ENERGIZING OREGON
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The Case for PEVs

The case for developing the market and infrastructure for plug-in electric vehicles (PEVs) is clear. Today, there are more than 250 million registered vehicles in the US. Although fuel economy has improved over time, in 2009 alone, US highway vehicles consumed more than 170 billion gallons of gasoline and diesel. The consequences of all that driving and burning of fossil fuels are well documented. Excessive tailpipe emissions contribute to smog and unhealthy air, while greenhouse gas (GHG) emissions contribute to global climate change. Americans’ dependence on the gas pump also means that America continues its dependence on foreign oil. For families, as gas prices fluctuate, so do household budgets; every uptick in fuel’s per-gallon cost causes stress and strain.

PEVs can help alleviate these intractable problems. A PEV itself of course consumes no fossil fuels—and when renewable resources power its battery, a PEV nearly eliminates pollution as an unwanted cost of operation.

Switching from using gas to electricity as transportation fuel also creates jobs and supports economic growth. Oregonians spend more than $8 billion on gas and diesel each year. On average, every dollar saved at the gas pump and spent on other goods and services creates 16 times more jobs across the economy. In addition, Oregon’s expanding PEV industry creates high-wage, high-skill jobs and attracts valuable investments to the state.

The Goal: Transportation Evolution

Simply put, rapid adoption of PEVs will strengthen our local economy while moving us closer to a zero-emission and oil-free transportation future. This Energizing Oregon plan contains priorities and specific actions designed to dramatically increase adoption of PEVs in Oregon and ensure that the state exceeds its per capita share of President Obama’s PEV deployment goal of one million PEVs on the road by 2015.

It should be noted that PEVs alone will not solve the state’s transportation challenges. Although increasing PEV adoption in Oregon is the focus of this plan, PEVs are but one piece of a broader strategy to achieve the necessary evolution of the transportation system, which must also include investments in mass transit, car sharing, pedestrian- and bicycle-friendly infrastructure, and continued development of more efficient transportation technologies.

The Oregon Way

Oregon is not a state that contents itself with simply understanding an issue. Quite the opposite: in Oregon, understanding an environmental challenge is synonymous with a call to action, no matter how insurmountable the problem may seem. Oregon’s leaders and its citizens, many of whom balance a fiercely independent spirit with a willingness to change
their behaviors to care for the common good, repeatedly have embraced aggressive approaches and innovative solutions that move the state towards a more sustainable future.

Consider that in 1993, Portland became the first US city to enact a strategy to reduce carbon emissions; local emissions are now 1 percent below 1990 levels, sharply countering the national trend. Oregon continues to foster green energy innovation statewide—spurring a wind- and solar-energy boom, creating hundreds of jobs, and supporting research and development in renewable energies.

Little wonder, then, that Oregon has already made significant inroads in developing the nascent PEV market. Currently, there are close to 800 charging stations in Oregon, including those in the West Coast Electric Highway network—which will provide charging facilities along I-5 from Canada to Mexico—with several more charging networks scheduled along well-traveled transportation corridors. Oregon is recognized as a national leader in streamlining building codes and permitting to facilitate PEV charging infrastructure. Oregon is also a location for the national EV Project, which will collect and analyze key data from the first thousands of PEVs deployed in areas across the United States in order to streamline deployment of the next generation of PEVs.

Oregonians have already proven to be willing to adopt greener vehicle technologies. Recognizing the state’s commitment and progress, as well as Oregonians’ green ethos, numerous automakers have chosen Oregon as a prime rollout location for new PEVs, such as the LEAF and Volt.
The Opportunity

Building the foundations for the PEV market, however, does not guarantee that a robust market inevitably will come. Even as many public and private stakeholders worked to facilitate the deployment of PEVs across the state, most recognized that moving PEVs from the category of novel purchase and into the mainstream would require being united in their purpose and goals. They also recognized the need to hone the policies and prioritize the actions that would have the greatest impact.

The opportunity to do just that came in April 2011, when the US Department of Energy (US DOE), through its Clean Cities Program, announced a funding opportunity to help entities develop community readiness and planning for PEVs and their charging infrastructure. Energizing Oregon, a planning process led by the State of Oregon and implemented with the Columbia-Willamette Clean Cities Coalition and Rogue Valley Clean Cities Coalition, successfully applied for that grant.

At its essence, Energizing Oregon is the state’s plan to put thousands of PEVs where they belong: rolling down Oregon’s roads. The plan represents the long-range thinking of more than 50 stakeholder groups, hundreds of people and thousands of hours.

Governor John Kitzhaber has been unequivocal in his support: “As a state, we are committed to aggressive deployment,” the governor wrote in his letter of commitment to Energizing Oregon.

Interestingly, the US DOE funding opportunity was announced the same month that Toyota announced it had sold its one millionth Prius in the US. A commonplace vehicle now, the Prius was once considered a novelty, just as the PEV is today.

To date, the pace of consumer adoption for PEVs has been faster than the adoption rate for hybrid vehicles, both nationally and in Oregon. PEVs have been available in Oregon for 22 months, and a total of 1,610 are currently registered in the state. By comparison, at the 22-month mark for Priuses—in 2002—there were 1,247 registered in Oregon.3

Clearly, consumers are interested in PEVs and Oregon is on the right track to establishing them as a transformative element of the state’s next-generation transportation infrastructure. But it will take sustained leadership, decisive action and continued investment to fulfill this promise.

The Plan: Energizing Oregon

Oregon is pushing ahead with a great sense of urgency. Some environmental issues require a long-range view, but developing the PEV market is very much about right now. Oregon’s strategy is about building on the momentum that the state has already made by pursuing what is called the “eyeballs and seats” strategy. Having people experience PEVs both visually and physically can overcome many reservations about the vehicles. Thus, Oregon wants to get more people inside PEVs and get more PEVs on the road, so that people see them as a usual part of highway-vehicle makeup—as a vehicle whose time has arrived.

After analyzing the 11 “critical elements” laid out by US DOE for state and local planning efforts (see page 16 for a full list), Energizing Oregon identified four areas in which existing building blocks for developing the PEV market can and should be turned into blockbuster results. These constitute Energizing Oregon’s priorities:

- Outreach, Education and Communications
- Policy and Inducements
- Deployment
- Utilities
OUTREACH, EDUCATION & COMMUNICATIONS

The Challenge: Research shows significant barriers in getting consumers to buy and drive PEVs. The product is expensive, for one, and employs an unfamiliar technology that requires people to abandon a highly ingrained behavior pattern: filling up at the gas station. Consumers also must overcome an intrinsic fear of “the unknown” with regard to PEVs, including the vehicles’ range and the limited availability of charging stations. There is good news: Research shows that once people are armed with even the most basic information about PEVs, these barriers and concerns are seriously diminished. Further, by giving people the opportunity to drive a PEV, their enthusiasm for the technology increases.

The Energizing Oregon Solution: Leading social marketing firm EnviroMedia developed a strategy, as well as a branding and advertising campaign aimed expressly at alleviating these main concerns, such as range anxiety. One of the core elements of the strategy is providing “eyeballs and seats” opportunities for people to see and drive PEVs, including the concept of “Signature Ride and Drive” events, where people can try a PEV themselves.

POLICY & INDUCEMENTS

The Challenge: Two barriers that stand in the way of more widespread PEV adoption are upfront cost, which remains high for PEVs compared with traditional vehicles, and the need for a more comprehensive and user-friendly network of charging stations. Establishing policies and inducements that help make PEVs more accessible and affordable will be critical to early adoption.

The Energizing Oregon Solution: Based on Oregon’s proven track record of creating innovative financing mechanisms to address problems, Oregon will develop solutions that ameliorate the higher upfront costs of PEVs, as well as develop and adopt building code changes that ease the process of installing charging stations. The plan identifies several specific, high-impact policies and actions that could be taken by multiple levels of government. It also considers how PEV market development will be influenced by other ongoing policy efforts, including Governor Kitzhaber’s 10-Year Energy Action Plan, adoption of Zero-Emission Vehicle rules, and the Oregon Clean Fuels Program, among others.

DEPLOYMENT

The Challenge: Fleet managers, who are potential large-volume consumers of PEVs, usually cannot justify or afford the higher upfront costs of PEVs, even with reduced fuel costs and lower maintenance. Additionally, consumers, who will use PEVs primarily for commuting, would benefit immensely by having charging available at work—but relatively few employers to date have installed them. Furthermore, Oregon is known as a hub for sustainable tourism, which has an obvious connection with PEVs and can lead to increased exposure to PEVs, but there is no concerted effort to exploit this opportunity.

The Energizing Oregon Solution: The strategy here focuses on three key elements: 1) Developing innovative financing mechanisms that encourage managers of large fleets to buy PEVs; 2) Developing policies that ease the installation of workplace charging and also informational tools to help employers understand the workplace need and the installation process; and 3) Creating and developing a new PEV tourism industry to facilitate PEV travel and expose more people to the vehicles.
UTILITIES

The Challenge: While the majority of utilities do not anticipate significant PEV adoption in their service territories over the next five years, the 41 utilities in the project area have questions regarding the potential impact of PEV charging stations on existing infrastructure—especially DC fast chargers, which deliver a large quantity of electricity in a short amount of time. Alleviating that uncertainty will go a long way to ensuring that utilities are informed, prepared and enthusiastic about a growing number of PEVs in their service territories.

The Energizing Oregon Solution: Oregon intends to work closely with utilities to keep them abreast of changing demographics, usage patterns, system impacts and rate design issues. Oregon also recommends a better process for assessing the real and potential impacts of the growing PEV market, including modifying DMV data collection processes to obtain real data on PEV ownership and developing a notification process to inform utilities when charging stations are installed in their territories.

THE PATH AHEAD

Originally, Energizing Oregon was envisioned as the plan that would lay the foundation for future selection as a targeted deployment community by the federal government—whereby a significant level of financial resources would be available to implement its strategies and tactics. Throughout the project, however, it became less clear that the opportunity to become a targeted deployment community would become available. Thus, the plan also includes elements that can be achieved locally without additional investment by the federal government. As a whole, the State is unlikely to be able to meet its ambitious deployment goals without a fairly significant investment of resources. The Energizing Oregon plan thus aims to strike a reasonable balance between big ideas that tend to be more expensive and local ideas that can be achieved with minimal investment.

All of these efforts will capitalize on Oregon’s willingness to adopt early and experiment, while also putting Oregon in the position of being able to share the best practices and lessons learned with other entities that have similar goals, now and in the future. These efforts also will lead to success in meeting Oregon’s and the country’s goals for PEV deployment as an important piece of transformational change in the national transportation system.
## KEY RECOMMENDATIONS

### ORGANIZATIONAL

Maintain an oversight group to guide and advance the development of the PEV industry in Oregon  
- Define, implement and oversee an organizational structure for implementation of key recommendations  
- Provide recommendations to the Governor  
- Coordinate between key industry leaders, government agencies and public representatives  
- Identify and resolve, on a continuing basis, key issues that impact the PEV industry and deployment  
- Promote the growth of the industry and economic development related to PEVs  

Identify entity(ies) responsible for implementation of key recommendations that have  
- Clear management responsibility to implement  
- Annual goals  
- Resources and oversight authority to implement

### DEPLOYMENT

Develop and implement a workplace charging program—including outreach and education as well as potential incentives—to encourage companies to install charging stations  

Establish financing mechanism(s) for fleets  
- Assess performance of Commercial Electric Truck Incentive Program (CETIP) and determine how best to proceed  
- Pursue a program similar to the Clean Energy Works Oregon program (see Drive Oregon’s proposal) and/or  
- Pursue a program based on energy savings performance contracts  

Continue to incorporate PEVs into sustainable tourism initiatives  
Secure funding to design and install local way-finding and other signage as needed

### POLICY

Explore ways to ease installation of charging stations in multi-dwelling units  
Develop a pilot residential code program for PEV readiness in new construction  
Ensure total cost of ownership is the basis for state vehicle purchases and explore giving state fleet manager budget flexibility to introduce PEVs into fleet  

Maintain and pursue PEV incentives  
- Retain existing state infrastructure credit  
- Institute $1,500 state tax credit for PEVs  
- Allow HOV lane access by PEVs even if only one occupant

Optimize design of Road User Fee program  
- Pilots should include but not be solely focused on PEVs  
- Fee should be fair but not overly punitive to PEVs

Pursue innovative projects  
- Smart charging and facilitating use of renewable energy in PEVs  
- Rural/remote charging stations  
- Next-generation charging technologies and systems
### UTILITIES

#### Information Collecting and Sharing
- Conduct annual outreach to utilities through trade associations, conferences and other means to provide information about demographics, usage patterns, system impacts and rate-design issues
- Continue to collect and analyze usage patterns at DC fast chargers and Level 2 public and residential charging stations
- Continue analysis of infrastructure impacts

#### Notification/Assessment of PEVs
- Pursue modification to DMV registration guidelines that allows for better DMV data on existing and new purchase PEVs in the state
- Pursue a notification process to utilities regarding the installation of new commercial or residential charging units

#### Infrastructure Support
- Seek public investment in rural/remote charging stations, such as to cover the costs to get power to a critical location for a charging station where there is not currently sufficient grid infrastructure
- Secure funding for a demo project for development of different charging technologies that do not require three-phase power

#### Policy Issues
- Track the Road User Fee Task Force process and any associated legislative proposals that may require utility metering or collection of taxes

### OUTREACH & COMMUNICATIONS

#### Develop a strategic and compelling brand identity
- Develop a campaign name and graphic identity
- Test campaign name
- Define brand use and co-branding guidelines

#### Expand strategic partnerships and sponsorships
- Collaborate with original equipment manufacturers (OEMs) and dealerships to create vehicle access
- Create engagement partnerships with major employers
- Engage lifestyle partners

#### Create experiential marketing opportunities
- Create signature ride-and-drive events
- Continue and coordinate existing grassroots outreach
- Empower early adopters to share the PEV experience

#### Develop support materials
- Create digital collateral materials
- Evolve existing website to be a go-to source for trusted information
- Implement paid media campaign

#### Garner earned media (conduct outreach to media that reach the target audience)

#### Maintain critical training programs, especially auto dealers and electricians
PROJECT OVERVIEW

TERMINOLOGY

A note on terminology: Throughout this report, a number of terms that refer to various types of electric vehicles are used. These definitions are taken from the US Department of Energy’s Alternative Fuels Data Center (U.S. Department of Energy, 2012).

