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Energy Provider Actions on Electric Transportation

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Summary

Energy providers are becoming increasingly well positioned to promote and facilitate mass electric vehicle adoption. This paper highlights the need for energy provider investment in transportation electrification and suggests actions to be taken now to accelerate adoption. It provides an overview of the EV market, explains why utilities are getting involved, and lists a wide variety of actions being taken by utilities, big and small, across the United States.

Keywords: ZEV (zero emission vehicle), consumers, EVSE (Electric Vehicle Supply Equipment), EV (electric vehicle), utility

1 Introduction

Electrically-powered vehicles have existed for over a century—but in just the last seven years electrified transportation has undergone dramatic changes. Modern mass market light duty vehicles that connect to the electric grid became widely available in 2011, with the introduction of the Chevy Volt and the Nissan Leaf. Since then, sales of electric vehicles (EVs) have grown rapidly. This is good news for EV buyers because electricity as a fuel is stable and inexpensive, particularly in the Pacific Northwest where we have some of the lowest electric rates in the country. It's also good news for the environment and our communities, because we have the lowest carbon content in our electricity, so EVs will reduce carbon emissions.

The growth of the EV market is good news for utilities, because EV charging is a new load emerging at a time of low electricity demand growth and because this load can be managed to occur off peak.

Utilities are not passive players in EV market growth. Examples abound of U.S. utilities being proactive in the development of the EV market. This report lists dozens of actions being taken by forward thinking utilities that are striving to maximize the benefits of EV market growth. Further, utilities are engaging with the entire transportation sector, not just light duty vehicles. As we observe a major transition toward transportation electrification, utilities will have the opportunity to enact change at all levels of transport, and to involve stakeholders in informing their strategies.

Utilities can act alone, but in some cases, actions will be more effective if taken by a group of utilities. Forth offers this paper to stimulate a discussion about how Northwest utilities can be effective participants in the development of electric transportation, and about how Forth can work with utilities to achieve the most positive outcomes.

This report focuses on electric vehicles that connect to the grid and are fueled by energy stored in batteries. Some EVs are plug-in electric/gasoline hybrids (PHEVs) and some are all electric (BEVs). These EVs have

a relatively small market share now, but sales are increasing rapidly, with significant implications for electric utilities.

Electric utilities were mostly observing the EV phenomena at first, but now many utilities are actively involved. This report provides an overview of the EV market, explains why utilities are getting involved, and lists a wide variety of actions being taken by utilities nationwide.

2 Current Electric Vehicle Market and Factors Driving Growth

EVs are currently a small percentage of all new cars sold, but are poised to grow at an astounding rate. There are now 42 models of passenger vehicles that use electricity as a fuel source available in the United States. In a report prepared for the American Public Power Association, Navigant Research projects that new EV sales will reach 700,000 units in the U.S. annually by 2021 [1]. By contrast, in 2017 EV sales hit nearly 200,000 units—meaning that annual sales are expected to more than triple in just four years. Morgan Stanley expects EVs to account for between 10% and 15% of the American new-car market by 2025. ING, a Dutch investment bank, projects that the European car market will be fully electric by 2035 [2]. Even OPEC, an organization made up of leading oil producing nations, recently revised its EV sales projections from 46 million EVs on the roads worldwide by 2040 to 266 million EVs [3]. EV adoption forecasts vary—but most predict exponential growth. Some forecasts predict conventional vehicles becoming obsolete once EVs reach cost parity with internal combustion cars because EVs are able to convert energy to forward motion almost three times as efficiently as gas-powered cars.

Key factors driving this growth include:

2.1 Electric cars are cheaper to operate

Oregon and Washington have some of the least expensive electricity in the country [4]. Powering a car with electricity in Oregon or Washington State is equivalent to buying gas for about \$1 a gallon. Using national average prices, it costs about half as much to fuel an EV as a conventional internal combustion vehicle. In the Northwest a vehicle can travel a mile with electricity for about one third the price of gasoline. Moreover, electricity prices are more stable than gas prices.

