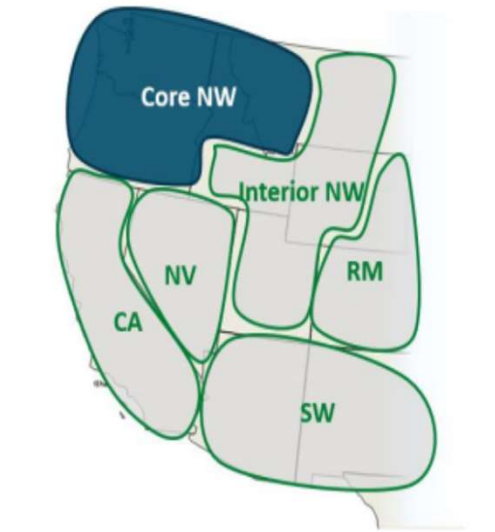
Achieving WA Energy Policy Goals

- CETA, GHG, Climate Commitment Act, etc.

Resource Cost

- NREL Annual Technology Baseline (ATB) provides a consistent set of technology cost and performance data

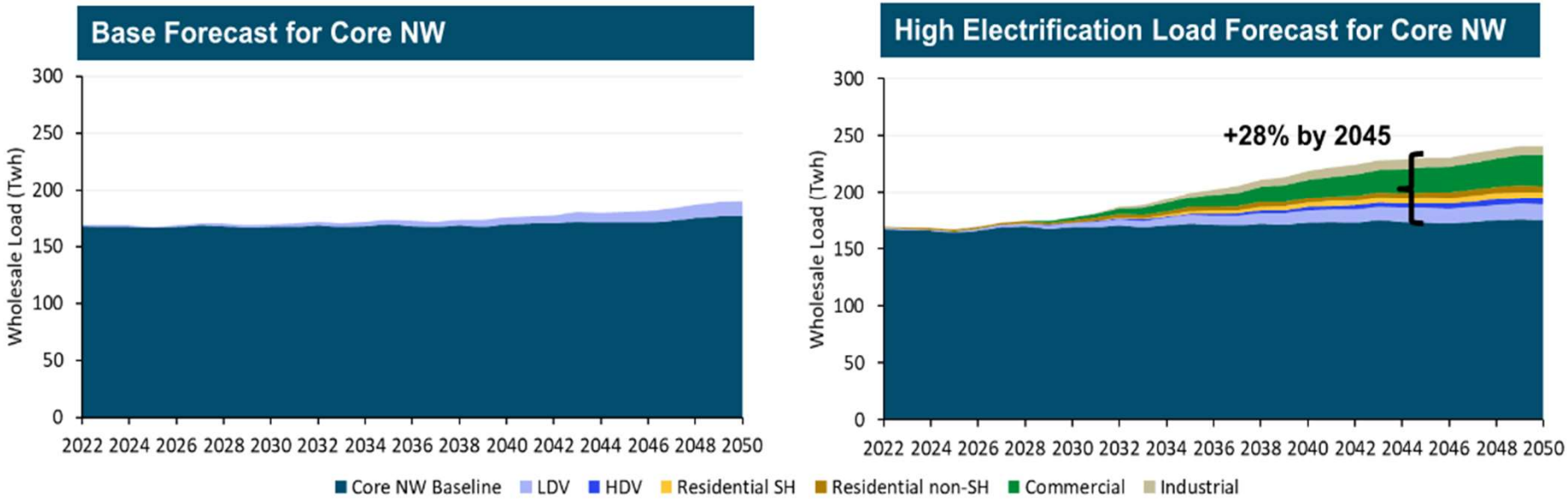
E3's Market Price Forecast



Energy+Environmental Economics

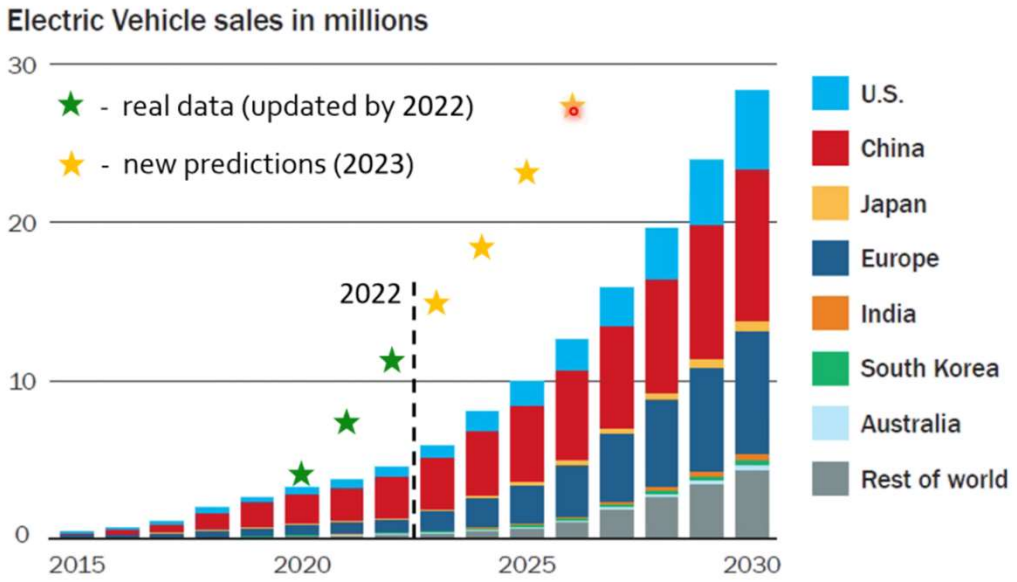
Load Forecast

- **Base load forecast is from NWPCC 2021 Plan benchmarked to E3's boundary of Core NW**
- **High Electrification scenario takes Washington's State Energy Strategy high electrification load and then scales up and benchmarked to the Core NW**
