

2017 DRIVE CLEAN SEATTLE Implementation Strategy



JUNE 2017



Seattle Office of
Sustainability &
Environment



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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

Road transportation represents two thirds of Seattle’s climate-changing carbon pollution. In addition to reducing the miles we need to drive to meet our daily needs and move goods around the city, we must electrify our cars, buses, and trucks to meet our carbon neutrality goals. Seattle’s carbon free electricity is an invaluable resource in meeting this goal as every gallon of gasoline or diesel which is replaced by electricity is a 100% reduction in carbon pollution.

While we continue to expand transit services, light duty vehicles, whether owned, shared, autonomous, or part of a fleet, will remain an important component of the transportation system. To that end, the City set a goal to increase electric light duty vehicle ownership to 30% by 2030. To meet this goal, Mayor Murray launched the Drive Clean Seattle Initiative to significantly expand our work to electrify the transportation sector at scale and to put us on the path to meet our carbon neutral goal.

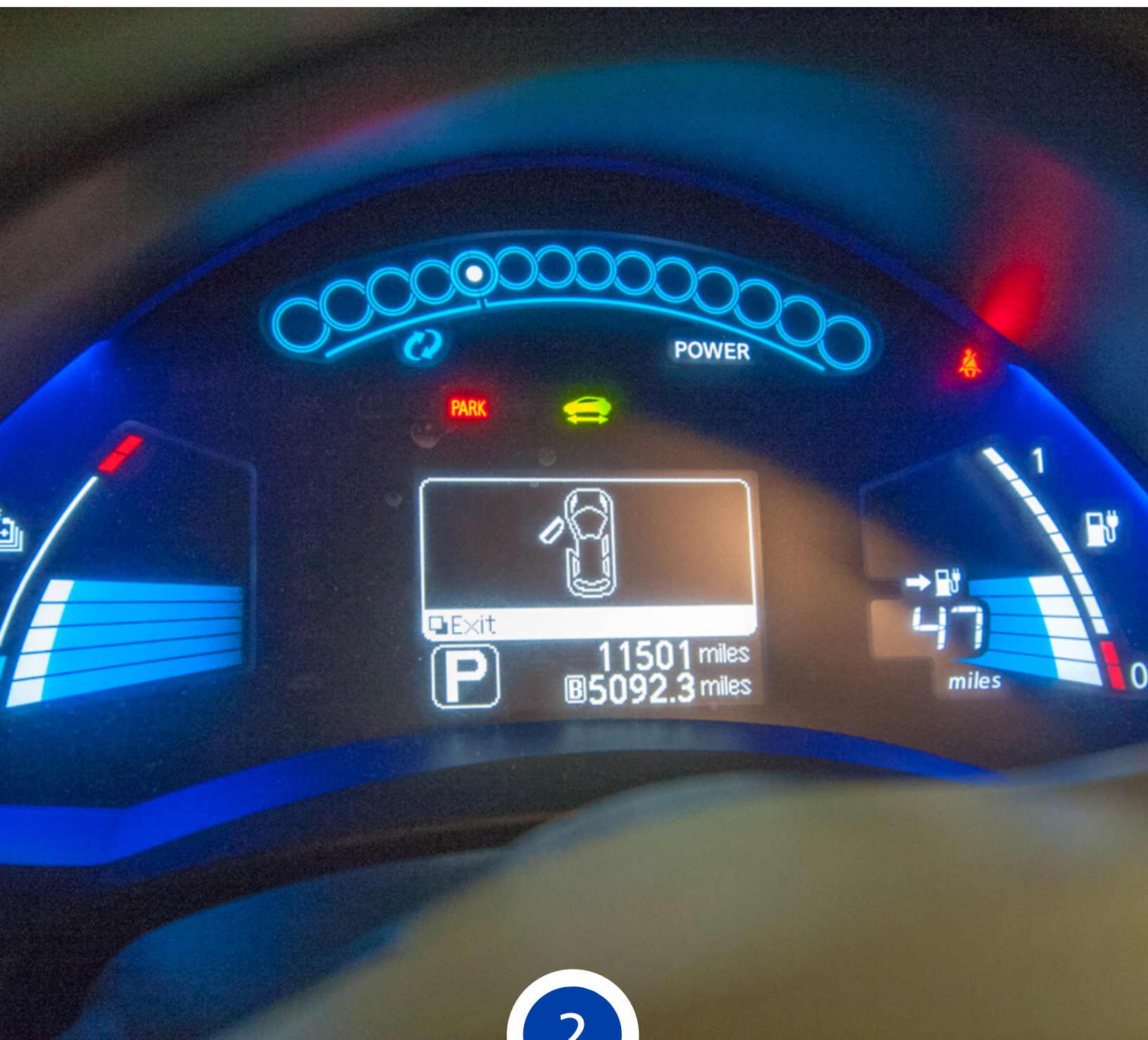
Seattle is ranked as one of the top US markets for electric vehicles (EVs) with an electric vehicle sales share that is four times the national average. As of the end of 2015, Seattle ranked 7th of the 50 largest US cities in both highest electric vehicle sales share and most extensive public electric charging infrastructure. So far in 2017, EV sales are up 74% in the United States over 2016 and reached a new record of 1.2% of all US car sales.

While this early market growth is impressive, significant barriers persist which prevent more widespread adoption. Our research shows that the most significant barriers include the up-front vehicle cost, the convenience or availability of charging, and general consumer awareness about electric vehicles. To reach our goals, Seattle must deploy a comprehensive suite of strategies that address these barriers while centering environmental justice. The experience of cities with the highest rates of EV adoption provide important lessons for Seattle. Following the example of other leading cities and thinking about our unique set of circumstances and characteristics, Seattle’s EV strategies should:

- Be coordinated and comprehensive and feature a diverse set of stakeholders.
- Leverage technology to advance the goals of a shared, clean and equitable transportation system.
- Ensure the benefits of a clean transportation system accrue to those most impacted by the air pollution of the current system.
- Facilitate greater access to charging and prioritize publicly available charging in ways which enable shared mobility, fleet electrification, and other policy goals.
- Increase consumer exposure to electric vehicles and awareness about the benefits of electrification through sustained programs and outreach activities.
- Electrify the City’s municipal fleet to lead by example and demonstrate best practices.

Drive Clean Seattle Implementation 2017-2018

STRATEGY	IMPLEMENTATION ACTION	LEAD DEPARTMENT
Smart Cities: Leverage technology to advance the goals of a shared, clean and equitable transportation system.	Advance electric shared mobility at Shared Mobility Hubs by developing infrastructure implementation roadmap for Shared Mobility Hubs.	SDOT
	Develop a policy framework for autonomous vehicles to encourage investment in electric vehicle technologies and shared mobility.	SDOT
Race and Social Justice: Maximize the benefits of a clean transportation system for those most impacted by the air pollution of the current system.	Partner with the Environmental Justice Committee to implement projects in EEL communities which deliver racial equity outcomes identified in the Drive Clean Seattle Racial Equity Toolkit.	OSE
	Complete additional racial equity toolkits for major Drive Clean Seattle projects and policies.	Various
EVs and EV Charging: Increase the adoption of electric vehicles by facilitating access to charging.	Advocate for Volkswagen settlement funding from both the State Mitigation Fund and the ZEV Investment Fund to accelerate EV adoption in Seattle and benefiting Seattle residents.	OSE
	Develop a network of off-street charging station clusters by developing an off-street EVSE cluster plan.	SDOT
	Explore pathways to allow electric vehicle charging in the right-of-way.	SDOT
	Install 20 DC fast chargers as part of City Light DCFC pilot project in 2017 and 2018	City Light
	Launch City Light residential charging pilot project to install at least 200 EV chargers in customer's homes.	City Light
	Develop EV ready code packages to ensure buildings and parking infrastructure can accommodate electric vehicles.	OSE
City Leadership: Electrify the city's fleet to demonstrate best practices.	Launch a workplace charging program for City of Seattle employees.	OSE
	Install 200 new charging stations for fleet vehicles in 2017/18 and achieve 40% electrification of current light duty municipal fleet.	FAS
	Partner with the Electric Power Research Institute (EPRI) to test a range of charging technologies on the City's fleet vehicles at the SeaPark Garage. The project will help City Light (and the City's Fleet Management Division) understand ways to leverage managed charging technology to mitigate the need for utility and customer infrastructure upgrades.	City Light/FAS
	Foster public-private partnerships with electric vehicle industry partners to facilitate investment in charging infrastructure and electric shared transportation.	OSE/FAS
Outreach and Awareness: Increase consumer exposure to electric vehicles and awareness about the benefits of electrification.	Develop website to provide residents and businesses information about electric vehicles and electric vehicle charging and to promote electric transportation.	OSE
	Participate in National Drive Electric Week and other EV Showcase and Ride & Drive events and activities.	OSE



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INTRODUCTION

Electric Vehicles as a Climate Strategy

In 2013, the City of Seattle set a goal to be carbon neutral by 2050. Transportation is the largest single source of climate and air pollution in Seattle which disproportionately impacts communities of color and lower income residents. The good news is that Seattleites are riding transit more, driving cleaner cars, and putting less miles on them. This trend is expected to continue; however more must be done to meet our climate goals and mitigate the disproportionate impacts of climate and air pollution. In addition to reducing vehicle miles traveled and driving alone, we must also replace the oil in our cars, trucks, and buses with City Light's carbon neutral electricity.