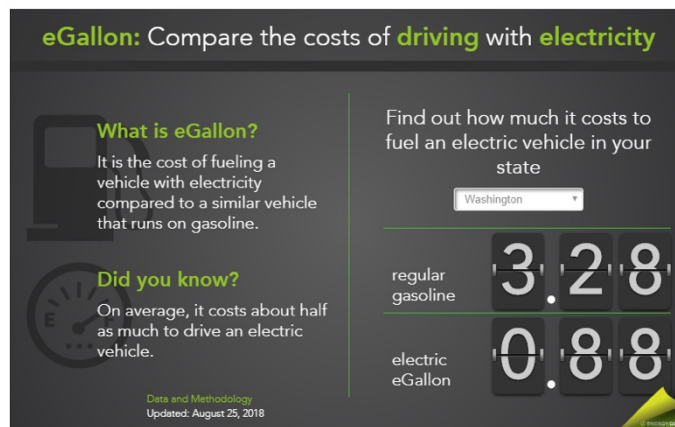


Figure 1: Average Price to Fuel an EV vs. Gasoline Car

2.2 Carmakers are making more and better electric vehicles

In the next 2-3 years we will see a large number of affordable 200+ mile range EVs enter the market. A sea change is coming—and it is coming because automakers are beginning to make serious investments in EVs. Nearly every major automaker has made a public commitment to electrifying their fleet.

Table 1: Electrification Commitments from Major Automakers

Carmaker	Commitment/Proposed Investment in EVs:
Daimler	\$1 billion to build battery facility
General Motors	20 all-electric models by 2023
Jaguar Land Rover	Electrify* entire line by 2020
Mercedes-Benz	Electrify* portfolio by 2022
Renault-Nissan-Mitsubishi Alliance	Deploy 12 all-electric models by 2022
The VW Group	\$84 billion in EV development
Volvo	Electrify* entire fleet by 2019

**Auto companies consider traditional hybrids as electric vehicles, so an announcement that the entire fleet will be “electrified” is not an indication of only plug-in electric vehicles.*

German luxury carmakers—in particular—are investing heavily in electrification because they have lost market share to Tesla in the last few years, are facing mandates for production at home, and face increasing demand globally, particularly in China.

Meanwhile, in China, automakers are vying to upend the global market. Spurred by government support and mandates, an EV revolution is taking place. CATL, China’s largest battery manufacturer, plans a \$2 billion IPO and is poised to supply auto manufacturers with inexpensive batteries, which is the crucial ingredient needed to make long range EVs affordable [5].

Still, despite these investments and commitments, many areas of the United States have a limited supply of EV models at this time. In Oregon and Washington, for example, auto dealerships along the I-5 corridor are more likely to have a plentiful supply of EVs than the rural areas and smaller cities east of the Cascades. Where models are more available, EV sales are dramatically higher.

2.3 Lithium-ion battery costs are dropping quickly

Lithium-ion batteries are the most expensive component in an electric vehicle. Most reports agree that between 2010 and 2015 the price of lithium-ion batteries fell from about \$1,000 per kilowatt-hour of storage capacity to \$350 and are now somewhere under \$200/kWh. Lithium-ion “gigafactories” being built in the United States, China, Korea, Japan, and Europe are pushing prices down due to economies of scale. Tesla’s batteries are predicted to fall below \$100/ kWh by 2020. At \$100 per kilowatt-hour, the US Department of Energy estimates that EVs will be as cheap to produce as internal combustion cars, which could be a tipping point for even more rapid growth in market share [6].

2.4 EVs offer significant environmental benefits

Currently, nearly one half of all Americans live in areas that don’t meet federal air quality standards. Gas-powered passenger vehicles and heavy-duty trucks are a major source of this pollution. EVs are an effective solution to this problem because they produce no tailpipe air pollution.

The transportation sector is a huge source of carbon emissions. EVs are an important strategy for carbon emission reduction, especially in the Northwest, which has the lowest carbon content electricity in the country [7]. The Union of Concerned Scientists estimates that EVs powered on grid-average electricity in the Pacific

Tesla and General Motors have already hit 200,000 units. Unless there is a modification to the policy, the tax credits for EV models from these carmakers will be gradually reduced and then eliminated altogether.

