

Electric Vehicle Charging Stations

Lessons learned from municipalities in Washington and Oregon

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Introduction

Municipalities throughout Canada and particularly in British Columbia are seeing opportunities for electric vehicles (EVs) to contribute to community transportation objectives. Ready access to public EV charging stations is viewed as key for motivating drivers to purchase EVs. Thus many municipalities are considering installing EV charging stations on their own land and working with businesses in their communities. To help such municipalities, Pembina has compiled experiences from local government staff who have already started down this road. Interviews with staff from five municipalities in Washington and Oregon provide insights into the factors for success in planning and installing EV charging stations and the challenges that remain.

The Pembina Institute wishes to thank the municipalities and their representatives for providing this information and consenting to be interviewed.

Background: The EV Project

Most of the communities interviewed in Washington and Oregon were part of a U.S. government funded program called The EV Project. In 2009, the U.S. federal Department of Energy awarded a grant of \$99 million to set up The EV Project — a national project dedicated to increasing the numbers of electric vehicles and electric vehicle charging stations.¹ ECOtality, a private company, was selected as the project manager to deploy and install charging stations in 21 major cities and metropolitan areas across nine states in the United States. The EV Project now has additional partners and a total value of \$230 million. The project continues to collect data from EV drivers who use these charging stations, providing information about the number of miles driven, how well the charging stations are being utilized, and the amount of energy used per charge.

High level findings from case studies

| City of Bellevue | | |
|--|------------|---------------------------------------|
| State | Population | Charging stations installed (Level 2) |
| Washington | 122,263 | 22 |
| <p>A key enabler for Bellevue's EV initiative was the passing of Washington House Bill 1481 (2009) which required actions by local governments to encourage and facilitate the establishment and promotion of electrified transportation by local governments.</p> | | |

| City of Lake Oswego | | |
|---|------------|---------------------------------------|
| State | Population | Charging stations installed (Level 2) |
| Oregon | 37,527 | 2 |
| <p>The city's sustainability advisory committee has been a local champion of sustainable transportation, helping promote EVs in the community. City planners recognize the importance of clear and uniform signage for EV charging stations to minimize confusion for vehicle owners.</p> | | |

| City of Salem | | |
|--|------------|---------------------------------------|
| State | Population | Charging stations installed (Level 2) |
| Oregon | 154,637 | 16 |
| <p>Salem developed an energy strategy as part of a federal grant program aiming to reduce energy consumption and create jobs.² EV charging station infrastructure was specifically identified as an action that could help the city meet its goal of creating and supporting a viable and diverse transportation network, enabling Salem to quickly move forward with installations when The EV Project funding became available.</p> | | |

| City of Seattle | | |
|--|------------|---------------------------------------|
| State | Population | Charging stations installed (Level 2) |
| Washington | 608,660 | 20 |
| <p>Seattle is encouraging EV adoption through developing consumer information, streamlining the permitting process for charging stations, and actively collaborating with The EV Project partners, in particular ECOtality and Nissan. Seattle City Council passed legislation to establish a \$2-per-session fee for public use of EV charging stations to cover operational, maintenance and electricity costs. Seattle is the only city in the sample that has a fee for EV charging.</p> | | |

| City of Hillsboro | | |
|--|------------|---|
| State | Population | Charging stations installed (Level 2) |
| Oregon | 92,970 | 34, plus 1 Level 3 quick charger located at City Hall |
| <p>Hillsboro was a leader on EVs prior to the federal funding program. Due to strong leadership from city council, the transportation committee, and the facilities and fleet departments, the city installed 9 publicly-available charging stations before The EV Project funding became available and has installed additional stations with The EV Project funding. EVs are recognized as part of the city's long-term sustainability goals, including its plans to move toward a 100 per cent non-fossil-fuel fleet by 2030. Intel, the city's largest employer, is committed to sustainability and, as of March 2010, had two of its own electric vehicle charging stations. A spokesperson for Intel believes that by installing so many stations, Hillsboro is "sending a strong message to businesses and the larger community about the area's commitment to sustainability".³</p> | | |

The interviews were conducted between July and August 2012.