In 2016, the City set a goal to increase electric light duty vehicle ownership to 30% by 2030. To meet this goal, Mayor Murray launched the Drive Clean Seattle Initiative to significantly expand our work to electrify the transportation sector at scale and to put us on the path to meet our carbon neutral goal. This brief report explores the factors associated with high EV adoption in other cities, examines opportunities to further advance our work, and identifies near term actions to meet the 2030 goal.

EVs in Seattle

Seattle has been working to encourage adoption of EVs in Seattle since 2009. Initial work focused on ensuring that Seattle was plug-in ready for the first generation of EVs by working to streamline permitting for charging infrastructure, incorporating EVs into the municipal fleet, developing a regional infrastructure network, and promoting outreach and consumer awareness.

Private sector electrification was advanced through a combination of federal, state, and local action. Federal funding supported the installation of public and private charging stations in Seattle through the *EV Project*. Washington State partnered with Oregon, California, and British Columbia to create the West Coast Electric Highway, installing DC/Fast Charging stations every 25-50 miles along the I-5 corridor and other major roadways in the Pacific Northwest. From 2011 to 2013 the City operated a pilot program to provide public access to charging infrastructure in City-owned or managed parking garages. The pilot program was a good opportunity for the City to learn about different charging station technologies, how drivers would interact with public charging stations, and the complexity of managing the service. The City transferred ownership and responsibility for the stations to site hosts at the end of the pilot project and some remain operational today.

In 2010, Seattle was awarded federal funding to begin investing in the electrification of the municipal fleet. These early investments allowed the City to gain experience as an industry leader in fleet electrification by operating one of the largest municipal electric vehicle fleets in the nation. Seattle currently operates over 125 on-road EVs (20% of the light duty fleet), 71 pieces of electric off-road equipment and over 500 conventional hybrids. In addition to the city's central motor pool, EVs are deployed in most city departments including police, fire, transportation, parks, and both municipal utilities. Fleet data shows that EVs offer a 98% reduction in climate pollution (thanks to Seattle City Light's carbon neutral electricity) and a 40% reduction in operating costs over conventional gas powered vehicles. Seattle's experience underscores the strong environmental and business case for fleet electrification.

One of the first Drive Clean Seattle implementation steps was an Executive Order directing City departments to reduce fleet-related climate pollution by purchasing low-emission or electric vehicles, using other clean fuels, and prohibiting idling. These actions will help us meet the 50% fleet emissions reduction by 2025 goal established in the Drive Clean Seattle Green Fleet Action Plan. Core strategies in the Green Fleet Action Plan are electrification, cleaner

fuels, increased efficiency, and a green fleet standard for fleet procurement. Specific fleet actions underway include:

- Purchase 100 new EVs through 2017 (to achieve 40% electrification of current light duty fleet); 250 EVs by 2020 (70% of light duty fleet) with a target of 400 EVs by 2023 (100% of light duty fleet).
- Install 200 EVSE for fleet vehicles in 2017/2018, 300 EVSE by 2020 and 400 EVSE installed for fleet by 2023.
- Work with equipment manufacturers to participate in fleet demonstrations of EV technology in medium and heavy duty vehicles over the next five years.

Current Landscape in Seattle

Seattle is ranked as one of the top US markets for electric vehicles with an electric vehicle sales share that is four times the national average. As of the end of 2015, Seattle ranked 7th of the 50 largest US cities in both highest electric vehicle sales share (2nd highest outside of California) and most extensive public electric charging infrastructure (3rd highest outside of California).

Plug-in Electric Vehicle Registrations by Year:

	2010	2011	2012	2013	2014	2015	2016	TOTAL
Seattle	6	273	370	975	962	962	1236	4784
Washington	20	1204	1906	4726	4649	4192	5381	22078
Seattle share	30.00%	22.67%	19.41%	20.63%	20.69%	22.95%	22.97%	21.67%

Data courtesy of the Electric Power Research Institute.

Through March of 2017, there were 359 additional EV registrations in Seattle, bringing the total to 5,143.

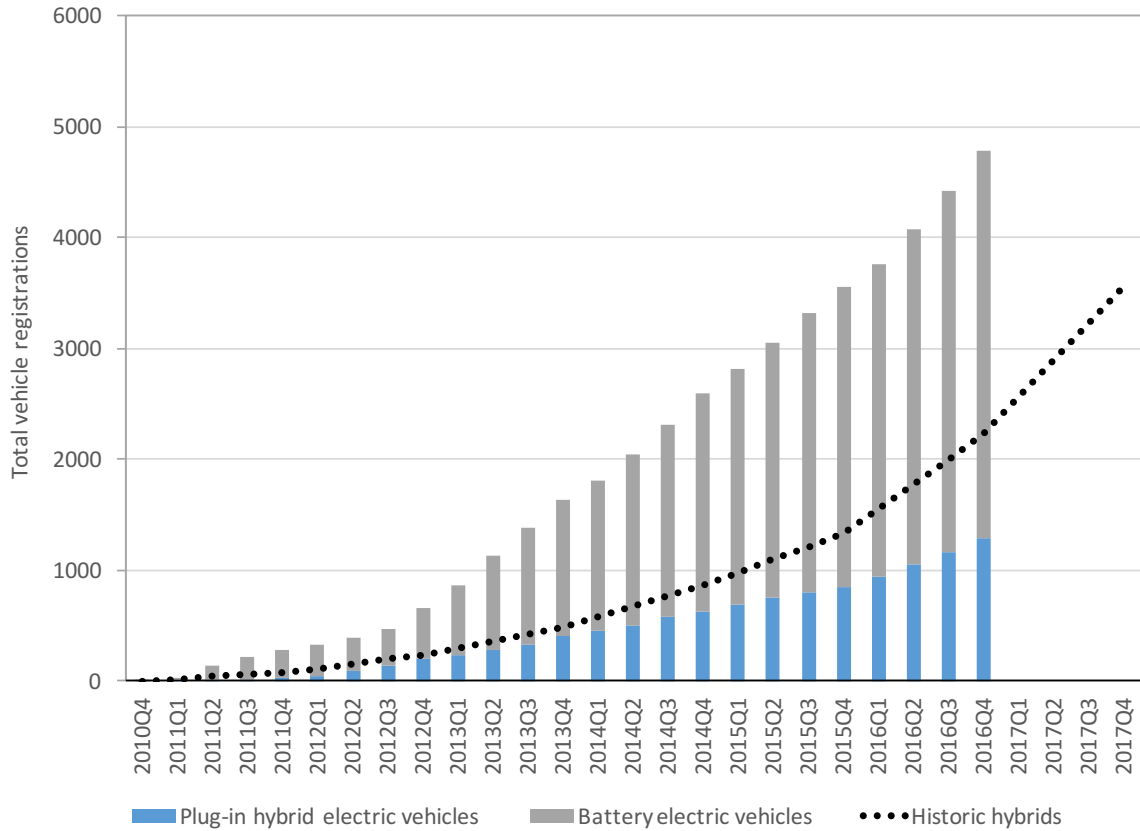


Chart courtesy of the Electric Power Research Institute.

Currently, EV buyers in Seattle can take advantage of both the federal tax credit of up to \$7,500 and the Washington State and local sales tax exemption of up to about \$3,100. The total available financial incentive depends on the type of vehicle and local sales tax rates.



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BARRIERS & OPPORTUNITIES FOR ACCELERATING ELECTRIC VEHICLE ADOPTION

Barriers to Electric Vehicle Adoption

Modern electric vehicles were introduced in 2010 and reached 1 million in global sales in September 2015. By January 2017, global sales doubled to 2 million. Through Q1 2017, EV sales are up 74% in the United States over 2016 and reached a new record of 1.2% of all US car sales. While this early market growth is impressive, significant barriers persist which prevent more widespread adoption. By better understanding the barriers and strategies in leading cities for addressing the barriers, we can better identify the best approach for accelerating EV adoption in Seattle. Our research shows that the most significant barriers include the up-front vehicle cost, the convenience or availability of charging, and general consumer awareness about electric vehicles.

Cost

Though electric vehicles offer significant fuel and maintenance savings compared with non-electric vehicles, the up-front cost of an EV remains a barrier for many, particularly for lower income residents, who are disproportionately impacted by the climate, air, and water pollution from fossil fuel use in our transportation system. At just over \$30,000, the MSRP of a 2017 Nissan Leaf (\$30,680) is significantly higher than that of its conventional counterparts: the 2017 Nissan Sentra (\$16,990) and Altima (\$22,500). Leading, perhaps, to a reputation as a niche luxury product, more expensive models have dominated the early market for electric vehicles in the United States. In 2016, Tesla sold more electric vehicles in the United States than any other carmaker and two models – the Tesla S (\$71,200) and the Tesla X (\$85,500) were among the five models of EVs which sold at least 10,000 units (of 159,139 vehicles total) in 2016.¹

This may be changing: A 2016 study by Bloomberg New Energy Finance forecasts that “during the 2020s EVs will become a more economic option than gasoline or diesel cars in most countries” and that by 2040, “long-range electric cars will cost less than \$22,000 (in today’s dollars)”.² Still, the affordability barrier remains and governments at all levels are looking at innovative ways to bring down the initial cost of EVs to increase affordability for residents of all income levels.