Electric drive vehicles include:

**Hybrid Electric Vehicles (HEVs):** HEVs combine an internal combustion engine or other propulsion source with an electric motor that uses energy stored in a battery. The battery in an HEV is not plugged in to charge, but charges through regenerative braking and by the internal combustion engine. The most well-known HEV on the road is the Toyota Prius.

**Plug-In Electric Vehicles (PEVs):** PEVs refer to both PHEVs and EVs, as described below:

- **Plug-In Hybrid Electric Vehicles (PHEVs):** PHEVs are powered by an internal combustion engine and an electric motor that uses energy stored in a battery that can be plugged into an electric power source. Some PHEVs are also known as extended-range electric vehicles (EREVs), but the term PHEV is used in this report. Examples are the Chevy Volt and the Plug-in Toyota Prius.

- **All-Electric Vehicles (EVs):** EVs use a battery to power the vehicle motor. These batteries are charged by plugging into an electric power source. EVs are also known as battery electric vehicles (BEVs), but the term EV is used in this report. Examples are the Nissan LEAF and Ford Focus EV.

Thinking big (and outside the box) is an ingrained part of the state’s culture, and PEVs are no exception: Oregon has established an ambitious goal to significantly exceed the state’s per capita share of the national goal of one million PEVs by 2015.
INTRODUCTION

The Oregon Opportunity

With a legacy of pioneering innovation, a longstanding commitment to environmental stewardship and a culture of public-private collaboration, Oregon is poised to be the proving ground for PEV adoption in the United States. From passing the nation’s first gasoline tax in 1919 to becoming an early adopter of GHG reduction goals, Oregon has a well-established reputation as a trendsetter in clean technology and transportation.

Building on that reputation, with support from the US Department of Energy (US DOE) and the Clean Cities program, Oregon is emerging as an international leader in the electrification of its transportation system. Oregon is a participant in the national EV Project, has a Governor-appointed Transportation Electrification Executive Council (TEEC), and has a dense concentration of charging infrastructure highlighted by Electric Avenue and the West Coast Electric Highway. Oregon is consistently one of the first introduction markets for new PEVs.

In 2011, the Oregon Legislature recognized the economic development potential of this growing industry by appropriating $1.2 million to launch Drive Oregon, a nonprofit public-private partnership designed to accelerate the industry’s growth in Oregon.

Key stakeholders, especially at Portland General Electric and Portland State University, have also held a series of events under the banner EV Roadmap to bring together thought leaders from the public and private sectors to review progress in PEV deployment and develop new ideas to push things even further. This project adopted the EV Roadmap banner for its public-facing website and outreach activities.

The stage is set for success. Nearly all original equipment manufacturers (OEMs) with PEVs coming to market—including Nissan, Toyota, Mitsubishi, General Motors and Ford—have committed to making Oregon an early launch market for these vehicles.

Oregon’s state agencies and partners have laid significant groundwork, including

- Participating in early partnerships with OEMs and early Electric Vehicle Supply Equipment (EVSE) deployment projects
- Creating statewide PEV and charging-infrastructure codes and policies
- Establishing business and residential incentives for the purchase of charging stations
- Developing installation guides for deployment best management practices

Indeed, as a result of these planning and deployment efforts, Oregon was awarded the Electric Drive Transportation Association’s E-Visionary Award in 2010, honoring the state for its leadership in transitioning towards a future of electrified transportation.

But meeting the state’s PEV deployment goal by 2015—and fulfilling Oregon’s promise in next-generation transportation—will require careful planning and coordination, as well as sustained investment and leadership.
Purpose of This Plan

This Energizing Oregon plan (made possible by funding through the US DOE’s Clean Cities Community Readiness and Planning for Plug-In Electric Vehicles and Charging Infrastructure grant) is a central element of the state’s journey towards PEV leadership, filling several important functions:

1. The yearlong planning process to create Energizing Oregon (led by the Governor’s Office, the TEEC and Business Oregon) served to convene and unite a diverse array of public and private organizations working on PEV infrastructure, policy, advocacy and technology throughout the state. What was once a loose coalition has become a cohesive, committed community poised for action.

2. By identifying the state’s key assets, barriers and opportunities, and prioritizing next steps, Energizing Oregon provides a clear path forward for the next two years and beyond.

3. The plan has the opportunity to serve as both a roadmap and a rallying cry, making the case for continued investment at the state and federal level and serving as a best practice model for other states.

4. This report fills a critical planning gap for the state. While the early DC fast charger projects currently underway are a good first step towards a fast charger network that will support the initial wave of PEV purchasers, this report addresses previously neglected areas, such as workplace charging, financing, sustainable tourism and ways to help utilities throughout the state prepare for and support the use of PEVs and charging stations.

Project Goals

Energizing Oregon has three primary objectives:

1. Integrate and optimize existing Oregon PEV readiness efforts.
2. Develop a statewide PEV market and community plan.
3. Create momentum for exceeding Oregon’s per capita share of the national PEV deployment goal.

Concurrent with (and tied to) the development of the Energizing Oregon plan, Oregon has also undertaken ambitious planning efforts over the past year to chart the state’s broader energy and transportation future. These include work underway to create the Statewide Transportation Strategy: A 2050 Vision for Greenhouse Gas Emissions Reduction and the 10-Year Energy Action Plan; both documents are still in draft form with finalization and adoption expected by the end of 2012.

The 10-Year Energy Action Plan includes a goal to convert 20 percent of large fleets in Oregon to alternative fuel vehicles, including biodiesel, electric, CNG and/or LNG vehicles. In addition, the Statewide Transportation Strategy identifies a shift to PEVs as a key component of achieving the state’s goal to reduce GHG emissions to 75 percent below 1990 levels by 2050.
“Energy is THE issue of our time—both globally and here in Oregon—and no single issue will have a greater impact on our state’s economy, environment and quality of life in the coming decade. The central question is whether we will shape our energy future through intentional investment and development, or whether it will shape us.”

OREGON GOVERNOR JOHN KITZHABER; From the cover letter in the Draft 10-Year Energy Action Plan released June 5, 2012

PARTNERSHIPS, ROLES & RESPONSIBILITIES

Energizing Oregon has been led by the Governor-designated TEEC. In November 2010, the TEEC held its first meeting, and in March 2011, the TEEC developed a policy statement on transportation electrification for the state. Members include high-level representatives from industry, higher education, utilities and local and state government; the full memberships list is included as Appendix 12.1.

Areas of strategic focus for the TEEC include:
- Strong public awareness and acceptance of transportation electrification
- Necessary and appropriate charging infrastructure
- Policy support for PEVs and a streamlined regulatory process
- Strong national and international partnerships
- Support for existing and developing companies
- Meeting Oregon’s GHG reduction target

The TEEC served as the steering committee for the project, providing guidance and oversight of both development and execution, and conducted the initial kick-off meeting in November 2011 to outline the key objectives and tasks of each work group. The TEEC was briefed on a bimonthly basis and provided guidance to the work groups on key issues.

The TEEC formed an executive committee that met on a monthly basis to review progress and address issues. The committee included the Governor’s office, the TEEC chair, the work group chairs and the overall project manager. The Energizing Oregon project team used four primary work groups to conduct research, develop plans and make recommendations, focused in four key areas: Deployment, Policy, Outreach and Utilities.

In September 2012, the TEEC approved the final recommendations of the work groups that are included in this report.
KEY FOCUS AREAS

The US DOE identified 11 “critical elements” in state and local planning for PEVs, including:

- Partnerships
- Ongoing roles
- Barriers and opportunities
- Current plans for PEVs
- Infrastructure plans
- Building codes
- Rapid permitting/inspection
- Zoning rules and ordinances
- Marketing, outreach and training
- Communications plan
- Utility policies and plans

In order to prioritize planning efforts, at the outset of the project, the team assessed Oregon’s current PEV landscape in each of the above 11 areas and identified where Oregon is ahead of the curve and where there are key gaps.

On the positive side, Oregon is recognized as a national leader in streamlining codes and permitting around both PEVs and infrastructure, and has buy-in and participation from a wide array of stakeholder groups. In contrast, the project team identified the following four areas for focus in Oregon’s work:

- The project team identified a significant gap in current outreach, education and communications activities relative to the level of effort and investment necessary to substantially increase PEV market penetration.
- Similarly, the project team identified the need for particular focus on financing and infrastructure. Although Oregon has been identified by OEMs as an early market and there are several infrastructure projects underway, current efforts are not adequate to achieve the state’s ambitious goals.
- As a new entrant to the market, PEVs face significant barriers before they can compete on a level playing field with the existing transportation industry. Therefore, policy and inducement tools are necessary and appropriate to support market development and were identified as a focus area for Oregon’s effort.
- Utilities have a key role to play in transportation electrification and thus have the potential to be either supportive or disruptive of this transition to PEVs. Oregon benefits from several highly engaged and knowledgeable utilities in the Portland Metro area and beyond, and the project team identified a key opportunity (and need) to take the lessons learned and good ideas from these utilities and make them accessible to all utilities across the state.

As noted above, four work groups were established to address each of these four core areas, as follows:

1) Deployment Work Group
   Mission: Research and develop strategies for understanding and supporting the next stage of vehicle and charging station deployment. Focus areas include workplace charging, fleet support and sustainable tourism.

2) Policy Work Group
   Mission: Research and develop priority inducements and necessary policy changes (building codes, permitting, etc.) to support the continued deployment of vehicles in Oregon.
3) Outreach Work Group
    Mission: Conduct research to determine the most effective outreach tactics and strategies to increase PEV adoption in Oregon. Conduct training to sustain momentum and cultivate key stakeholders.

4) Utility Work Group
    Mission: Engage utilities in Oregon, identify key issues, conduct analysis and communicate information to utilities.

Each work group was chaired by a member of the TEEC and included support from one or more state agency staff. In addition, each work group had a dedicated coordinator responsible for scheduling meetings, writing meeting notes and providing other project support. The work groups included a broad range of partners from higher education, industry and government, and all meetings were open to the public.

The Energizing Oregon core team included the project manager, work group staff and coordinators. The group met on a biweekly basis to assure alignment and consistency in approach to the project. In addition, the group was responsible for identifying and determining what issues should be addressed and by which work group.

In an effort to keep the public informed, the core team provided monthly email updates that included progress to date, as well as the dates, times and locations of all project team meetings. In addition, a publicly accessible project website (otrec.us/research/Oregon_energy) was built; the site includes all meeting materials, meeting summaries and announcements of future meetings.

In June 2012, the project team provided a preview of the project results and recommendations at the EV Roadmap conference held in Portland. In September 2012, the TEEC approved the final recommendations of the work groups that are included in this report.
**BUILDING CAPACITY**

As an “Early Adopter” state, Oregon began the Energizing Oregon planning process with many of the key building blocks already in place for broad PEV deployment. In order to sustain momentum during the yearlong planning process, the project team identified (and allocated US DOE grant funding for) several key on-the-ground activities necessary to continue building visibility, engaging stakeholders and training key audiences.

These initiatives included outreach by the two Oregon Clean Cities Coalitions, training developed in partnership with the Oregon Auto Dealers Association (OADA) and work with the National Electrical Contractors Association (NECA)/International Brotherhood of Electrical Workers Local 48 (IBEW Local 48).

Each of these on-the-ground efforts is briefly summarized below. Detailed descriptions and supporting materials are available on the Energizing Oregon resources website at evroadmap.us/content/energizing-oregon-plan.

**Columbia Willamette Clean Cities Coalition**

Through the Energizing Oregon grant, the Columbia Willamette Clean Cities Coalition (CWCCC) has conducted outreach and training at regional and statewide events. This outreach includes developing educational and promotional materials for events. The Energizing Oregon grant has allowed CWCCC to collaborate with community stakeholders and engage the public in support of its mission to promote domestically produced alternative fuels.

**Key collateral developed:** Website (www.cwcleancities.org); West Coast Electric Highway Overview; Cost of PEV Ownership and Drive Electric for Fleets brochures

**Key events:** Green Transportation Conference (January 11, 2012); Booth and CWCCC/NAFA Alternative Fuel Workshop at the Portland International Auto Show (January 26-29, 2012); Ford Focus Electric Ride and Drive (May 22, 2012); EV Roadmap 5 (June 22, 2102); EV Live (June 22-23, 2012); Oregon Electric Vehicle Association EV Appreciation Day (July 14, 2012); Panel at Oregon Transportation Association Conference (September 10, 2012); Odyssey Day (October 18, 2012); Green Transportation Conference II (October 24, 2012)

**Rogue Valley Clean Cities Coalition**

The Rogue Valley Clean Cities Coalition (RVCCC) has completed several PEV awareness projects in Southern Oregon. The March 16 grand opening of the West Coast Electric Highway drew about 75 people, a convoy of PEVs and media attention from as far away as Paris. The coalition brought under one tent mayors, county commissioners, auto dealers, Southern Oregon University, the Oregon Department of Transportation (ODOT) and the Oregon Department of Energy (ODOE), along with senior officials from AeroVironment, Mitsubishi Motors North America and Drive Oregon.

