CENTER FOR CLIMATE AND ENERGY SOLUTIONS

BREAKOUT GROUPS - CHARGING INFRASTRUCTURE GAPS

New Approaches to Financing the Publicly Available Electric Vehicle Charging Network

Following the plenary session, workshop participants will join one of three breakout groups. Each group will have the opportunity to explore three types of electric vehicle (EV) charging infrastructure gaps, focusing on a specific illustrative example drawn from the report, *Assessing the Electric Vehicle Charging Network in Washington State*. The three gaps to be explored in the breakout groups are presented below.

Background

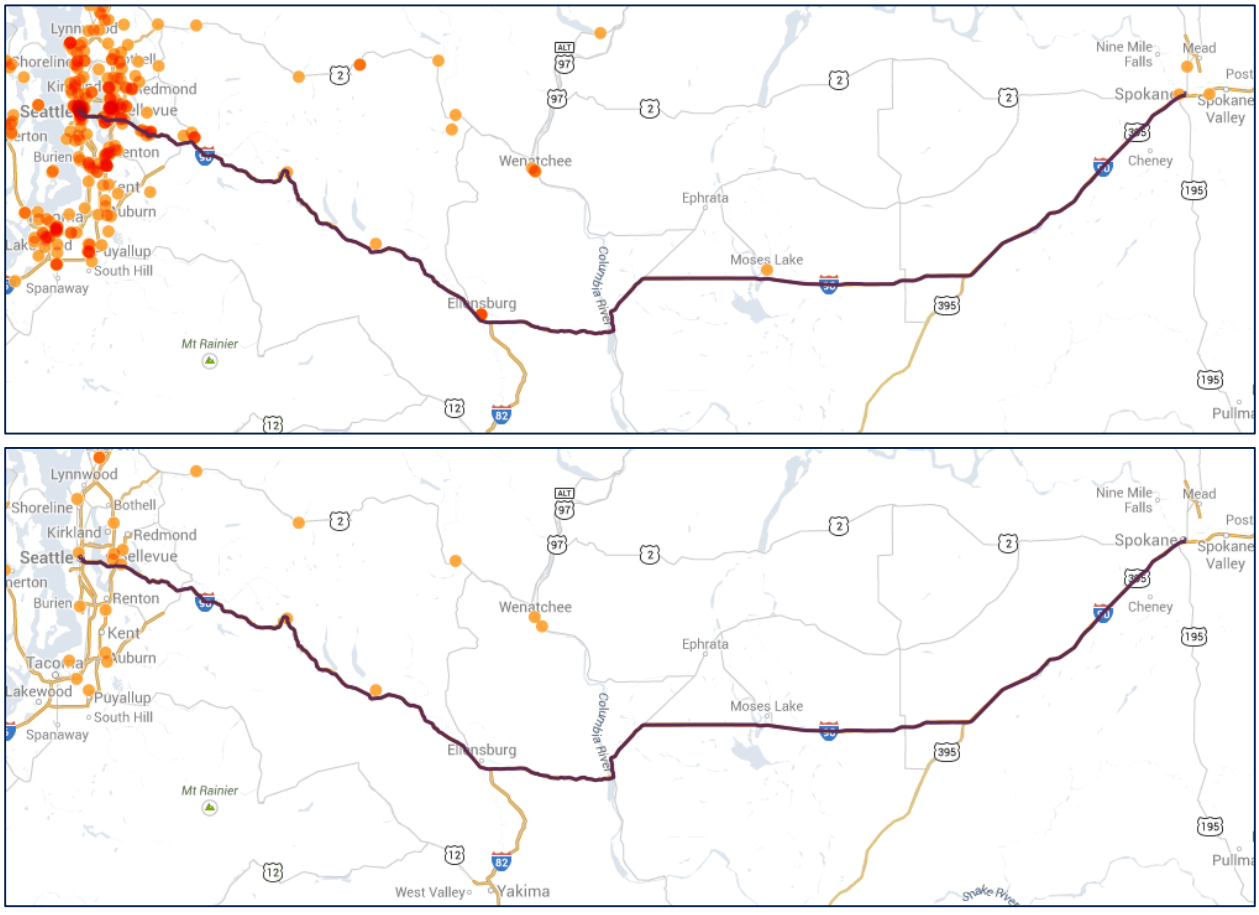
The direct current (DC) fast charging network in Washington provides access to charging along much of the Interstate 5 corridor and in King County, but DC fast charging is unavailable in much of the state. The alternating current (AC) Level 2 charging network in Washington provides access in King County, but does not provide access in much of the rest of the state outside of Vancouver. Seventy-four percent of populated ZIP codes in the state, covering 44 percent of the population, have no Level 2 charging stations. As a result, many possible destinations may be inaccessible to battery electric vehicle (BEV) drivers.

