



Electric Transportation Plan

July 7, 2020

Partnering with our community to ensure that customers have the knowledge they need and the support they require while optimizing the grid for growing electric transportation needs now and into the future.

Table of Contents

- Executive Summary..... 2
- Background and Policy 2
 - Market, Technology and Barriers..... 2
 - Market..... 3
 - Technology 4
 - Barriers 4
 - Legislation 5
- Value of Electric Transportation 6
 - Benefits..... 7
 - E3 Cost/Benefit Analysis..... 7
- Snohomish PUD’s Role Supporting Electric Transportation 9
 - Key Strategies and Actions 9
 - Community 11
 - Grid..... 12
 - Adoption..... 13
- Moving Forward..... 15

Executive Summary

As the PUD envisions the utility of the future with greater integration of distributed energy resources, changing needs of our customers and growing decarbonization policies, electric transportation can play a pivotal role in providing a flexible and manageable load. Partnerships with our customers will be essential to maximize the benefits for them and the PUD. If not well managed, increasing electric transportation could exacerbate rather than mitigate power supply and grid management challenges.

Electric transportation efforts to date have built on three key strategies. This plan reaffirms those strategies and expands actions developed to overcome barriers, support customers, align with the PUD's strategic priorities, such as affordability, and optimize the electrical grid. The strategies, developed by a collaborative team from departments across the PUD and described later in the document, provide guidance for PUD actions and policy.

This inaugural Electric Transportation Plan addresses the requirements of SHB 1512, current business conditions and planned actions. An accompanying resolution is submitted as part of the approval process. PUD staff are requesting approval of both the resolution and Electric Transportation Plan.

Background and Policy

The primary purpose of this plan is to outline key strategies for investing in infrastructure for electric transportation while meeting the legislative requirement for the adoption of an electrification of transportation plan by the PUD's Commissioners before offering incentives. The PUD's plans for its own fleet are not within the scope of this plan.

Market, Technology and Barriers

While there are several factors contributing to the challenge of predicting future electric transportation trends as technology rapidly advances, there is a consensus that electric vehicle adoption will trend upwards. The timing and size of the upward trend is less certain, especially with current conditions impacting vehicle production, fuel cost and unemployment.

Adoption rates are being driven by legislative actions, commitments from vehicle and equipment manufacturers, and consumer demand on a world-wide scale. The electric vehicle industry has seen steep increases in adoption rates from the advancement of technology and new entrants such as Tesla which has captured a majority of the market.

Market

Washington State is third in the nation for electric vehicle adoption¹ and Snohomish County is second in Washington State for the number of registered electric vehicles². Recently, Snohomish County was identified as one of the top fifteen counties in the nation for electric vehicle (EV) adoption, at 4.4%, while the national average is 1.9%.³ This presents an opportunity for the PUD to support our customers investing in electric transportation and to shape the charging load to optimize the electrical grid, while keeping rates affordable for our customers.

The recent legislative adoption of a zero emissions vehicle (ZEV) program, city decarbonization initiatives, and investments from all vehicle manufacturers are some of the influences contributing to the upward trend in electric transportation. The impact of these influences has now extended beyond the light duty vehicle market to adoption of medium duty trucks and vans for delivery fleets.

Electric Vehicle Market Overview



Sources: www.data.wa.gov , www.epri.com and www.plugshare.com

¹ EV Market Share by State 2018 retrieved from www.evadoption.com

² WA Department of Licensing data for Snohomish County and Camano Island, June 4, 2020 retrieved from www.Data.wa.gov/demographics/electrical-vehicles-by-county

³ Electric Power Research Institute 2020 Electric Transportation Update (March 2020) retrieved from www.epri.com

Technology

The electric transportation industry is rapidly advancing both vehicle and equipment technology with consideration for consumer demands and specialized commercial applications. In response, the electric vehicle manufacturing industry is establishing unprecedented partnerships between vehicle manufacturers to reduce investment costs and speed the time to market. One example of this is General Motors's EV platform and battery integrated into Honda's new electric vehicle designs.

The benefit of partnerships between vehicle manufacturers should be realized in 2023 when over 130 models are expected to be available and half of those vehicles are expected to be SUVs and cross overs which currently account for a majority of the car sales. Additionally, the partnerships have extended to commercial vehicles with input from delivery companies on fleet vehicle design with the Amazon and Rivian partnership. Real world pilot projects include collaboration with utilities on vehicle and grid interaction as delivery routes are refined for performance, and charge management strategies are developed to minimize operational costs.