2.5.4 VW Settlement Funds

In 2017, the U.S. Department of Justice entered into a settlement with Volkswagen paying \$2.7 billion in damages for equipping diesel vehicles with devices that falsified emissions testing. Some of this money can be used by States to promote transportation electrification. Volkswagen also agreed to invest \$2 billion over 10 years to build a nationwide “Electrify America” charging business [12]. Both Portland, OR and Seattle, WA were selected as top priority metros for community investment from Electrify America, which will build out Level 2 and DC Fast Charging stations within these metros. Combined with the targeted high-speed nationwide highway infrastructure development, the Pacific Northwest will be well connected by the middle of 2019.

3 Why are Electric Utilities Promoting Electric Vehicles?

If managed correctly, EVs offer financial, grid, air quality and customer service benefits to electric utilities.

3.1 Potential Financial Opportunities

Transportation electrification is an unprecedented financial opportunity for electric utilities at a time when sales are slowing. Since 2008, electricity demand has grown slowly compared to previous decades. Residential electric sales have actually declined since 2010 [13]. Electricity sales grew at about 2% between 1990 and 2007, but the Department of Energy’s Energy Information Administration projects growth of only 0.5% per year between 2015 and 2040 [14]. Many regional utilities are seeing slower growth, or even a reduction in demand.

EVs offer utilities the opportunity to increase demand and potentially even reverse the trend toward lower electricity sales. Utilities can expect a 13 to 40 percent increase in electricity consumption among households that own an EV, with annual mileage being the key variable influencing overall energy consumption [15]. A 2018 study conducted by Energy and Environmental Economics (E3) found that EVs in OR and WA provide \$387 ratepayer net benefits on average. The study found that, in total, EVs will provide \$278 million in ratepayer net benefit. These benefits can be applied to reduce rate pressures, invest in programs to encourage further EV adoption or other investments [16].

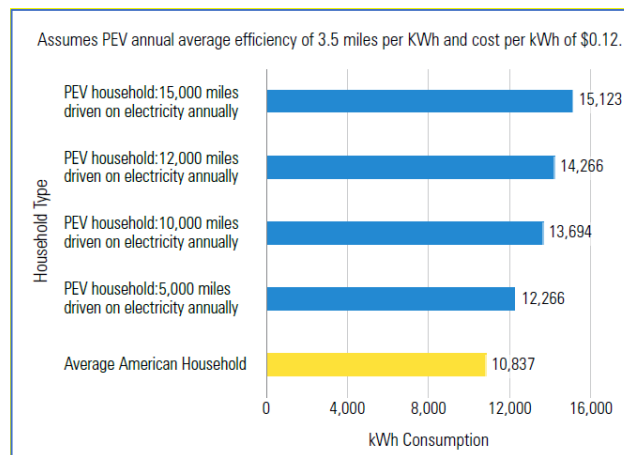


Figure 3: Expected Household kWh Consumption With an Added EV

3.2 Potential Grid Benefits

The grid has a large amount of unused capacity, especially during the late evening and early morning hours or early afternoon in solar-rich areas. Adding EV charging during off-peak hours allows the utility's fixed costs to be spread out over more sales, which would reduce pressure on rates for all customers. EV charging is not expected to create any widespread problems on the grid for many years, even if the most bullish predictions of EV sales growth materialize. An MIT study found that the existing generation and transmission capacity of the nation's grid could accommodate five to 50 million EVs [17]. In the short term, the most significant impacts on the grid appear to be very limited. A small percentage of transformers might need to be upgraded if they are already near capacity and served several homes that began charging EVs.

Renewable Energy (RE) and EVs could be an ideal match. Americans independent of ideology or geography are asking for higher levels of renewable energy [18]. While intermittent generation can create challenges, this is an opportunity for utilities to incentivize EV charging during periods of inexpensive surplus wind or solar generation. If managed properly this can result in happier customers who are excited to use renewable energy at a lower price point for charging their EV. If utilities don't take advantage of this opportunity others may do so, especially if solar, wind and storage prices continue to plummet. Already various business models have sprouted up to harness renewables production and battery storage [19]. Some businesses are simply taking advantage of arbitrage opportunities while others are offering EV charging solutions to customers without the need for a grid connection.