  - Electrification grows across all sectors, most noticeably in commercial and transportation to meet state's net-zero emissions by 2050.
  - Commercial and residential SH electrification indicates a switch to high electric resistance & heat pump adoption which will significantly impact load profiles and ultimately peak load



EV Sales Exceed 2019 Projections

- In 2022, EVs accounted for 18.6% of total vehicle sales
- Will the predictions hold? Will it underestimate?
- **Demand is exceeding the expectations, so we must ensure we will meet it**



Annual Sales of Passenger EVs (Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs))

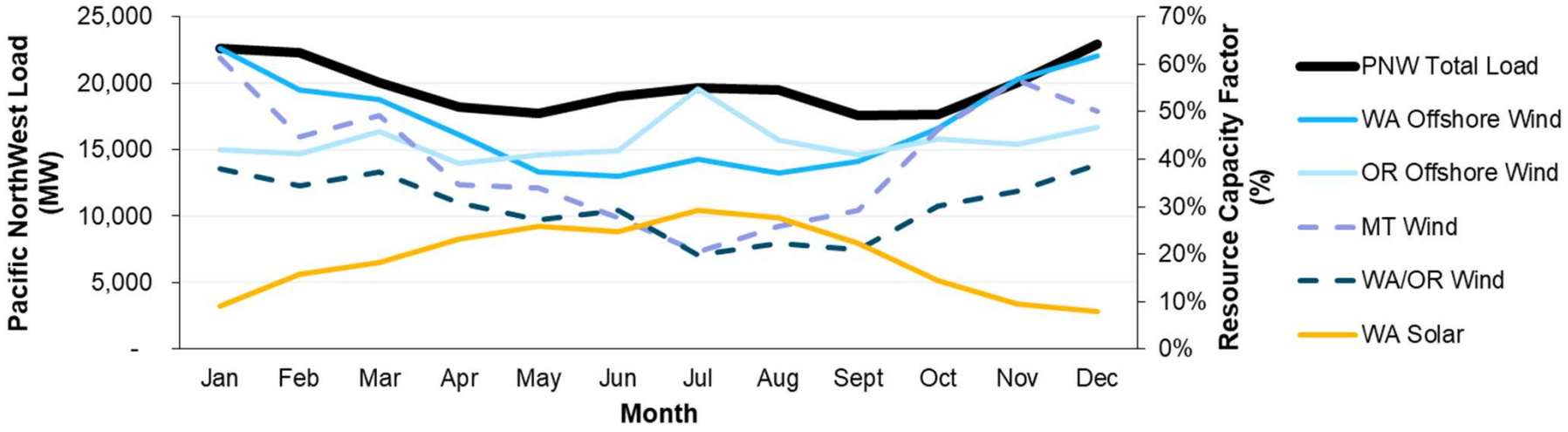
Source: BloombergNEF Long-Term Electric Vehicle Outlook 2019