RVCCC also devoted a session to PEVs at the June 27 Fleet Managers Conference at the Jackson County Public Works Auditorium and held an electric car show and forum sponsored by local auto dealers at the Rogue Federal Credit Union in August. The coalition also submitted an updated Plug-In Vehicle Strategic Planning Feasibility Study and prepared materials for a regional training session for first responders.
Key collateral developed: Facebook page with event photos, website (www.roguevalleycleancities.org) linking to dozens of media stories and clips about Oregon’s West Coast Electric Highway

Key events: Grand Opening of the West Coast Electric Highway (March 16), Fleet Manager Conference (June 27), Electric car show and forum at Rogue Federal Credit Union (August)

NECA-IBEW Local 48 Electrical Training

NECA-IBEW Local 48 developed and offered two levels of training related to DC fast chargers. Level One was an introductory course offered to people primarily engaged in the electrical, renewable, power distribution, energy and motor vehicle industries. Level Two was an advanced course for industry professionals who are active in the process of installing EVSE, from the point of sale to the contractor and anyone in between.

Oregon Auto Dealers Association

The Energizing Oregon project included two efforts with OADA: support of the EcoCenter at the Portland International Auto Show and training sessions for auto dealers around the state. The Portland International Auto Show attracted a large crowd with this year’s attendance exceeding 100,000 people. Energizing Oregon funds and partners provided significant support to the EcoCenter, which covered the entire upper level of the convention center. Also at the auto show, CWCCC hosted its annual alternative-fuel workshop, which was sponsored by the NAFA Fleet Management Association and featured sponsored presentations from original equipment manufacturers and fleet managers.

OADA also is planning auto dealer training sessions in three locations (Medford, Eugene and Portland) in partnership with IBEW and CWCCC. Topics for the sessions will include PEV technology, DC fast charger installation, codes and permitting, public infrastructure build-out, and incentives.
BACKGROUND
Developing an Understanding of Oregon’s PEV Landscape

RESEARCH REVIEW

The Energizing Oregon team began the research phase with an in-depth review of recent third-party research, including market forecasts, consumer opinions and technology roadmaps. Reviewed sources included:

- The Portland State University School of Business Administration MBA Capstone project report, Driving Adoption of Electric Vehicles to the Early Majority, which details the early majority PEV buyers in Oregon and identifies the barriers to and enablers for adoption. (Anderson, Kocher, Matson, and Oothoudt, 2011)

- Electric Vehicles and the Oregon Tourism Industry: A White Paper by the Oregon Transportation Research and Education Consortium (OTREC), which provides guidelines for collaboration between the tourism and PEV industries. (Bronstein and MacArthur, 2011)

- Electric Vehicle Charging Infrastructure Community Needs Assessment by OTREC, which provides background research on PEV infrastructure. (Parker and Brode, 2012)

- Pike Research Reports, including:
  > Hybrid Medium and Heavy Duty Trucks (Pike Research, 2010)
  > Pike Pulse Report: Electric Motorcycles and Scooters (Pike Research, 2012)
  > Total Cost of Ownership of Alternative Fuel Vehicles (Pike Research, 2012)
  > Electric Vehicle Batteries (Pike Research, 2011)
  > Electric Vehicle Charging Equipment (Pike Research, 2011)
  > Electric Vehicle Market Forecasts (Pike Research, 2011)
  > Electric Vehicle Geographic Forecasts (Pike Research, 2012)
  > Electric Vehicle Consumer Survey (Pike Research, 2012)

The team also identified data gaps and conducted additional primary research. Project-funded surveys and research included:

- Literature Review and Consumer research on PEV Marketing in Oregon (Enviromedia, 2012)
- Online survey of Portland metro region Opt In members (3,719 participants) to better understand what everyday commuters think of PEVs (DHM Research, 2012)
- Online survey of Portland Auto Show attendees (324 participants) (OTREC, 2012)
- Online survey of Oregon and Washington PEV owners (200 participants) (OTREC, 2012)
- Online survey of fleet managers in California, Oregon and Washington (OTREC, 2012)
- Interviews of OEMs (Proudfoot and Luftig, Energizing Oregon: Summary of Memo of PEV OEM Interviews, 2012)
Together, the information gathered via both primary and secondary research helped deepen the project team’s understanding of the marketplace, consumer attitudes and technology development—and forms the basis for the recommendations in the plan.

OREGON’S PEV LANDSCAPE: CONSUMERS

Oregon is home to more than 3 million licensed drivers (Oregon Department of Motor Vehicles, 2011) and 3.2 million registered vehicles (Oregon Department of Transportation, 2011). As of September 2012, 1,610 PEVs were registered in Oregon (Horvat, 2012).

Current Consumers

To better understand current owners, a survey of 200 Oregon and Washington PEV owners was conducted. Overall, the survey showed high levels of satisfaction with PEV ownership and daily use (MacArthur, 2012). As described below, the majority of current owners use their PEV for daily commuting (driving fewer than 70 miles each day) and charge at home (MacArthur, 2012).

The vast majority of PEV owners live in urban areas, primarily Portland (Horvat, 2012). Oregon, like several other Western states, has two very different population groups: one living in dense urban and suburban centers and the other living in or near small rural towns, or on isolated ranches and farms. PEV consumer surveys have consistently indicated that rural consumers will be among the last group to adopt PEV technology. Rural Oregonians are much more likely to drive trucks or SUVs and have range and usage needs exceeding current PEV specifications. The map above indicates the heavy concentration of PEV ownership in urban and suburban counties and along the I-5 corridor.

An online survey of current PEV owners in Oregon showed extreme satisfaction with their vehicles. Survey respondents have driven their vehicles for an average of 9,500 miles for an average of 14 months; 90 percent have more than one vehicle at the household; 90 percent live in single family homes with a garage and/or driveway; and only 2 percent have no home-charging unit. Eighty-one percent of owners use their PEV as their primary car or for daily commuting, driving an average of 40 miles a day, with 95 percent of them driving under 70 miles a day (MacArthur, 2012).
Potential Consumers

Most consumers still consider PEVs a relatively new technology. That said, in a 2011 survey from Deloitte, 12 percent of Americans said they are “very interested in electric vehicles” and another 42 percent are willing to consider them despite being unfamiliar with the technology. These individuals represent potential buyers who can be motivated to buy (Deloitte, 2010).

Everett Rogers’ Diffusion of Innovation Curve theorizes that the first 2.5 percent of buyers of a new technology are Innovators—technology enthusiasts who are risk takers and have the resources and desire to try new products. The next group is Early Adopters, the 13.5 percent of the population who are selective of which technologies they start using. Early Adopters in turn reduce others’ uncertainty about new technologies, paving the way for adoption by the Early Majority (Enviromedia, 2012).

Online and auto show surveys helped gauge perception of PEVs among average Oregonians. Although PEV registration numbers in Oregon show that Innovators are still the primary buyers of PEVs, Portland Auto Show survey data forecasts a significant growth in PEV purchases in the next three years. Of the 75 percent of 2012 Portland Auto Show respondents who said they plan on buying a new car within the next three years, 66 percent said an all-electric vehicle was “maybe” or “probably” going to be their next car (OTREC, 2012).

Almost all respondents had heard about PEVs, with men more likely than women to say that they knew a fair amount or a great deal about them (64 percent versus 31 percent). Attitudes about PEVs vary, with some boasting about the technology and the vehicles’ positive impact in reducing our reliance on oil. “They are our future,” said one respondent. Others were more hesitant, citing concerns about the cost of PEVs and the driving range per charge. “I honestly do not think that Americans are willing to pay such a high price for such a small vehicle with so many limited capabilities,” explained another respondent. In the March 2012 Opt In survey, respondents in the Portland region said their maximum budget for a new car would range between $20,000 and $25,000 (DHM Research, 2012), while the cost for a PEV ranges between $22,500 and $32,500 after the federal tax credit (MacArthur, 2012).

About 20 percent of 2012 respondents said they would consider purchasing a PEV in the next two years and a small percentage already owned a PEV. “We own a LEAF, and I drive it every day to bring the kids to school and run errands,” said a respondent. Most, however, said they would not consider buying a PEV any time soon, saying that the cost would have to go down and the driving range would have to go up before they would seriously consider a PEV. One respondent expressed it this way, “I’d buy an electric in a heartbeat if it had a 150-mile range and could recharge in a couple of hours on a 110 circuit. Maybe someday...” (DHM Research, 2012).

In the Metro Opt In survey, a quarter of the respondents said they were somewhat or very likely interested in purchasing a PEV in the next two years, with a higher level of interest from Democrats, Independents and
people with annual household incomes over $100,000 (DHM Research, 2012). The Auto Show survey showed a slightly lower level (20 percent) of buying commitment in the next two years. Of those who said they were somewhat or very likely to purchase a PEV, 50 percent were more interested in purchasing a PHEV or an extended-range electric vehicle. Individuals expressed the need to use these PHEVs for a majority of trips made, including longer distance trips. Those ages 18-34 (45 percent) were more likely than those 35-54 (35 percent) and 55 and older (27 percent) to prefer an all-electric vehicle (DHM Research, 2012).

Additional findings on consumer attitudes are outlined in the Outreach and Communications section.

HEV adoption is widely used as a proxy for PEV adoption in deployment studies and US sales forecasts. Cumulative HEV sales in the United States passed the two million mark in May 2011 (Schweinsberg, 2011) with 44,500 HEVs now registered in Oregon (Horvat, 2012). When the Prius was launched in 1999, Toyota specifically targeted the Innovator and Early Adopter segments in its marketing campaign. By 2004, the company had launched a new, larger version of the vehicle with a new campaign aimed at capturing the Early Majority market (Ozaki and Sevastyanova, 2011).

Oregon’s Early Majority PEV consumers are likely to be found in communities with a population of 50,000 or more and also within a 10-mile radius of these cities. There are six urban areas in Oregon: Portland and vicinity, Eugene, Salem, Medford, Bend, and Corvallis. The highest predicted concentration of Oregonians with characteristics consistent with the PEV purchaser profile (Deloitte, 2010) is found in the greater Portland area. The Portland metropolitan area is a good fit for Early Majority consumers in terms of urban concentration, household income, age, housing trends and environmental and political leanings (Deloitte, 2010).

It would be shortsighted, however, to perceive efforts to reach Oregon’s Early Majority consumers as only benefiting urban Oregonians. Rural Oregon is the source of much of the energy that will power PEVs (Oregon Department of Energy, 2011). Demand for clean, renewable energy from the wind, wave, solar and cogeneration facilities at lumber mills, dairies, wastewater treatment plants and landfills is likely to increase with widespread adoption of PEVs. Thus, there are potential economic benefits for rural Oregon from PEV adoption even before the vehicles are ready to meet these potential buyers’ needs and expectations.

In Oregon, people identified “environment and health” as the top reason they would consider purchasing a PEV. “Economic” matters came in a close second. Second-tier influencers included “national security” and “energy security.” The bottom tier included “family budget” and “job creation.”
Smaller urban and rural areas will benefit from a campaign to the Early Majority buyers in the longer term as well. When Multnomah County residents were asked in a 2009 DHM survey, “How important is it that Oregon becomes a leader in the nation for using PEVs as an alternative to gasoline fueled vehicles?,” 49 percent of participants said, “very important,” and another 41 percent said, “somewhat important.” When those 90 percent responding “very important” or “somewhat important” were asked why they felt PEVs were important for Oregon, 59 percent indicated that it was because Oregon has a green and innovative reputation—and should maintain its position as a green leader. PEV campaign messages should capitalize on Oregonians’ pride regarding their state’s reputation for sustainability leadership (DHM Research, 2009).

**Commercial & Industrial Use**

By nature of their jobs, fleet managers and buyers are natural Early Adopters: they tend to be analytical in their purchasing decisions, and thus more willing to consider the total cost of a vehicle over the entirety of its lifecycle. This is essential for PEVs, whose initial upfront cost is currently higher than similar-sized internal combustion engine (ICE) vehicles. As compared with individual consumers, fleet managers also have a great deal of buying power and built-in budgets for ongoing vehicle replacement.

Commercial diesel trucks also consume a disproportionately high volume of fuel and emit a disproportionate amount of emissions per mile traveled. Replacing these vehicles with PEVs clearly reduces fossil fuel use and has significant air quality benefits.

Companies with large fleets have also recognized the value of adding PEV trucks as a smart public relations move, one that associates their brands with sustainability and a green ethos. Companies such as UPS and Coca-Cola trumpet their PEV purchases and also the number of miles their green fleets have traveled.

In a November 2011 report prepared for OTREC, Portland State University MBA students reported that fleet managers are most willing to try PEV technology when federal and state incentives are available to offset the high upfront costs and in urban fleets where the vehicles don’t have to travel long distances between charges with routes that are limited to a predetermined, in-range length. Most fleet owners, however, are primarily deterred by the significant cost difference of PEV trucks compared with ICE trucks, which at this time usually cannot be recovered through the lower cost of fuel and maintenance alone—although significant incentives may make the technology more attractive. Another primary concern is the cost of installing fast-charging equipment (Anderson, Kocher, Matson, and Oothoudt, 2011).
OREGON’S PEV LANDSCAPE: INFRASTRUCTURE

Beyond simply installing chargers, the build-out of a robust, connected PEV charging infrastructure in Oregon is important to help bridge the gap between Innovators and Early Adopters. With the deployment of a robust fast-charging network, the Northwest PEV driver will no longer be limited to the 100-mile range of the typical PEV, but will be able to traverse the state to destinations that were previously unattainable.

To date, three major projects have been conducted to build out necessary infrastructure for PEV charging in Oregon. The state has been involved in planning for the adoption of PEVs and supports several projects around the state focused on PEVs and infrastructure, including the following:

• **ECOtality’s EV Project.** ECOtality’s June 2012 EV Project data shows 724 charging units installed and 93,225 charging events performed in Oregon since project creation. In addition, ECOtality had 429 Nissan LEAFs and 59 Chevrolet Volts enrolled in the project, with a total of 2,995,493 miles driven (ECOtality, 2012).