In the long run, electric vehicles may become a storage resource for utilities, enabling them to accept excess renewable energy off peak and to feed that energy back to the grid on peak, and to offer a range of other grid services such as voltage & frequency control and beyond.

3.3 Potential Customer Service Benefits

Transportation electrification is an opportunity for electric utilities to engage with their customers to offer a new, exciting product line with economic and environmental benefits. Research shows that utility customers are expecting to hear more from their utility on issues and opportunities related to EVs. A survey of consumers conducted by the Edison Electric Institute found that almost two-thirds of respondents wanted their electric utility to take a leadership role in encouraging a shift toward electric transportation [20].

3.4 Potential Policy Opportunities

Some states are adopting policies that encourage utility participation in transportation electrification. For example, utilities in Oregon may participate in the Clean Fuels Program—a scheme that provides financial incentives to utilities based on the number of electric vehicles registered in the utility's service area. (Forth is the backstop aggregator of the Clean Fuels Program; learn more at <https://forthmobility.org/our-work/utilityengagement#Oregon-Utility-Support>.)

4 Utility Actions to Advance Transportation Electrification

Given these trends and potential benefits to utilities—it is no surprise that many utilities across the country are rapidly adding electric vehicles to their portfolio of programs. There is a wide range of EV related activities that utilities may undertake, as this graphic shows. This section provides a high-level summary of the ways different utilities are engaging with their customers on EVs.

Table 2: Spectrum of Utility EV Activities

<i>Learn</i>	<i>Manage</i>	<i>Educate</i>	<i>Promote</i>
<ul style="list-style-type: none"> • Visit EV Showcase or Learning Center • Meet EV owners • Visit Dealerships • Purchase an EV • Network with other utilities • Track EV adoption 	<ul style="list-style-type: none"> • Develop EV Strategy/Plan • Encourage “Smart Charging” 	<ul style="list-style-type: none"> • Education and Outreach campaigns • Organize a ride and drive event 	<ul style="list-style-type: none"> • Promote with Renewables • Build charging infrastructure • Rebates for charging • Incentives for EV and E-bike purchases • Promote EV ride sharing • Dealership Engagement • Influence EV policy

4.1 Learn

4.1.1 Visit an Electric Vehicle Showcase or Learning Center

One of the best ways to learn about EVs is to visit Forth’s Electric Vehicle Showcase in downtown Portland, Oregon. You’ll see, and be able to test drive, a variety of electric vehicles. Experts are on hand to answer questions. The showcase is located at: 901 SW 1st Ave, Portland, OR 97204 <https://forthmobility.org/showcase>. Similar electric vehicle showcases can be found in other parts of the country as well. For example, Kansas City Power and Light’s Connect program includes an electric vehicle display [21]. Idaho Power also has a Charging Showcase, allowing customers to see five types of Level 1 and 2 charging stations [22].

4.1.2 Meet EV Owners

Electric vehicle owners tend to be passionate, well-informed, and eager to talk about their EV experience. This is a great way to learn about the local EV market, and how well EVs might work for a variety of consumers with different driving habits. Each September, Plug-In America, Sierra Club, and The Electric Auto Association, support a national EV celebration to raise awareness and highlight the benefits of plug-in vehicles called National Drive Electric Week. The week features events held throughout the country, led by local plug-in drivers and advocates. These events typically include some combination of EV parades, ride-and-drives, electric tailgate parties, press conferences, award ceremonies, informational booths, and more. There were more than 300 events in 2018. This is a great way to engage with local owners and drivers [23].

4.1.3 Visit Dealerships

Not every dealership carries EVs. A visit to a dealership will explain why some do and others don’t, and provide a glimpse of the expertise level of the sales staff and you can test drive EVs they have in stock.

4.1.4 Purchase an EV

Shopping for an EV is an educational experience. A team of utility staff can help with this, and the vehicle can then be used for a variety of utility activities. Publicizing the vehicle to customers in newsletters, on the website and at events positions the utility as source of EV information.



