Puget Sound Energy (PSE) Review of Electric Vehicle Topics

Second EV Workshop

Docket UE-160799

January 15, 2025

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Agenda

- Transportation Electrification (TE) Planning & Rate Recovery
- Electric Vehicle (EV) Load Forecast and Modeling Inputs
- Clean Fuel Standard (CFS) Activities

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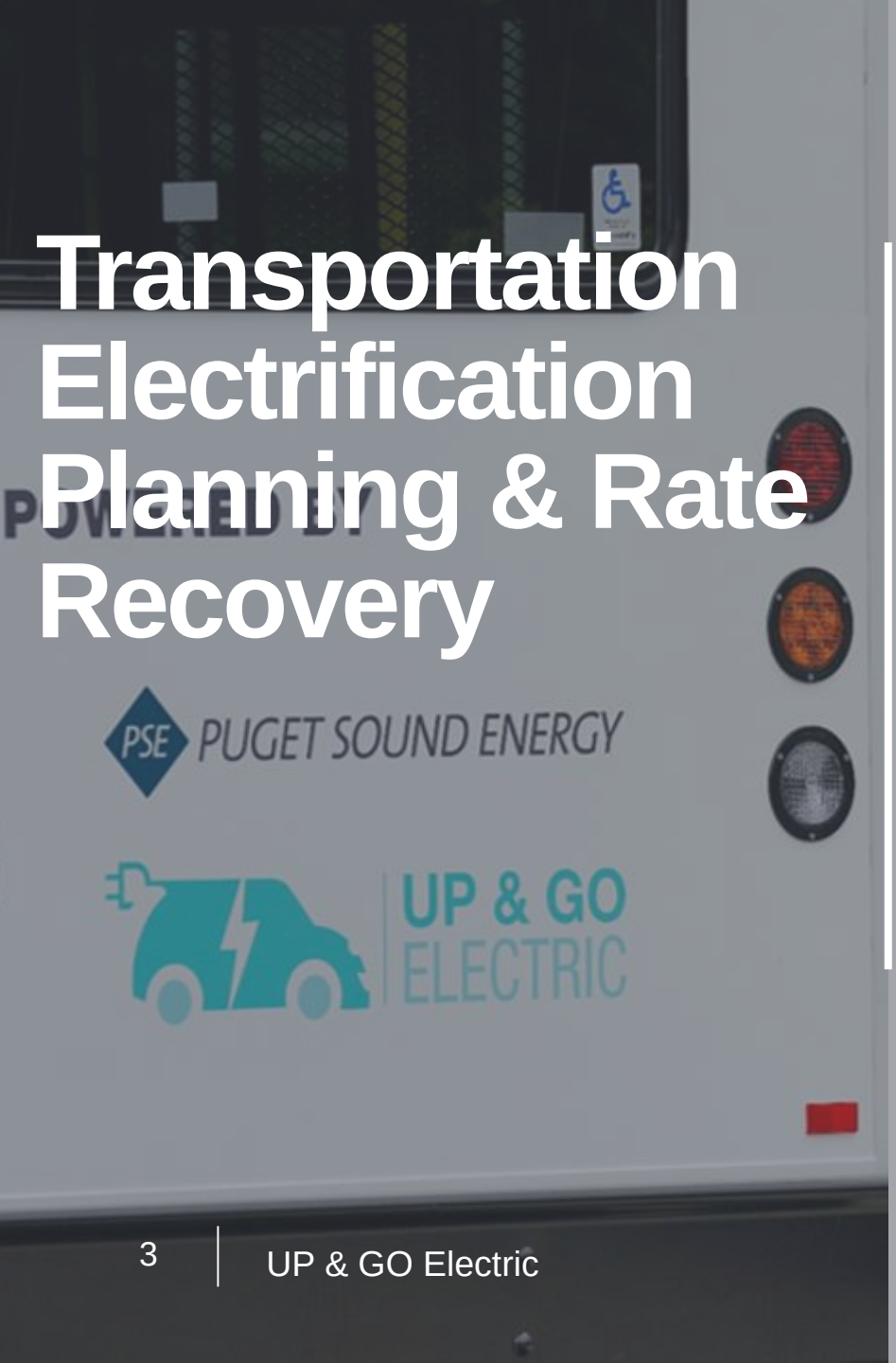
Transportation Electrification Planning & Rate Recovery



- Planning for TE investments
- Recovery of TE investments
- Rates for EV charging services

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PSE Transportation Electrification Planning

PSE's Existing Transportation Electrification Plan (TEP)

- PSE's TEP, filed in March 2021, and acknowledged by the Commission in August 2021, recognizes that TE can benefit the entire grid and all electric retail customers.
- PSE's TEP included a preliminary forecasted spend of between $75M-$109M for years 2021-2026 to fund the portfolio of tariffed TE products and services.

