

Seattle Department of Transportation

EXECUTIVE SUMMARY

Human-Centered Design Study on Equitably Expanding the EV Charging Network



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Department of
Transportation

PURPOSE OF THIS STUDY

The Seattle Department of Transportation (SDOT) conducted a three-part human-centered design study in the summer of 2018 to guide the expansion of the public electric vehicle (EV) charging network in low-income communities and communities of color. This work is part of the City's [Drive Clean Seattle](#) initiative and is driven by priorities set forth in its [Race and Social Justice Initiative](#) and [Equity and Environment Agenda](#).

As the City moves toward its goal to achieve carbon neutrality by 2050, electrifying the transportation sector is key. Two-thirds of the City's greenhouse gas (GHG) emissions come from transportation. Having a robust public charging network will help support the transition to electric mobility and a reduction in GHG emissions.

This research can inform future investments and policies to help expand EV charging equitably, in a way that provides benefits to host communities and does not exacerbate displacement risk. The results of this study are meant to inform SDOT's EV Charging in the Right-of-Way (EVCROW) pilot program and its EV Supply Equipment (EVSE) Roadmap for Shared Mobility Hubs.¹

The Race and Social Justice Initiative (RSJI)

directs City departments to lead with race in analyses of potential inequities, acknowledging that past investments and policies have resulted in some communities receiving disproportionate benefits and other communities bearing disproportionate burdens.

The Equity and Environment Agenda

is a blueprint to advance racial equity in Seattle's environmental work. The Agenda lays out four key goal areas and recommended strategies in each area: healthy environments for all; jobs, local economies and youth pathways; equity in city environmental programs; and environmental narrative and community leadership.

¹This document does not represent City of Seattle policy or the policy of any City department but may inform future policy development.



RELATED PROJECTS

EVCROW Pilot Program

The [EVCROW pilot program](#) allows the installation of electric vehicle charging stations at curbside locations or other parking areas located in the public right-of-way. These stations are available to the public and existing parking regulations continue to apply. The EVCROW pilot program is designed to provide more public charging options across the City to serve a growing number of EV drivers, particularly shared mobility drivers and those that don't have access to EV charging at home.

EVSE Roadmap for Shared Mobility Hubs

The City of Seattle is committed to improving connections to public transit via electrically-powered shared mobility services such as car sharing and ridehailing. The EVSE Roadmap presents an initial strategy to increase EV adoption in shared mobility services with other City departments and regional partners and is supported by a multi-regional grant from the U.S. Department of Energy.² Following completion of the EVSE Roadmap, SDOT will manage its implementation, which includes the deployment of EV charging stations at or near prioritized shared mobility hubs and an associated marketing and outreach campaign. SDOT will not own or have any legal interest in the EVSE installed through this project.

²The EVSE Roadmap document referred to here is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Vehicles Technologies Office (VTO) Deployment Award Number DE-EE0008261.

STUDY OBJECTIVES

This study was conducted to better understand and gather input on the following from communities of color and low-income communities:

- Perceptions of EV charging
- Needs and desires in future EV charging station deployments
- EV charging needs and desires of shared mobility drivers and community stakeholders (regardless of EV ownership)
- Actual or perceived barriers to use or pain points for potential EV drivers
- Important considerations for siting and permitting EV charging stations, including mechanisms for ensuring benefits accrue to host communities
- Potential concerns (e.g., displacement) and potential mitigations
- Suggestions for meaningful outreach and engagement activities
- Siting criteria and potential sites for EV chargers

WHY HUMAN-CENTERED DESIGN

Following internally-developed guidelines, the first EV chargers installed through the EVCROW pilot program were sited near the Beacon Hill light rail station in an amenity-rich part of the neighborhood. While these siting criteria may yet prove effective, the engagement the City conducted in advance of the installation was not, and the chargers were negatively received by surrounding businesses and community institutions that felt the chargers had been designed with someone else in mind.