Figure 4: Chevrolet Bolt Branded by Flathead Electric Cooperative

4.1.5 Network with Other Utilities

Forth has a utility work group and hosts an annual conference, which can help utilities in Oregon and Washington. Utility associations and conferences are beginning to feature EVs.

4.1.6 EV Adoption Tracking

Knowledge of how many EVs are charging in the service territory can help a utility determine if there is any chance of harmful grid impacts. Some utilities have offered a modest incentive payment to motivate EV buyers to inform the utility of an EV purchase. Utilities can also work with Forth and state agencies to get EV adoption numbers for their service territory.

Examples:

1. Philadelphia utility PECO Energy pays residential customers \$50 if they provide notification of purchase of a qualified PEV along with basic information about where and when they plan to charge their new vehicle.
2. SRP in Phoenix pays customers \$50 (gift card) if they sign up for their EV community when they buy or lease an EV.
3. Emerald PUD is offering \$100 to register an EV in an effort to track EV registrations.

4.2 Manage

4.2.1 Develop and EV Plan/Strategy

A logical first step some utilities have taken is to develop an EV strategy. This will help the utility gain a good understanding of the local EV market and to set some EV goals. The strategy could be and to take a look at grid implications of higher EV ownership then incorporate EV adoption forecasts into load planning. The strategy can consider ways to manage EV charging load.

Examples:

1. SmartCharge Nashville is an undertaking of FleetCarma, Tennessee Valley Authority, Nashville Electric Service and Middle Tennessee Electric Membership Corporation to help prepare for EV growth [24, 25]. This coordinated approach between utilities, municipalities and vendors is a great way to develop a successful EV strategy.
2. Forth has assisted utilities in Oregon and Washington on the creation of tailored EV strategies. Columbia River PUD hired Forth to provide a list of strategic options, to conduct a half-day EV education session for their EV team, and to facilitate the discussion needed to finalize the EV Strategy.

4.2.2 Encouraging “Smart” Charging

Many utilities across the country are using time of use (TOU) rates and other strategies to encourage drivers to charge ‘off peak’ or at other times that will maximize grid benefits. In the Pacific Northwest, rates are low to begin with, making TOU rates less effective. However, every car and most chargers can easily manage when charging takes place, and education and incentive programs can encourage drivers to charge off peak.

Examples:

1. Austin Energy offers customers with EVs “off-peak charging at home, or anytime on-the-go — all for a fixed rate as low as \$30/month. By charging during off peak hours, EV drivers are plugging into clean, 100% renewable energy” [26].
2. In Utah Rocky Mountain Power is running a TOU pilot for plug-in electric vehicles. Participants receive a \$200 incentive and choose one of two rate options, both of which heavily discount off peak use and charge much higher rates for on-peak [27].
3. FleetCarma, a company setting out to provide technological solutions to accelerate the transition to electric vehicles, offers a number of hardware and software platforms to help manage peak load. Their SmartCharge Rewards platform allows utilities to reward customers choosing to charge off-peak through behavioral incentives. It gives EV owners the opportunity to pay less for charging while removing the need for a submeter and improving grid efficiency and resiliency [28].

4.2.3 Flexible approaches to demand charges for medium and heavy-duty fleets

The electric options for medium and heavy-duty vehicles have increased dramatically over the past few years. However, demand charges are proving to be a significant barrier in some cases. Some utilities are adjusting rate structures that will make investments in EVs more cost-effective for commercial and municipal operations. Reduced demand charges can sometimes be justified by the increased revenue generated by electricity sales to these fleets; through higher per-kwh rates; by the benefits from battery storage for frequency and voltage control, or alleviating distribution constraints.

Examples:

1. Foothills Transit near Los Angeles looked at electric transit buses, which would be four times as efficient as their current CNG buses, but more costly to run because of high demand charges. In order to ramp up the program the California PUC agreed to a temporary moratorium on demand charges, followed by a gradual phase-in. This allows the transit agency to increase the number of electric buses cost effectively until demand charges become a smaller percentage of electricity costs [29].
2. Southern California Edison has addressed this in a similar fashion by adjusting rate structures. They have created TOU rate classes for 0-20kW, 20-500kW and above 500kW [30]. Super off-peak rates at night allow a fleet user such as a transit agency to charge without demand charges at a reduced rate. Using battery storage to buffer charge rates is also becoming more cost effective.