• **EV fast charge stations in Southern Oregon.** These stations are part of the West Coast Electric Highway infrastructure building efforts. ODOT received $915,000 in American Recovery and Reinvestment Act funding to install 10 PEV DC fast chargers from Halsey to Ashland along the I-5 corridor, creating over 200 PEV-ready miles. ODOT hired AeroVironment to deploy these DC fast chargers as part of a coordinated strategy with other installations in Oregon and Washington (AeroVironment, 2011).

• **Tiger II Grant for EV Infrastructure.** ODOT received $3.34 million from the US Department of Transportation to expand the DC fast charger network in Northwest Oregon along key transportation corridors. Twenty-two charging stations up and down the Coast, the Columbia River Gorge and in the Willamette Valley are scheduled for completion by the end of 2012. At least eight more charging stations farther south down the Coast, over the Cascades and in the Gorge are slated for installation by the end of 2013 (Oregon Innovative Partnerships Program, 2012).

The three projects above are important elements of the West Coast Electric Highway.

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The first segment of the string of fast-charging stations is now open in Southern Oregon, with other sections of the West Coast Electric Highway now open for PEV drivers in Washington. Eventually, the highway will provide charging facilities along all 1,381 miles of I-5 from Canada to Mexico, making owning a PEV more convenient for longer distance travel.
Owner Perspectives on Infrastructure

To better understand how current PEV owners are using the charging infrastructure, an online survey was conducted. The results of the statewide survey from 200 Washington and Oregon PEV owners show that they are extremely satisfied with the initial efforts to develop public infrastructure (OTREC, 2012). Below are some highlights from the survey.

Preferred Charging Location:
- Respondents primarily rely on home charging and charge outside the home only rarely, as when additional range is needed.
- Forty-five percent charge more than weekly outside the home and 55 percent charge less than weekly or rarely.
- Interestingly, 25 percent describe themselves as charging at any opportunity they can. Some of this behavior could be related to range concerns or parking availability.
- Only 2 percent have no home charging unit installed.
- Most of the PEV owners (91 percent) in this survey have Level 2 equipment at home and the 70 percent that have access to public or workplace charging are primarily using Level 2 charging.
- Currently, 49 percent of the PEV owners with DC fast charging capability use the chargers to some degree. This is a high degree of use compared to other regions of the country, attributable to the fact that Oregon is leading the nation in DC fast charger infrastructure.

Satisfaction with Infrastructure:
- Satisfaction with the current infrastructure is split between respondents: 49 percent are very or somewhat dissatisfied and 36 percent are very or somewhat satisfied.
- Respondents were most pleased with the regional DC fast charger network.
- The group is somewhat more satisfied with the information they receive on charging station locations (accuracy of information, ease of finding locations, frequency of updates, etc.) with 40 percent being somewhat satisfied and 28 percent being dissatisfied.
- Respondents expressed the most dissatisfaction with the current business models used to charge for charging. The two major issues highlighted in the responses were the operational aspects of certain chargers and the lack of seamless charging experience. Respondents on average had two or three charging membership cards and expressed frustration that payment methods and the use of charging networks were so varied and difficult.

Future Investments:
- The respondents felt the most important aspects of a successful and usable infrastructure are convenience and affordability.
- Asked where future infrastructure development efforts should focus, respondents felt DC fast chargers should be placed along highways and at gas stations, and Level 2 should be placed at work, parking lots and major retail centers.

Charging Cost:
- In looking at “willingness to pay” for charging, 50 percent of respondents felt that getting an 80 percent charge within 30 minutes from a DC fast charger should cost between $2 and $5, and 25 percent felt it should be under $2.
• For Level 2, respondents thought the average cost for an hour of Level 2 charging should be $1.25.
• In general, when it comes to preferred rate of paying, 66 percent would like to pay per kilowatt hour versus by the minute or charging event.

Perspectives on Costs, Policies & Inducements

In the Opt In and Auto Show surveys, purchase price is the top concern for individuals making a decision to purchase a PEV. In the Opt In survey, the price thresholds peaked at the $20,000–$24,999 range, with a top range of $35,000 or more. Currently, the Nissan LEAF would cost approximately $27,000—with federal tax incentives—slightly above the preferred price point. Other concerns topping the list were limited driving range of the vehicles, availability of charging stations (or fear of getting stranded) and time required to charge the vehicles (DHM Research, 2012).

To address the purchase price of vehicles, Opt In survey participants were asked about restoring the state tax credits for PEVs so that the cost would be more comparable to a gas-powered car of the same size. Members in Clackamas (42 percent) and Washington (35 percent) counties were most likely to say the state should not provide tax incentives for PEVs. Those in Multnomah county (51 percent) said the state should restore state tax incentives or make it more than $1,500.

OEMs and EVSE manufacturers were interviewed to assess industry and market readiness in Oregon. OEMs believed that barriers to PEV deployment include a lack of consumer education about lifestyles suitable for PEV use and a lack of consumer demand for PEVs in Oregon. In addition, manufacturers believed that PEV costs are high compared to ICE vehicles, with too few incentives to make up for the cost difference. They also cited low dealership enthusiasm for selling PEVs (Proudfoot and Luftig, Energizing Oregon: Summary Memo of EVSE Company Interviews, 2012).

Manufacturers were interested in engaging dealerships in promoting PEVs to consumers and creating a marketing plan that would get consumers into dealerships and get dealers interested in selling PEVs. They also suggested focusing on workplace charging rather than public charging to meet the commuting needs commonly cited as critical for Early Adopters. Finally, they highlighted the importance of incentives to increase PEV sales, including both financial incentives and “perks,” such as preferred parking and HOV lane access.

Another barrier to PEV deployment and the associated infrastructure in particular are the demand charges that utilities charge to maintain the grid infrastructure to serve peak loads. An initial analysis by ODOE shows that demand charges and rate structures can, depending on the level of usage, mean some locations will likely not be financially feasible as sites for DC fast chargers. This could have impacts on efforts to build out a comprehensive network of infrastructure that supports the use of PEVs over longer distances. Additional study and analysis of this issue is warranted, and potential solutions should be developed and tested.
PRIORITY: DEPLOYMENT

INTRODUCTION

The previous sections of this plan have laid out just how nascent the PEV market is at present—and also the many barriers to PEV adoption, chief among them high upfront vehicle costs, the lack of supporting infrastructure and competition against a well-funded and well-established existing industry. Nonetheless, it was the Deployment Work Group’s charge to develop and prioritize innovative strategies that, simply put, will get the most PEVs on the road—and get them on the road as soon as possible, thereby helping Oregon reach its ambitious PEV goals. This section will discuss the three strategies that the Deployment Work Group identified as the highest priority and, thus, deserving attention in this project.

BARRIERS

• Lack of enthusiasm from dealerships to sell PEVs
• Turnover at auto dealerships limiting institutional knowledge and, thus, ability to sell PEVs
• Confusing information on true state of charge between EVSE and vehicle
• Upfront cost issues
  > Consumers unwilling to pay incremental cost over ICE vehicle
  > Difficulty of monetizing tax credits and lack of upfront funds for public fleets
• Lack of workplace charging
• Lack of consumer education about charging stations
• Need for existing charging infrastructure to be more user-friendly
  > Lack of central resource identifying charger locations, type, reservation capabilities, etc.
  > Lack of interoperability and communications protocol among different EVSE networks
  > Different pricing models from EVSEs
  > Variability in pricing due to different demand charges by utilities
  > Different DC fast-charger standards
  > Lack of uniform or sufficient signage, especially off of interstate highways
  > Intermittent technical issues
• Insufficient charging stations to support desired number of vehicles, especially along major corridors
• Difficulty of installing and operating DC fast chargers
  > High upfront capital cost to install DC fast chargers
  > High demand charges, especially for DC fast charging in some rural utility territories
  > Inconsistent and sometimes difficult siting procedures by local governments and utilities
  > Difficulty or delays in negotiating site agreements with hosts
  > Cost to extend sufficient electrical service to remote sites
The Oregon strategy places a premium on fleets, and there are compelling reasons for that. Fleets with medium-and heavy-duty trucks discharge a disproportionate share of GHG emissions and pollutants into the air, contributing to poor air quality and adverse health effects. As compared with consumers, managers of large fleets also represent a small but captive audience—and this audience happens to have clearly defined needs, a tremendous amount of buying power (consider that UPS has 78,000 trucks in its fleet (Oregon Department of Transportation, 2012)), and built-in budgets for regular vehicle replacement. By nature of their jobs, fleet managers also are more receptive to deeper analyses of a vehicle’s cost over its entire lifecycle, which is essential for PEVs, whose upfront costs at this juncture remain much higher than ICE vehicles.

Public and private fleets also represent a large number of vehicles on the road, thereby potentially increasing the on-road visibility of PEVs. Sizeable PEV purchases by companies are more likely to garner media attention, as did UPS’s 2011 purchase of 100 PEV trucks (Baker, 2011). Such stories are natural educators: they mainstream the idea of PEVs, buoy consumers’ knowledge of the technology, and pique curiosity and interest.

Because there are relatively few fleet managers, the project team conducted in-depth interviews with fleet managers and/or buyers at six companies operating in the region, including UPS, Staples, Northside Ford, PGE, Frito Lay and Enterprise (Anderson, Kocher, Matson, and Oothoudt, 2011). As compared with survey data, this qualitative approach allowed for a much fuller understanding of these companies’ needs, their expectations and their challenges with regard to deploying PEVs. This approach also allowed the team to hear directly from purchasing decision-makers about what exactly influences their decisions—invaluable data as Oregon develops and implements programs to stimulate the PEV market in the future.

Each of the six fleets interviewed already has experience with PEVs. Even in the most progressive instances, however, fleet managers have only tried PEV technology in small test cases. These trials have been designed to meet local regulations and emission requirements (e.g., those in California), as well as to take advantage of federal, state and local incentives.

For these companies, the bottom line remains a core concern: electric trucks and batteries are still limited in production, and prices are high. A PEV truck can cost between $130,000 and $160,000, while a comparable diesel truck costs between $75,000 and $90,000 (Oregon Department of Transportation, 2012). So far and in most cases, these costs cannot be recovered through the lower fuel and maintenance costs alone.
Closing the PEV Price Gap

Oregon has recognized the need to help companies deal with these cost differentials. Last March, ODOT, with funding from the federal Congestion Management and Air Quality program, launched the Oregon Commercial Electric Truck Incentive Program (CETIP). Designed to improve air quality in specific areas of Oregon, the program provides $20,000 vouchers—essentially reimbursements—to help companies replace polluting diesel trucks with higher-cost PEVs. The goal is to facilitate the replacement of 200 high-polluting medium-sized urban-delivery diesel vehicles within one or two years (Oregon Department of Transportation, 2012).

Because CETIP’s funding recipients must report vehicle miles traveled, diesel fuel replaced and electricity usage, the program will provide invaluable information about PEVs’ real-world performance. CETIP’s funding mechanism, however, is aimed at reducing costs in the short term only. Vouchers are not sufficient as a long-term solution and have not been used extensively even in the short term in Oregon and New York, where a similar program was set up.

Building on the successes and lessons learned from Clean Energy Works Oregon (CEWO), Drive Oregon has helped lead the charge to create Clean Fleets Work. This public-private partnership is designed to help overcome the barriers to PEV adoption in fleets by providing one-stop-shop service with customized financial products or lease instruments for fleet operators. The program’s intent is to provide a simple, user-friendly platform that manages operational complexity, service delivery and the aggregation of financial incentives on behalf of the fleet operator. These financial products will enable fleet-owning entities to deploy PEVs at a monthly cost comparable to—and sometimes lower than—the cost of comparable ICE vehicles. This economic bottom line goal is absolutely critical to removing barriers to more widespread PEV adoption.

Significantly, fleet managers interviewed for this project indicated that they would indeed respond to policies that translate into meaningful savings. The insight of Mike Britt, chief alternative fuels manager for UPS, summed up this point of view. Britt said that as UPS makes its purchase decisions for alternative fuel vehicle, the company plans to continue to “follow the funding.”

Oregon has long been a leader in developing more innovative financing solutions to stimulate green markets. In 2010, the City of Portland launched Clean Energy Works Oregon (CEWO), a program designed to help homeowners finance energy-efficiency upgrades with low-cost loans and rebates; based on the project’s success, the model was expanded statewide with funding from the US Department of Energy in 2011. CEWO helps make energy upgrades accessible for average homeowners by providing a central point of coordination, free energy audits, customized plans and no-cost loans for homes that demonstrate potential to increase energy efficiency by at least 15 percent. To date, more than 2,000 homes have taken advantage of the program.
The Supply Side of the Equation: OEMs

Interviews with OEMs of cars and trucks also were conducted. This deepened the team’s understanding of PEV sellers’ points of view, their strategies, how they allocate vehicles to the Oregon market and their political and market needs. Among the questions posed to three truck manufacturers were, “What policies or inducements factor into your distribution decisions?” and “What barriers need to be removed to improve sales?” Below is a summary of findings from those conversations (Proudfoot and Luftig, Energizing Oregon: Summary of Memo of PEV OEM Interviews, 2012).