- Granholm, Jennifer M. "National Blueprint for Lithium Batteries 2021–2030." (2021)
- BloombergNEF Electric Vehicle Outlook 2023

WA OSW Production is Highest in Winter Months

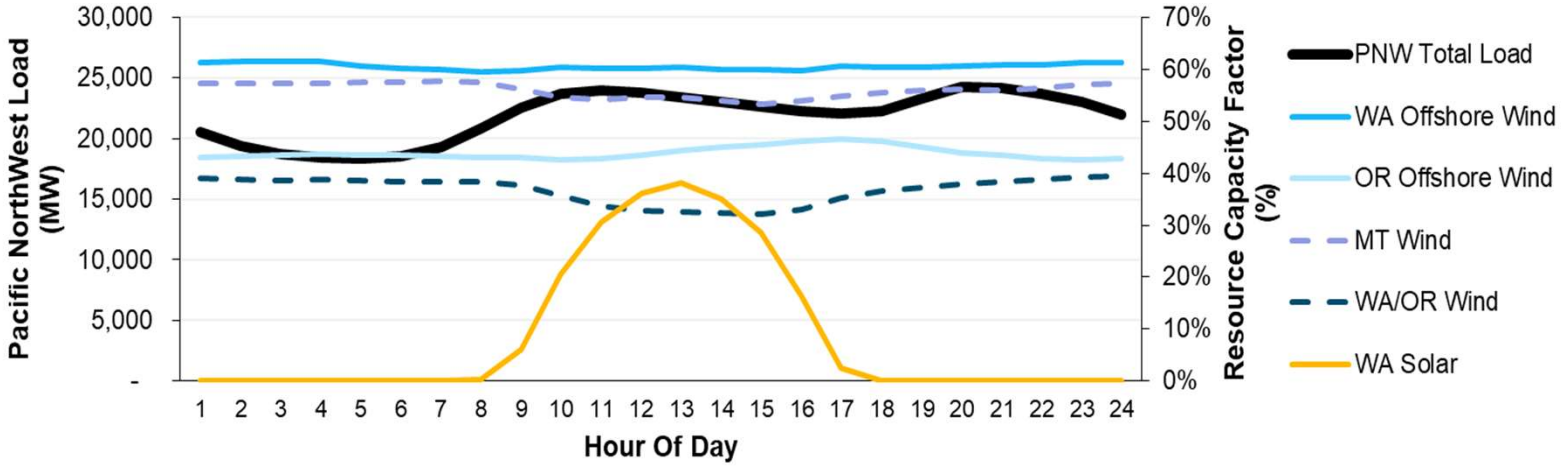
Energy+Environmental Economics

- WA OSW is best fit resource to meet WA peak demand load in winter months
- Solar seasonal production is inversely relative to Northwest seasonal load patterns
- OR OSW has a flatter seasonal production pattern w/summer spike
- WA onshore wind offers lower average winter capacity factors than OSW



WA OSW Production is Highest in Winter Months

Energy+Environmental Economics



WA OSW has the highest average generation (capacity factor %) compared to solar, WA/OR, MT onshore wind and OR offshore wind across <u>all winter hours</u>

WA Electrical System Benefits

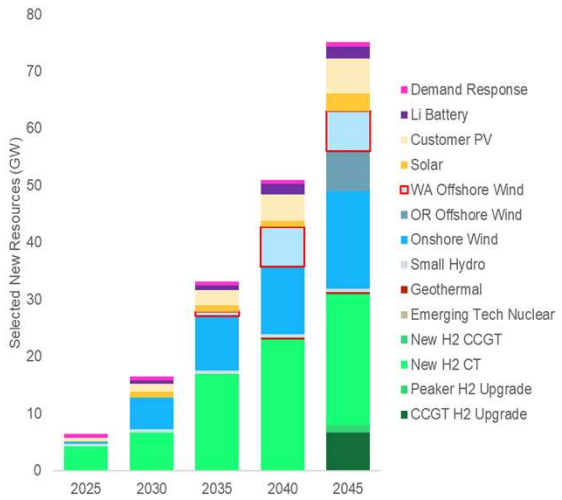
Energy+Environmental Economics

OSW has the potential to reduce system costs to Washington ratepayers over $5 billion on a Net Present Value (NPV) basis in the Base Scenario when WA is limited to 7 GW of OSW