4.2.4 Flexibility around demand charges for DC fast charge (DCFC) stations

DCFC stations can have very high, but short term, peak loads. Until there are larger numbers of electric vehicles on the road, these demand charges make up a disproportionate share of DCFC costs. For example, Pacific Power found that many fast chargers in the Pacific NW were spending over 80% of their monthly costs on demand charges. Especially in rural areas, these costs are untenable. Pacific Power has responded by proposing a 10-year phase in for demand charges, with higher kWh costs that gradually decline over that period. Many other utilities and jurisdictions have completely waived demand charges for DCFC, recognizing that fast chargers are essential to serve an EV market that - overall - provides substantial ratepayer benefits. Utilities may also consider piloting new types of rate structures which would seek to better reflect the growth and behavior of EV charging.

4.3 Educate

A recent study from University of California at Davis, revealed that, even in the largest electric vehicle market in the country with a growing number of charging stations, and policies supporting electric transportation,

consumers are generally unaware of the benefits of EVs. This demonstrates a tremendous potential and need for investment in education and outreach campaigns. Utilities have great reach and usually great credibility with consumers and many utilities are providing outreach on EVs. An effective outreach campaign can have multiple channels and activities, including the website, newsletters, bill stuffers and events [31]. Utilities should be sure to identify and train someone to be an expert in EVs to be able to answer questions for customers as well as promote the vehicles with staff.

Examples:

1. A number of Northwest utilities have invested in “Choose EV”, a consumer engagement software package developed by the Yenter Group, with support from Forth [32].
2. Alliant Energy has a great set of education materials on their website [33].
3. Sacramento Municipal Utility District has an excellent EV section on their website, including testimonials from EV users [34].
4. American Electric Power (AEP) Ohio is partnering with Smart Columbus to advance electric vehicle awareness efforts in Columbus, OH, from offering ride and drive experiences to encouraging fleet adoption of EVs and enhanced workplace charging outreach [35].

4.3.1 Organize a Ride and Drive Event

Ride and drive events provide participants with an opportunity to learn about EVs and to test drive in a neutral setting, without having to visit an auto dealership. These events are a key component of education and outreach. A well-executed ride and drive integrates with a community event attracting thousands of people who are exposed to your utility programs and learn about EVs available in your area. Ideal community events for ride and drives include farmer’s markets, sustainability-related events (e.g., Earth Day events), or classic car shows. Test drives open people’s eyes to the myriad advantages EVs offer, especially their responsiveness. Local auto dealers realize the benefits and are even more excited to participate after they experience their first ride and drive.

Example:

1. Forth has partnered with many utilities (Puget Sound Energy, Avista, Tacoma Utilities, Portland General Electric, Pacific Power) in the Pacific Northwest to offer ride and drive events.

4.4 Promote

4.4.1 Promoting EVs along with Renewable Energy

Utility regulators, policy makers and customers have been pushing utilities to increase renewable energy (RE) generation. Solar and wind generation are intermittent, which creates challenges for utilities. Some parts of the country, including the Northwest, are seeing the overall supply of renewables exceed demand at certain times of the day or year, and EV’s connected to smart chargers are a spectacular answer to this problem. This creates an opportunity for depressed power prices, and offering inexpensive charging with renewable energy is a great way to make customers happy.

Examples:

1. In Minnesota many Great River Energy (GRE) co-ops offer their customers a special rate to charge at night with 100% wind power. Kandiyohi Power Coop is one of many GRE coops to offer low off-peak rates advertising EV charging with 100% wind power.
2. Similar programs are found in Texas where surplus wind is driving negative wholesale pricing at a higher frequency than before [36]. Austin Energy is advertising EV charging with wind power [37].
3. With excess solar energy mid-day Hawaii Electric Co offers a TOU rate for EV owners. It is less than half the cost during mid-day as during the evening peak period [38].