Convenience of Charging

The ability to conveniently charge an electric vehicle is a key factor for electric vehicle adoption, however, the availability of charging is currently limited. Electric vehicles are typically charged at home, at work, or at publicly-accessible charging stations located in communities or along highway corridors. Information about the types of charging is provided below:

Residential charging is the most common type of charging and takes place at the driver’s personal charging station at home overnight or at other times when there is little demand for the vehicle. This is usually a Level 1 or Level 2 charging station which charges batteries over several hours depending on the power of the charger and the battery’s state of charge. The vehicle owner pays for the electricity through their utility

¹ <https://www.forbes.com/sites/rpapier/2017/02/05/u-s-electric-vehicle-sales-soared-in-2016/#51c97dc5217f>

² <https://www.bloomberg.com/features/2016-ev-oil-crisis/>

bill. Charging at home provides easily accessible charging, however, it requires a driveway, garage, or other parking space and charging equipment which may require an expensive electrical upgrade.

Workplace charging effectively doubles the all-electric commuting range for EVs and some employers provide free or heavily subsidized electricity. According to the Department of Energy, employees with access to charging at work are six times more likely to drive an EV.³ As of January 2017, more than 750 workplaces hosted over 7500 charging stations. However, those stations were accessible to only about one million employees across the country.

Publicly available charging includes both Level 2 charging stations and high-powered fast chargers which can fully charge most EV batteries in under thirty minutes. These charging stations are typically commercial ventures for a fee or free and offered in partnership with parking space owners. They are generally found at transit stations, public parking lots, retail locations, rest stops, and curbside in some urban environments. EV charging remains a nascent industry with multiple business models competing to see which will be the most successful. The industry relies heavily on financial partnerships with site hosts and subsidies from government and utilities.

Consumer Awareness

In 2015, the Consumer Federation of America found that greater consumer knowledge about EVs directly correlates with consumer demand. However, a recent review of electric vehicle consumer awareness and outreach found that there is a “general lack of knowledge and awareness about electric vehicles.”⁴ In fact, less than half of US consumers can name an EV make and model and, of that half, 95% could only name the Nissan Leaf or Tesla Model S. Awareness of EV incentives is similarly low with 44% of US consumers aware of the federal tax incentive for EV purchases. The extensive literature review by the International Council on Clean Transportation (ICCT) also confirms that experience with EVs is closely linked with EV adoption. This experience mostly comes from employees driving EVs at work, driving or riding in an EV that is part of a shared mobility fleet, or as part of a ride and drive promotional campaign. In general, the ICCT concludes, “consumers with greater knowledge or experience are more likely to value electric vehicles higher, consider electric vehicles as a future purchase option, and be willing to pay a premium for the technology.”

Strategies in Leading EV Cities

The electric vehicle market primarily emerged in response to California state mandates and associated policies and programs. As expected, California cities lead in EV adoption rates. We first explore the California context and then look at the strategies of leading EV cities.

³ <https://energy.gov/eere/vehicles/workplace-charging-promote-charging-work>

⁴ <http://www.theicct.org/literature-review-EV-consumer-awareness-and-outreach>

California

Representing about half of the US electric vehicle market, California is a global leader in electric vehicles. California has more than twice the charging infrastructure, more than three times the electric model availability, and more than four times the electric vehicle market share as national averages.⁵

The California advantage can largely be attributed a comprehensive portfolio of regulations, policies, financial incentives, charging infrastructure investments, and public-private partnerships which have accelerated the adoption of EVs in the state.

ZEV MANDATE

California currently has a waiver under the Clean Air Act allowing it to set stricter vehicle pollution standards than the federal standards set by the Environmental Protection Agency. Other states can adopt the California standards, but cannot adopt their own standards. Nine states (Oregon, and 8 states in the Northeast) have adopted California's ZEV program to require automakers to sell zero-emission vehicles in their states. The ZEV program requires automakers selling vehicles in California to sell a certain percentage of electric vehicles. The current iteration of the ZEV mandate would require approximately 15% of vehicles sold in California to be electric by 2025. As of 2015, the ZEV market represented 65% of US EV sales.

The ZEV mandate has had a significant impact on model availability in California. The leading California cities in EV adoption rate have over twenty models available. However, ICCT data shows that 80% of metropolitan areas across the country have no more than five EV models available and that 51% of the US population live in an area with five or fewer EV models available. The average number of models available in California cities is just over 15 while the US average is about 7.

LOW CARBON FUEL STANDARD (LCFS)

The LCFS was adopted in California in 2009 and is a performance-based regulation that requires regulated parties to reduce the carbon intensity of their fuel mix by at least 10% by 2020. The program establishes an emissions credit-trading system. Credits are generated by clean transportation fuel providers who sell less carbon intense fuel and then sell their credits to a regulated refinery which uses the credit to meet its LCFS obligation. The credit system has generated millions of dollars of investment in clean transportation choices for Californians. Municipal and corporate fleets and electric vehicle supply equipment providers have leveraged the credit trading marketplace to fund their EV-related investments.

CLEAN VEHICLE REBATE PROGRAM

California's carbon cap-and-trade program has raised billions of dollars in revenue. Some of this revenue funds the Clean Vehicle Rebate Project which offers rebates of up to \$7,000 for new zero emission vehicles in addition to federal incentives. Through this rebate and other types of incentives specifically designed for low and moderate income drivers, California has incentivized the purchase of over 100,000 clean vehicles since 2010.

⁵ http://www.theicct.org/sites/default/files/publications/ICCT_EV_Calif_Cities_201609.pdf

Lessons of Leading EV Cities

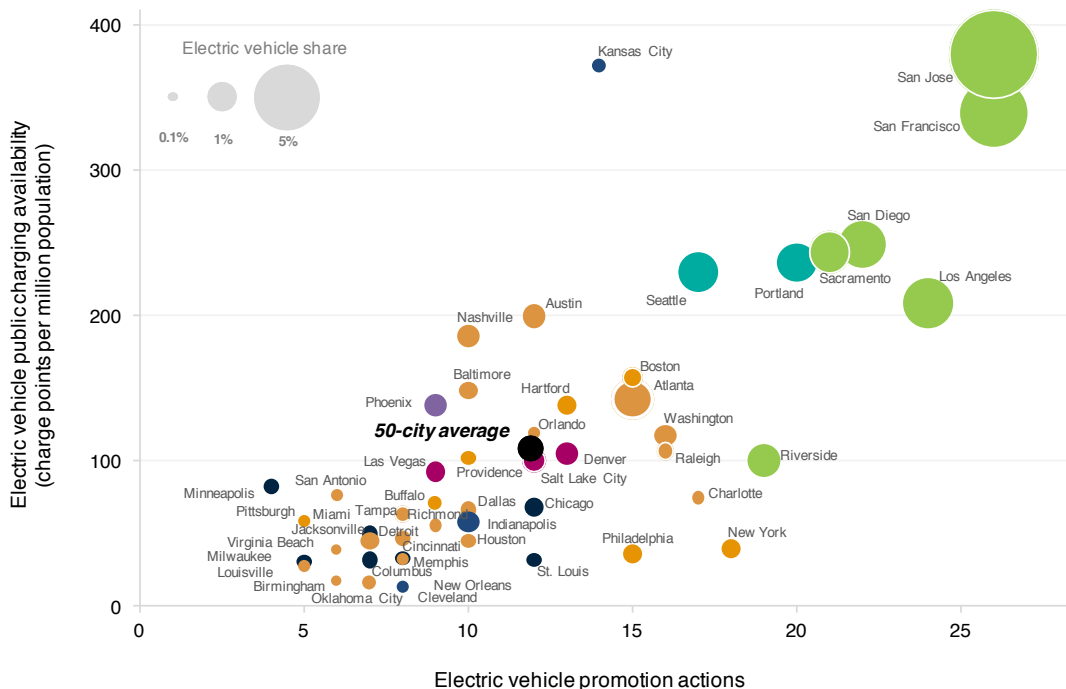
A review of cities in the United States and globally reveals four conditions present in cities with high EV adoption rates:

1. Coordinated and comprehensive action by diverse stakeholders

Cities with high EV adoption rates feature broad and coordinated action by government, utilities, non-profits, and the private sector addressing the three major barriers of cost, convenience, and consumer awareness. Government policies and incentives create the regulatory and financial environment necessary to foster private sector investment in EV infrastructure and services as well as individual purchases. Businesses invest in electrification of their fleets and workplace charging demonstrating innovation solutions to electrification challenges. And the non-profit sector and government conduct consumer outreach and advocacy helping to mainstream EV adoption. Together these actions, particularly when well-coordinated, create the environment which leads to wide-scale EV adoption.

2. Public electric vehicle charging availability

Even though most people charge their vehicles at home, the availability of public and workplace charging is a key driver of electric vehicle adoption in leading EV cities. It is likely that public charging gives drivers confidence that they can charge when needed, increases consumer awareness of electric vehicles, and helps to mainstream EVs in consumers' minds as a viable option. Across the country, cities with the highest EV market share have four times as much public charging as other cities. Workplace charging is also an important factor. In San Jose, for example, Silicon Valley businesses have invested heavily in workplace charging and the city of San Jose has the largest EV market share of the largest fifty cities in the country. In fact, San Jose's share is almost double that of the second highest – San Francisco.