With increasing electrical capacity needs for charging infrastructure, best practices are being established by utilities nation-wide to achieve diversity factors for vehicle charging to minimize the impact on utility infrastructure. While standards for light duty chargers have been established, there is an urgency to develop heavy-duty bus charging standards as this market continues to grow and has potential for vehicle-to-grid value.

Barriers

The three greatest barriers to electric vehicle adoption are awareness of electric vehicles and charging technology, availability of charging and initial first cost of electric vehicles.

Customer Awareness

Education and awareness continue to be the largest barrier to electric vehicle adoption with both electric vehicles and charger technology widely unknown and still thought of as emerging. For consumers, the challenges of finding a reliable source of information and interacting with knowledgeable sales staff at car dealerships remain. With an increase in availability and adoption of buses and delivery trucks, fleet managers are sharing and collecting information from small scale pilots throughout the nation.

Charging Infrastructure

The availability of charging is challenging for all EV owners and especially challenging for multi-unit dwelling (MUD) residents and renters or homeowners without a garage since a majority of vehicle charging occurs when the vehicle is parked at the EV owner's residence. For those EV owners renting, using nondedicated parking or operating as part of a transportation network company (TNC – Uber/Lyft), public or workplace charging is essential. Access to charging needs to be equitably developed for all customers for wide scale EV adoption to occur.

For commercial customers, the barrier to charging is charger standards and costs. While several standards for charging have been established for light duty vehicles, charging standards for heavy duty vehicles and buses are under development and most charging infrastructure is proprietary. Utilities can play a role to support the build out of charging infrastructure and inform managed charging strategies for customer fleets to reduce high demand charges.

Electric Vehicle Cost

By 2025, it is predicted that the cost of a new electric vehicle will reach parity with internal combustion engine (ICE) vehicles. However, due to the past and current volume of electrical vehicle leases, the secondary market is already at parity or close to parity. Incentives and tax breaks at the federal, state and manufacturer level can support the adoption of both new and used electric vehicles. Further support for electric transportation from utilities can include incentives for charging infrastructure with additional value to all ratepayers from managed charging.

The recent zero emission vehicle mandate in Washington is expected to bring a wider variety of electric vehicles to the market if it follows national trends. The mandate extends to medium-duty trucks as well even though adoption has been limited by viable electric vehicle alternatives. Buses are the one exception and their adoption rates have been increasing throughout the world. The full economic benefit has yet to be realized with vehicle-to-grid technology still in the early stages of development with early indications of significant potential. Cost is still a barrier and grant funding has subsidized most of the electric buses in the United States.

Legislation

SHB 1512, as passed by the Legislature and signed into law by the Governor in 2019 (codified as RCW 54.16.430), clarified the authority of consumer owned electric utilities to invest in infrastructure and provide outreach about and incentives for electric transportation, with a requirement that the utility demonstrate that such programs benefit the ratepayers, or at a minimum, do not increase net costs to ratepayers overall by more than 0.25%.

The Legislature also recognized that the benefits of electric transportation programs could be different for each utility, depending upon its circumstances. Some of the benefits cited by the legislature include optimizing the use of electric grid infrastructure, improving the management of electric loads, better managing the integration of variable renewable energy resources, and cost-effective energy efficiency through more efficient use of energy resources and more efficient use of the electric delivery system.

The legislature noted that utilities could consider a variety of these types of benefits in establishing their electrification of transportation plans, including some or all of the following:

(a) The applicability of multiple options for electrification of transportation across all customer classes;

(b) the impact of electrification on the PUD's load, and whether demand response or other load management opportunities, including direct load control and dynamic pricing, are operationally appropriate;

(c) system reliability and distribution system efficiencies;

(d) interoperability concerns, including the interoperability of hardware and software systems in electrification of transportation proposals; and

(e) overall customer experience.

The key strategies and accompanying actions, as described further in the document, support many of the benefits listed above while providing customer choice and affordable rates.

In the 2019 legislative session, several other bills passed which support the electrification of transportation and the grid resources required for charging infrastructure. Below is a short summary of the bills passed in the 2019 legislative session.