Reflecting on this outcome, as part of a review of the City's **Drive Clean Seattle** initiative to electrify transportation, the City's Environmental Justice Committee (EJC)³ recommends the use of creative engagement strategies such as human-centered design to achieve more robust feedback about the design and deployment of EV charging stations. The City undertook this study in direct response to this recommendation by the EJC and to inform the second phase of the EVCROW pilot program and the EVSE Roadmap. Through this effort and others like it, the City aims to demonstrate its commitment to its guiding principles of putting people first and advancing racial and social justice.

How Human-Centered Design Works

Human-centered design is a type of problem-solving that works with the intended users of a product or service to identify their needs and design the basic elements together. In the context of EV charging stations on curbsides, this approach is used to understand the needs and desires of potential users and others who might be impacted, both around using and interacting with the charger directly and about how it might fit into the existing fabric or character of the neighborhood.

³The [Environmental Justice Committee](#) (EJC) is convened by the Office of Sustainability and Environment and comprises 12 compensated community representatives. The precursor to the EJC, the Community Partners Steering Committee, developed the City's [Equity and Environment Agenda](#), and the EJC now advises the City on programs and efforts relevant to achieving environmental justice outcomes.

METHODOLOGY

SDOT contracted Halibut Flats Research and Development, a local human-centered design consultant, to lead the design and implementation of the study, which was conducted between July and September of 2018. To understand the needs and perspectives of both shared mobility drivers and members of low-income communities and communities of color who might be impacted by installations of new EV chargers, the study included three phases:

- 1) Interviews with 7 shared mobility (Uber and Lyft) drivers
- 2) Interviews with 10 individuals from low-income communities and/or communities of color
- 3) A focus group comprising a selection of interviewees from the first two phases along with other stakeholders from the City and local non-profit organizations (13 total participants)

The interviews were conducted one-on-one between the consultant and the participant and were designed to elicit open and frank responses to questions about familiarity with EVs and EV chargers, curiosity, concerns, and suggestions for their placement.

The focus group included participatory design elements to elicit feedback on essential siting considerations for EV chargers. The primary exercise allowed participants to brainstorm suitable and unsuitable locations for EV charger placement using maps of neighborhoods they were most familiar with. During the discussion a portion of participants were encouraged to share both their takeaways from the exercise and anything they thought was missing from the conversation.

Participant Overview

SDOT and the consultant used Facebook ads to recruit 17 participants from communities of color and low-income communities for the first two phases of the study. Early participants also recommended friends and family for participation. Participants were racially diverse and lived in neighborhoods in South Seattle as well as in the far northeast part of the city (see figures below).

The focus group comprised three shared mobility drivers from the first phase of the study, four community stakeholders from the second phase, three representatives from community-based organizations, and three City staff representatives.