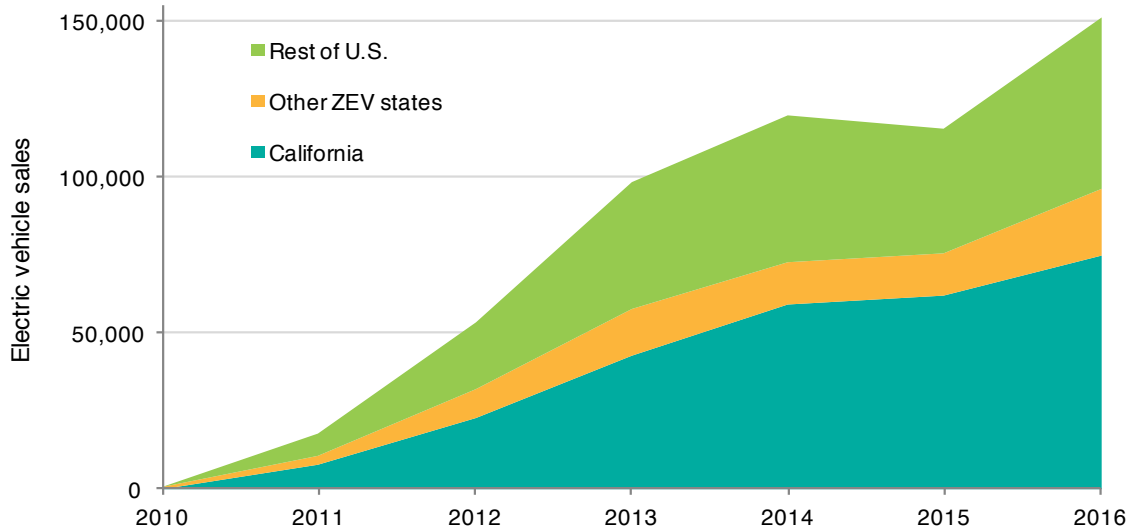
<http://www.theicct.org/leading-us-city-electric-vehicle-2016>

3. Incentives

Incentives remain an important component of government action to drive EV adoption. Incentives include purchase incentives like tax credits and rebates, operating incentives, parking incentives, or special access to HOV lanes or other benefits. Leading EV cities all have significantly higher incentives available for the purchase and operation of electric vehicles. This includes Washington State, where the sales tax exemption has helped drive early adoption of EVs. The power of incentives was evident when in 2015, the Georgia state legislature suspended a \$5000 tax credit for the purchase of an electric vehicle, resulting in an 80-90% decline in sales.

4. Electric vehicle model availability

The availability of a wide range of EV models is linked to high adoption rates. A variety of options is needed to meet the range of consumer needs and drive competition in the market. The states with the greatest number of EV models are those where regulations require auto manufacturers to sell zero emission vehicles (ZEV). As of 2015, 65% of nationwide EV sales occur in states with ZEV mandates. California, the first state with a ZEV mandate, accounted for 54% of the US market in 2015. Manufacturers typically release models in California, then in other states with ZEV mandates, and then more broadly. Consequently, 51% of the US population lives in a city with five or fewer EV models available. However, Washington State, which does not have a ZEV mandate, has relatively high EV model availability. Local efforts to increase demand for electric vehicles is likely to increase the number of models available as automakers will look to leading EV cities for initial deployment of new electric vehicle models.



<http://www.theicct.org/ev-markets-calif-cities-sept2016>

Potential Strategies to Accelerate EV Deployment

There is no one single action that cities can take to significantly increase EV adoption rates. Successful cities deploy a comprehensive suite of strategies that address the barriers of cost, convenience, and consumer awareness. These strategies are explored below.

Cost

PURCHASE INCENTIVES

One of the most successful ways to encourage the purchase of an electric vehicle is to reduce the purchase price. Purchase incentives usually take the form of a tax credit or rebate on the purchase of a new electric vehicle but could be designed to apply to used vehicles as well. Because purchase incentives involve significant costs, federal and state governments are generally best positioned to offer these types of incentives. However, creatively designed purchase incentives are possible at the city level too. For example, many cities in China feature regional purchase subsidies and tax exemptions and the metropolitan government in Paris operates a cash-for-clunkers style subsidy program which provides 25% rebates when an older vehicle is replaced with a low emission vehicle.

OPERATING INCENTIVES

Decreasing the cost of operating an electric vehicle and providing improved access in dense urban environments can increase uptake. Examples include:

- Reduce or eliminate registration fees
- Reduce or eliminate tolls
- Reduce or eliminate public parking fees
- Provide access to restricted travel lanes, such as HOV lanes or bus lanes

Research indicates that these incentives are effective in advancing EV adoption. However, these incentives can work at cross purposes with other important goals such as generating funding to maintain the roadway system, which is also used by EVs, and managing travel demand by encouraging shared mobility and reducing congestion. Therefore, these incentives need to be balanced with the full range of transportation policy goals. These concerns are increasingly relevant as adoption rates increase. Alternately, operating incentives could also be designed to increase the cost of operating polluting vehicles either through registration fees, variable tolling rates, or other mechanisms. Though, these options could raise concerns around racial equity and social justice.

Convenience of Charging

PUBLIC CHARGING

The availability of public charging infrastructure is significantly linked to high EV adoption rates in cities. Local governments can play a role in increasing public charging networks by:

- Streamlining permitting and reducing permitting-related costs
- Providing direct financial incentives such as rebates, grants, or through public private partnerships
- Investing in government-owned infrastructure

- Developing codes and policies to allow and encourage charging stations to be installed in more areas throughout the city
- Partnering with EV stakeholders to ensure charging stations are accessible to the public through web based maps and other EV-related apps which show the availability of public charging stations in an area

WORKPLACE CHARGING

According to the Department of Energy, an employee with access to charging at work is six times more likely to drive an electric vehicle than the average worker. Local governments can adopt workplace charging policies themselves, provide grants or rebates, promote successful workplace charging programs by area businesses, and partner with community stakeholders to provide workshops and other information to encourage the adoption of workplace charging by local businesses. It is important to design workplace charging policies which support the goal of reducing drive alone commute trips. Strategies may include combining workplace charging with local or regional vanpool or carpool programs or prioritizing these programs in areas with poor transit access.

HOME CHARGING

Charging at home is the easiest and most popular way for drivers to charge their electric vehicle. There are two primary ways cities can make home charging more convenient for residents and encourage greater EV adoption:

- Providing grants, rebates, or reduced permitting expenses for the installation of home charging stations
- Developing EV-ready codes and policies to encourage EV charging stations for multi-unit dwellings

Consumer Awareness

FLEETS

Many fleets have outpaced the public in the integration of electric vehicles. Government purchases, state incentives, and procurement guidelines and targets have helped drive this segment of the market. It is also likely that corporate and government fleets, with greater access to capital and a fiduciary duty to constituents or shareholders, are in a better position than individuals to seek out and realize the return on investment of electric vehicles.

In addition to increasing electric vehicle adoption, fleet EVs increase awareness of EVs because they provide opportunities for people to drive and become familiar with the technology. Research indicates that as people become more familiar with electric vehicles and have more experience driving and riding in them, they are more likely to purchase one for their own use.

Seattle participates in the Pacific Coast Collaborative's West Coast Electric Fleets initiative which provides fleet managers a toolkit to help facilitate EV deployment. Many companies in our region are also working to reduce their carbon footprint and have invested in electric fleet vehicles.

Technology is revolutionizing the way people move within cities. As the popularity of shared mobility services grows, so does the opportunity to reduce pollution from the transportation system. Shared mobility fleet vehicles typically drive many more miles per year than the average vehicle increasing the economic and environmental return on investment. The City of New York recently set a goal to convert a third of the taxi fleet to EVs by 2020 and the cities of Denver, Portland, Seattle, and New York recently collaborated with major transportation sector companies on a federal grant application to accelerate the use of EVs in local shared mobility fleets.

PUBLIC OUTREACH AND ENGAGEMENT ACTIVITIES

Different types of outreach and awareness activities from a diverse set of actors help increase general knowledge and understanding about electric vehicles. Research shows that *sustained* programs that utilize a broad range of outreach activities are the most successful at capturing a wide audience of potential consumers. The range of activities in leading cities includes:

- Informational websites
- Ride and drives
- National Drive Electric Week promotional events
- Ribbon-cuttings for public charging stations
- Advocacy and trade association organizations
- Online or app-based maps of charging stations
- Highly visible signage
- EV Tourism
- Dealer awareness activities
- EV group buy programs
- EV showcases or demonstration zones
- Youth education and professional development
- Awards and recognition



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INTERDEPARTMENTAL STRATEGIES

Meeting the City’s goals for reducing transportation pollution requires a coordinated effort across multiple city departments:

- The Office of Sustainability and Environment manages the Drive Clean Seattle initiative coordinating the City’s effort across departments.
- The Department of Transportation manages the right-of-way, including EV charging and parking, and coordinates the integration of electric vehicles into other “Smart Cities” strategies such as autonomous and shared mobility.
- As the City’s municipal electric utility, Seattle City Light manages the city’s electric grid and is working to ensure the city can meet the electrical needs of the transition to electricity as a transportation fuel. Further, City Light is responsible for installing and operating any city-owned publicly available electric vehicle charging stations.
- The Department of Construction and Inspections is responsible for the building and energy codes and ensuring that the city’s codes are prepared for the increase in electric vehicles.
- The Department of Finance and Administrative Services’ Fleet Management Division implements the Drive Clean Seattle Green Fleet Action Plan to electrify the municipal fleet.

