

The Program

This exciting and unique undertaking was launched in August of 2011 as a two-year project to learn about the interaction and performance of charging stations and a variety of electric vehicles (EV) starting to appear in our region. We also seek to understand the charging preferences and travel patterns of EV visitors.

The unique partnership between the **City of Portland, Portland General Electric (PGE) & Portland State University (PSU)/Oregon Transportation Research and Education Consortium (OTREC)** led to the creation of Electric Avenue. Built along an entire block-face at the PSU campus in the heart of downtown Portland, Electric Avenue uses 100% renewable energy from PGE, and offers EV charging priced at standard city parking rates. The site is comprised of eight on street parking spaces with seven available charging stations.

The current electric vehicle supply equipment (EVSE) vendors onsite include Eaton, Shorepower, OpConnect, General Electric, SPX, and Kanematsu JFE Radipas. Two DC Quick Chargers can charge a vehicle within 30 minutes, while five Level 2 stations can charge vehicles in 4-6 hours. Some Level 2 chargers are equipped with Level 1 outlets, allowing them to accommodate plug-in hybrids and EV conversions. One Level 2 station provided by OpConnect can charge two vehicles simultaneously. Ongoing use and effectiveness data is being collected to explore the future implementation of charging infrastructure and consumer behavior.

The Place

Located in the south end of downtown Portland, Oregon, this project is situated in the heart of the PSU's bustling campus adjacent to the Sixth Avenue Transit Mall where light rail trains, electric street cars, buses, cars, bikes, and pedestrians share a well-integrated personal and public transit corridor. It is a perfect place to understand the fit and flow of electric vehicles in the larger mobility context of the city.