Based on travel simulations completed in *Assessing the Electric Vehicle Charging Network in Washington State*, EVs with longer electric-only ranges are more likely to complete trips with the current charging infrastructure. Any BEV on the market today can travel from Seattle to Portland, Oregon along Interstate 5 because of the relatively high density of charging stations. However, additional charging infrastructure is needed to facilitate travel to the Pacific Coast and between the eastern and western part of the state along Interstate 90.

Breakout 1: Interregional Charging Gaps (East-West Travel along Interstate 90)

Most BEV drivers cannot complete the trip from Seattle to Spokane along Interstate 90. *Assessing the EV Charging Network in Washington State* concluded that only a BEV with 200 miles of range could complete a trip from Seattle to Spokane along Interstate 90, charging at Level 2 stations in Ellensburg and Moses Lake locations. Currently, only Tesla Motors offers a BEV with a range of 200 miles or more.

The figure below illustrates the lack of charging along this important corridor. Residents at either end and along the corridor would benefit from additional charging along access points to Interstate 90. In addition, this charging could spur interest in EVs and result in additional vehicle sales. Any approach to addressing this gap should consider current, widely-available BEV technology, which only allows a vehicle to travel less than 100 miles on a single charge.



Seattle-Spokane travel corridor. The dots in the figure on the top shows existing AC Level 2 charging locations while the figure on the bottom shows existing DC fast charging locations. In both maps, greater density of coverage is shown with darker colored dots.

The Challenge

The business case for providing EV charging along corridors is challenging because stations may not be used enough to cover the cost of installing and operating them. High-powered, DC fast charging is the preferred charging method in this case because it is unlikely that drivers will want to spend extended periods at charging locations between their trip origin and destination. A single DC fast charging station, for instance, may cost over $170,000 to own and operate over its lifetime and is unlikely to be profitable through a pay-per-use business model alone. Project developers will likely have to secure additional sources of revenue or funding to achieve a sustainable business model.