This section of the report explores the impacts and the opportunity to support transportation electrification across departments, specifically including Seattle City Light, the Department of Transportation, and including a review of the code environment for electric vehicles and EV charging.

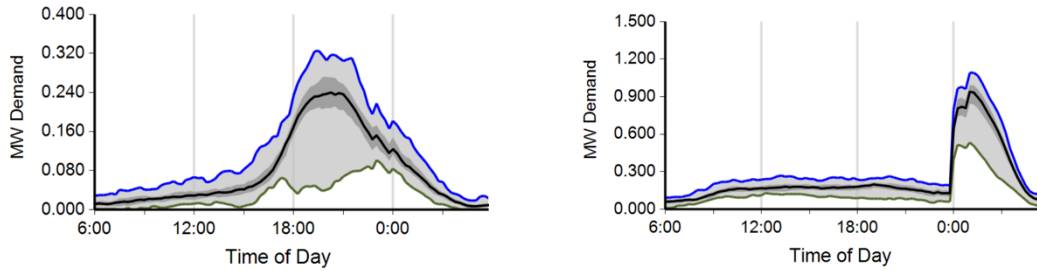
Seattle City Light Technical Report

As the transportation market evolves in Seattle, it is increasingly clear that adoption of electric vehicles and other electrified transportation will continue to grow. The technology, too, is rapidly changing; new vehicles with larger batteries and extended range have the potential to fundamentally change how customers use the electricity system.

EVs at scale highlights both an opportunity and a potential challenge for Seattle City Light. Combined, these vehicles are a large new load that could add value by more effectively utilizing the system, while dramatically reducing the city’s largest source of greenhouse-gas emissions. Unlike other distributed energy resources, EVs increase total electricity demand and help drive down rates by spreading utility fixed costs across greater volumetric sales. Or, conversely, EVs could further constrain the electric grid. Vehicle charging may require the utility to procure additional generating capacity and upgrade distribution infrastructure sooner than planned.

To illustrate this point, the figures below compare two cities studied in the EV Project.⁶ The graph on the left illustrates a typical daily residential charging pattern where there is little influence from the local utility. Drivers begin to charge their vehicle as soon as they get home in the evening, which is aligned with the utility’s evening distribution peak. In contrast, the graph on the right illustrates a daily load shape where the utility offers a price signal encouraging customers to charge later in the evening when there is plenty of capacity on the system.

⁶ Francfort, J. 2014 DOE Vehicle Technologies Office Review. EV Project. Idaho National Laboratory. June 20, 2014. INL/MIS-14-31743



To better understand the opportunity for the utility, Seattle City Light commissioned a team from across the organization to carry out a technical analysis and lay out a case for how the utility should prepare for the evolving market. Because transportation electrification does not fit neatly into one segment of our existing business, team members had expertise in finance, distribution engineering, energy planning, communications, and customer service.

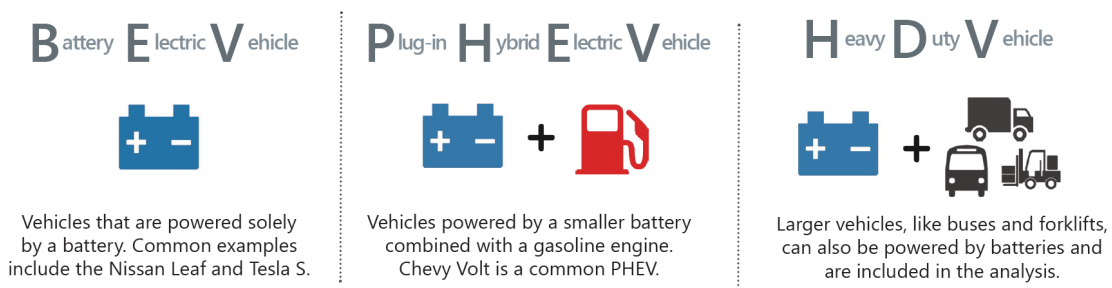
The goal was to answer three questions:

- 1) What is the value of transportation electrification to the utility and our customers?
- 2) Are there limitations to the system from an increased charging load?
- 3) What role should City Light play in transportation electrification market?

Technical Assessment

City Light worked closely with Energy + Environmental Economics (E3) to develop a technical assessment of the financial, grid, and environmental impacts of EV adoption in our service territory. The methodology is consistent with well-established practice to evaluate the cost effectiveness of energy conservation—specifically the Total Resource Cost (TRC) and the Ratepayer Impacts Measure (RIM). This is heavily informed by the California Electric Transportation Coalition Electrification Analysis published in 2015, with inputs and assumptions tailored to City Light’s system.

The methodology is centered around a benefit/cost model of transportation electrification growth in our service territory and includes Battery Electric Vehicles (BEVs), Plug in Hybrid Electric Vehicles (PHEVs), as well as Heavy Duty Vehicles (HDV), such as forklifts, and buses⁷.



The model starts with an initial population of EVs and adds new vehicles each year on varying adoption curves. Based on inputs for avoided costs, vehicle performance, charger parameters, load profiles, and other factors, the

⁷ In other places throughout the document, EV refers to all plug-in vehicles.

model calculates annual EV costs and benefits incurred within City Light’s territory. The model accounts for non-EV load growth as well, and is thus able to separate distribution upgrades triggered by baseline growth from those attributable directly to EVs.

INPUTS AND SCENARIOS

Due to the nascent nature of the EV industry, an analysis inherently involves a tremendous amount of uncertainty. If EV adoption rates, charging behavior, cost, or other major parameters do not follow forecasts, results will differ. Scenario analyses help us understand which variables have the greatest impact on our cost and benefit results, as well as provide the range of possible outcomes.

The baseline scenario (“Base Case”) is aligned to Washington State’s near term policy goal of 50,000 EVs on the road by 2020. We estimate a quarter of the vehicles to meet the State’s goal will come within our service territory, up from roughly 5,000 vehicles on the road today.

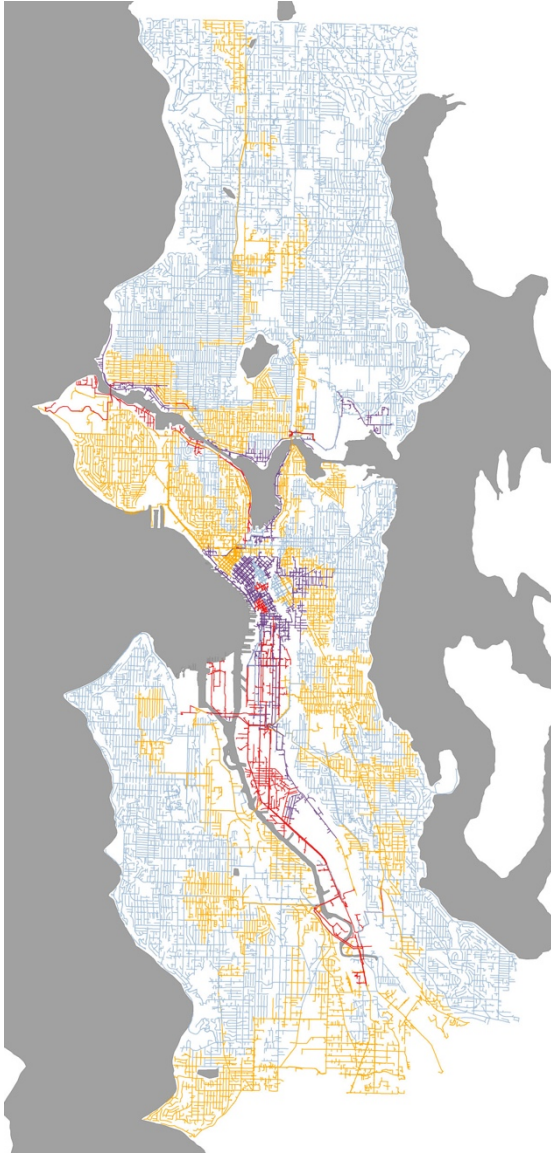
Our analysis consists of the base case accompanied by six sensitivity cases. As shown in the table below, each of our six cases is designed to test the sensitivity of EV impacts to key variables such as adoption rate, charger prices, carbon prices, and EV charging behavior. For example, adoption rates after 2020 varied from roughly from 90,000-224,000 EVs in Seattle by 2030.