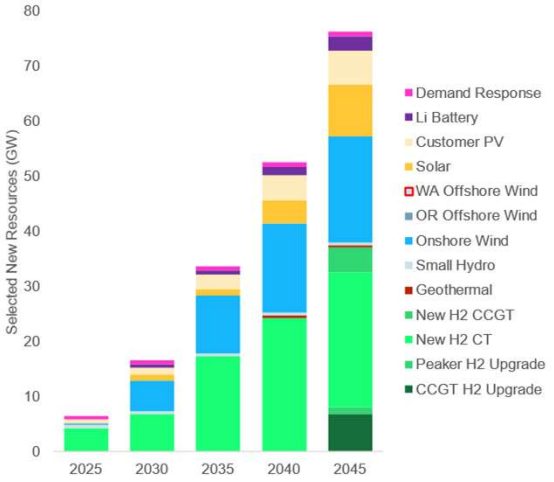
System Cost Savings =
Costs without OSW in WA/OR
– Costs with OSW Allowed

Most system benefits of OSW concentrated in 2045 due to large additions to reach policy goals

Selected Resources with Limited OSW



Selected Resources without OSW

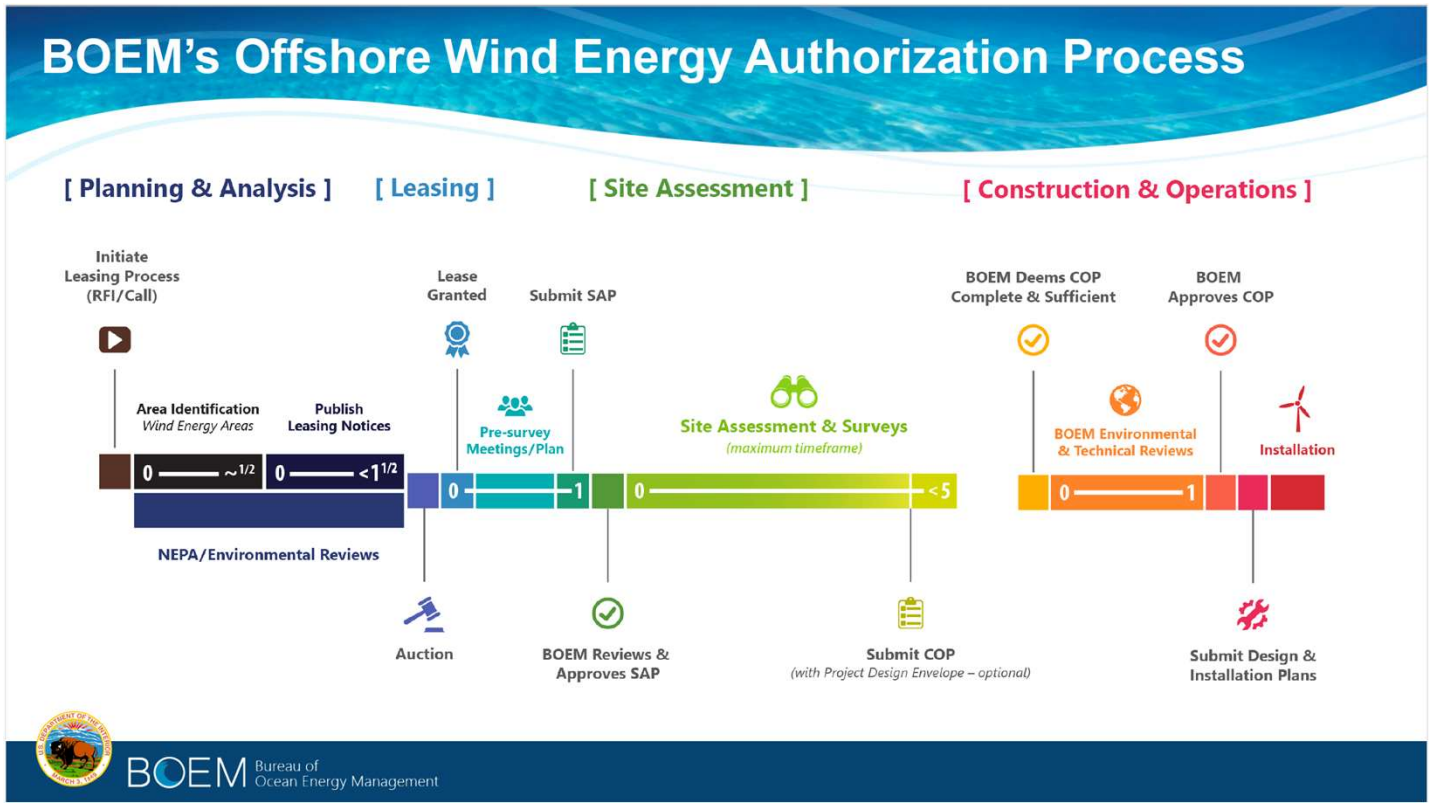


BOEM's OSW Leasing Process (30 CFR 585)

The OSW leasing process is triggered by either:

a) Submittal of an Unsolicited Lease Request to BOEM, or

b) a Governor's request to BOEM to designate and lease offshore wind energy areas



What's Next?

State-led Interagency Task Force	Governor should form a **WA state OSW Interagency** Task Force inclusive of all stakeholder groups and tribal entities