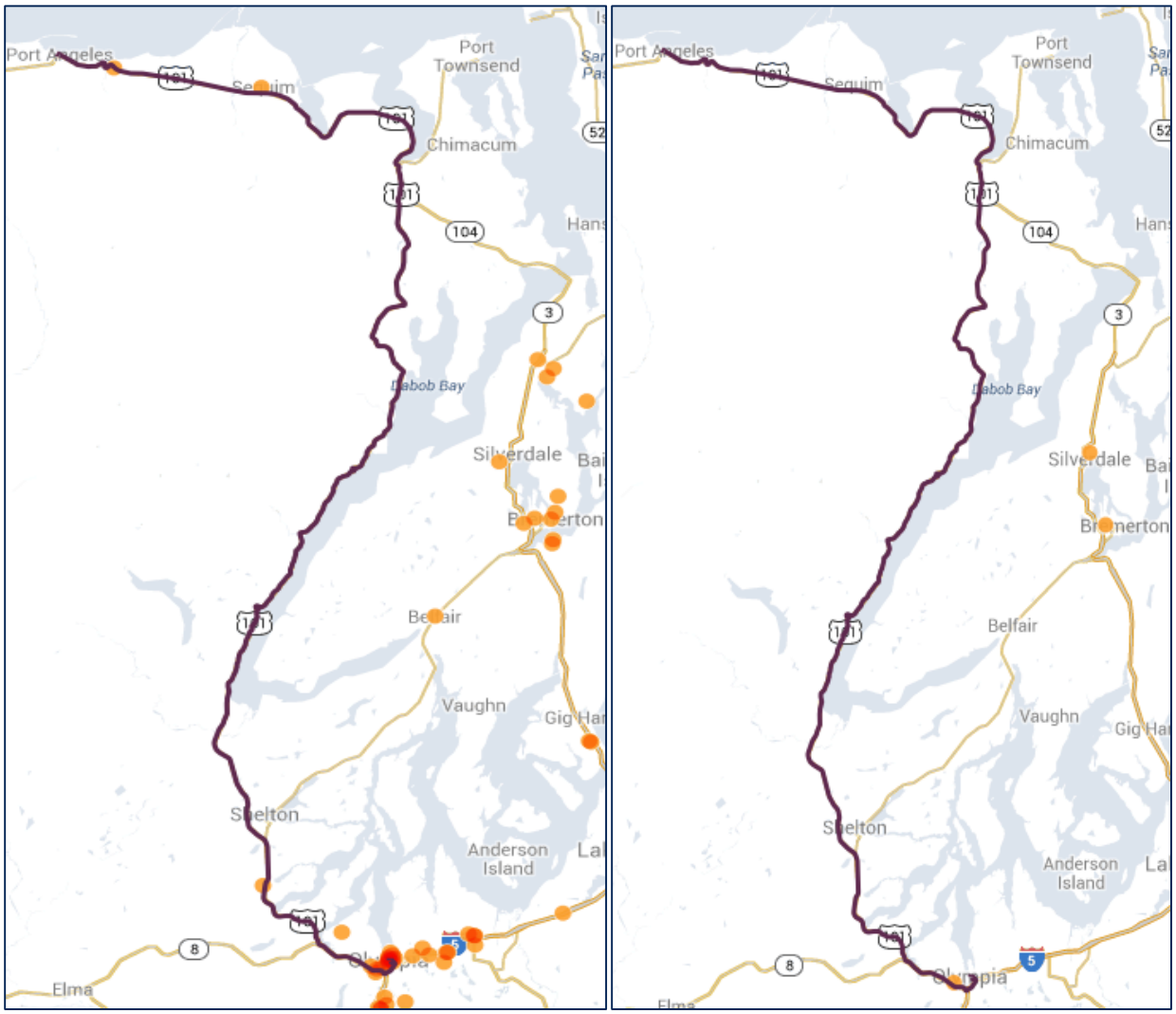
Discussion Questions

1. Please refer to financial model from the plenary session (see Appendix B of the Plenary Session Materials document). What are the most important financial assumptions and key barriers to addressing this charging gap?

2. Using the Solutions Toolbox as a guide, discuss possible solutions or combinations of solutions that could address this infrastructure gap in a financially sustainable way. Is the solution actionable today? Can it be replicated in multiple locations?

Breakout Group 2: Destination Charging Gaps (Travel to the Pacific Coast)

Assessing the EV Charging Network in Washington State also identified a sizable gap in charging locations exists from population centers around Puget Sound to a common Pacific Coast destination. Although the simulation completed for the paper was specifically from Olympia to Port Angeles, a lack of charging along most routes to the Pacific Coast (e.g., Aberdeen) makes it difficult for many EV drivers to access this part of the state (see figures below). Additional charging along key routes and at local destinations would benefit EV drivers wanting to visit the Pacific Coast and local businesses, offering an economic development opportunity through "EV tourism."



Puget Sound to Port Angeles corridor. The dots in the figure on the left shows existing AC Level 2 charging locations while the figure on the right shows existing DC fast charging locations. In both maps, greater density of coverage is shown with darker colored dots.

The Challenge

Charging locations are needed along key routes to and at popular destinations in order to enable BEVs to travel to these regions and to enable PHEVs to travel more electric miles. The business case for providing EV charging to enable travel to popular destinations is challenging because the value of this charging infrastructure is uncertain to local businesses and other stakeholders. For example, businesses that support the tourism industry may value charging locations more than businesses that cater to local populations. Establishing the overall benefit to the local economy of EV charging infrastructure may help define its value to this region.