Factors for success

As identified through the interviews, the following factors have helped support success in installing EV charging stations:

- including EVs in local government sustainability and transportation plans and projects
- internal collaboration
- municipal levers — expediting installation permitting and code changes
- federal and state government support
- working with other public sector entities in a regional approach
- information sharing and public outreach through multiple sources

Including EVs in sustainability and transportation plans and projects

Several interviewees noted the benefits of explicitly including EVs in their own sustainability and/or transportation plans. In Lake Oswego's sustainability plan, the city aims to improve the fuel efficiency of the public fleet as well as increase the number

of alternative and clean vehicles such as EVs. As part of Salem's energy strategy, the city included EV charging station infrastructure as a strategy to strengthen transportation options for the community.

Hillsboro has integrated its EV infrastructure with other forms of transportation in its new intermodal transit facility that includes 13 EV charging stations. Located next to a hospital and community college, the facility supports multiple commute modes in a central location.⁴

Internal collaboration

Seattle and Hillsboro found that certain departments within its city played an important partnership role to encourage uptake of EVs. In Seattle, the Office of Sustainability and Environment acts as a coordinator for initiatives spanning several City departments including Planning and Development, Transportation, Seattle City Light, the fleet division of the Department of Finance and Administrative Services, the

Seattle Public Library and the Seattle Center.

Hillsboro created an internal working group with representatives from different departments to provide valuable perspectives on charging station siting. For example, the internal working group provided guidance on parking restrictions and risks at facilities, giving a better idea of where charging stations could be sited based on technical and bylaw suitability.



Two Level 2 wall-mounted charging stations at a city-owned public parking lot in Lake Oswego. Source: City of Lake Oswego, 2012.

Municipal levers — Expediting charging station permitting and code changes

Municipalities were able to support success through changes to their own operation and municipal codes. Salem, Bellevue, and Seattle have streamlined EV permitting through their building permit system, enabling residents to easily obtain permits for residential charging station installation. In all three cities, applying for an electrical permit to install EV charging is no different than applying for an electrical permit to install wiring for a clothes dryer or stove.

Seattle noted the importance of a streamlined permitting procedure in order to support the business case for charging station vendors considering installations in

the city. Interviewees felt this goal had been achieved.

“We have been able to coordinate well internally, and have tried not to make installation of EV charging stations so different and special that it becomes a big issue at the time of permitting.”

— Sandra Pinto de Bader, City of Seattle

Additionally, Seattle’s Department of Planning and Development has made modifications to its municipal electrical code to require that new construction for residential occupancies accommodate future EV charging.⁵

Support from federal and state governments

The EV Project was seen as the major impetus for EV charging station installation. The EV Project enabled many of these communities to install their charging stations by having a third party (ECOTality) take on the responsibility of financing, purchasing, and contracting for the installation of the chargers. For example, the total value of Salem's first 14 public charging stations is estimated at \$75,000, but because of the cost share provided by the EV Project and with a donation of \$3,000 from Salem Electric to support EV charging stations being installed in its service area, the City’s total cost share was only \$2,500.

State government support came in the form of legislative direction and information sharing; the state also installed stations on its own land. In Washington State, House Bill 1481 (2009-2010) was designed to support EV uptake, with a stated purpose to “encourage the transition to electric vehicle use and to expedite the establishment of a convenient and cost-effective electric vehicle infrastructure that such a transition necessitates.”⁶ This bill was cited by

interviewees from Bellevue and Seattle as important to their action on electric vehicles.

“The fact that the federal government was investing in the vehicle technology, and the state was pushing us to build the infrastructure for them, both helped lend enough support and credibility to help us move people past the fear of the unknown and to a willingness to try something new.”

— Sheida Sahandy, Sustainability Strategist,
City of Bellevue

The Oregon Department of Transportation Office of Innovative Partnerships was a convener, gatherer and disseminator of information, and led the effort to standardize EV signage across the state. The department has also played a role in the provision of charging stations along state and interstate highways.