- HB 2042, Advancing Green Transportation Adoption, revives some of the tax breaks for purchasing electric vehicles, and limits the benefit to new vehicles under \$45,000 and used vehicles under \$30,000.
- SB 5116, Clean Energy Transformation Act, requires Washington utilities to provide power free of greenhouse gases by 2045. The bill authorizes the use of utility infrastructure and systems to maximize the benefits of electric vehicle charging such as managed charging and vehicle to grid (V2G) capability as alternative compliance options in the early compliance periods.
- HB 1257, Concerning Energy Efficiency, requires all new building construction projects with on-site parking to install the electrical wiring to accommodate level 2 vehicle charging equivalent to the greater of one space or ten percent of the spaces.

In the 2020 legislative session, SB 5811 continued to reinforce Washington's commitment to transportation electrification by adopting California's vehicle emissions standards, including California's zero emissions vehicle program. With the passage of this bill, Washington State became the 12th Zero Emissions Vehicle (ZEV) state.

Value of Electric Transportation

Electric transportation provides financial benefits to both the ratepayers and consumers with additional positive societal impacts; air quality being the most measurable. Widely documented benefits from electric transportation are noted below.

Benefits

In Washington state, transportation contributes 47%⁴ of greenhouse gas emissions; the highest percentage of the four northwest states. Snohomish PUD is uniquely positioned to support electric transportation with 98% carbon free power resulting in **significant reductions in emissions**.

By expediting the transition to electric transportation, both on and off road, the region gains **improvements to air quality and public health**. Tailpipe emissions are eliminated with an electric vehicle and significant greenhouse gas emission reductions can be attributed to Snohomish PUD's low carbon power when used for charging.

Electric vehicle operating and maintenance costs are lower than those for internal combustion engine (ICE) vehicles. **Lower fuel cost and reduced maintenance** on electric vehicles lowers the total cost of ownership. Additional environmental benefits are gained from fewer mechanical systems with fluids that may leak or need to be disposed of.

Electric vehicle charging can be flexible for many drivers, allowing for improved **efficiency of the electrical grid**. Managed charging optimizes the grid and keep rates affordable for all our customers.

Stronger **energy security** is gained from power generated here in the Northwest and fueling electric transportation. Greater adoption of electric vehicles creates less reliance on imported fuel needed for ICE vehicles.

With the passage of SB 5811 and the adoption of California's zero emissions vehicle program, potential benefits associated with electric transportation include the **monetization of environmental attributes** associated with carbon reduction in the transportation sector.

E3 Cost/Benefit Analysis

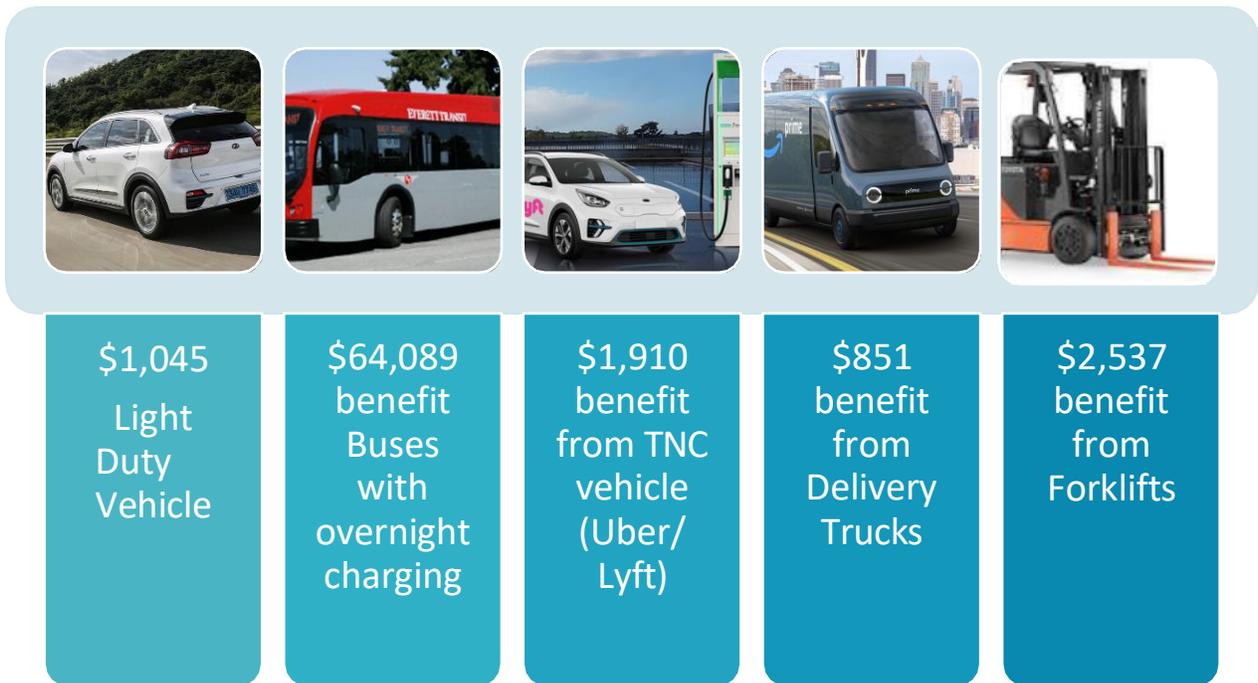
In 2016, six Washington utilities contracted with Energy+Environmental Economics (E3) consulting to identify the impacts and benefits of electric vehicle adoption region wide and four utilities (Snohomish PUD, Chelan PUD, Tacoma Power and Puget Sound Energy) sponsored an additional level of detail specific to their own service territory. On a regional basis, the study calculated a net benefit to all ratepayers, expressed in terms of dollars of benefit per vehicle class included in the study. However, there were significant differences among utilities and vehicle classes.