Future Transportation Electrification Planning

- PSE is contemplating filing the next TEP in conjunction with the 2027 Integrated System Plan (ISP, to be filed by April 1, 2027, per statute), pending the outcome of planning logistics and the Commission's ISP rulemaking (U-240281).

PSE TE Rate Recovery

Electric Vehicle Supply Equipment Cost Recovery

- Due to recognition in the TEP that TE can benefit the entire grid and all electric retail customers, recovery of costs from all customers, not just those directly participating, is appropriate.
- PSE currently funds capital and operating costs associated with TE initiatives through Schedule 141TEP (Transportation Electrification Plan Adjustment Rider), which applies to nearly all electric customers excluding retail wheeling, lighting classes, and special contracts.

Rates for EV Charging Services

- In addition to these TE programs, the charging load associated with EVs is recovered through individual customer class charges.
- Alternative EV charging rates that reflect the unique load behavior of EVs compared to traditional customers could be beneficial.

Fleet Depot Rate Class Model

For demonstration purposes only. Final design and availability subject to WUTC regulatory approval.

Energy Only

we heard you

- Offers customers the most flexibility
- Attractive for low usage customers

Demand Only

stagger load is easier

- Service scales with the customer
- Compensates for capacity freed up that require more resources to offer
- Easier to stagger load than to shift it completely

Energy & Demand

strongest incentives

- Savings and service scales directly with user adoption
- Most accommodating for sites beyond depot charging