Working with other public sector entities – a regional approach

The Cities of Seattle and Bellevue took a regional collaborative approach to their EV initiative. Both cities worked together to share knowledge, and they collaborated with the Washington Department of Transportation, the Puget Sound Clean Air Agency, and King County to develop more comprehensive information around EV planning and charging station siting and installation. Over the two years of The EV Project, Seattle and Bellevue held four EV conferences where multiple stakeholders came together to share current EV activities, discuss what each community was learning from their respective EV planning processes, and learn how to address challenges. Invited stakeholders included utility providers, charging station manufacturers, and local governments. As a result of this region-wide interest in EVs, the governor of Washington State appointed an EV task force.⁷

“[We asked] the Puget Sound Regional Council, our metropolitan planning organization, to do a study, for which a number of jurisdictions provided small amounts of funding. This study helped us get some real data to figure out where we could site charging spots and who would be most likely to use them.”

— Sheida Sahandy, Sustainability Strategist,
City of Bellevue



City of Hillsboro inter-modal transit facility.
Source: City of Hillsboro, 2012.

Information sharing and public education

Each municipality employed a different approach for information sharing and public education around EVs. The City of Seattle has a communications strategy to ensure its residents understand the implications of owning an EV. The City has produced Client Assistance Memos for residential and commercial property owners that explains the requirements for installing EV charging stations.^{8,9} The City is also distributing an information guide that outlines a number of facts and myths about owning an EV.¹⁰

Bellevue has produced a number of EV resource documents to inform current and prospective EV owners about charging, charging station types and how to obtain permits.¹¹ Nissan has hosted public events in Bellevue by doing roadshows with vehicles

and providing general information about the technology. Bellevue staff have been supportive of such outreach efforts from private sector and have also provided public education materials and city-specific information about EVs, such as charging station location.

Lake Oswego has been making the business case to business owners for why they should consider a charging unit in front of their business or in their parking garage. The main suggested benefits include attracting customers in the short term, and being prepared for the demand as the longer-term market for EV owners expands. The city has also sought local press coverage of new station installations and EV purchases in the Portland area to raise the profile of private sector participation. To further promote EVs within the community, the city's Sustainability Advisory Board hosted an EV Expo in 2010 and 2011, with local manufacturers and representatives of EV charging equipment and the local EV club, and featuring several kinds of electric vehicles.

Hillsboro city staff have played a strong role in education and outreach on electric vehicles. They have developed resources and actively engaged the business community on opportunities regarding EVs and EV infrastructure.

Challenges

The interviewees were asked to identify challenges associated with their roles in deploying charging station infrastructure. The challenges identified through the interviews are:

- parking
- need to build EV charging station network at appropriate pace
- limited private sector collaboration

Parking

Dedicated parking for EV charging appeared to be a challenge across the communities. Installing charging stations may conflict with current development codes. Lake Oswego was not permitted to install chargers at one of its locations because this would have reduced the number of general parking spaces available to below the amount required. Bellevue is considering a number of approaches to deal with parking conflicts between non-EV and EV owners. Signage and permitting is one approach. Others include designated spots for EV parking only, EV parking only while charging, allowing only EVs in charging spots before 8 a.m., or allowing non-EV parking in charging spots only if the rest of the lot is full. Most of Bellevue's chargers are in parking lots and to date, when there has been conflict, placing a polite note that requests that people leave those spots for those who need to charge has worked effectively. Salem experienced some conflict where non-EV drivers who received tickets for parking in EV only spaces complained that EV charging spaces were vacant and never used.



EV signage in Lake Oswego
Source: City of Lake Oswego, 2012

Limited private sector collaboration

While some municipalities have been working with local businesses to encourage the private sector to install charging stations, interviewees did not identify any major collaborations with the private sector. In general, municipalities have played an important role in education on EVs and as liaison between businesses with potential interest in charging station installations and the businesses that supply equipment and services. Local governments also hire businesses to provide equipment and services for their own charging stations. However, none of the interviewees provided examples of collaboration between local governments and businesses when planning for charging station locations. The lack of collaboration was not considered an obstacle to local governments and EV charging stations, but could be a lost opportunity.

Cities such as Seattle and Hillsboro believe that private sector involvement in EVs will be indispensable for the future, and that local governments may not be the best stakeholder to be actively pushing EVs forward. Local governments can act as facilitators of information sharing and outreach, but the private sector will need to play a more active role in innovation of charging station deployment. For example, in Hillsboro, Intel installed EV chargers before the city began installing them, and the Fred Meyer supermarket chain has set up a corporate agreement directly with ECOTality to deploy charging stations.