Costs and benefits were calculated for five electrified vehicle segments: 1) personal light-duty vehicles, 2) taxis and transportation network company (TNC-Uber/Lyft) vehicles, 3) forklifts (both light-duty and heavy-duty), 4) buses, and 5) parcel delivery trucks. The vehicle segments were selected based on commercially available electric vehicles at the time of the 2017 study.

⁴ Building "Good Load" to Reduce Carbon Emissions, Northwest Energy Coalition, JJ McCoy, 2016

Specific to the PUD, the net economic benefit to the region over a 20 year period is \$83.1 million dollars from personal electric passenger vehicles and the benefit to our ratepayers is \$57 million.⁵ Electrification of other transportation such as buses, forklifts, transportation network companies (TNC), and delivery trucks all have a net positive benefit to the region and our ratepayers. Additional benefit to ratepayers was quantified when vehicle adoption was combined with managed charging.

Ratepayer Benefit per Electric Vehicle



Source: E3 Report

The analysis further identified load profiles providing the most opportunity, shifting from early evening peaks to charging during low load hours of late night and very early morning. Early evening personal vehicle charging coincides with current peak household energy use and a benefit is seen even with a slight shift in the timing of charging. This benefit to the PUD's ratepayers increases from \$57 to \$152 million⁵ by managing personal vehicle charging. Transit, school buses, and delivery trucks all have the potential to charge during the low load hours of late night and early morning which could result in further grid optimization.

Additional cost/benefit analysis was provided for delivery trucks, buses, forklifts, and TNC vehicles with managed charging only considered for buses. The greatest benefit to our

⁵ Economic and Grid Impacts of Plug-in Electric Vehicle Adoption in Washington and Oregon, March 2017, Energy+Environmental Economics

ratepayers over the 20-year period was per bus at \$64,089 and forklifts contribute \$2,537 of benefit followed by ride-share vehicles at \$1910 and \$851 per delivery truck. While the E3 report determined a relatively small benefit from delivery fleets and did not estimate managed charging benefits, these fleets have the potential for overnight charging since their operation usually coincides with business hours.

The E3 study provided an initial analysis of the benefits from several vehicle types commercially available at the time. Since the report was published, the EV industry has made significant advancements in vehicles for medium-heavy duty uses and improvements in charging technology. Accordingly, we are confident that the benefits identified in the 2017 E3 Study are higher today than they were in 2017. Pilots across the nation testing the optimization of driving and charging profiles for commercial vehicles, including buses and delivery trucks, will further inform potential benefit. As opportunities for beneficial electrification are identified within the service territory, the PUD will update and expand the cost/benefit analysis for these vehicle types, applications, and charging management. In the meantime, sufficient benefit information is documented through the E3 Study to enable the PUD to move forward with some incentive programs.