Subscription

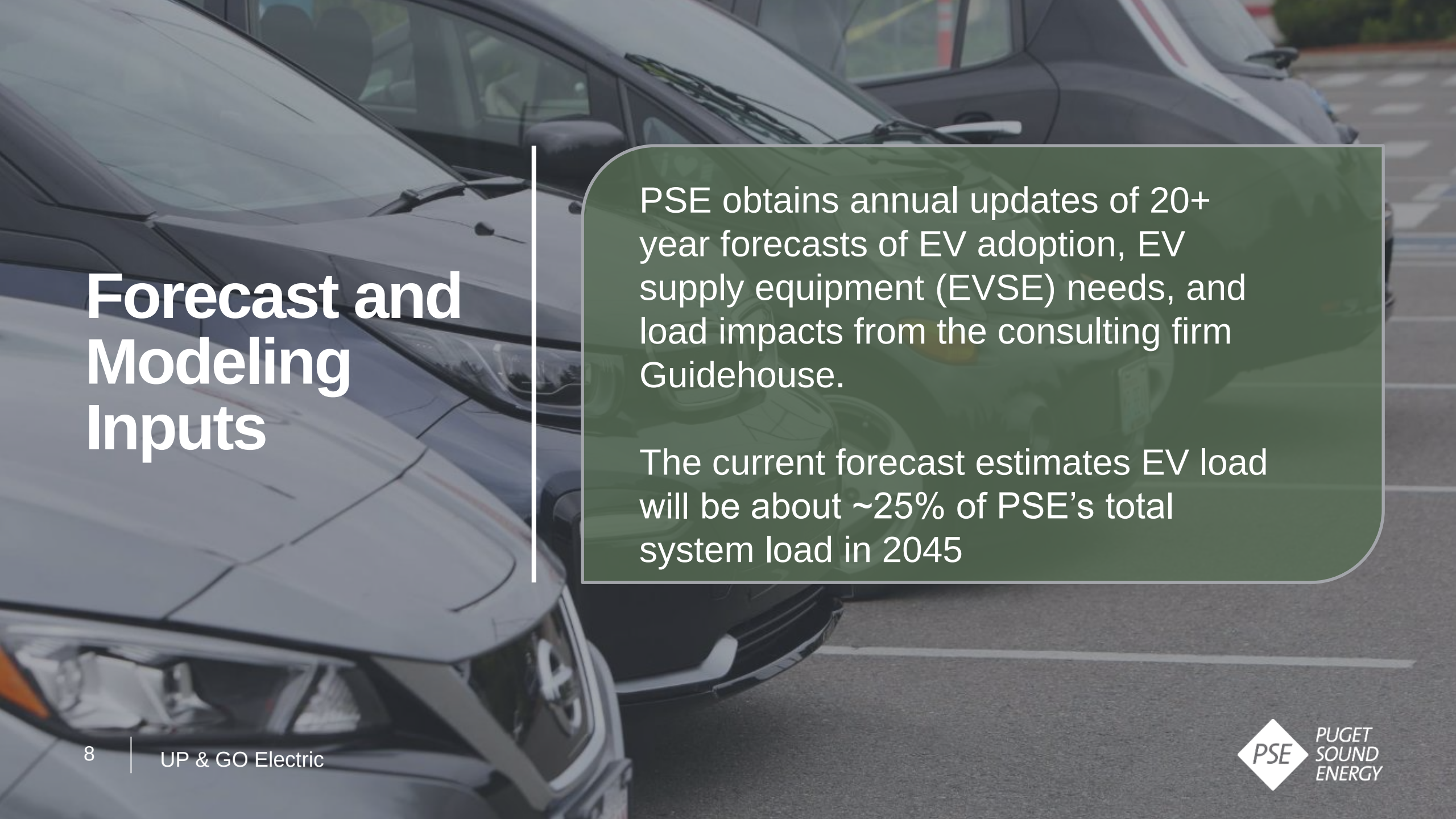
tiered Netflix style

- Flexible and scalable
- Simple to understand and communicate
- Easier and more predictable bills, focus on customers' business instead of utility pricing

Fleet Depot Charging Pricing Options

For demonstration purposes only. Final design and availability subject to WUTC regulatory approval.

Different Charges	Pricing Options			
	Energy Only	**Demand Only**	**Energy and Demand**	**Subscription**
Energy Charges ($/kWh)	On peak and Off peak	No	On peak and Off peak	On peak only
Demand Charges ($/kW)	No	On peak and Off peak	On peak and Off peak	No
Pass-Thru Charges ($/kWh)	Yes	Yes	Yes	Yes
Fixed Charges	Basic Charges	Basic Charges	Basic Charges	Subscription Charges



Forecast and Modeling Inputs

PSE obtains annual updates of 20+ year forecasts of EV adoption, EV supply equipment (EVSE) needs, and load impacts from the consulting firm Guidehouse.

The current forecast estimates EV load will be about ~25% of PSE's total system load in 2045

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PSE EV Forecasting Overview

Guidehouse provides PSE forecasts of EV adoption, the associated EVSE need, and load impacts within PSE's Service Area through 2050.

EV Adoption	Charging Needs	Load Impacts	Peak Impacts
Forecast battery-electric (BEV) and plug-in hybrid (PHEV) EV adoption for Light-, Medium- and Heavy-Duty Vehicles	Forecast charging infrastructure needs associated with EV adoption across charging use case and technology	Forecast monthly energy requirements to support EV adoption within PSE's service area	Forecast peak impacts using load shapes associated with charging

Guidehouse's VAST model is a complex tool that incorporates multiple variable inputs, including **cost of ownership, vehicle efficiency, vehicle miles traveled, and policy assumptions** to generate forecasts. The underlying methodology is considered an industry standard and is commonly employed in the field.

An in-depth presentation of the most recent results and methodology was made as part of PSE's April 17, 2024 Resource Planning Advisory Group (RPAG) presentation, which can be found at https://www.cleanenergyplan.pse.com/rpag-meeting-april-17-2024.