OEM-Reported Barriers to Getting More PEVs on the Road:

• Lack of fleet manager education about lifecycle return on investment for a PEV
• PEV first/capital costs are high compared to ICE vehicles and there are not enough incentives to make up for first costs
• Infrastructure needs create another layer of cost

Actions to Overcome the Barriers:

• Work with both company leadership and fleet managers to bridge the information gap regarding lifecycle costs
• Target “captive” fleets—those that work short, local routes
• Make PEVs more accessible to fleets through incentives and unique payment plans for leasing or buying vehicles
• Streamline the permitting process and necessary utility upgrades for charging infrastructure
• Use tradeshows as a platform for educating fleet managers about PEVs
• Target fleets and commercial markets as a way to expose PEVs to consumers

Some OEMs are already trying to increase PEV sales by responding to buyers’ concerns. Adjusting battery size depending on vehicle use and route can reduce total vehicle cost. They also reported using a financing structure that reduces the upfront cost of a PEV truck as compared to that of a diesel-powered truck—and that then allows the difference to be paid back over time from the money saved on fuel.

Closing the PEV Information Gap

Innovative financing alone, however, does not guarantee a permanent place for PEVs in fleets. PEV trucks are not suitable for all fleet applications. Although the fleet managers interviewed had detailed selection processes in place that helped ensure that PEVs would be able to meet the functional requirements for which they were purchased, some companies performed more thorough analysis than others.

The companies that performed the most intense pre-purchase analysis were the happiest with PEVs—and were more inclined to purchase PEVs in the future. The best success stories came from companies that relegated PEV trucks to routes in urban settings, where the vehicles don’t have to travel long distances between charges. Truck OEMs reported that the majority of PEV truck owners are companies that operate large urban freight fleets. PEVs also received high marks on routes that have a predetermined, in-range length—what are termed “captive” routes.
The companies that expressed less satisfaction with their PEVs experienced issues with power and payload. This perhaps indicates that the routes and payload needs weren’t analyzed carefully enough before making the PEV purchase.

For companies successfully using PEVs in their fleets, some surprising positives have emerged: Staples found that its drivers are driving more efficiently in an apparent attempt to compete with each other on who can return to the garage with the most charge at the end of a route. PGE found that the high-lift PEV trucks are much easier and safer for crews to work with, since ground-to-high-lift communication is much easier without the noisy truck motor running to power the lift.

Another important finding the interviews uncovered is that fleet managers’ and drivers’ perceptions change about PEVs in general after their experiences, even though the bulk of the experiences are with PEV trucks. Many users quite enjoyed driving and working with the PEV trucks. (Among the words used to describe PEVs in the interviews were “quiet,” “peppy,” “smooth” and “reliable”). They also expressed a better understanding of the PEV technology, and due to their increased comfort level with PEVs, they expressed interest in purchasing a PEV for personal use in the future, something they admitted they would not have considered before their interaction with the fleet PEVs.

This change in attitude matches findings of other PEV trials: the more that people interact with PEV technology, the more that they become comfortable with it and begin to consider it as a viable transportation option. It also indicates that increasing the number of PEVs in fleets may be a way to reach potential Early Majority PEV buyers. Even if fleet buyers and drivers do not purchase PEVs for their personal use, their endorsements of PEVs could influence others.

### KEY RECOMMENDATION: Establish financing mechanism(s) for fleets

- Assess performance of Commercial Electric Truck Incentive Program (CETIP) and determine how best to proceed
- Pursue a program similar to the Clean Energy Works Oregon program (see Drive Oregon’s proposal) and/or
- Pursue a program based on energy savings performance contracts
WORKPLACE CHARGING

Although the evidence is primarily anecdotal, the majority of PEV charging seems to be taking place at home. The next most important location for charging in many cases appears to be at the PEV owner’s workplace. In its Electric Vehicle Consumer Survey, Pike Research found that the most popular choices for charging stations are the workplace (74 percent) and roadside charging stations (82 percent). There are existing programs targeting roadside charging stations, but very little is currently targeted directly at the workplace application.

Having the opportunity to charge at work provides a nice “security blanket” and goes a long way to addressing range anxiety. Should PEV drivers have to run unexpected errands or respond to emergencies, the availability of workplace charging will give them confidence that they will still have enough charge to get home. Additionally, workplace charging can serve as a primary charging location for those PEV owners who do not have facilities available at home. It also encourages more people to buy PEVs.

Several large employers in Oregon, including Intel, Nike and Mentor Graphics, have found value in the installation of workplace charging. In order to understand the experiences of these organizations and their motivations for installing charging stations, interviews were conducted with staff at a number of representative organizations. In summary, the major themes of the interviews were that the “green” marketing or promotional aspects of supporting cleaner transportation were important reasons for organizations to install charging. Having an internal champion of workplace charging also was important for ensuring the equipment installation was completed. Finally, the availability of incentives was an important factor in the cost-benefit analysis of the stations.

The interviewees also provided the following pieces of advice for other organizations considering installing workplace charging:

• Know why your company is going to do this (Are employees asking for it, is it a benefit for employees, is it public relations, is it a strategic priority, is it for employee recruitment or retention?)
• Talk to your employees first to gauge the level of interest
• Accept that you won’t have all the answers at the beginning
• Check the availability of incentives
• Look for total cost information, which can be hard to quantify
• Start the permitting process early
• Do your research. Talk to those who have installed charging stations already
• Talk to your contractor(s) about technical issues and conduit-trenching issues
• Identify your budget for the project in advance
• Go slow and put your toe in the water, but build your infrastructure with possible future expansion in mind (especially conduit trenching and electrical panels)
• Use the marketing department to share your charging station success story
• Keep in mind that the hurdles to doing this are not that big
• If you are an internal champion:
  > Be prepared to do some heavy lifting and planning to get your organization to buy into installing charging stations
  > Create an informational packet for internal decision makers
  > Find internal allies, explore possibilities, identify resistance and be a creative problem solver
Another beneficial aspect of workplace charging, at least in Oregon, is that the installation of these stations can help large employers meet their requirements under the state’s Employee Commute Options (ECO) program, which seeks to encourage large employers to help their employees commute to and from work in ways that reduce regional air-quality impacts. Other states or regions have similar programs and should recognize the installation of workplace charging as a way for an employer to meet its programmatic requirements.

Although there are a few Early Adopter organizations that have installed charging stations, workplace charging is nowhere near the norm. Many organizations have been reluctant to install infrastructure due to a variety of real or perceived issues, such as:
1. Cost of the equipment and installation
2. Employee equity: should the employer offer charging for free or for a fee?
3. Taxes: if charging is free, is the value of the electricity provided considered a taxable benefit by the IRS?
4. Accurate estimates of operating costs
5. Uncertainty or lack of understanding of building codes
6. Uncertainty about business models for charging: is it better to own the infrastructure or have a third party own and operate the infrastructure?

Many of these issues could be addressed if there was a concerted effort by a trusted source to get accurate, high-quality, easy-to-use information out to organizations in the community—especially to those that are interested in workplace charging but are overwhelmed by the process or don’t have the in-house resources to work through it. Good outreach and education materials on PEVs and charging stations do exist, but presently these materials are not focused on the workplace application. Developing and distributing materials specifically dealing with the issue of installing charging facilities at workplaces would help address organizations’ concerns.

For all these reasons, this plan recommends the development of a program focused on workplace charging. This program should build on the activities conducted to date and should include case studies of Oregon companies and organizations that have installed charging, since their direct experiences and lessons learned are highly valuable. These materials should also include information on the connection between charging and the state’s ECO program. Furthermore, the materials should explain all available incentives to support charging installation. A template employee survey should be developed that can be given to organizations so that they can assess their employees’ need and desire for workplace charging.

Once all of these materials are available, outreach should be conducted to companies and organizations that are most likely to install charging. (This outreach should be done in connection with any outreach that targets employees and/or the general community as described in other sections of the plan.) Outreach should also be done at existing events that bring together groups of candidate firms in one place, such as industry conferences and association meetings. Last, the outreach should at least initially be aimed at the types of employers (high-tech firms, high-wage employers, large employers, etc.) that are likely to have employees who are likely to consider purchasing PEVs in the near term.

Another aspect of workplace charging is the opportunity to integrate employee charging with that of clients and visitors, as well as an organization’s own fleet vehicles. Installing stations that can be used by multiple types of vehicles can help optimize the design of the installation and use resources most cost effectively.
Work should be done to examine the optimal way to integrate these different uses of charging stations under a variety of likely scenarios at different organizations. For example, a case study could be developed for an organization that wants to support both employee and fleet charging. Another case study could examine an organization that wants to support employee and visitor charging. Other scenarios should be explored as well.

As with many other aspects of the initial rollout of PEVs, Oregon is an ideal place to tackle and solve many of the issues around workplace charging. There is a state tax credit that can fund up to 35 percent of a PEV infrastructure project, and the program includes a pass-through option to help nonprofits, employers and building owners with financing. In addition, many Oregon businesses look for ways to promote a green image and would be receptive to outreach and education on the benefits of workplace charging. Oregon should move forward with a well-developed and determined program to significantly increase the amount of workplace charging installed in the state in order to support this critical element to facilitating purchases of PEVs.

**KEY RECOMMENDATION:** Develop and implement a workplace charging program—including outreach and education as well as potential incentives—to encourage companies to install charging stations

## SUSTAINABLE TOURISM

Increasing hands-on PEV driving experiences and PEV visibility (the “eyeballs and seats” approach to PEV adoption) is pivotal in getting more PEVs on the road. As such, Oregon’s well-established $8.7 billion tourism industry has been identified as a key driver of the state’s PEV deployment strategy. Because of the state’s mild climate that is hospitable to batteries, a predominant cultural support for sustainability and a series of densely built cities within 100 miles of each other, both the federal government and automakers have named Oregon as an ideal location to launch PEVs. The tourism industry also has a very strong role to play in overcoming one of consumers’ chief concerns about PEVs: range anxiety, which continues to be one of the biggest barriers to putting more people in PEVs and getting them on the road.

Oregon already is on the cutting edge in developing the new market for PEV tourism. The infrastructure foundation of the tourism strategy is the robust PEV fast-charger network dubbed the West Coast Electric Highway, which ultimately will run from Vancouver, British Columbia to Baja California. In March 2012, ODOT unveiled the first leg of the highway in the state with ten DC fast chargers that run from the California border to the city of Cottage Grove. These charging stations make more than 200 miles of easily travelable highway in Southern Oregon “PEV-ready,” allowing PEV tourists to take in sights like the Rogue River Valley and Ashland.

In the future, additional fast charging stations will be installed along I-5—considered the “spine” of Oregon’s transportation system—and along the “ribs” towards tourism hotspots like the Coast, the Columbia River Gorge, the Willamette Valley and over the Cascades.

There are more reasons that Oregon is an ideal candidate for PEV tourism development. Some 84 percent of leisure travel in Oregon is made by car (Bronstein and MacArthur, 2011). These short trips could easily be
replaced by private PEV travel. A nationwide Green Traveler analysis conducted by the US Travel Association found that 85 percent of survey respondents who were considering a trip to Oregon categorized themselves as environmentally conscious. Even more importantly, of those considering a trip to Oregon, 15 percent claimed they would be willing to pay more for travel companies that “offer eco-friendly option [sic] to customers” (US Travelers Association, 2010).

To propel the idea of a PEV tourism effort forward, a broad spectrum of tourism stakeholders began working together in April 2011. The Deployment Work Group reconvened all of the parties a year later. Project staff attended a Sustainability Tourism Advisory Committee (STAC) meeting in May 2012 to determine how the tourism industry could become actively engaged in PEV travel. A sub-committee of the STAC containing the members most interested in the PEV tourism program worked together to identify approaches that will help develop infrastructure, make it easier for tourists to plan routes and travel by PEV, and market the nascent industry to both thought leaders and tourists. A summary of key points appears below.

**Connecting Travelers (& the PEV Curious) to PEV Fleets**

Those businesses that already have PEVs in their fleets—including ZipCar, Getaround, Car2Go, Enterprise and Hertz—are integral to providing travelers with the ability to test drive or rent a PEV. These passenger-vehicle fleets also could serve as a clearinghouse for PEV tourism information in Oregon.

Notably, Enterprise has plenty of PEVs at the ready and will include more in their fleet, should the demand continue to increase. “We have the most fuel-efficient fleet for a rental car agency,” one Enterprise representative stated. “We track specific (popular) cars on different calendars. We grow to meet demand.” The project team agreed to work with Enterprise to see if there is a possibility to include a “green traveler” option on their reservation page. This would not only make the PEV option more visible, but it would also make reserving a PEV a more seamless experience.

**Connecting PEV Travelers with Smartphone Apps**

Success of PEV tourism depends on making sure that PEV travelers have a successful trip. To facilitate this, PEV travelers should have itineraries that are mapped, planned and ready to roll—which means they need up-to-date and accurate information about charging station locations, time required to charge at each station, distances between destinations and PEV-ready routes. Brochures risk becoming static in a rapidly developing market. Thus, smartphone apps and electronic media, which allow for easy updating as new charging stations are added throughout the state, are likely the best information mediums for PEV tourists.

Such media also work well for the PEV user: Pike Research found that PEV owners were tech savvy. The majority of respondents (84 percent) were “very” or “extremely” interested in an application that would provide them with the location of the nearest charging station. As consumer adoption of smartphones and mobile applications continues to grow, the level of interest in these applications will also increase.

In developing this application, the project team and tourism industry discussed a number of information needs, chief among them a one-stop-shop that has a map with charging station locations, the distances between charging stations and tourism hotspots, as well as information that shows the level of charging available at each station and how long it should take to charge.
Creating Itineraries Tailored to PEV Travelers

Travel Oregon is known for developing smart itineraries for every type of traveler—and then presenting these itineraries in creative ways that are easy to follow. Therefore, it’s natural to tap this expertise and apply it to PEV tourism, especially as Oregon further builds out its charging station infrastructure. In conjunction with the current and future installation of charging stations along the West Coast Electric Highway, Travel Oregon is working to create mini itineraries that allow PEV drivers to easily access charging stations and refuel for the trip.