Snohomish PUD's Role Supporting Electric Transportation

The PUD remains focused on our core business of providing safe, affordable, reliable, and environmentally sustainable power to the community we serve. As our customers adopt electric vehicles in greater numbers, we are committed to support and partner with them.

Puget Sound vehicle traffic flows across four utility service territories and consideration was given to the activities taking place in each of the other three service territories. A few of the considerations include consistent messaging, vehicle purchasing, charging needs, and delivery routes. However, similar to nationwide best practices, each utility is unique in its business structure, customer needs, and grid infrastructure. In nation-wide best practices, transportation plans include some common themes reflected in this plan while addressing the specific needs within the utility service territory.

Some differences in Puget Sound utility transportation plans are driven by municipal structure, investor ownership, high volumes of ride share vehicles, port activity, and long commutes. There is also the opportunity to learn from the many pilots among northwest utilities given the collaborative environment. Insights from California are closely followed with the number and depth of programs funded at over a billion dollars.

Key Strategies and Actions

This plan describes three key strategies, that set the groundwork for the PUD's support and participation in the continued growth of electric transportation in Snohomish County and Camano Island, consistent with the PUD's Strategic Priorities. The key strategies and

associated actions propose solutions to overcome the current barriers and adapt to the rapid advancement of technology while benefits for all ratepayers are achieved.

Many of the actions described in this plan are established best practices for utilities across the nation. These actions will inform the development of policies and programs supporting electric transportation while aligning with the interests of customers, EV owners, local governments, the state, and manufacturers.

The actions described in this plan are fairly high level. The individual actions, pilots and programs will be consistent with the framework of this plan, including its economic cost/benefit analysis, thus giving staff the ability to design the actions that meet current and developing needs. The PUD's progress under the plan will be shared and discussed with the Board periodically. Any significant alterations to the plan based on changes in the economics of transportation electrification, electric vehicle industry, Board input, and/or the regulatory environment will be presented for approval. The Board will approve annually, as part of the PUD's budget, the expected expenditures under the plan.

Key Strategies for Electric Transportation



Build community through outreach and education about electric vehicles



Optimize the grid with transportation electrification



Enable customer adoption of electric transportation

Community

Build community through outreach and education about electric vehicles.

The PUD has been a trusted energy efficiency advisor to our customers for more than forty years. We are expanding the role to include electric vehicles and charging infrastructure by leveraging existing channels in support of electric vehicle adoption. Efforts will focus on general outreach and education with a targeted effort to those customers with immediate potential for electric vehicle purchase.

This multi-channel approach creates an opportunity to build consumer confidence, supporting the benefits from electric transportation, such as affordability, through education and awareness. These actions will create informed choices for customers on electric vehicle ownership, fleet electrification, and electric transportation impacts. The PUD's established EV Community of EV owners and interested individuals will be the focal point for participation in residential focus groups and program participation.

Priorities for a dedicated engagement manager will focus on general outreach to educate employees, customers, auto dealers, and charging site hosts along with targeted outreach to fleet customers. In establishing priorities, a variety of resources providing information on light-duty vehicles were considered and compared to the limited communication on new developments and pilots for the medium-heavy duty EV sector.

The PUD's EV website pages include a quick link from the home page, basic EV information, several tools to assist in the purchase decision, and a charging locator. This information will be leveraged into other forms of communication for broad distribution at events, ride and drives, and other community engagements in the future.

With approximately 80% of electrical vehicles leased⁶, the secondary vehicle market is ideal for many buyers due to the lower purchase price than for a comparable internal combustion engine (ICE) vehicle. However, many of those buyers may not be aware of this opportunity or considerations when purchasing an electric vehicle. Reaching buyers of vehicles on the secondary market will be one of the priorities.

Continued improvement and development of additional programs will take place under the umbrella of the plan consistent with the goals and strategies of this Electric Transportation Plan. Similar to the PUD's Energy Efficiency program planning process, the PUD's annual budget will reflect electric transportation programs for each year.

⁶ Retrieved from www.myeve.com

Grid

Optimize the grid with transportation electrification

The PUD has an ongoing effort to revise its planning and forecasting models to incorporate a number of distributed energy resources including electrical vehicles. Further refinement to the inputs of these models includes county specific data and current national trends. Utilizing these models with our system planning maps, system constraints have been identified and high-level heat maps were developed to target available capacity and/or identify areas of further study.