FIGURE 1: RACE/ETHNICITY OF STUDY PARTICIPANTS

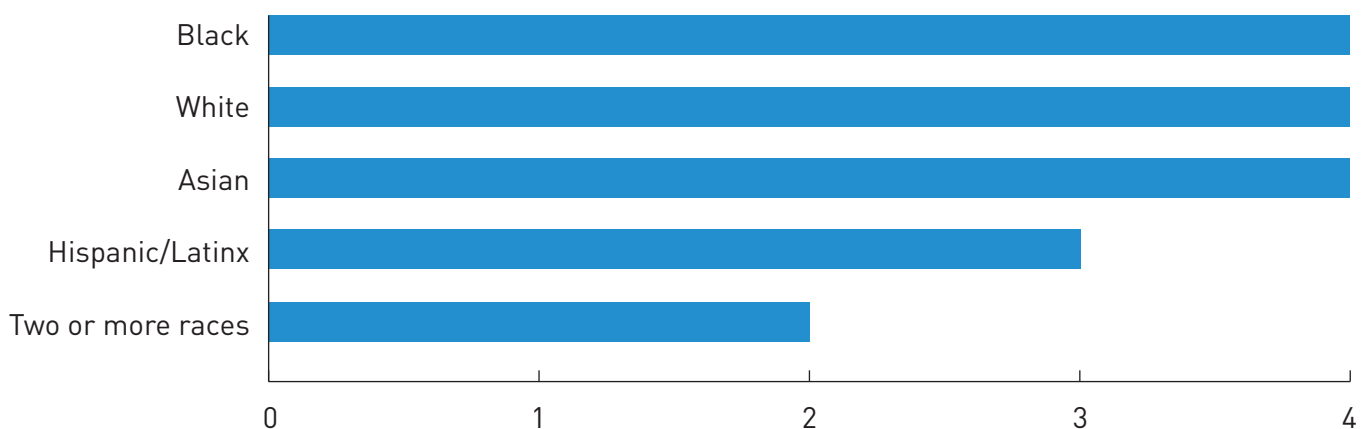
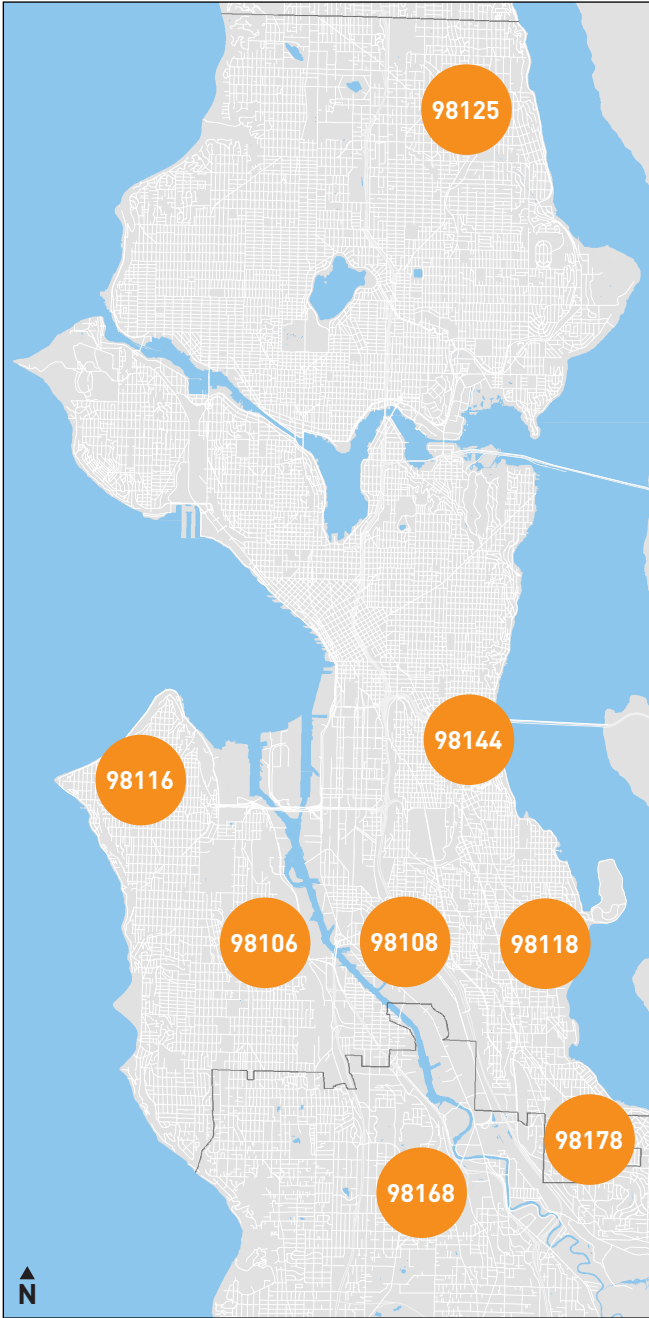