The Proposition

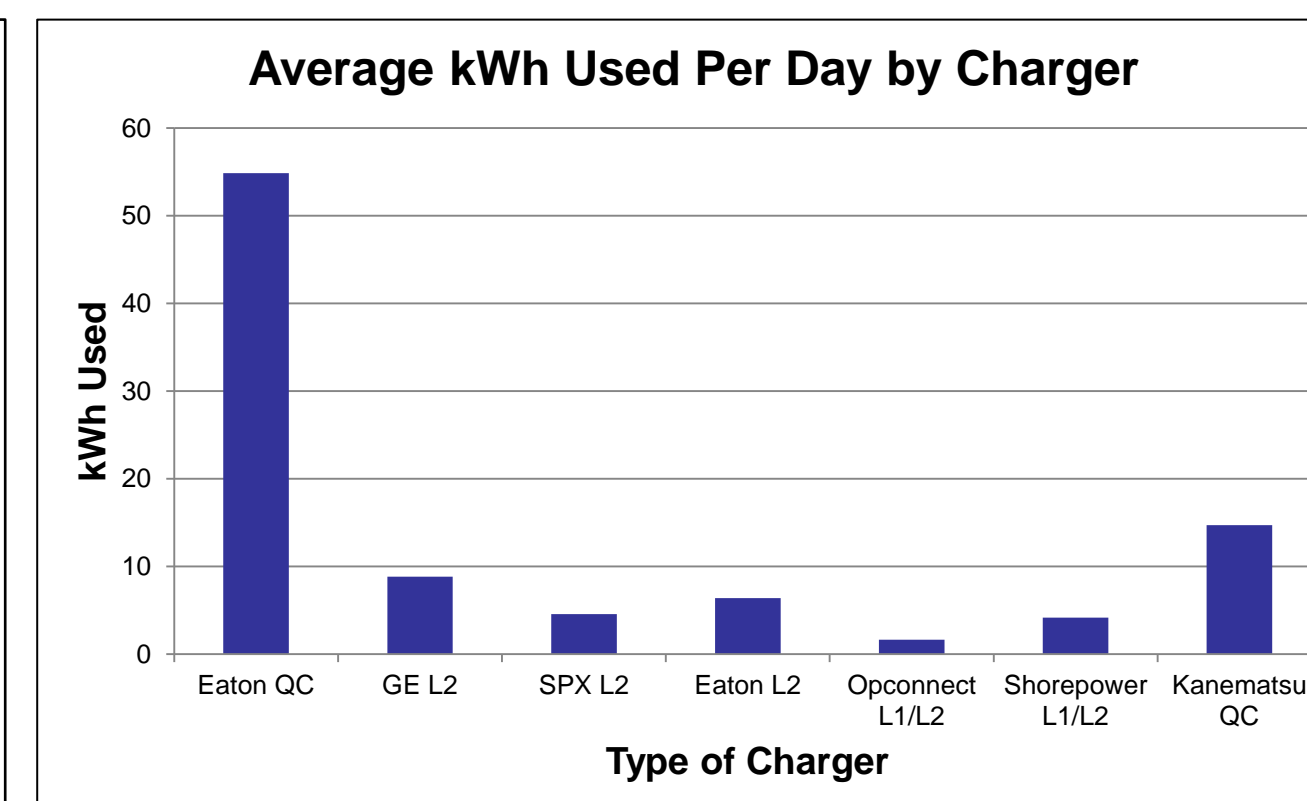
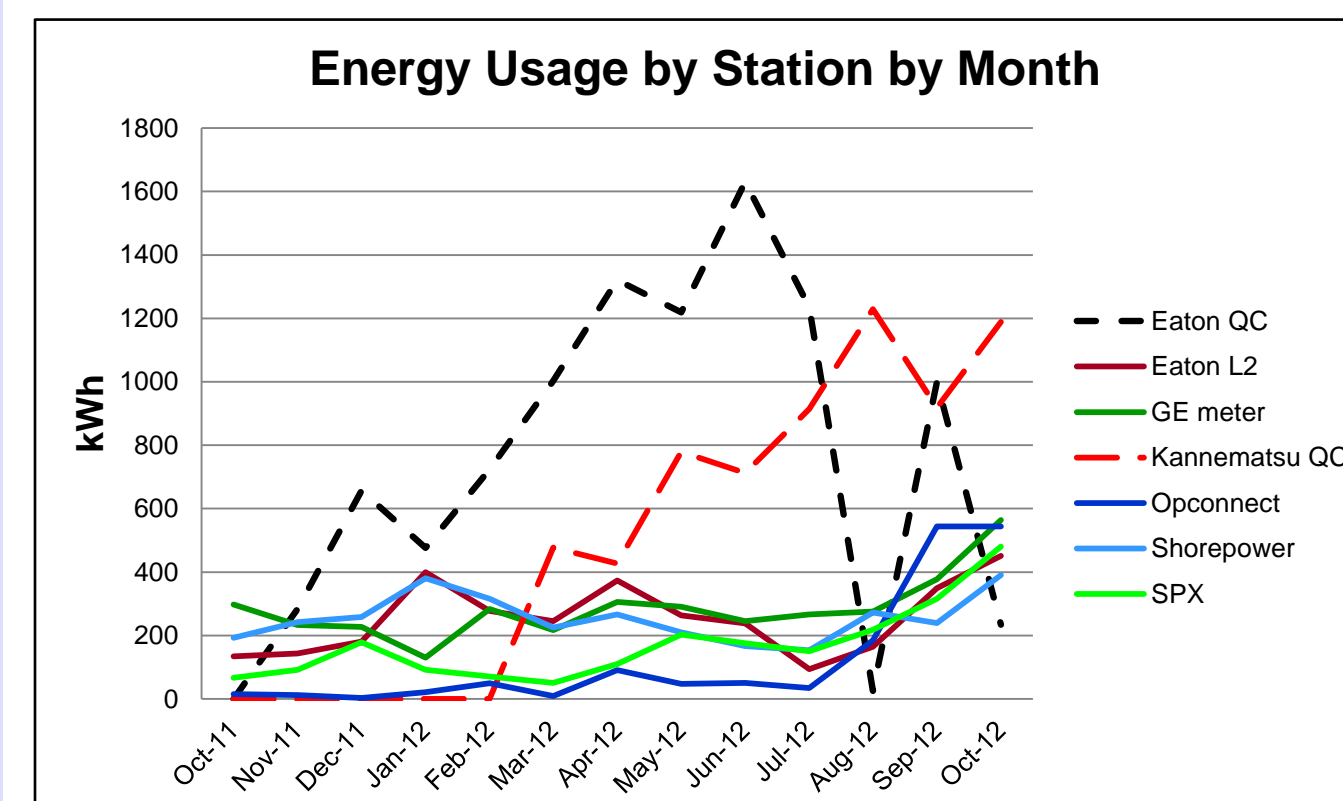