EV Load Forecast Model Key Inputs & Outputs

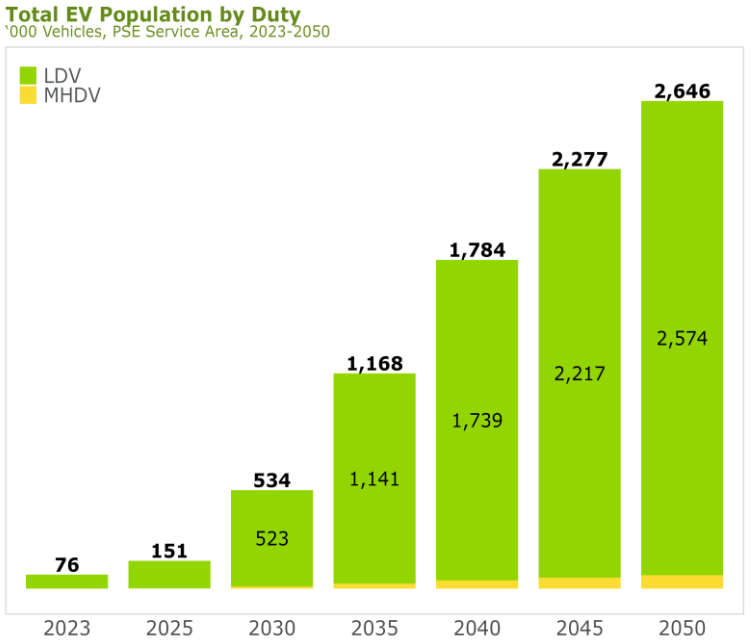
Key Inputs		
Input	**Description**	**Source**
EV Adoption Forecast	Number of BEVs and PHEVs by census tract by year	Guidehouse
Charger-to-Vehicle Ratios[1]	Current, long-run, and interpolated ratios of chargers needed to support number of EVs, by Tech, EVSE Owner (Public/Private), Use Case	Alternative Fuel Data Center (current) NREL's EVI-Pro (long-run)
Existing Charging Infrastructure	Locations of existing charging stations by tech, owner, and use case	Alternative Fuels Data Center
EVSE Forecast	Number of chargers needed to support EV adoption	Guidehouse
VMT	VMT (vehicle miles traveled) by segment, along with vehicle efficiency, determines total energy needs	FHWA, EDF, EMFAC, AFDC
Vehicle Efficiency	kWh/mile forecast	Argonne National Lab
PHEV e-Utilization	Proportion of PHEV (plug-in hybrid EV) miles using battery	
Stock Vehicle Charging Profile	Typical hourly charging behavior by vehicle type and use case	Guidehouse

Key Outputs	
Output	**Description**
Site Location	Census tract
Use Case	Charging use case, examples include Public Market and Private Depot
Technology	L1, L2, DC
Year	2023-2050
Day of Week / Time of Day	Hourly, Weekend/Weekday
kWh	Monthly energy consumption
kW	Hourly load

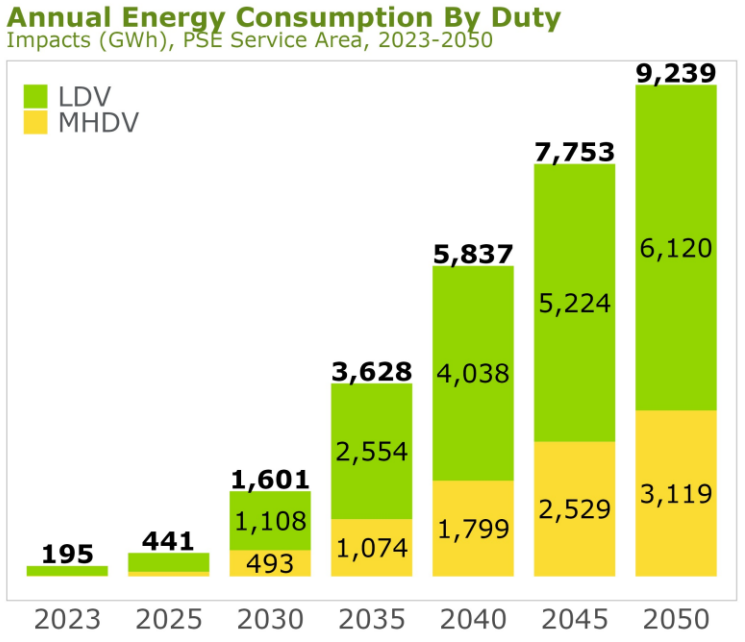
PSE EV Adoption & Load Impacts

Current forecasts project by 2050, there will be 2.6 million EVs in PSE's Service Area (71% of the total vehicle population), requiring 9.2k GWh of energy with an annual EV peak forecasted to hit 1,800 MWs