Discussion Questions

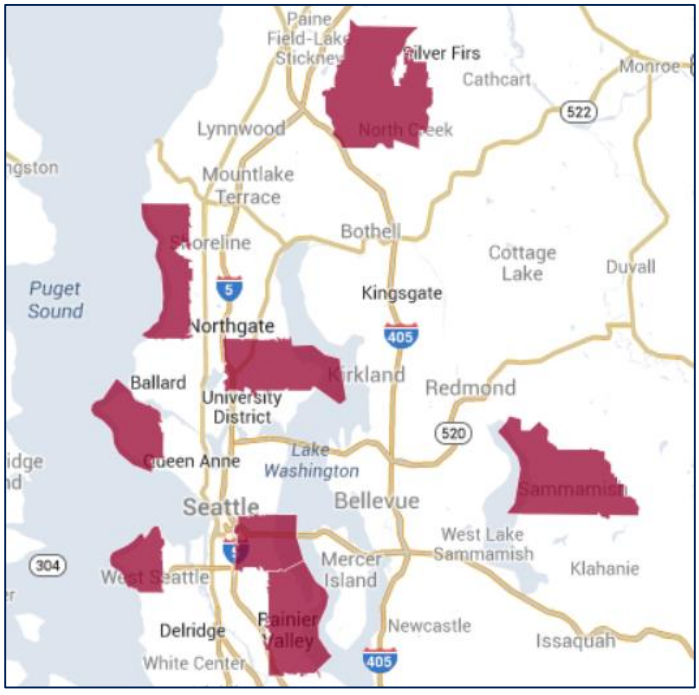
1. Please refer to financial model from the plenary session (see Appendix B of the Plenary Session Materials document). What are the most important financial assumptions and key barriers to addressing this charging gap?

2. Using the Solutions Toolbox as a guide, discuss possible solutions or combinations of solutions that could address this infrastructure gap in a financially sustainable way. Is the solution actionable today? Can it be replicated in multiple locations?

Breakout Group 3: Urban Public Charging Gaps (Seattle Metro Region)

The analysis in *Assessing the EV Charging Network in Washington State* revealed that while there is a lot of charging available in the Seattle Metro area, there are also a lot of BEVs. As a result, the ratio of EVs to charging locations in the Seattle Metro Region is very high (more than eight EVs for every Level 2 charging port in King County), resulting in potential EV charging congestion, where EV drivers have to wait to use charging stations. This congestion may discourage EV purchases and travel. The table below shows ZIP codes in this region that have *no* Level 2 charging locations but at the same time currently have over 50 EVs registered within the ZIP. EV drivers who live in this region or those who work there or visit it frequently would be the primary beneficiaries of additional charging. In addition, new charging in this area could help spur additional EV sales.

ZIP CODE	PRIMARY CITY	COUNTY	BEVS REGISTERED	PHEVS REGISTERED	EVS REGISTERED
98012	Bothell	Snohomish	63	36	99
98074	Sammamish	King	120	17	137
98115	Seattle	King	121	34	155
98116	Seattle	King	42	20	62
98118	Seattle	King	38	13	51
98144	Seattle	King	44	18	62
98177	Seattle	King	50	16	66
98199	Seattle	King	44	14	58



ZIP codes in Seattle area with 50 a more EVs as of December 2013 and no Level 2 charging stations.

The Challenge

The business case for providing EV charging in urban areas is challenging because home charging may accommodate the daily driving needs of many residents. Many residents in urban areas, however, do not have access to home charging while others commute into the urban area and could use charging stations to increase the use of their EV. However, these customers may not use these stations enough to make offering charging services in urban areas profitable. It may be difficult to identify other stakeholders who would benefit from additional charging services in urban areas.

Discussion Questions

1. Please refer to financial model from the plenary session (see Appendix B of the Plenary Session Materials document). What are the most important financial assumptions and key barriers to addressing this charging gap?

2. Using the Solutions Toolbox as a guide, discuss possible solutions or combinations of solutions that could address this infrastructure gap in a financially sustainable way. Is the solution actionable today? Can it be replicated in multiple locations?