Other ideas include creating mini itineraries centered on major sports events, such as Portland Trail Blazers games (there are charging stations in the stadium parking lot), Timbers Games, and University of Oregon and Oregon State University sporting events.

Developing the PEV Infrastructure Beyond the Highway

The project team identified an opportunity to develop awareness of the new PEV tourism strategy within the restaurant and lodging industry, and to encourage (and assist) those stakeholders to install charging stations to meet the needs of this new category of travelers.

For instance, hotels, casinos, shopping districts and museums are more likely to be interested in Level 2 charging, since travelers will spend more time in these locations. This is one area where the experience and knowledge base of workplaces that have already installed chargers could also help ease the processes of charger installation in the tourism arena. PEV tourism stakeholders will help facilitate coordination with the state’s major travel-industry trade group, the Oregon Restaurant and Lodging Association to encourage and promote PEV travel.

Creating More Buzz for PEV Tourism

The travel and leisure industry relies heavily on buzz, which can be built for PEV tourism through well-established marketing techniques, such as pitching stories to travel publications and including PEV travel in the Travel Oregon Visitors Guide. In addition, the project team agreed that it would be smart marketing to recruit an electrification conference to Portland, allowing the state to market Portland as “The EV-Ready City.” Conference organizers and participants in market familiarization (FAM) tours also could be given a free PEV rental, creating a cascading effect of word-of-mouth buzz.

KEY RECOMMENDATION: Continue to incorporate PEVs into sustainable tourism initiatives
SIGNAGE

A lack of clear and consistent signage has proven to be one of the biggest challenges to PEV and charging station deployment. Standardized signage would increase the public’s knowledge about and use of charging stations. For most charging stations, way-finding signs are a rarity or are limited to exits on major highways. Locations for charging stations are often based on cost, so they are placed near a transformer or electrical panel; however, this often means that charging stations are in locations that may not be intuitive for drivers to find. Signage, when it is available, is inconsistent and can send mixed messages by mixing “No Parking” signs and “Electric Vehicle Only” signs at the same location.

Standardization is needed for signage on PEV charging/parking spaces and way-finding markers. Similar to the national handicapped parking symbol, a nationally unified “Plug-in Vehicle Only” sign or logo would be a significant step forward. A simple sign that clearly and politely states that the parking spot is only for PEVs would significantly limit the visual clutter currently seen.

Way-finding around the city is another concern, as some PEV drivers have expressed having difficulty finding charging stations, particularly when driving in unfamiliar places. While many ICE vehicle drivers have come to rely on large gas-station logo signs, there are no such signs for charging stations. On April 1, 2011, the Federal Highway Administration updated the Manual on Uniform Traffic Control Devices to give interim approval for the “optional use of an alternative electric-vehicle charging general service symbol sign” on state highways. ODOT played an important role in getting this standard approved. This approval seeks to establish an interim national standard for charging station sites. This sign is currently being used on the Southern Oregon stretch of the West Coast Electric Highway—but it is only on the interstate. Ideally, such a sign would be standardized nationally (or at least regionally), with elements indicating DC quick charger and/or Level 1 and 2 charger availability. Also critical are additional signs to help drivers locate charging stations once off the interstate.

Having proper signage will not only help existing drivers of PEVs, it will also create visual evidence to the general public that charging stations are numerous. This would go a long way to assuaging range anxiety.

KEY RECOMMENDATION: Secure funding to design and install local way-finding and other signage as needed.
PRIORITY: POLICY

INTRODUCTION

Policies and inducements can help level the playing field and address externalities in the current market to facilitate fair competition. They also are vital to achieving the ambitious federal and state PEV deployment goals. There are limits to how far policies can and should go, however. Policies should be thoughtfully designed to help realize all of the various benefits of PEVs, and they must be targeted at the right places for the right amount of time. In order to create policies that meet all of these goals and parameters, there are multiple things to consider:

- What policies will encourage the right behaviors and avoid undesirable consequences?
- How do we acknowledge that some types of government support, particularly financial supports, should not be provided in perpetuity, but only until the market can stand on its own?

BARRIERS

- Lack of incentives (beyond just monetary) to make up for the incremental cost of a PEV
- Building codes: new residential construction is not required to be PEV-ready
- Homeowner association rules and Covenants, Conditions and Restrictions (CC&Rs) in multi-family housing can prohibit, or make it difficult and expensive, to install PEV charging stations
- Difficulty getting needed land use permits and right-of-way from local authorities for installation of public charging, especially in the city and especially with inconsistencies in how DC fast chargers are treated
- Perception that PEVs compete with other technologies, such as natural-gas vehicles
HIGH-PRIORITY POLICY RECOMMENDATIONS

The Policy Work Group focused on the following questions when deciding which policies and inducements were the most important at this time:

1. Does the policy lead to PEV sales?
2. Does the policy produce visibility of PEVs?
3. Does the policy enhance the ownership experience?
4. Does the policy help level the playing field?
5. Does the policy achieve high leverage for any dollars spent?
6. Does the policy support or is it consistent with existing goals and policy efforts, including environmental, energy and economic goals?
7. What is possible in the timeframe of this plan?
8. Is the policy politically feasible?
9. Does the policy appropriately consider consumers’ rights to privacy, choice and safety?
10. Does the policy have minimal impacts on non-PEV owners/drivers?
11. Does the policy produce economic development in Oregon?
12. Is the policy consistent with long-term viability of the transportation and utility systems?

After the evaluation process using the questions described above, the Policy Work Group made the following recommendations for policies that should be implemented as soon as possible. The recommendations are only briefly described below. There will need to be additional work to further define the concepts and programs that should be undertaken with appropriate stakeholders to implement these recommendations.

Financing Mechanisms

The issue of new financing mechanisms to address the higher upfront cost of PEVs and supporting infrastructure has been discussed in the Deployment section of this report so that discussion is not repeated here. The Policy Work Group clearly identified this as an issue that required attention. The group discussed both a financing program, such as the one discussed previously and modeled after Clean Energy Works Oregon, as well as a program modeled after energy-savings performance contracts in buildings, whereby an entity would cover the higher upfront cost, but recover its funding via the operational savings over the life of the vehicle.

Building Code Changes

Oregon is a national leader for the work it has done to streamline and simplify building code and permit issues around installing EVSE. This is possible, in part, because Oregon is one of only a handful of states with a “statewide” building code that prohibits local jurisdictions from adopting different codes than those approved by the State of Oregon Building Codes Division (BCD). Examples of the actions BCD has taken since 2008 to make it faster and cheaper to install PEV infrastructure and encourage PEV deployment include establishing a single permit for installing EVSE, creating a statewide alternative method (SAM) for calculating electrical service for facilities installing multiple charging stations, allowing residential charging stations to be
installed through BCD’s “Minor-Label,” and creating an Oregon Smart Guide on “Electric Vehicle Charging at Home”. That said, the Policy Work Group identified an additional code-related action that Oregon could take to even further encourage PEV deployment: Develop a pilot residential-code program to require PEV readiness in new construction.

**KEY RECOMMENDATION: Develop a pilot residential code program for PEV readiness in new construction**

**Government Actions**

There are a variety of other activities that governments at different levels (local, regional, state) could take to support PEVs. The Policy Work Group identified these actions as high priorities:

1. Ensure total cost of ownership is the basis for state vehicle-purchase decisions, and consider giving the State’s fleet manager greater flexibility to allow creative ways of incorporating PEVs into the State fleet
2. Institute a $1,500 state tax credit for PEVs
3. Retain Oregon’s existing PEV infrastructure credit
4. Allow high-occupancy vehicle (HOV) lane access by singly occupied PEVs
5. Adopt PEV friendly regulations for multi-family housing, such as what has been proposed or adopted in California and Hawaii

**KEY RECOMMENDATION: Maintain and pursue PEV incentives**

- Retain existing state infrastructure credit
- Institute $1,500 state tax credit for PEVs
- Allow HOV lane access by PEVs, even if only one occupant

**KEY RECOMMENDATION: Explore ways to ease installation of charging stations in multi-dwelling units**
Pilot Projects

The Policy Work Group recommended that the state develop partnerships and create designated funding for pilot projects that will further PEV technology developments, integration with existing infrastructure and promote local economic growth. Two specific examples of pilot projects the work group thought warranted further examination were:

1. Smart-charging pilot to develop and/or test the hardware, software and communication protocols needed to vary the charging of PEVs in response to grid conditions and consumer preference. A specific focus of the pilot should be to match renewable energy generation, in particular intermittent wind power, with the charging of PEVs by using a smart-charging system. It will likely be easiest to first run a smart-charging pilot within a commercial or public fleet and then expand it to include individual residential consumers.

2. Expansion and/or replication of the PEV fleet proposal being developed with Metro, the regional government of the Portland metropolitan area. The idea is to buy or lease a small suite of different kinds of PEVs that would be “loaned out” on a demo basis to different jurisdictions to try for a month or a quarter at a time. The use of the PEVs will be monitored for use and performance to see how well they work in each fleet. Fleet managers and PEV drivers will be surveyed and interviewed to provide additional insights into how to make PEVs successful in fleets.

KEY RECOMMENDATION: Ensure total cost of ownership is the basis for state vehicle purchases and explore giving state fleet manager budget flexibility to introduce PEVs into fleet

KEY RECOMMENDATION: Pursue innovative projects

- Smart charging and facilitating use of renewable energy in PEVs
- Rural/remote charging stations
- Next-generation charging technologies and systems
OTHER SIGNIFICANT POLICY INITIATIVES THAT COULD HELP DRIVE THE PEV MARKET

There are a number of related and significant policy efforts underway or in place that have implications for PEVs. These policy initiatives are not discussed in detail here, but they are presented as context for additional drivers/influencers on PEV market development. Some of these are still works-in-progress. In some cases these policy efforts have direct impacts on PEVs. In others, the impact may be tangential, but not necessarily insignificant. Each initiative is described very briefly with an emphasis on the connection between the initiative and PEV market development in Oregon. The specific initiatives are:

- Governor Kitzhaber’s 10-Year Energy Action Plan
- Road User Fee
- Zero-Emission Vehicle rules
- Oregon Clean Fuels Program
- Planning efforts

Oregon Governor Kitzhaber’s 10-Year Energy Action Plan

The Governor’s 10-Year Energy Action Plan is being compiled with input and advice from hundreds of community stakeholders and organizations. The plan names three main goals:

1. Maximizing energy efficiency and conservation measures to meet new electricity-load growth
2. Removing finance and regulatory barriers to enhancing clean energy infrastructure development
3. Accelerating the market transition to a more efficient, cleaner transportation system

The current draft of the plan clearly recognizes and elevates the importance of PEVs. To this point, the plan suggests the following action: “Target activities to accelerate the deployment of intelligent transportation systems and electric vehicles, including potential integration with grid modernization initiatives.” Work to implement the 10-Year Action Plan should be as consistent as possible with work to implement this PEV community-readiness plan.
Road User Fee

PEVs are in the unique position of using the roads but not paying a gas tax, which is a primary source of transportation funding in the state. Although the near-term effect of PEVs on Oregon’s road finance is negligible (and the current fiscal crisis is not due to the introduction of PEVs) in the new era of highly efficient internal combustion engines and hybrid technology, Oregon and other states must find a replacement funding source and develop new efforts. Efforts such as the amendment to the Fiscal Year 2013 Transportation Appropriations bill (H.R. 5972) that would prohibit the use of US Department of Transportation funds to research or implement vehicle miles traveled (VMT) approaches are unhelpful.

Oregon has been a leader in finding successful mechanisms to fund its transportation system. This history includes the first gas tax, as well as the first alternatives to replace the gas tax in the form of a VMT fee. There is broad consensus that transportation funding suffers from a long-term crisis. Gas tax revenues are down in inflation-adjusted terms, with little prospect of rising, and they will continue to fall as vehicles become more fuel-efficient. The shift away from ICE vehicles will accelerate the slide in revenues. Yet the need for maintaining and building transportation infrastructure continues.

The road user fee discussion in Oregon is an attempt to find a feasible and equitable way to continue to fund transportation. The Oregon Legislature passed HB 3946 over ten years ago, creating the Road User Fee Task Force. Tasked with suggesting alternative funding solutions, this group determined that the most feasible option was a fee based on VMT, which charges drivers based on in-state miles driven, not on fuel use. Thus, it should more evenly place the burden of funding Oregon’s road infrastructure on those who use it. There are several pilot studies as part of the process to determine the best way to track and charge drivers by VMT.

Initial efforts to force PEVs to “pay their fair share” have focused on PEV-only fees as a way to make up for lost gas tax revenue. Such fees will raise costs for PEVs. While a usage-based fee of some kind is probably necessary as part of a resolution to long-term infrastructure-funding challenges, the funding crisis demands a solution that equitably obtains money from all road users and does not single out PEVs.

This presents an opportunity for Oregon and other states considering a VMT approach. If done correctly, Oregon can both continue to advance its advantage in transportation electrification and move towards a sustainable funding model. To accomplish these twin goals, the Policy Work Group recommended these two points on this topic:

1. Pilot programs for road user fees should not be focused solely on PEVs
2. The usage rate should bring PEVs in alignment with their constitutional cost responsibility requirements, but should be phased in over time in order to avoid the situation in which PEVs pay a disproportionate tax compared to very efficient ICE vehicles or HEVs

**KEY RECOMMENDATION:** Optimize design of Road User Fee program

- Pilots should include but not be solely focused on PEVs
- Fees should be fair but not overly punitive to PEVs
Zero-Emission Vehicle Rules

Oregon is one of several states that have adopted the Zero Emission Vehicle (ZEV) rules developed by California. Under the Clean Air Act, California is the only state that is allowed to adopt vehicle-emission standards that are tighter than federal requirements. However, once California adopts such rules, other states may adopt the same rules if they do so identically. California first adopted the ZEV rules as part of its Low Emission Vehicle regulation in 1990. The objective of the ZEV rules is to make pollution-free vehicles available at a commercial scale as quickly as possible.