Moving forward, Hillsboro sees an opportunity to work with developers to encourage the integration of greater electrical capacity in new building construction. The City intends to have a conversation with developers to outline the benefits and costs of including extra electrical capacity for EV charging. These

considerations can be applied to both residential and retail development.

Additional lessons and advice from interviewees

With EV charging stations now in place, the local governments interviewed for this research are thinking about the future of their fleets, and how EVs will continue to develop as a transportation alternative for their citizens. Below are some thoughts from the interviewees:

1) Frame EVs as a demonstration project that will help inform future decisions

As governments have fiscal constraints, framing EV initiatives as demonstration projects can allow the public to understand that data is being collected and analyzed. Questions on EVs and charging infrastructure still exist but these demonstrations will help inform future decisions. If the results are positive, then the public may be more inclined to allocate public resources to it. In addition, the demonstrations will inform private companies on reliability of charging stations and help when determining risks and benefits of investing themselves.

“Framing deployment of EV infrastructure as a demonstration project is extremely helpful because people know that there will be data to help support it. EVs are such a new idea, and because public institutions are under such a financial strain right now, it is important to understand the financial implications of providing EV infrastructure over the long term. A demonstration project can make this possible.”

— Judith Johnduff, City of Salem

The City of Bellevue faced some initial skepticism around EVs when they were introduced to the community. Some citizens

felt that the range of an EV would be inadequate for their daily needs. Other local governments are pointing to their public charging stations as a way to alleviate concerns around range anxiety. Indeed, the purpose of the public charging stations is to provide a "top off" charge to help EV owners reach their destination, if a charge is needed. The Sustainability Strategist in Bellevue noted that it usually takes two weeks for new EV owners to overcome range anxiety as they drive around and become acquainted with the vehicle.

Information being compiled and shared by The EV project is helping to address some range anxiety concerns. Preliminary data from The EV Project in King County indicates that the average commute is 22 miles per day, with the national average at 27 miles.¹² This is well within the range of EVs on the market today. Data from The also confirm that the majority of EV charging occurs at home; between April and June 2012, 89 per cent of charging occurred through residential Level 2 charging.^{13,14}

2) Maintain a dialogue with EV owners

Bellevue, Salem, and Hillsboro all discussed the importance of ongoing communication with EV users to learn about their experiences and to better understand how the technology is working. Communicating and engaging with EV users not only builds

understanding of the technology, but can enable local governments to manage the system more effectively, including potential pricing rates for charging, and where to locate additional stations. Bellevue is using quantitative data to understand how well its chargers are working, but is also speaking directly with EV users to gather more information.

"The other thing I would say we could have done more, and actually have done since we installed the first ones, is really communicating with users which is important because this is so new. The people who are actually using them — and by necessity have experience — have important things to communicate [back] to those who are installing [new stations]."

— Peter Brandom, City of Hillsboro

Conclusion

These local governments from the Pacific Northwest provide initial insights into how EVs are working in practice. Amid the uncertainty and scepticism associated with this transportation alternative, they are pushing ahead with EV infrastructure to understand how much promise they hold for local sustainability goals, and as an alternate transportation option for the present, and future.

¹ For an overview and details on The EV Project, see <http://www.theevproject.com/>

² For information on the Energy Efficiency and Conservation Block Grant Program, see <http://www1.eere.energy.gov/wip/eecbg.html>

³ Casey Parks, "Hillsboro hopes its electric charging stations entice alternative-energy industry," *The Oregonian*, March 19, 2010. http://www.oregonlive.com/hillsboro/index.ssf/2010/03/hillsboro_hopes_its_electric_charging_stations_entice_new_industry.html

⁴ As another example of multi-modal integration, Portland State University's "Electric Avenue" provides 5 charging stations next to a transit hub. Justin Gerdes, "10 EV Charging Lessons Learned From Portland's Electric Avenue," *Forbes*, March 27, 2012. <http://www.forbes.com/sites/justingerdes/2012/03/27/10-ev-charging-lessons-learned-from-portlands-electric-avenue/>

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