4.4.2 Direct investment in charging infrastructure

It makes sense for utilities of all structures, from investor-owned to consumer-owned, to be directly involved in the build out of charging infrastructure, as it is a natural extension of electricity delivery to customers.

Some investor-owned utilities are able to receive a rate of return on capital invested in electric vehicle service equipment (EVSE). By investing in charging infrastructure the utility can support market growth and select the right smart charging equipment that will allow for load shifting and peak shaving.

Examples:

1. Avista's current pilot program not only provides incentives for residential and commercial customers to install charging equipment, it also invests in the installation of publicly accessible level 2 chargers and seven DC fast chargers at strategic locations throughout their service territory [39].
2. Kansas City Power & Light (KCP&L) provides EVSE leasing opportunities and special charging rates through their Clean Charge Network with over 1000 chargers in the Kansas City area they have worked to reduce range anxiety [40].

4.4.3 Utility Fleet Charging

Another great way for utilities to understand EVs and help drive adoption is by incorporating EVs into the utility fleet and to enable EV adoption among employees with workplace charging. Incentivizing fleets can help commercial customers scale. Likewise, workplace charging helps drive wider EV adoption.

Examples:

1. An example of this is PG&E who has purchased hybrid-electric bucket trucks and passenger vehicles for their fleet operations. They have installed Level 2 chargers for their fleet vehicles as well as chargers for employee's personal vehicles [41].
2. Idaho Power has also begun using hybrid-electric bucket trucks in their fleet as well as electric forklifts, electric utility vehicles, battery assisted trucks and branded passenger EVs which generate buzz at community events. Situated in a regional trucking hub, Idaho Power is also working to electrify refrigerated trucking in their service territory [42].

4.4.4 Residential Charging Rebates

Offsetting the cost of residential EV chargers incentivizes customers to go electric. Some utilities now offer rebates for level 2 chargers for residential customers, which enables them to encourage the installation of equipment that can be used in a smart charging program.

Examples:

1. Columbus Ohio (City of Columbus Division of Power) offers up to \$500 rebates for each level 2 charger installed at a residential property [43].
2. Holy Cross in Colorado offers a \$650 rebate for level 2 chargers to customers who own or lease an EV [44].
3. Gulf Power in Florida offers \$750 rebates for level 2 chargers [45].
4. Eugene Water and Electric Board offers \$300 toward buying a new or used EV or installing a Level 2 charging station at workplace. The utility is also offering a 4% loan to encourage installation of commercial charging infrastructure [46].
5. City of Ashland in Oregon offers \$300 for new or used battery electric vehicles, \$200 for new or used plug-in hybrid vehicles and \$500 to install a workplace charging station [47].

4.4.5 Charging Support: Multi-Family

Multifamily developments pose a special challenge for the location of charging equipment. Some utilities that have large portions of multifamily dwellings are experimenting with new approaches.

Examples:

1. Half of San Diego Gas and Electric's (SDG&E) customers live in multi-family housing. SDG&E is meeting this challenge by installing 350 EV charging stations at multi-family residences and businesses with 10 chargers per station for a total of 3,500 chargers [48].
2. Austin Energy encourages multifamily building owners to provide charging stations by reimbursing them for EV charging and providing contractors to clean and maintain the charging stations. All electricity provided at these multifamily stations is 100% renewable [49].

4.4.6 Rebates for new & used EVs + E-bikes

EV rebates are a powerful tool some utilities have employed to sell more EV's. The utilities that have offered these rebates have combined them with requirements or incentives for charging equipment.

Examples:

1. For a limited time in late 2016 and early 2017 several utilities offered a \$10,000 rebate on Nissan Leafs. They included KCPL (Kansas City Power and Light), KIUC (Kauai Island Utility Cooperative) , Maui Electric Co and Hawaii Electric Co [50, 51, 52].
2. To encourage both EV purchases and smart charging, Omaha Public Power District (OPPD) offers a \$4,500 rebate with the purchase or lease of a new EV and the purchase of a ChargePoint Home™ charging station [53].
3. Marin Clean Energy is helping low-income customers with a \$3,500 rebate to purchase or lease an EV which can be combined with other rebates for a savings of as much as \$12,000 for a new EV or \$9,000 for a used EV [54].
4. SMUD in Sacramento offers a \$599 incentive to approximately cover the cost of charging for two years or to purchase a level 2 charger in addition to their \$3,000 Nissan Leaf Rebate [55].
5. A number of utilities, including Burlington Electric and Austin Energy, offer rebates on E-bikes—as well as lending programs so that rate-payers can test E-bikes for several days before buying [56].