California’s ZEV rules require the largest automakers to earn increasing amounts of ZEV credits by providing the public with fuel cell vehicles, battery electric vehicles, PHEVs or advanced hybrids. The rules allow a great amount of flexibility, but in general, the farther a ZEV can travel without emitting pollution, the more ZEV credits it generates. California’s Air Resources Board recently went through the processes of updating the state’s ZEV rules. For more detail on specific requirements, see www.arb.ca.gov/msprog/zevprog/zevprog.htm.

The Oregon Department of Environmental Quality (DEQ) is likely to propose adoption of the latest ZEV rules together with updated GHG and “tailpipe” emission-reduction requirements developed by California. Due to the highly flexible structure of the ZEV rules, we cannot predict the number of PEVs that the program will bring to Oregon. It is clear, however, that the ZEV rules adopted by California and opt-in states such as Oregon are essential to developing the clean technologies needed to meet the state’s GHG reduction goals for 2050.

Oregon Clean Fuels Program

HB 2186, passed by the Oregon legislature in 2009, authorized the Environmental Quality Commission to adopt rules to help the state achieve GHG emissions-reduction goals. This bill enabled the creation of the Oregon Clean Fuels Program, originally known as the Low Carbon Fuel Standard. The current program proposal from DEQ consists of a phased approach in which the first few years are designed as a reporting and data-gathering phase. Oregon producers and importers will be required to report the volumes and lifecycle GHG emissions of the fuel they supply to Oregon. The next phase would require fuel producers and importers to reduce the carbon intensity of transportation fuels by 10 percent over 10 years. This phase will only be implemented if the current program sunset date of December 31, 2015 is lifted by the state legislature and subsequent rules to trigger its implementation are adopted by the Environmental Quality Commission. Oregon producers and importers can meet requirements in multiple ways, including by increasing the use of electricity as a transportation fuel.

The Clean Fuels Program clearly recognizes electricity as the low-carbon fuel that it is: The most recent research by DEQ states that, as transportation energy, average electricity from the Oregon grid has only roughly 42 percent the carbon intensity of gasoline. Furthermore, the value for electricity is just above half the value for natural gas burned in vehicles. Electricity’s advantage will grow as the regional electric grid gradually consists of less coal and more renewables in response to energy policy, market forces and the State’s Renewable Portfolio Standard. In addition, if policy and technology facilitate charging PEVs solely with renewables, the carbon intensity of electricity in PEVs could fall farther still. That said, future ICE vehicles are likely to become more efficient as well, which will make the difference between these vehicles and PEVs less dramatic and possibly undoing some of the gains from a cleaner future electricity mix.
**Municipal Planning Efforts**

There are several mandatory plans that municipalities in Oregon are required to revisit at regular intervals. These plans include comprehensive plans, transportation system plans and other land use planning. There are also emerging planning frameworks statewide and for metropolitan planning organizations (MPOs) for GHG emission reductions through coordinated land use and transportation planning. Plans such as these guide future urban development in Oregon, and they present a clear opportunity for PEVs to be considered as potential tools to achieve their various goals.

The Oregon Sustainable Transportation Initiative (OSTI) passed by the Oregon Legislature is one example of this. OSTI requires that all MPOs in the state conduct coordinated land use and transportation planning for GHG emissions reduction. The intent of OSTI is to help the state meet its GHG emissions-reduction goal. OSTI’s strategy is to look at the new backdrop of energy and transportation and how it interacts with land use to create healthier, livable communities.

Another example is the State’s Jobs and Transportation Act, which tasks Metro with developing scenarios for alternative land use and transportation to both accommodate population growth and reduce light-duty-vehicle GHG emissions. **PEVs are an important strategy to reduce transportation GHG emissions, so this work could provide a mechanism to promote PEVs.**

**OTHER POLICY IDEAS**

The previous sections only discussed some of the policy ideas that were considered as part of this project or have been implemented in other places. There are obviously many other policy ideas that could be pursued. Some examples are higher purchase incentives, other financing mechanisms, parking incentives, purchasing targets and utility incentives. There are several good resources online to explore other policy ideas. In particular, the US DOE-funded Database of State Incentives for Renewables and Efficiency (www.dsireusa.org) and the US DOE Alternative Fuels Data Center’s website on federal and state laws and incentives (www.afdc.energy.gov/laws) have extensive information on incentives and policies around the country.
PRIORITY: OUTREACH & COMMUNICATIONS

INTRODUCTION

Because PEVs are a consumer product as well as a means of transportation, understanding and influencing Oregonians’ perception of PEVs will be as critical as building infrastructure, technology and policy in the effort to exceed Oregon’s per capita share of the national goal of 1 million PEVs by 2015.

In order to address these challenges, the Outreach Work Group held several meetings to brainstorm what were the likely key audiences to be reached, key messages that would resonate with these audiences, and key mechanisms that would reach these audiences and get more people in PEVs. Eventually, the Energizing Oregon team engaged leading social marketing firm EnviroMedia to build on the group’s work and assess consumer attitudes, buying behaviors and associated values; and ultimately to build a comprehensive outreach and communications strategy to create the cultural shift necessary to drive broad adoption of PEVs.

Early in the planning process, the Energizing Oregon team also identified a need to begin on-the-ground outreach concurrent with the development of the more robust and ambitious marketing plan. Such outreach was necessary to build “buzz” during key early infrastructure build-out and product launches by several OEMs in Oregon in 2012, as well as to provide important field-testing of messaging and outreach approaches to inform Oregon’s long-term strategy.

The challenges in getting consumers to adopt PEVs in Oregon are clear: A product that requires behavior changes and incorporates unfamiliar technology seems inherently risky to early buyers. The process of refueling at a gas station is a highly ingrained behavioral pattern for drivers—perhaps more so in Oregon, where drivers do not even pump their own gas. While ambitious infrastructure plans are underway, public charging stations are not yet widely available. Finally, the prices of PEVs to date are well above those of ICE vehicles.
BARRIERS

- Lack of consumer demand
  > Uncertainty about the pace of improvements in battery technology
  > Concern about performance of vehicles (range, recharging time, etc.)
  > Perception that PEVs are a status symbol for well-off urban professionals
  > Lack of good information from rental car companies regarding how far PEVs can go, where they can recharge, how long it will take them to charge, etc.
- Lack of consumer knowledge
- Lack of consumer education programs, particularly on lifestyle and driving patterns
- Insufficient array of models to satisfy consumer desires

AUDIENCE ASSESSMENT

As a starting point to their work, EnviroMedia conducted an analysis of national and statewide studies in order to create an accurate understanding of Oregonians’ perceptions of PEVs, identify which audiences can most effectively amplify different messages, and better understand not just how, but why consumers may be willing to overcome barriers to PEV adoption. This work included a literature review and focus groups conducted with existing and prospective PEV owners. Key findings are summarized in the EV Landscape: Consumers (page 19).

Based upon this assessment, EnviroMedia concluded that while the barriers that prevent people from becoming Early Adopters of the new technology are varied, nearly all of them are rooted in one factor: “the unknown.” A successful marketing strategy must address the “unknowns” in order to make PEVs seem less risky and more accessible, directly mitigating concerns including:

- Cost of PEVs compared to similar ICE vehicles
- Cost of battery replacement
- Range anxiety
- Charging station anxiety (installation cost and charge time)
- Charging station availability
- Performance
- Safety
- Appearance

EnviroMedia’s research analysis also identified several core findings underlying the strategic communications roadmap for Energizing Oregon and its partners:

- Research strongly indicates that current hybrid electric vehicle owners are likely future buyers of PEVs.
- The core audience for this effort in Oregon is typically high-earning urban or suburban males, ages 35 to 60. They are also politically active and concerned about protecting the environment and reducing US dependence on foreign oil.
- Environment, US economy, energy security and the novelty of owning a PEV are the primary purchase motivators for Early Adopters. Family budget and job creation did not rank as high as expected.
- Providing even basic information on PEVs dramatically increases interest in PEVs among consumers, who then become more likely to purchase.
- Oregonians appreciate the State’s resolve to create a strong PEV infrastructure. This proves to consumers that PEVs are not a passing trend and the convenience of public charging makes owning a PEV a more viable option.
SUMMARY OF MARKETING & COMMUNICATIONS ROADMAP

Building on the audience assessment and input from key stakeholders, EnviroMedia prepared a comprehensive outreach and communications strategy to drive Oregon’s future work to influence consumer attitudes and buying behavior and to increase PEV penetration in Oregon. This plan is available on the Energizing Oregon resources website at evroadmap.us/content/energizing-oregon-plan.

The plan provides Oregon with:
1. An umbrella marketing and communications strategy to effectively engage consumers and accelerate adoption
2. A revised set of public education messages geared toward shifting consumer behavior in favor of PEV purchases
3. A set of recommended outreach tactics and educational tools that can be disseminated through a comprehensive public education campaign

In addition, the plan includes a more detailed analysis of the financial investments that will be necessary to undertake a public-education effort of this scale—and to do so in a manner that can ultimately move adoption closer to Oregon’s statewide goal in the next two years.

Key elements of the plan include:

1. **Expand the circle of early buyers through targeted advertising, media and peer-based education tactics** targeted at higher-income male audiences. This will rely on heavy peer-based social marketing engagement and a supporting media campaign that will target the next wave of adopters to join the club of PEV owners in Oregon.

2. **Educate likely buyers about accessibility by addressing key unknowns** (range anxiety, charging infrastructure, safety). This will rely on a comprehensive suite of media tactics to reach the target audience multiple times in multiple formats—with specific emphasis around urban/suburban media channels, online targeting, radio and mobile marketing.

3. **Connect with likely buyers through an experiential marketing campaign** that helps engage consumers with individualized, personal PEV experiences—both through ride-and-drives and an aggressive online engagement program that delivers culture-based messages and reflects this audience’s desire for freedom and independence.
OUTREACH PILOT PROGRAMMING: FIELD TESTING & WEBSITE

EV Roadmap Outreach Specialist

In order to field-test communications tactics and messages and to lay the groundwork for future, more comprehensive communications and outreach work, the project engaged a temporary outreach specialist. The specialist’s work focused on three key elements:

1. **Launch an online presence for the project**, including the creation and management of a website (www.evroadmap.us), Facebook page (www.facebook.com/evroadmap) and Twitter handle (@evroadmapus), as well as LinkedIn efforts from independent and affiliated professionals, including the outreach specialist. The goal of this effort was to educate, entertain, inform and inspire, aiming to enlighten the uneducated, yet energize and enthuse the EV faithful.

2. **Partner and network with various like-minded organizations and stakeholders** that are viewed as key to the EV Roadmap mission and/or tethered to the success of EV Roadmap in some capacity. Partners included Multnomah County Office of Sustainability, the Oregon Electric Vehicle Association, Nissan dealerships and Sunlight Solar of Oregon. For some partners, the outreach specialist provided event coordination and media exposure. For other partners, the outreach specialist wrote guest columns for their newspapers or participated in their meetings.

3. **Create new and piggyback onto existing events** throughout the state of Oregon during the busy summer months. This included everything from new events, joint events, neighborhood events and workplace events. These efforts exposed many Oregonians to PEVs, illustrated the benefits of PEVs and countered common myths.

CUB Educational Outreach Campaign

The outreach specialist’s work was coordinated with a parallel and complementary educational outreach campaign managed by the Policy Center of the non-profit Citizens’ Utility Board of Oregon (CUB). CUB’s mission is to represent Oregonians in energy and telecommunications matters related to the private utilities, public policy and state legislation. A full-time AmeriCorps member, whose position was funded independently by CUB and the national community-service program AmeriCorps, managed CUB’s outreach campaign, which launched in early 2012.

In line with CUB’s mission to serve as a trusted resource for all Oregonians, the CUB outreach campaign is aimed at the general public. CUB believes it is important to foster broad societal support for PEVs, as well as the resulting environmental and consumer benefits. This will support continued adoption as PEVs become more accessible to more Oregonians in the future.

The primary strategy of the campaign is hosting booths and displaying PEVs at large community events, including neighborhood fairs, community movie nights, driveway parties and festivals. Additionally, CUB partnered with other organizations to host engaging educational presentations.
Key outcomes of this effort to date include:

- Connecting with more than 600 Oregonians to promote PEV technology and its multiple benefits to consumers, while answering common questions and concerns
- Participating in 16 events across the Portland metropolitan region in a six-month timeframe
- Developing informational outreach materials, including a diagram of smart-charging technology and a brochure focused on the environmental benefits of PEVs
- Organizing a presentation and “EV Drive In” in partnership with Solar Oregon and the Oregon Museum of Science and Industry
- Establishing connections with community leaders and electric vehicle owners and advocates to further support outreach efforts

**Key Recommendations: Develop a strategic and compelling brand identity**

- Develop a campaign name and graphic identity
- Test campaign name
- Define brand use and co-branding guidelines

**Key Recommendations: Expand strategic partnerships and sponsorships**

- Collaborate with OEMs and dealerships to create vehicle access
- Create engagement partnerships with major employers
- Engage lifestyle partners

**Key Recommendations: Create experiential marketing opportunities**

- Create signature ride-and-drive events
- Continue and coordinate existing grassroots outreach
- Empower early adopters to share the PEV experience

**Key Recommendations: Develop support materials**

- Create digital collateral materials
- Evolve existing website to be a go-to source for trusted information
- Implement paid media campaign

**Key Recommendations: Garner earned media (conduct outreach to media that reach the target audience)**

**Key Recommendations: Maintain critical training programs, especially auto dealers and electricians**
INTRODUCTION

While the majority of the 41 utilities in the project area do not anticipate significant PEV adoption in their service territories over the next five years, many of Oregon’s utilities have questions regarding the potential impact of PEV charging stations on existing infrastructure. Alleviating that uncertainty will go a long way to ensuring that utilities are informed, prepared and enthusiastic about a growing number of PEVs in their service territories.