To refine customer data and gain more knowledge about the driving and charging behavior of our residential electric vehicle owners, we have contracted with FleetCarma and will recruit EV owners from our established EV Community to participate in the two-year study. The study will have the additional benefit in the second year to understand the potential for influencing off-peak charging behavior.

FleetCarma helps utilities understand and manage electric vehicle charging by providing EV drivers with a plug and play C2 device that is self-installed in the car's on-board diagnostic (OBD) port. The anonymized data on driving and charging patterns is provided to the utility for system planning and customer behavior trends. Additionally, the information can validate incentives for off-peak charging through the Smart Charge Rewards platform. EV drivers can access their data through FleetCarma's app and track any rewards.

Outreach efforts for targeting and establishing partnerships with large electrification load customers such as private fleets, transit, and the ferry system will focus on planning for managed charging to optimize the grid and reduce charging peaks to minimize costs for the customer and ratepayers.

Vehicle-to-grid (V2G) technology is in the early stages of development and has the potential to be a source of grid services. The PUD's Arlington microgrid (late 2020 completion) site will demonstrate the viability of V2G by testing the functionality and impact on systems and equipment, including integration with community solar and battery storage.

Continued improvement and development of additional programs will take place under the umbrella of the plan consistent with the goals and strategies of this Electric Transportation Plan. Similar to the PUD's Energy Efficiency program planning process, the PUD's annual budget will reflect electric transportation programs for each year.

Adoption

Enable customer adoption of electric transportation

The PUD continues to support adoption of electric vehicles by partnering with our customers and planning future pilot rate schedules, incentives, and innovative pilots. Strategic customer partnerships include car dealerships (Nissan and Kia), delivery fleets adopting electric vehicles (Amazon, UPS and Pepsico) and charging developers (ChargePoint, EVgo, Volta and EnelX). With AMI technology, more options supporting alternative rates and incentive programs for our customers will be possible.

Over eighty percent of future residential EV owners plan to charge their vehicles primarily from their homes, yet only fifty-five percent have their own garage.⁷ To better understand the needs and solutions for the multi-unit dwelling (MUD) EV owners, the PUD is participating in DOE's MUD grant with the Center of Sustainable Energy (CSE) which identifies barriers to MUD and curbside charging with a second phase to demonstrate charging infrastructure innovation.

In recognition of the current high cost of electric transportation, state agencies have issued several RFPs for grant funding including VW settlement funds, The PUD has participated in these as support to customer proposals or as the proposer in partnership with one or more of our customers. Recently, the PUD, a municipal customer and a commercial customer were awarded grants from the Department of Ecology to install fast chargers. Partnerships with grant funding will be a key structure supporting the build out of EV infrastructure at public, workplace, and multi-unit dwelling sites to ensure equitable access to EV charging. Further, the PUD will explore alternate rate structures, incentives, and managed charging guidelines as potential solutions to reducing EV charging site operating costs for long term sustainability.

Continued improvement and development of additional programs will take place under the umbrella of the plan consistent with the goals and strategies of this Electric Transportation Plan. Similar to the PUD's Energy Efficiency program planning process, the PUD's annual budget will reflect electric transportation programs for each year.

⁷ Accenture Strategy eMobility Value Research, 2019

Key Strategies and Actions

Community

- Dedicated EV engagement manager
- Equitable access to charging
- Building EV community of Customers
- General outreach and events
- Visible and simple information and tools

Grid

- FleetCarma pilot
- EV growth model for system planning
- System impact guidelines for planning
- Arlington Microgrid V2G
- Long term partnerships with large electrification sites

Adoption

- Government fleet knowledge sharing
- EV Dealership outreach
- Partnering with delivery fleets
- Engagement with cities' climate change initiatives
- Residential incentive and managed charging pilot

Moving Forward

The strategies and actions outlined above prepare the utility for the future when wide-scale adoption of electric transportation occurs. Planning and actions now will ensure that customer preferences are met, system upgrades are planned, and customer EV charging has been influenced to optimize the grid. The key strategies will guide the planning of equitable opportunities for EV adoption and operational guidelines while providing benefits to all ratepayers.

The PUD has well-established processes for energy efficiency which will serve as a guide for documentation, approval, and implementation of proposed EV customer outreach, programs, and/or rate schedules. This inaugural plan will be updated as needed with consideration given to PUD budgets, market changes, Board input, and/or system impacts at a minimum.