	BASE CASE	HIGH ADOPTION CASE	HIGH CHARGER COST CASE	CONSERVATIVE CASE	HIGH GAS & CARBON CASE	MORE PUBLIC CHARGER CASE	RATE BASE CASE
GAS PRICE (\$/GALLON OF GASOLINE)	EIA (reference Price case)	-	-	10% less than base case	EIA (High Gasoline Price case)	-	-
CARBON PRICE (\$/METRIC TON CO₂)	35% less than SCL 2016 IRP forecast	-	-	-	SCL 2016 IRP Carbon Price	-	-
ADOPTION CURVE	50,000 LDVs by 2020	62,500 LDVs by 2020; 25% increase from base case	-	-	-	-	-
CHARGER COSTS	See Table 6 in Technical Appendix	-	3x base case for commercial chargers; + \$1000 for residential L1 and L2 chargers	-	-	-	-
VEHICLE COSTS	EV vehicle prices decline 9% annually	-	-	EV vehicle prices decline at 4.5% annually, ½ the base case rate	-	-	-
CHARGING PATTERN	54% of EVs charge only at home; 46% charge both at home and workplace	-	-	-	-	All EVs charge both at home and at the workplace	-
RATE BASE	SCL pays none of the charger costs	-	-	-	-	-	50% of charger costs added to SCL rate base

SPATIAL DISTRIBUTION OF CHARGING

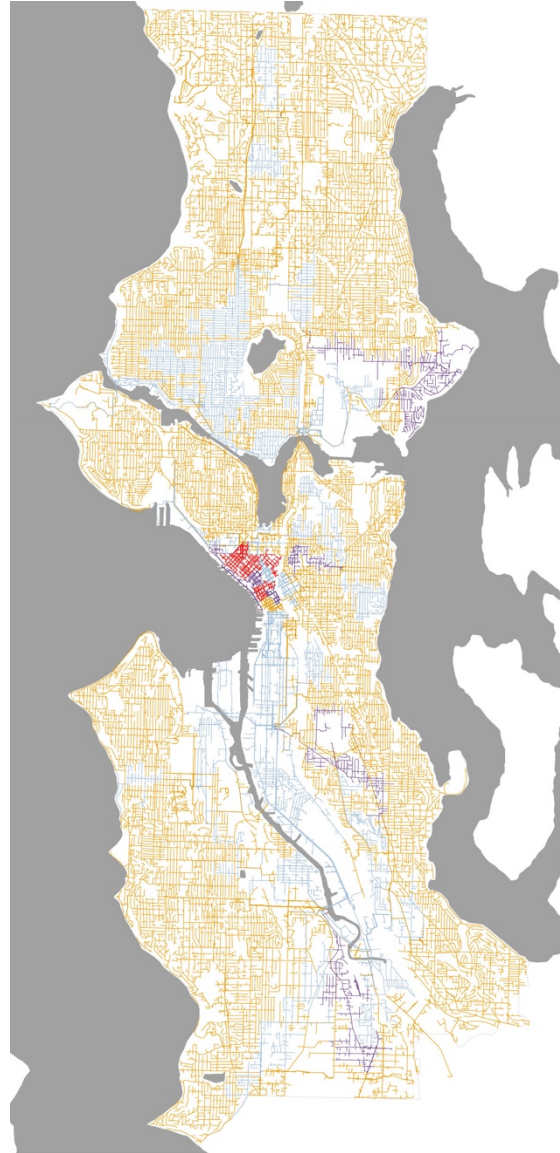
An important part of accurately estimating financial impacts is developing a mechanism that distributes forecasted EVs across the distribution grid in a realistic manner. We calculated the percentage of total annual energy load from each ratepayer class on each of City Light's 178 distribution feeders. The EV load associated with that ratepayer class was then distributed across the feeders using the same percentage breakdown. For example, if a feeder served 2% of the total annual residential load, our model allocated 2% of the LDV home charging load to that feeder.

WORK



0%-0.25%
0.26%-0.5%
0.6%-1%
1.1% +

HOME



0%-0.5%
0.6%-1%
1.1%-1.5%
1.5% +

BENEFIT COST APPROACH

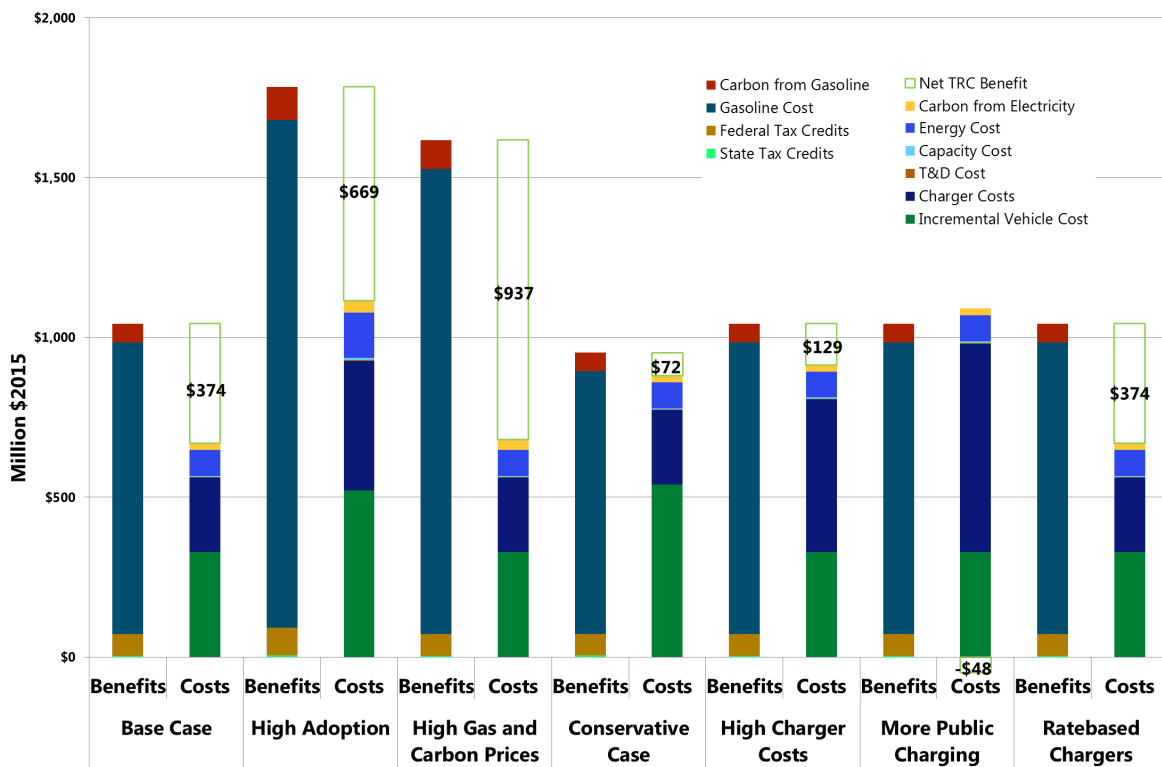
This analysis uses two tests to evaluate the cost-effectiveness of EVs. These tests are the Total Resource Cost Test (TRC) and the Ratepayer Impact Measure (RIM); both are common in utility resource planning. The basic principle of both tests is to identify each source of cost and benefit associated with a technology, and then compare the summed costs to the summed benefits. If the benefits exceed the costs, the technology has a positive net benefit and is cost-effective. If the costs exceed the benefits, the technology is not cost-effective.

The difference between the TRC and RIM is that they perform this evaluation from different stakeholder perspectives. The TRC measures costs and benefits accrued across the entire economy due to the technology being evaluated. The TRC therefore includes costs paid by the utility as well as those borne by EV customers. The RIM looks specifically at utility ratepayers. The benefit is the revenue the utility brings in from EV charging, while the only costs that are considered are those that fall on the utility.

TOTAL RESOURCE COST TEST RESULTS

The figure below represents TRC results for the Base Case and six sensitivities. These results are summed across the entire portfolio, so each case includes all vehicles. All cases assume a Time-of-Use (TOU) rate schedule with lower rates during off-peak periods.

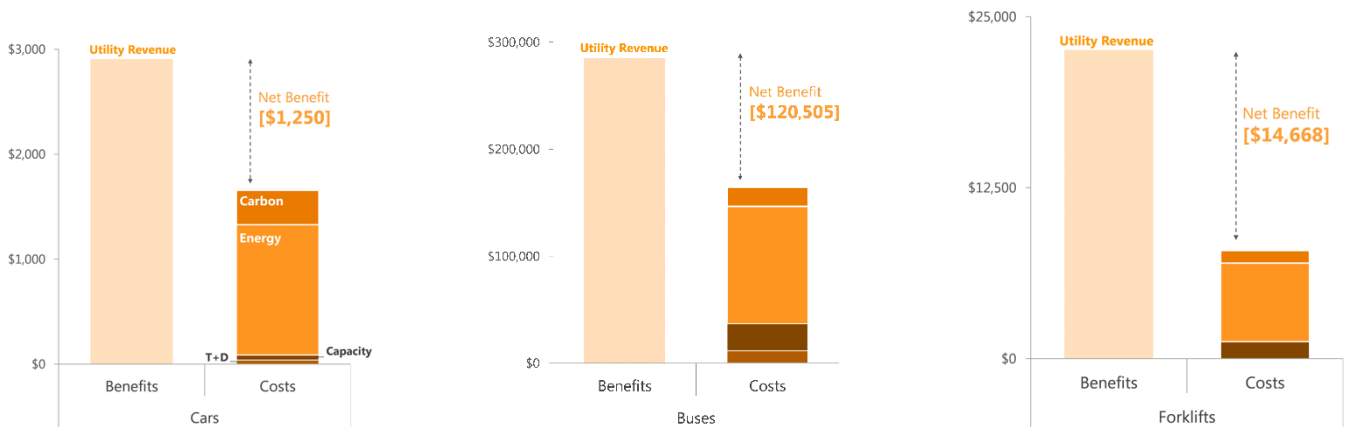
The Base Case produces a positive net TRC benefit of \$374 million. Increasing adoption by 25% in the High Adoption case produces a 79% increase in net benefit compared to the base case. The High Gas and Carbon scenario produces the largest net benefit, increasing by 150% over the base case to \$937 million. The Conservative Case, in which gas prices are reduced by 10% and vehicle price declines at half the rate used in the Base Case, produces a smaller but still positive net benefit of \$72 million. The High Charger cost case has the same total benefits as the base case but roughly double the charger costs, reducing the net benefit by two thirds compared to the base case.