BOEM	**WA state OSW Interagency** Task Force invites BOEM to participate in the interagency coordination BOEM should engage with NW Treaty tribes via direct **Government-to-Government** coordination
State Studies	WA State needs to assess value of OSW: • In meeting States' Energy and Climate goals, • Economic impacts – positive and negative • Employment benefits
Engage	Engage with ongoing West Coast OSW key regional initiatives Coordinate with OR, CA, BPA, NW Power Council on the OSW initiatives, policies and plans

Questions?

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Trident Winds LLC
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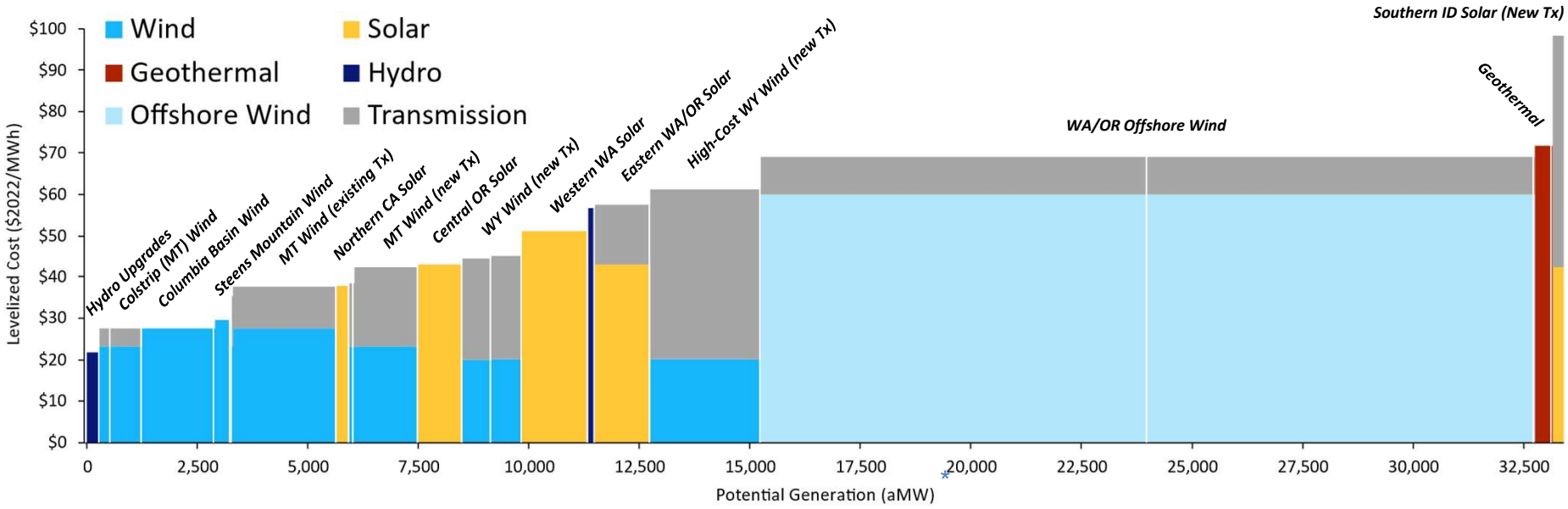
206.300.7721