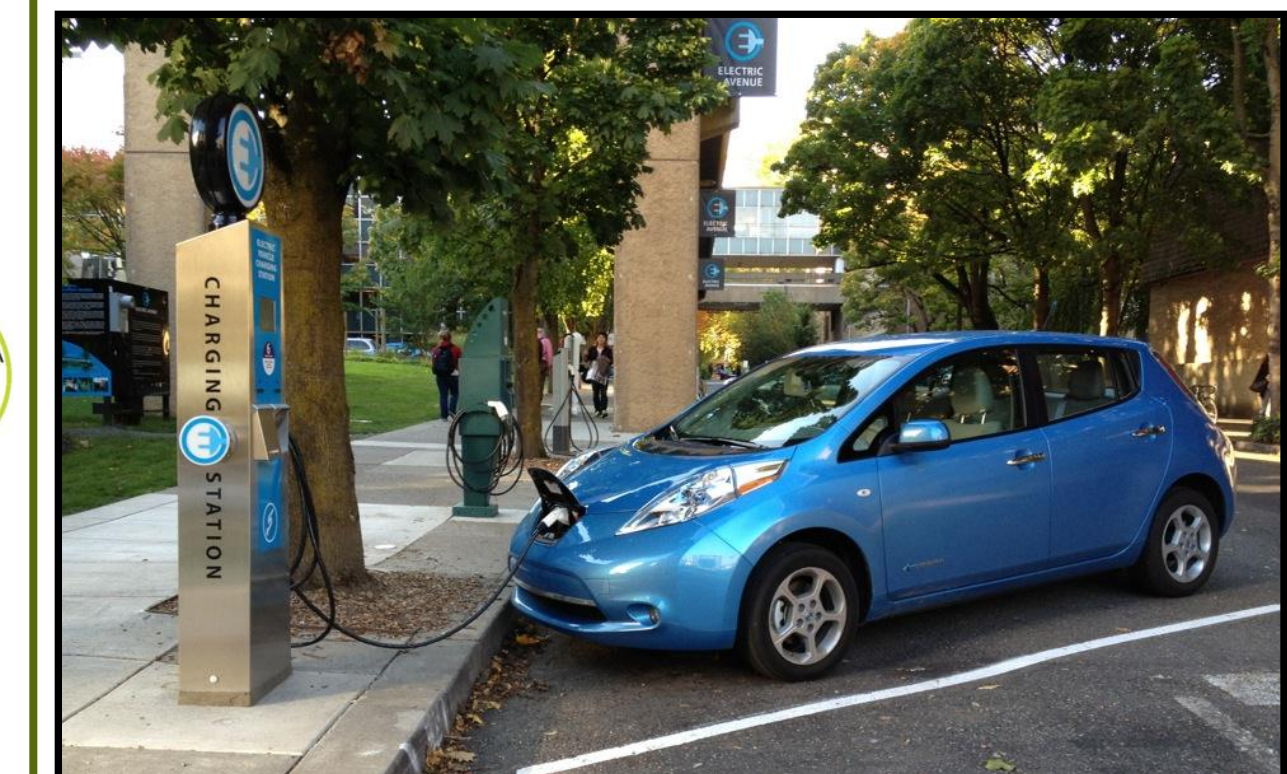
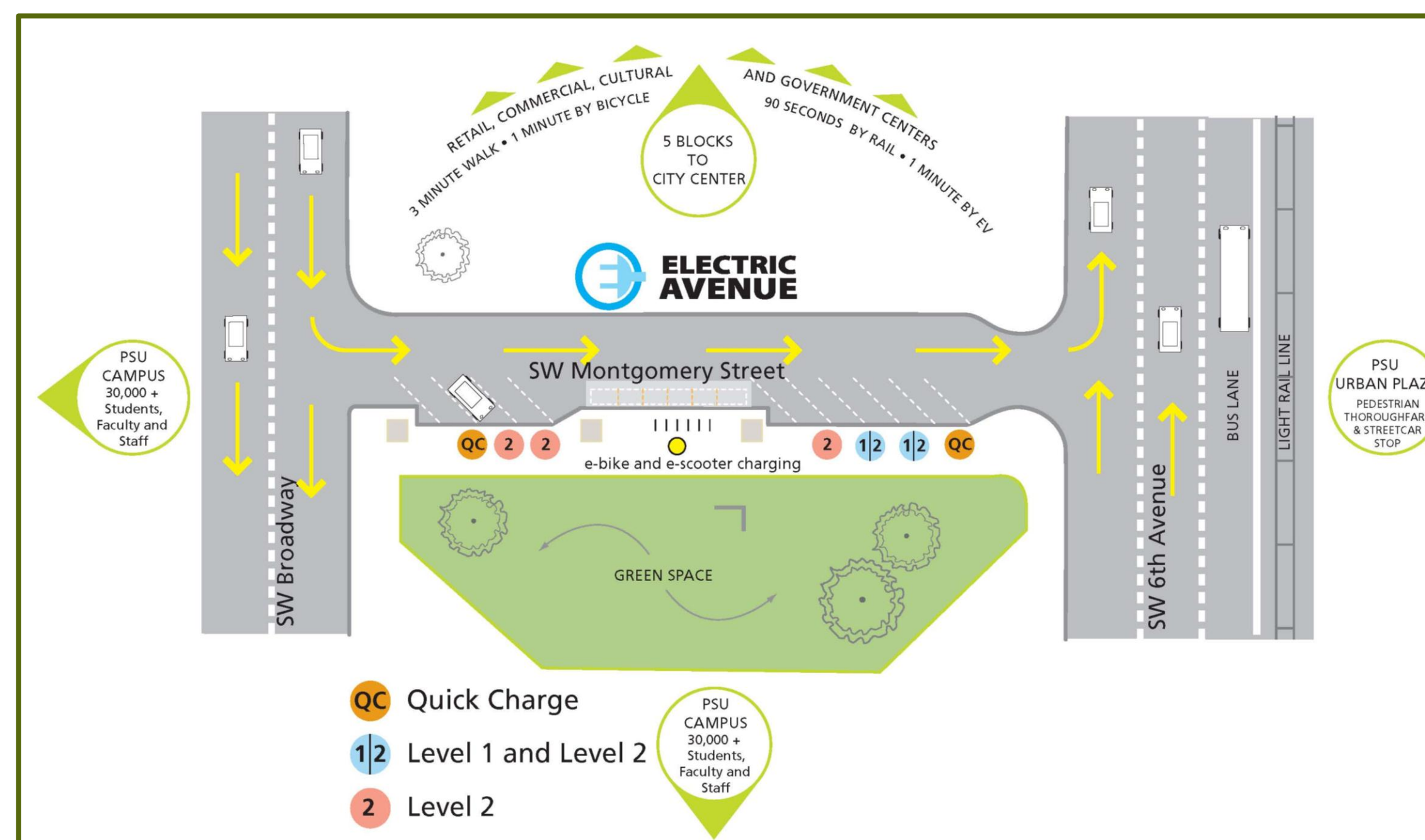
Why do this at all? And why do this in Portland?