4.4.7 Promoting EV ride sharing

The success of Uber and Lyft has made ride sharing a larger share of urban traffic. Electric utilities are partnering with these companies to support EV driving for ride-sharing.

Examples:

1. Portland General Electric, Duquesne Light Company, and Rocky Mountain Power are among the companies to announce collaborations focused on educating transportation network company (TNC) drivers about the benefits of EVs and facilitating charging infrastructure to ensure that more of the miles driven are electric [57].
2. Uber and Sacramento Municipal Utility District (SMUD) partnered to offer Uber drivers an extra \$1.50 (\$1.25 from SMUD, \$0.25 from Uber) per trip completed in an EV [58].
3. Forth has partnered with Uber in Portland, OR, to support their efforts to encourage drivers to make the switch to plug-in vehicles.

4.4.8 Working with dealers to improve engagement around EVs

In some markets a key barrier to increased EV adoption is a lack of EV inventory or sales focus. Utilities can help grow the local EV inventory by reaching out to auto dealers and demonstrating their commitment to a multi-year EV promotion effort. Having a plan for dealer outreach and engagement is an important step in effectively promoting EVs to customers.

Examples:

1. Avista partnered with Forth in an outreach to local auto dealers to better understand supply in the area and educate dealers on utility incentives. While this outreach began as preparation for a Ride & Drive event in Spokane WA, it builds an ongoing relationship to support auto dealers, helps them obtain and sell more EVs, and grows the utility's EV program. Sales staff were excited by the utility sales promotion incentive (SPIF) for referring customers to Avista's EV program.
2. Chargeway is a software platform designed to simplify the conversation about electricity as a fuel. In January 2019, Chargeway will launch an Oregon Pilot which will include station labeling and Chargeway Beacons- digital electric fuel sales assistants- in coordination with Forth, Portland General Electric, Oregon Auto Dealers Association and perhaps other utility partners, to engage consumers alongside salespeople at the point of sale. These displays will provide users with key information about charging and will also provide information on cost savings of driving an EV vs. a gas car based on local utility pricing and other financial incentives to reduce the purchase price. The

Beacon provides utilities and advocacy groups a voice at the point of sale to simplify the experience for both consumers and dealer salespeople and provide confidence in electricity as a fuel.

4.4.9 Utilities as influencers of electric vehicle policy

Some choose to advocate for EV policy at the local, state and federal level, either directly or through utility or nonprofit organizations.

Examples:

1. Throughout the legislative process of passing the transportation bill (HB 2017) in Oregon which allowed for an EV rebate, Portland General Electric and Pacific Power were among the key stakeholders voicing their support.
2. In March 2018 thirty-six of the nation's largest utilities sent a letter to congressional leadership requesting the vehicle cap for federal EV tax credits be removed. Signers included Portland General Electric, Seattle City Light, Tacoma Power, and Pacific Power and many more covering almost every state in the US [59].
3. Idaho Power and the Treasure Valley Clean Cities Coalition developed an EV interest group. The group meets several times per year to share information and look for ways to work together to support EV adoption through programs or policy.

5 Conclusion

The EV market is growing rapidly. This paper highlights dozens of examples of forward-thinking utilities that are striving to maximize the benefits of EV market growth. Because of our low electricity prices and the low carbon content in our electricity—Northwest utilities, in particular, have much to gain from the growth of the EV market. Northwest utilities have a unique opportunity to shape and influence the transition to a transportation system that is fueled with electricity.

Forth is committed to supporting utilities with this transition. Learn more about how we can help here: <https://forthmobility.org/our-work/utilityengagement>.

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