FIGURE 2: HOME ZIP CODES OF STUDY PARTICIPANTS



KEY FINDINGS

Participant input from the interviews and focus group ranged from positive and curious feedback to critical questions and suggestions. Input can be grouped into the following categories:

- **Information gaps persist.** Most participants were familiar with or had heard of EVs and their associated environmental benefits, but had concerns around range and charging rates, and questions around maintenance. Participants wanted to know where they could learn more about costs and benefits of owning or using EVs, maintenance, safety, and impacts on parking and gentrification. Most expressed interest in learning more and supported the idea of initiatives that would increase awareness in their communities, particularly through community-based organizations (CBOs) that already have strong networks and relationships.
- **High costs are perceived as a barrier to accessing EVs.** Participants identified cost as a key barrier to EV adoption, from the cost of the vehicle to the combined costs of parking and charging. Outside the prospect of EV ownership, some were concerned about changes to the costs of emissions testing and vehicle registration because of increased EV adoption in the region.
- **Need for reliable transportation.** Participants expressed concerns related to the range of a single charge, particularly if they were relying solely on public infrastructure.⁴ Others worried that there may not be enough EV chargers to support an increase in EV ownership and use—e.g., chargers may be occupied when needed. Others were concerned that chargers would be located too far from their homes to be useful. Some challenged the focus on EV adoption given other problems with Seattle’s transit network, including overcrowding, availability and frequency of service, and proximity of routes to home and work.

- **Charging speed and location are key considerations.** Shared mobility drivers indicated that direct current (DC) fast chargers, which can charge most vehicles to 80% of battery capacity in 20-30 minutes, would be appropriate for siting in the public right-of-way. Level 2 chargers, which take several hours to provide a full charge, would not be fast enough for drivers to charge during or on either end of their shifts, unless chargers were placed near the driver's residence and they could leave their vehicle parked for extended periods of time (e.g., overnight charging). Participants further suggested that DC fast chargers be installed at locations where they typically spend at least 20-30 minutes, such as grocery stores and shopping centers.
- **Concerns related to loss of parking and exacerbation of gentrification and displacement.** Some participants reacted negatively to the idea of replacing public parking spaces with public EV charging stations because it would provide little to no benefit to communities where EV ownership was lower than the city average. There was also feedback that EV chargers could exacerbate existing trends of gentrification, displacement, and neighborhood change by providing infrastructure that would only benefit people who don't already live in a given neighborhood.
- **Safety concerns.** Some participants expressed concerns about experiencing racial profiling while using public EV charging stations, and others wondered about individual and community safety associated with EV chargers more broadly.



⁴Many participants did not have access to a dedicated parking spot at home. Those who did have a dedicated parking spot did not have access to power (e.g., a garage), meaning that installing a Level 2 charger at home would be difficult or impossible and owning an EV would mean relying on public infrastructure.

SUGGESTED NEXT STEPS

Overall findings of the human-centered design study as well as direct suggestions by participants suggest the following action items and areas for future work.