BARRIERS

- Inability to assess or project the number of PEV purchasers in utilities’ service territories
- Insufficient experience with public PEV charging to accurately project the demand and system impacts of public charging stations
- The high kW demand and relatively low total energy usage of DC fast charging stations is a point of concern for some utilities, particularly for charging stations in remote locations outside metropolitan areas
- Demand charges have been identified as a potential concern for owners and hosts of public charging stations
- Lack of sufficient grid infrastructure in some locations, especially remote locations, to support charging stations, particularly DC fast chargers

OREGON’S UTILITIES

Utilities in the project area vary in structure and preparedness for PEV deployment. Of the 41 utilities in the project area, three are investor-owned, and the rest are publicly owned and managed by independent boards. The Portland metropolitan area is served by two investor-owned utilities (IOUs), and the city of Eugene, Oregon’s second largest metropolitan area, is served by Oregon’s largest public utility. All public utilities in Oregon are wholesale customers of the Bonneville Power Administration (BPA). BPA is a federal power-marketing agency that markets the output of 31 federally owned dams and one federally managed nuclear plant in the Northwest.4
State of Preparedness & Awareness

The level of PEV adoption and associated state of preparedness and awareness about PEVs among utilities varies throughout the state. While the utilities serving the metropolitan areas have made efforts to plan for PEV deployment, many utilities outside the metropolitan areas do not anticipate widespread residential EV ownership in their service territories in the next five years and, therefore, have not developed any specific policies or programs surrounding residential PEV charging. For these utilities, the major emphasis is on preparation for the DC fast chargers located along highway corridors and along the Oregon coast.

Some utilities have reviewed their retail rate tariffs to assess how amenable they are to PEV charging stations. Given that some charging stations, particularly DC fast chargers, have high demand and low energy usage, some utilities have evaluated how their demand charges might affect charging costs.

For the IOUs, the Oregon Public Utilities Commission (OPUC) has provided two rulings to guide them in their support and service to PEVs and PEV infrastructure. In January 2012, orders 12-013 and 12-158 were published. The orders affirmed that PEV charging-service providers are not subject to OPUC regulation under Oregon statute. In addition, the orders established criteria required for an investor-owned utility to rate-base investments in PEV charging services and directed them to offer customers a time-of-use PEV rate if the customer desired. With an eye towards the day when EVs might become a tool for integrating wind and solar generation, the Commission, in Order 12-013, directed the investor owned utilities to analyze their need for flexible generating capacity in their biennial integrated resource plans. The Commission further directed the utilities to perform this analysis in a way that treats all sources of flexible capacity consistently.

All 41 utilities in the project area were surveyed in April 2012 to assess what the utilities knew and were doing about PEVs. The questions were focused on understanding the awareness of the utility about PEVs and understanding what issues they perceived might be associated with deployment of PEVs in their service territories. Thirty utilities responded to the survey, providing key data on utility awareness and preparedness.

There was a distinct difference in the responses between those utilities that service metropolitan areas and those outside of metropolitan areas. The utilities serving urban areas are both aware of PEVs and have customers that own and operate them. These utilities have a process for managing PEV inquiries and see PEVs as an opportunity to provide customer service.

The majority of utilities outside the metropolitan areas do not anticipate a significant presence of PEVs in their service territory in the next five to ten years. However, the utilities did identify potential concerns if and when the penetration of PEVs in the state increases. Specifically, these utilities had questions about the impact of multiple PEV charging stations on existing grid infrastructure.
Utility Information Needs

Based on the results of the survey, the following key areas of uncertainty were identified. The more utilities feel they are informed on the following issues, the better prepared they will be to support PEVs in their service territories.

- **PEV Adoption Information and Projections**: The majority of utilities in Oregon do not believe that they will see significant level of PEV adoption in their service territory within the next five years. However, they are interested in the information about current adoption rates, locations and demographics. They are also interested in technology advancements and the demographics of future buyers. This information will help them assess when PEVs will come to their service territory and what type of impact they may have. Information of this nature should be provided at least annually as utilities update and/or prepare their long-term forecasts.

- **DC Fast Charger Demand and Associated Impacts**: The timing and level of demand associated with DC fast chargers is a large question for many utilities. Many utilities have questions about when and for how long the chargers might be in use. Ultimately, the utility is most concerned about how one or more DC fast chargers in their service territory might impact their wholesale rates charges (see below), their existing infrastructure and power quality. Gathering and sharing information about existing DC fast chargers, their actual use and utility experience with the chargers is important for continued adoption.

- **Wholesale Demand Charges**: Thirty-eight of the 41 utilities in Oregon are publically owned and purchase wholesale power from BPA, whose customers are subject to a new demand charge that went into effect in October 2011. The demand charge is assessed on the utilities highest demand hour in a month. Oregon public utilities have questions about what the financial impact might be of a DC fast charger being in use during the utility’s highest demand hour of the month. BPA has conducted analysis and shared it with customers based on potential circumstances. Utilities are interested in continuing to receive information of this kind, updated with actual DC fast-charger information.

- **Existing Retail Rate Design**: DC fast- charging stations have high demand but low energy usage, meaning they draw energy at a high level, but they don’t draw energy for very long. Utilities have a choice in how they measure demand. Some measure demand based on a 15-minute average, while others use a 30-minute average. The level and design of the demand charge influences charging costs.

- **Future Infrastructure Impacts**: Although most utilities have standard ways of assessing and managing the need for new or reinforced system infrastructure, most utilities raised questions about how many charging stations it might take to require system upgrades. The system upgrades might be related to DC fast chargers or the addition of several Level 2 chargers in a geographic area. Shared experience from other utilities is likely the best information that can be provided to address this concern.
WORK GROUP ACTIVITIES

In an effort to address utility information needs, the work group conducted a four-part webinar series over a two-month period, with each webinar focused on a key topic identified in the utility survey.

Webinars

In an effort to provide accurate information regarding PEVs to Oregon utilities, a four-part webinar was conducted in June and July 2012. The webinars covered the following topics:

- PEV Overview (June 15) - Background information about PEVs, chargers and user demographics
- Usage Patterns (June 29) - Overview of usage patterns to date at DC fast chargers, as well as public and residential Level 2 chargers
- System Impacts (July 13) - Utility experience on power quality and distribution-system effects
- Rate Design (July 27) - Wholesale and retail rate-design issues

KEY RECOMMENDATION: Information Collecting and Sharing

- Conduct annual outreach to utilities through trade associations, conferences and other means to provide information about demographics, usage patterns, system impacts and rate-design issues.
- Continue to collect and analyze usage patterns at DC fast chargers and Level 2 public and residential charging stations.
- Continue analysis of infrastructure impacts.

KEY RECOMMENDATION: Notification/Assessment of PEVs

- Pursue modification to DMV registration guidelines that allows for better DMV data on existing and new purchase PEVs in the state.
- Pursue a notification process to utilities regarding the installation of new commercial or residential charging units.

KEY RECOMMENDATION: Infrastructure Support

- Seek public investment in rural/remote charging stations, such as to cover the costs to get power to a critical location for a charging station where there is not currently sufficient grid infrastructure.
- Secure funding for a demo project for development of different charging technologies that do not require three-phase power.

KEY RECOMMENDATION: Policy Issues

- Track the Road User Fee Task Force process and any associated legislative proposals that may require utility metering or collection of taxes.
The Governor’s Office and TEEC have reviewed and approved this report. In their review of the report, they recognized that some elements of this report will require additional funding either from state, federal or outside sources in order to be implemented. However, other elements of the report can—and should—be implemented using existing agency or organizational resources.

The Steering Committee and key project partners are currently in the process of finalizing a Declaration of Cooperation, a signed commitment document that captures the implementation actions partners will undertake. The table below shows which actions can be completed in the near future with existing resources and those that require additional funding.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>Ready for Implementation</th>
<th>Funding Needed for Implementation</th>
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| Deployment      | • Develop financing mechanisms for fleets  
• Continue the process of incorporating PEVs into sustainable tourism | • Develop and implement a workplace charging program  
• Implement financing mechanisms for fleets  
• Install way-finding signage                                                             |
| Policy          | • Pursue building code changes to facilitate installation of charging stations  
• Maintain and pursue PEV incentives  
• Optimize design of Road User Fee program                                                  | • Explore ways to ease installation of charging stations in multi-dwelling units  
• Ensure total cost of ownership is basis for state vehicle purchases  
• Pursue innovative projects                                                               |
| Outreach and Education | • Maintain website  
• Continue grassroots outreach                                                              | • Implement comprehensive outreach plan  
• Maintain critical training programs with auto dealers and electricians                    |
| Utilities       | • Continue utility education and collaboration                                             | • Develop an improved process for notification/assessment of PEVs in the state                    |
In addition to the identification of actions to ready to be implemented now, the TEEC has also identified the following organizational elements that should occur in order to support implementation. Steps are underway to put these elements into place.

1. **Statewide Coordinating Committee** – assures that key participants and partners involved in PEV deployment in Oregon coordinate on key issues on a regular basis.

2. **State Agency Coordination** – assures that the several state agencies with key roles in PEV deployment meet routinely to find synergies and alignment in their efforts.

3. **Pursuit of Additional Funding** – assures that specific entities are watching for funding opportunities and are ready to assist in the development of proposals.

4. **Implementation of Actions** – identifies entities responsible for implementation of activities that can be done without additional funding.
CONCLUSION

Rapid adoption of PEVs will strengthen the local and national economy while moving us closer to a zero-emission and oil-free transportation future. This Energizing Oregon plan is a critical step along the path toward transformation of the transportation system in Oregon and beyond – but it is only the beginning. As we implement these priorities and actions, Oregon has the opportunity to continue a history of pioneering innovation and to lead the way in PEV deployment. With sustained leadership, decisive action and continued investment, we are ready for the challenge and excited about the opportunities ahead.
CREDITS & SOURCES


OTREC. (2012). Fleet Manager Interviews. Portland, OR: OTREC.


Footnote Sources


3: Oregon DMV Data, September 2012. (same date as map)
WEB RESOURCES

The following supporting materials are available for download on the Energizing Oregon webpage at evroadmap.us/content/energizing-oregon-plan.

Outreach and Communications Plan

Summary Memo of EVSE Company Interviews

Summary Memo of OEM Company Interviews

Training and Implementation Project Summaries

NECA Training Modules

Utility Webinars
ACKNOWLEDGEMENTS

Many partners contributed to the creation of this report, including:

**TEEC / Steering Committee**
- Bonneville Power Administration
- Columbia Willamette Clean Cities Coalition
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- Eaton
- ECOtality
- Enterprise
- Ford
- Freightliner Custom Chassis
- General Electric
- General Motors
- Getaround
- Go EV
- Good Company
- Green Light Motors
- Heathman Hotel
- IBM
- InSpec Group
- Jackson County
- Kanematsu
- League of Oregon Cities
- Mast Collaborative
- Mitsubishi
- Mitsubishi Heavy Industries
- NECA/IBEW Local 48
- Nichicon
- Nissan
- Oregon Department of Energy
- O’Neill Electric
- OpConnect
- Oregon Auto Dealers Association
- Oregon Building Codes Division
- Oregon Department of Environmental Quality
- Oregon Travel Information Council
- Oregon Transportation Research and Education Consortium
- PacifiCorp
- Portland Community College
- Portland General Electric
- Portland State University
- Rogue Valley Clean Cities Coalition
- SPX
- Sharepower Technologies
- Smith Electric Vehicles
- Toyota
- Travel Oregon
- Travel Portland

**Outreach Work Group**
- Citizens’ Utility Board
- Climate Solutions
- Columbia Willamette Clean Cities Coalition
- Drive Oregon
- Ford
- General Motors
- Mast Collaborative
- Metro
- Multnomah County
- Northwest Energy Coalition
- Oregon Department of Energy
- Oregon Department of Transportation
- Oregon Solutions
- Oregon Transportation Research and Education Consortium
- Portland General Electric
- Portland State University
- Rogue Valley Clean Cities Coalition

**Policy Work Group**
- Citizens’ Utility Board
- Climate Solutions
- Columbia Willamette Clean Cities Coalition
- Coulomb Technologies
- Drive Oregon
- Ford
- General Motors
- Getaround
- Good Company
- Mast Collaborative
- Metro

**Deployment Work Group**
- AEA Oregon
- AeroVironment
- Association of Oregon Counties
- Azure Dynamics
- Citizens’ Utility Board
- City of Eugene
- City of Portland
- City of Springfield
- City of The Dalles
- City of Vancouver
- Clark County
- Clapper Creek
- Columbia Gorge Community College
- Columbia Willamette Clean Cities Coalition
- Coulomb Technologies
- DoubleTree Hotel
- Drive Oregon
- Eaton
- ECOtality
- Enterprise
- Ford

**Utility Work Group**
- Bonneville Power Administration
- Citizens’ Utility Board
- City of Eugene
- City of Portland
- Clapper Creek
- Clark PUD
- Columbia Willamette Clean Cities Coalition
- ECOtality
- Eugene Water and Electric Board
- Ford
- Northern Wasco Public Utility District
- Oregon Auto Dealers Association
- Oregon Building Codes Division
- Oregon Department of Energy
- Oregon Municipal Electric Utilities Association
- Oregon Museum of Science and Industry (OMSI)
- Oregon Public Utilities Commission
- Oregon Solutions
- PacifiCorp
- Plug In America
- Portland General Electric
- Salem Electric
- Springfield Utility Board