Renewable Resource Supply Curve

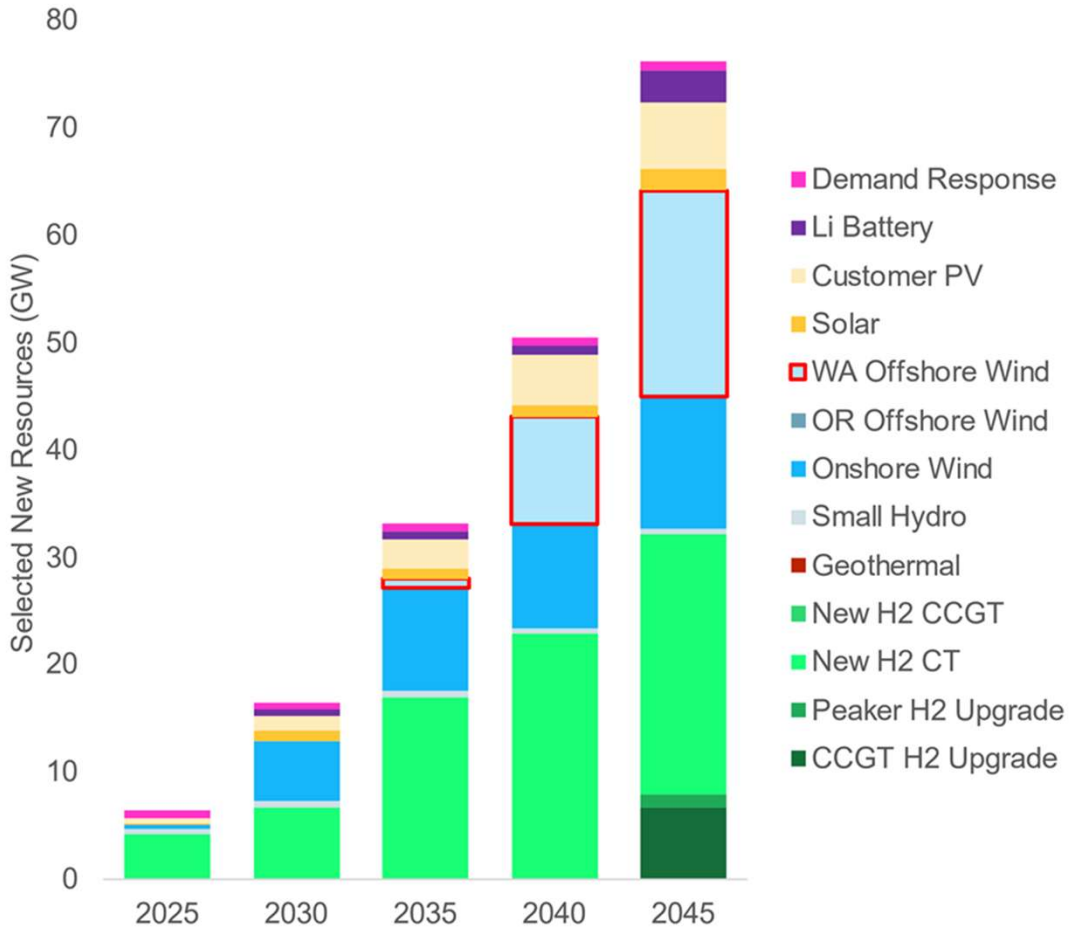
Transmission costs are included within cost curves that RESOLVE sees for resource selection

- Some resources, particularly out-of-state wind, have large transmission costs relative to the base resource cost

WA and OR offshore wind are <u>unrestrained builds</u> and given the same cost curve but have different generation profiles and capacity accreditation based on coincidence of generation and historic peak load hours



*aMW represents the resource capacity adjusted for level of production

Model results pair WA OSW with substantial contributions from other cost-effective renewable resources and conservation

New Resource Selection in Base Scenario at $60/MWh 2035 Offshore Wind LCOE