Key Finding	Suggested Next Step	Potential Partners*
Information gaps persist	<p>Conduct effective and inclusive outreach by putting on EV 101 and charging demonstrations at community events such as summer festivals.</p> <p>Providing written and verbal information in the languages spoken by the communities that might host an EV charger.</p> <p>Use familiar messaging around costs, such as the price of an e-gallon compared to a regular gallon of gasoline.</p>	<p>Office of Sustainability and the Environment</p> <p>Seattle City Light</p> <p>Department of Neighborhoods</p> <p>SDOT Communications</p>
High costs are perceived as a barrier to accessing EVs	<p>Expand EV access in the short term by developing a low-income electric car share program.</p> <p>Explore new charging rates for EV charging providers that can pass on savings to customers.</p> <p>Provide information about public vs. residential charging possibilities and associated costs.</p>	<p>Office of Sustainability and the Environment</p> <p>SDOT Curbspace Management and Transportation Equity Programs</p> <p>Clean Air Agency</p> <p>Seattle City Light</p> <p>EVSE Providers</p>
Concerns related to loss of parking and exacerbation of gentrification and displacement	<p>Support local economies in EV-related work, such as messaging contracting opportunities to local women- and minority-owned businesses.</p> <p>Further work with local community-based organizations and support other innovative ways to tie benefits back to local economies.</p> <p>Generate positive conversation about EVs by locating EV chargers at neighborhood hubs and in dedicated spaces at schools with community support.</p> <p>Consider alternate locations to right-of-way charging (e.g. private lots) in areas with high curbs space parking demand and low EV adoption.</p>	<p>Office of Sustainability and the Environment</p> <p>Office of Economic Development</p> <p>Finance and Administrative Services' Women and Minority-owned Businesses Program</p> <p>Department of Neighborhoods</p> <p>EVSE Providers</p>

Key Finding	Suggested Next Step	Potential Partners*
Need for reliable transportation	<p>Integrate EV work with other elements of Seattle’s transportation planning, such as the Transit Master Plan and first- and last-mile transportation pilots.</p> <p>Guide EV charger deployments as feasible to create a more reliable, expansive, and equitable public charging network.</p> <p>Consider limiting charging time during “peak use” hours.</p>	<p>Office of Sustainability and the Environment</p> <p>SDOT Policy & Planning and Curb Space Management</p> <p>Local Transit Agencies</p> <p>EVSE Providers</p>
Charging speed and location are key considerations	<p>Integrate chargers with places drivers frequent such as grocery stores, retail amenities, and transit hubs.</p> <p>Work with shared mobility service providers to message EV charger locations and availability to drivers.</p> <p>Partner with multi-unit dwellings to provide “charging plans” for residents.</p>	<p>Shared Mobility Service Providers</p> <p>EVSE Providers</p> <p>Seattle Housing Authority</p>
Safety concerns	<p>Work with local law enforcement to explain what an EV charging station is and its user’s expected behavior.</p>	<p>Office of Sustainability and the Environment</p> <p>Seattle Police Department</p>

*Potential partners are suggested for consideration for future work, but do not represent a commitment from the entities and groups listed.

UNRESOLVED CONSIDERATIONS

While this study identified several next steps for SDOT, there remain barriers to EV adoption that are beyond the scope of SDOT’s current programs or authority. SDOT is recording these unresolved considerations and communicating them to other City departments and external organizations that may have a role in addressing them.

- **Vehicle access.** Expanding access to EV chargers addresses only some barriers to EV adoption, namely lack of charging access and range anxiety. New EVs remain more expensive than traditional gas-powered alternatives, and this high cost can be prohibitive for many individuals and households with limited wealth or income.

- **Technology, payment, and language barriers.** Currently, most EV charging stations are found and accessed via smartphone app—i.e., they do not directly accept credit cards or cash for charging a vehicle, but rather require customers to pay via credits they have purchased through the app. Though SDOT is developing multilingual wayfinding signage to help direct drivers to nearby EV chargers, lacking a smartphone or data plan remains an unresolved barrier to access.

- **Residential charging.** While publicly accessible EV chargers have a role to play in expanding access to charging, they are not a replacement for the proximity and reliable availability of having a charger at home. In-home EV chargers are outside of the scope of what SDOT can permit or influence as the manager of the public right-of-way.

ELECTRIC MOBILITY BEYOND PERSONAL VEHICLE OWNERSHIP

The benefits of transportation electrification are not limited to those that come driving an electric vehicle over a traditional gas-powered vehicle. There are many existing options for electric transportation—electric buses, electric ridesharing, and electric bike share are among those available in Seattle—and these options are growing every year. Though this research focuses on EV charging, other electric transportation options should be encouraged and could in some cases provide greater GHG reduction benefits.