RATEPAYER IMPACT MEASURE RESULTS

The RIM lets us drill down to only the costs and benefits that accrue to the utility and our ratepayers. Again, in all scenarios, there is a large net benefit from charging and there is less variance across each scenario than the TRC results.

Of importance to City Light are the RIM results on a per vehicle basis, as shown in the figures below. This net benefit can also be interpreted as the maximum per-vehicle cost that utilities could incur while still maintaining a net RIM result of zero. For example, this revenue surplus could go towards costs for a charging program or could help the utility pay other, non-EV related costs, thus benefiting ratepayers who do not have EVs. For forklifts and buses, both vehicle types have large positive net benefits, orders of magnitude larger than the LDV per-vehicle net benefits. While buses and forklifts are more expensive vehicles, their net benefit is proportionately larger than passenger vehicles due their higher relative use. For example, an average car drives 30 miles a day, while a bus can drive hundreds of miles daily.



GREENHOUSE GAS EMISSIONS (GHG)

GHG emission reductions and improved air quality are among the primary motivations for transportation electrification. Electric vehicles powered by City Light’s carbon neutral electricity can be assumed to have zero GHG emissions. City Light is powered primarily by hydro generation, and plans to meet all future energy demand with conservation and renewable energy. To achieve carbon neutrality and GHG neutral power for its customers, City Light voluntarily mitigates its small share of GHG emissions, including operations and power purchases, with GHG offsets. This means that GHG emissions are reduced by 100% for City Light powered EVs, compared with gas powered vehicles.

In the High Adoption use, this could prevent release of approximately 351,500 metric tons of annual GHG emissions by year 2030, yielding a total GHG reduction of over 3.5 million metric tons over the lifetime of the program. This assumes each vehicle has a lifetime of ten years. Adoption of electric vehicles will also prevent release of many other harmful and hazardous tailpipe emissions, leading to less local air pollution in City Light’s service territory, making Seattle a healthier place to live.

While the environmental benefits of electrification are clear, the cost of greenhouse gas offsets is not a key financial driver in a cost-benefit electrification analysis. Compared with offset costs, other financials such as; gasoline prices, technology costs, and charging infrastructure costs are far more impactful to the financial analysis.

GENERATION IMPACTS

Projected EV adoption will add additional electric load that City Light must serve with its generation resources. However, we believe these loads can be handled largely by our existing portfolio. In the base case, we expect EVs to add a relatively modest 38 aMW of load per year by 2030, much of which will be offset by increases in building efficiency.

DISTRIBUTION IMPACTS

One of the most promising findings of this analysis is that EV adoption at the base or high adoption rates is very unlikely to incur prohibitive distribution costs for City Light. Despite the fluctuations across rate schedules and adoption rates, transmission and distribution (T&D) costs make up a very small percentage of overall utility costs. For both adoption scenarios, T&D costs account for 2-3% of utility costs under the TOU rate and 9% under the flat rate, as shown in the table below. Any potential energy and capacity costs the utility will incur to serve future EV load will be much larger than the T&D costs. Overall, our results suggest that EV adoption in City Light's service territory is highly unlikely to require widespread upgrades to the distribution grid.

SCENARIO	RATE SCHEDULE	TRANSMISSION & DISTRIBUTION COSTS (MILLION \$ 2015)	PERCENT OF UTILITY RIM COSTS*
Base Case	TOU	\$3,404,856	2.7%
Base Case	Flat	\$14,658,792	8.9%
High Adoption	TOU	\$4,768,961	2.3%
High Adoption	Flat	\$24,157,165	8.8%

*RIM costs include energy, capacity, transmission and distribution, RPS compliance, and carbon emissions from electricity generation.

A partial explanation for why T&D costs are so low is the amount of available capacity already existing on City Light's 26 kV distribution system. Roughly 80% of feeders can add at least 552 LDV chargers or 8 bus chargers before needing a capacity upgrade. This is relative to approximately 2,500 customers on an average residential feeder. The high amount of available capacity on the City Light distribution grid will be able to absorb a significant portion of the new EV charging load, so distribution upgrades will likely be restricted to areas with an unusually high EV density or where high EV density coincides with rapidly increasing non-EV load.

Program Roadmap

From our team's work, we see a consistent net benefit for transportation electrification in our service territory. This is true for EVs, buses and non-road transportation from both a utility and wider economic perspective. Similarly, analysis shows that our distribution system has capacity to support large-scale EV adoption at low additional cost.

Having answered our initial questions, we see City Light playing an essential role in the success of transportation electrification in Seattle. As a publicly owned electric utility, we support customer-driven programs that are consistent with our utility purpose of providing affordable, reliable and sustainable power.

Our programs will focus on increasing the availability of electric vehicle charging. This will allow further access to carbon-neutral electricity that customers are demanding, better utilize current utility assets and contribute to the aggressive goals of the Drive Clean Seattle Initiative. Over the next year, we will implement two pilot programs

focused on public stations and residential charging. In addition, we will support fleet and transit electrification through technical assistance and technology demonstration projects.

DC FAST CHARGING PILOT

City Light will construct 20 public DC fast charging stations at 10-15 sites within our service territory, which will triple their availability. These stations allow EVs to charge most of their battery pack in quick 30 minute sessions at either City-owned property or private sites. The stations will be compatible with all available EV models that are designed to accept fast charging. City Light will own and install the charging infrastructure, and will charge a reasonable fee for their use.

Procurement, design and site selection will progress through 2017, and the first stations will be in operation by the end of the year. The sites will be highly visible and easy-to-access locations. The visibility is key to show City Light's commitment to the technology, raising consumer awareness about EVs, and also improving charging availability for residents with limited parking and shared used mobility applications.

RESIDENTIAL CHARGING PILOT

In addition to public charging, City Light will help install at least 200 Level II stations in customers' homes. These stations will facilitate data collection about location and usage, and allow us to better understand in more detail the impact to our distribution system. For the customer, it will lower the initial cost and uncertainty with the technology.

Initially, the program design will be based on the utility owning the charging station and the customer will have a manageable payment on their electricity bill. With additional authority from the State, the program design might shift to a customer incentive. We are still determining eligibility and if the program will be targeted by market sector, but it is scheduled to launch by the end of 2017.

ELECTRIC FLEETS

Fleets, both large and small, are a perfect opportunity to electrify vehicles that see regular and consistent use. However, the primary challenge in fleet electrification is the enormous quantity of charging infrastructure required, often at a single location.

To address these issues, City Light is committed to better understanding best practices and lowest cost means to support widespread fleet electrification. Specifically, the SeaPark Garage EV Charging Infrastructure Demonstration, in partnership with EPRI, will test a range of charging technologies on the City's fleet vehicles. There is a great degree of variation in charging design, from simple charge stations that provide no external control or communications to advanced units that are supported by remote data collection, user authentication and control capabilities. This project will help City Light understand ways to leverage managed charging technology to mitigate utility and customer infrastructure upgrades.

TRANSIT

All-battery electric buses are a nascent but growing segment of the transit market. King County Metro has acquired three all-electric buses, and has committed to having 120 in service by 2020. Such a rapid deployment will require a significant expansion in charging infrastructure, which will likely be located at a Seattle base. City Light will proactively work with Metro to provide technical support and address electric service opportunities. We will design

a strategy that makes the most sense for both organizations—addressing Metro’s need for flexibility in the future and City Light’s ability to optimize the load on our distribution network.

PENDING LEGISLATION

While these programs will leverage utility ownership and our technical expertise, we also believe there is a role for City Light to encourage private development of charging infrastructure. However, we lack the authority to use ratepayer dollars for this purpose. Specifically, under Article VIII of the Washington State Constitution, incentives or any other payment for privately owned charging infrastructure currently could be considered a gift of public funds.

In parallel to program development, City Light will also pursue legislative authority for more flexibility in our program design. We are closely following House Bill 1335 in the current special session, which would provide authority for using ratepayer funding to support private charging stations. This could affect program design, specifically on residential and transit opportunities.

SDOT Opportunities

The Seattle Department of Transportation (SDOT) is committed to helping the City achieve its climate goals, including the Drive Clean Seattle initiative’s objective to achieve 30% of all vehicles being electric by 2030. Achieving this goal will require a mixture of policy changes, procurement changes, infrastructure investment, and public-private partnerships. SDOT’s approach is to enable the expansion of the supply of charging infrastructure citywide (particularly in the public right-of-way) and promote the expansion of the supply of electric vehicles used for shared mobility services like free-floating car share, one-way car share, TNC-based ridesourcing and ridesplitting services, and other taxi and for-hire services.

The following implementation strategies represent near-term and long-term opportunities that would expand access to charging for people who do not have access to a private garage with particular emphasis on optimizing the use of limited EV charging for shared mobility.