As to the first question, we do this because the rapid population growth, mass urbanization, and energy security issues make sustainable urban mobility a top-of-the-agenda item for every metropolitan region on the planet in the decades ahead. As to the second question, the simple answer is that the Portland region has been electrifying its transportation system since the 1980s when light rail trains were introduced, and, more recently, when modern electric streetcars were reintroduced in 2001. With a whole range of all-electric and plug-in hybrid vehicles now coming to market, we made the choice not simply to react to their appearance, but to understand and document how they worked, how well they performed, and if they served the region's long-view interests in urban planning, personal and freight mobility, economic development, public health, and quality of life.

The Research

Electric Avenue is a two-year research project that will focus on both urban electric mobility and the infrastructure to support it. Because Electric Avenue is a living lab in the heart of PSU, faculty and students from a multiple disciplines will have an opportunity to study how people will use the vehicles and the charging stations.

Come visit Electric Avenue soon! **Plug in. Charge up. Drive on.** www.pdx.edu/electricavenue



PSU has conducted a number of interviews, surveys and data collection - preliminary results show:

- In the first year, **90,000 "emission-free" vehicle miles** of have been charging at Electric Avenue
- DC quick chargers are the most popular charging stations
- Most cars used the facility during the afternoon/evening hours
- Generally, people are happy with the user experience
- Signage has been an issue at the site, especially for gas cars.
- Concern about reliability of equipment, some stations have been "down" for short periods

Lessons Learned from the First Year of Operation

1. **Design standards needed** – Electric Avenue was designed and built with a functional catalog of chargers in order to be a demonstration place. As the many chargers arrived for installation, the diverse design language employed by the companies, difficult installation instructions, ADA compliance, and the lack of charging cord 'neatness' and ease all presented challenges. From the installation of the chargers to the positioning of the power cords and the plugs to the cars' computers, there is a critical lack of standardization throughout the various charger/vehicle combinations. It is recommended that charger manufacturers standardize certain elements of design to ensure future compatibility and ease of use.
2. **Standardize authentication** – Some chargers require the use of an ID or membership card before a vehicle can be charged, leaving many EV drivers with a stack of different cards for different EVSE networks. The development of a universal authentication process would greatly simplify the EV user.
3. **Time to rewrite some codes** – Design standards can be adopted by jurisdictions to ensure easy permitting, uniformity, and ease of installation. It is an iterative process and each city will need to explore what works best within City Codes and permitting structures. If a city were able to move ahead of the installation and preempt some code changes the way would be smoother.
4. **Clear, simplified signage** – Signage needs standardization and simplification and should be regulated and uniform throughout the city and, where possible, throughout the country. A national conversation about design of site and wayfinding signage is needed, and an outreach campaign needs to be developed to educate the public about these new signs and what they mean.