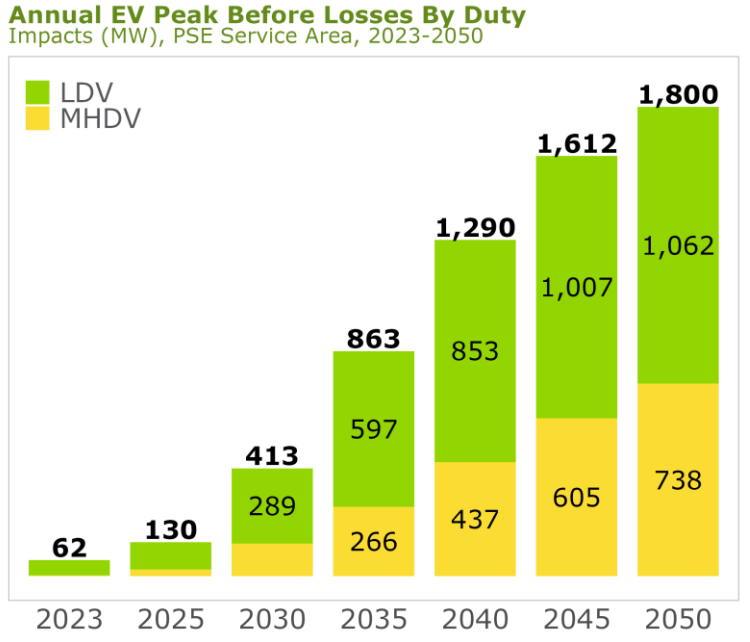
EV Population



Energy Need



EV Peak Before Losses*



The forecast is **heavily impacted by policy** assumptions; specifically, it assumes sales targets under the Advanced Clean Cars II (ACC) and Advanced Clean Trucks (ACT) are achieved.

Uncertainty

Policy-defined sales targets have greatest impact: The assumption that WA will hit sales targets established under the ACC and ACT drives very high EV adoption, but it is not certain whether these targets will be achieved.

The magnitude of the energy requirements associated with EVs may vary: While EVs will introduce a substantial amount of energy to the PSE system, uncertainty regarding the success of sales targets, VMT associated with EVs, and fuel efficiency lead to a wide range of how much energy will be needed.

Uncertainty in LDV (light-duty vehicles) forecasts related to home charging: As more individuals without access to home charging adopt EVs, dependence on workplace and public market charging will likely grow.

Uncertainty in MHDV (medium- and heavy-duty vehicles) forecasts related to unknown market behavior: As a nascent market, it is still unclear what the charging needs and behavior may be for large vehicles (e.g., Long-Haul trucks) as duty-cycle, battery efficiency, and use of in depot vs. en-route charging are not yet well-established.

CFS Activities

CFS Spending Requirements
(based on Ecology guidance) [1]

- 50% Category 1 (Ecology List)
- 30% Category 2 (located within or benefitting designated communities)
- 20% Category 3 (Utility-Selected)

[1] CFS Guidance on Residential EV Charging CreditRevenueRequirements

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Background & Monetization Strategy

CFS Engagement and Development Activities

- PSE submitted letter to Ecology to participate in the Washington Clean Fuel Standard on January 12, 2023.
- PSE registered in the Washington Fuels Reporting System (“WFRS”) by March 31, 2023, to report fuels and bank or transfer CFS credits.
- PSE filed a petition requesting deferred accounting treatment related to implementation of the Department of Ecology’s Clean Fuel Standards Regulation under Docket UE-240582 on July 31, 2024. Approved by the Commission November 7, 2024.
- Strategy is to augment or amplify PSE's TEP portfolio with revenues generated through Clean Fuel Standard credit monetization.
- PSE will monitor market conditions and monetize, as needed, to fund programs to which we've committed, and will invest to the degree to which generated revenue allows.

Transportation Emission Reduction Grants

Maximum # of awarded projects and available incentives contingent upon annual CFS budget

CFS-funded incentives for grants, grant matching, and grant writing

- Implementation partners contracted & program design and customer engagement strategy initiated
- First annual grant cycle is expected to open by Q2 2025 and will provide a 4 month open application period
- Funding awards can cover up to 100% of eligible project costs, including studying, planning, promoting, or deploying Transportation Emission Reduction technology and projects
- Up to 75% of funds may be paid upon application approval, remaining 25% paid upon project completion
- Awardees must agree to periodic project status reporting through project completion.

Questions?

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