Advance Electric Shared Mobility and EVSE Supply at Shared Mobility Hubs

The Seattle Department of Transportation recently developed a Shared Mobility Hub program to aggregate transportation connections and travel information into a seamless, understandable, and on-demand travel experience. SDOT plans to create a dense network of shared mobility hubs throughout the city, often co-located with major transit facilities and in places where frequent transit services intersect. A key objective for shared mobility hubs is to advance the use of electric car share and ridesourcing vehicles by accommodating fast charging at or very near hub locations.

Strategically siting fast charging infrastructure at major transit connections will tap into multiple benefits, including:

- Improving access to transit, particularly in areas with poor first mile/last mile connections
- Encouraging shared mobility service providers and transportation network company drivers to invest in EVs
- Expanding the supply of clean transportation vehicles
- Exchanging reliance on privately-owned vehicles with more demand for shared EV fleet vehicles

To funnel charging station investment at shared mobility hubs, SDOT will implement the following over the next two years:

- Develop strategy to facilitate use of electric transportation at Shared Mobility Hubs, focusing on demand, supply needs over time, and implementation priorities
- Work with electric charging infrastructure providers to target investments at shared mobility hubs
- Coordinate with Sound Transit and King County Metro to site charging infrastructure on transit property

Develop a Network of Off-street Shared EVSE Clusters

Many neighborhoods in Seattle have land uses with commercial or institutional surface parking lots and structures that are used intensely during weekday business hours but underutilized through the night. Many parking facilities are sparsely used or vacant from 7:00 p.m.–7:00 a.m., creating opportunities to rent the empty parking spots to residents interested in access to charging. This strategy requires the following implementation actions over the next two years:

- Begin a partnership and collaboration with Seattle Department of Construction and Inspections to implement this strategy
- Develop an off-street EV charging cluster plan to determine phased supply for lease-based EV charging
- Develop a lease agreement template for commercial property owners to execute shared use leases for overnight EV storage and charging
- Study the feasibility and organizational structures for a shared EVSE parking brokerage (either publicly managed or in partnership with one or more private app developers)

EV-Ready Codes

Codes and regulations are important tools to encourage the installation of electric vehicle charging equipment. Recent code changes in Seattle have helped support EV charging. Our Land Use Code was amended in 2011 to allow charging devices in yards in single-family zones. In addition, the definition of “retail sales and services, automotive” was clarified to allow battery exchange stations for electric vehicles to be included among automotive retail sales and service uses allowed in commercial zones. Finally, the definition of “principal use parking” was clarified so that battery charging stations and rapid charging stations for electric vehicles are considered accessory to parking facilities. The land use code present an opportunity to require the electrification of parking spaces. For example, San Francisco recently adopted a *100% EV Ready* ordinance requiring parking spaces in new residential and commercial buildings.

Code Changes to Support EV Charging

RELEVANT CODES	CODE CHANGES TO EXPLORE
Land Use Code/Zoning Title 23 of the Seattle Municipal Code (SMC)	Add requirements to provide EV charging and/or the electrical infrastructure needed to support specific levels of charging in the future.
Residential Code SMC Title 22	Include references to the new land use code requirements.
Electrical Code Seattle amendments to the 2014 edition of the National Electrical Code adopted by Ordinance: 124593	This code currently includes electric capacity requirements for the needed level of charging infrastructure, which would be determined by the land use code. References would be included to the new land use code requirements.
Priority Green Expedited Voluntary program to shorten the time to get a new construction permit in exchange for meeting a green building rating	Explore adding projects that exceed the new land use code requirements for EV charging to be eligible for Priority Green. Projects would also need to meet a green building rating including: Built Green® 4-Star, 5-Star, or Emerald Star; or Leadership in Energy and Environmental Design™ (LEED)® gold or platinum.



5

RACIAL EQUITY ANALYSIS

2016 Racial Equity Toolkit

A race and social justice lens is essential to ensure the benefits of transportation electrification accrue to those most impacted by the negative effects of a fossil fuel based transportation system and to ensure transportation electrification strategies do not exacerbate existing inequities. An important goal of the Drive Clean Seattle initiative (DCS) is to maximize air quality, cost-savings, and other benefits of electric transportation for communities of color. In 2016, the Office of Sustainability and Environment completed a Racial Equity Toolkit (RET) for the Drive Clean Seattle initiative.

The Seattle Equity & Environment Agenda served as the foundation for the development of racial equity outcomes, which were refined with input from the Community Partners Steering Committee.

Drive Clean Seattle Racial Equity Outcomes

1. Improve air quality in the places where EEL communities live, learn, work and play.
2. Bring economic benefit to EEL communities through an increase in green transportation jobs and a decrease in transportation costs.
3. EEL communities have equitable access, accountability, and decision-making power in Drive Clean Seattle.
4. Highlight the clean transportation stories and experiences of EEL communities.

Drive Clean Seattle program has been collaborating with the Equity & Environment Initiative (EEI) to identify actions to advance these goals. Drive Clean Seattle and EEI staff collaborated to host a workshop with the EEI Community Partners Steering Committee. which resulted in:

- Shared goals, identified existing connected work, identified and shared creative and unusual ideas to advance the Equity & Environment Agenda.
- Surfaced barriers, assumptions, and questions regarding participation in DCS from communities of color.
- Began to establish a collaborative relationship with community leaders.

Drive Clean Seattle seeks to develop policies and make investments which center environmental justice. Reducing transportation pollution is an important environmental justice strategy because the environmental benefits of electric transportation such as better air quality, decreased climate pollution, and less storm water pollution all address environmental hazards which disproportionately affect communities of color. Further, by electrifying the transportation sector, the City is creating a less costly and more convenient transportation experience. Electric transportation provides significant potential economic benefits for communities of color such as green jobs in clean transportation or in related electrical work and more money circulating in local economies as fuel dollars are kept at home. However, there is real concern that, without a diverse set of policies in place, simply increasing EV infrastructure in communities could increase rents or other cost of living indicators and increase risks of displacement and gentrification.

2017 Race and Social Justice Strategies

Building on the work in 2016, the Drive Clean Seattle team met with the Environmental Justice Committee early in 2017. Continuing to build this partnership will help deliver on the racial equity outcomes established as part of the RET. Important racial equity implementation actions for 2017 include:

- Utilize creative, culturally relevant strategies and foster community cohesion by connecting EV and transportation programs to cultural anchors, such as community centers, churches, and service providers. Initial ideas include locating chargers to serve these facilities, provide maps to local services at charging stations, creating interpretative signage about electric vehicles, engaging local youth in creating art for the charging stations.
- Engage community to learn how increasing EV infrastructure may unduly burden EEI populations and have unintended consequences around displacement and gentrification. Work with community and stakeholders to identify and mitigate unintended consequences such as impacts to parking for local businesses, increased property values, and changes in types of jobs needed to service electric vehicles.
- Partner directly with community-based organizations, work in close collaboration with the EEI, and build partnerships with service industry anchors to develop a suite of policy and program actions which will work in tandem to address racial equity in transportation electrification. Early ideas brainstormed by the Environmental Justice Committee include developing job training programs, providing interpretative signage at charging stations describing the benefits of electric vehicles, and collaborating with local community service providers to use electric vehicles. We will continue to explore the ideas in collaboration with the Committee.
- Assist in any racial equity analyses for major projects within Drive Clean Seattle by providing data and coordinating stakeholder engagement with the Environmental Justice Committee and others. This will help project toolkits have integrated outcomes that flow from the DCS toolkit similar to how the DCS outcomes were coordinated extensions of the Equity & Environment Agenda.



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CONCLUSION

To meet our carbon neutrality goals, it is critical that we electrify the transportation sector. Light duty vehicles, whether owned, shared, autonomous, or part of a fleet, will remain an important component of the transportation system. Therefore, the City set a goal to increase electric light duty vehicle ownership to 30% by 2030. To meet this goal and broader electrification goals, Mayor Murray launched the Drive Clean Seattle Initiative to significantly expand our work to electrify the transportation sector at scale and to put us on the path to carbon neutrality.

The experience of cities with the highest rates of EV adoption demonstrates that local government can play a significant role in accelerating the transition to electric transportation by addressing the most significant barriers to EV adoption. Seattle is deploying a comprehensive suite of strategies that address the barriers of cost, charging convenience, and consumer awareness while centering environmental justice. Following the example of other leading cities and thinking about our unique set of circumstances and characteristics, Seattle's electrification strategies are being designed to:

- Be coordinated and comprehensive and feature a diverse set of stakeholders.
- Leverage technology to advance the goals of a shared, clean, and equitable transportation system.
- Ensure the benefits of a clean transportation system accrue to those most impacted by the air pollution of the current system.
- Facilitating greater access to charging and prioritize publicly available charging in ways which enable shared mobility, fleet electrification, and other policy goals.
- Increase consumer exposure to electric vehicles and awareness about the benefits of electrification through sustained programs and outreach activities.
- Electrify the City's municipal fleet to lead by example and demonstrate best practices.

As laboratories for innovation, cities are where the future happens first. And, as the level of government most closely connected to people's daily lives, cities have unique opportunities to improve air quality and public health, advance environmental justice, and reduce the economic risks of fossil fuel dependence and worsening climate change through policies and programs which support electric vehicles. Seattle's goals are bold, and our communities' innovative spirit and commitment to environmental quality for all positions us to meet the challenge in ways that yield environmental, community and economic goals.

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