



UNIVERSITY TRANSPORTATION CENTER RESEARCH BRIEF

PROJECT TITLE: Locating Fast Charging Stations for Safe and Reliable Intercity Electric Vehicle Travel in Washington

PRINCIPAL INVESTIGATOR: Don MacKenzie (UW)

INSTITUTION: SINGLE-INSTITUTION PROJECT

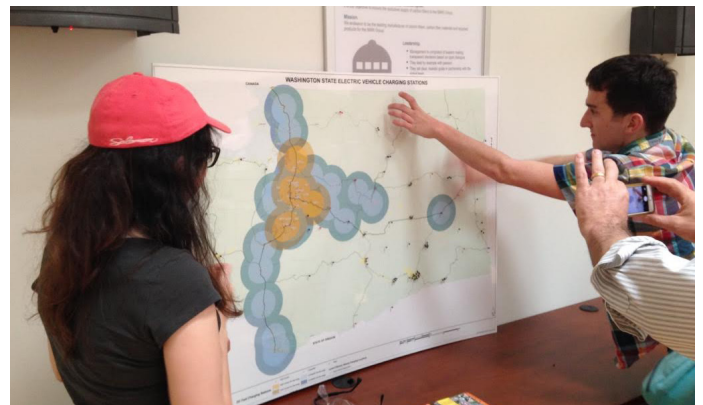
ESTIMATED COMPLETION DATE: JANUARY 2018

SPONSORS: THE PACIFIC NORTHWEST TRANSPORTATION CONSORTIUM, WSDOT



Background

Washington is a leader in consumer-driven EV adoption. Through 2014, Washington and California were the only two states in which EVs constituted more than 3 of every 1000 vehicles registered (EIA, 2014), and the market has continued to flourish (Figure 1). Unlike California, Washington does not have a zero-emission vehicle (ZEV) mandate forcing these vehicles into the market. Washington relies instead on maintaining an environment in which consumers are incentivized to adopt EVs. Chief among these incentives are an exemption from the state sales tax for many EV purchases, and a strong public recharging system. Washington has approximately one public charging station for every 10,000 people – ranking it fifth in the nation. However, due to the high adoption of EVs, there is one public DCFC station in Washington for every 271 plug-in vehicles – worse than the national average of 247 vehicles per DCFC station. If Washington is to continue its EV leadership and achieve Governor Inslee’s goal of 50,000 plug-in vehicles on the road by 2020, it will need to further increase EV adoption and ensure that owners can use their EVs for as many trips as possible. Public investment in DC fast charging infrastructure is a key to realizing this goal while maintaining highway safety.



Research Project

The goal of this work is to identify high-value locations for public DCFC investment based on (1) high level of expected demand based on EV ownership and long-distance travel patterns, and (2) high potential to spur further EV adoption.

We working with WSDOT to acquire origin-destination data on long-distance vehicle trips in Washington state, and Department of Licensing data on the numbers of EVs and of all vehicles registered in each ZIP code across the state. We are using these data to develop an O-D matrix for EV trips in the state, and the expected level of EV traffic along each highway segment, if recharging were not an obstacle to long-distance EV travel. Then we are assigning these trips to the highway network based on travel times and costs. From these results we will generate a map to visualize the potential level of EV traffic along each highway segment. This map will help WSDOT to prioritize investments so that current EV owners can safely and reliably travel between cities using their EVs. Finally, we are also developing a statistical model of EV adoption rate at the ZIP code level, based on residents’ demographics (education level, race, income, etc.).