BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

Docket UE-160799, Rulemaking to consider policy issues related to implementation of RCW 80.28.360, electric vehicle supply equipment

COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL

From:
Max Baumhefner
Natural Resources Defense Council
111 Sutter Street, 21st Floor
San Francisco, CA 94104

To:
Steven King, Executive Director & Secretary
Washington Utilities and Transportation Commission
P.O. Box 47250
1300 S. Evergreen Park Dr. SW
Olympia, WA 98504-7250

November 23, 2016

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

The Natural Resources Defense Council (NRDC) submits these comments to the Washington Utilities and Transportation Commission (Commission). NRDC is a non-profit membership organization with around 85,000 members and activists in Washington and a long-standing interest in minimizing the societal costs of the reliable energy services that a healthy Washington economy requires. We have participated in numerous Commission proceedings over the last 30 years with a particular focus on representing our Washington members' interest in the utility industry's delivery of cost effective energy efficiency programs, renewable energy resources, and other sustainable energy alternatives.

II. GENERAL COMMENTS

NRDC urges the Commission to act to realize the full potential of House Bill (HB) 1853 (2015) to accelerate the electrification of the transportation sector in a manner that supports the electric grid. Attached to these comments, please find a recently published NRDC report, "Driving Out Pollution," which details the imperative to electrify the transportation sector and explains why and how the electric industry should play a leading role in that effort. The report, which includes an extensive set of references, describes three phases of utility policy to accelerate the electric vehicle market:

1. *Removing Barriers to Adoption, Ensuring Grid Reliability, and Maximizing Fuel Cost Savings*
2. *Closing the Charging Infrastructure Gap and Promoting Equity*
3. *Capturing the Value of Grid Services and Integrating Renewable Energy*

An excerpt from the reports executive summary is included below:

> *Widespread adoption of electric vehicles (EVs) is an essential strategy for driving carbon pollution out of the transportation sector.*[1] *Large-scale deployment of EVs*

[1] *See* Williams, J.H. et al., *Pathways to Deep Decarbonization in the United States*, Energy and Environmental Economics, Inc. (E3), November 2014; California Council on Science and Technology, *California's Energy Future*: *The View to 2050*, May 2011; Williams, J.H. et al., "The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity," *Science* 335, no. 6064 (January 2012): 53-59; Cunningham, Joshua, "Achieving an 80% GHG Reduction by 2050 in California's Passenger Vehicle Fleet," *SAE International Journal of Passenger Cars—Electronic and Electrical Systems* 3, no. 2 (December 2010): 19-36; Wei, Max et al., "Deep Carbon Reductions in California Require Electrification and Integration across Economic Sectors," *Environmental Research Letters* 8, no. 1 (2013); Melaina, M. and K. Webster, "Role of Fuel Carbon Intensity in Achieving 2050 Greenhouse Gas Reductions within the Light-Duty Vehicle Sector," *Environ. Sci. Technol.* 45, no. 9 (2011): 3865–3871; International Energy Agency, *Transport, Energy, and CO2: Moving Towards Sustainability*, OECD/IEA, 2009; National Research Council, *Transitions to Alternative Vehicles and Fuels* (Washington, D.C.: The National Academies Press, 2013).

also can cut the costs of replacing dirty power plants with clean energy like wind and solar power. And EVs powered by those renewable resources are virtually emissions free.

Realizing this potential requires a robust network of charging stations where consumers live, work, and play. Such a network will pave the way for a larger and more diverse EV market. Electric utilities are uniquely positioned to facilitate the creation of this network because they can make use of spare grid capacity to charge EVs, generating significant new revenues. In turn, the growing customer investment in EVs with large, advanced batteries can be leveraged to bring more renewable energy into the system.

With the right policies, the power and scale of the electric industry could be unleashed to transform the way America travels while saving us money and protecting our health, environment and economy from dangerous climate change.

HB 1853 provides the Commission with a directive and an opportunity to help lead the nation toward this brighter future.

III. RESPONSES TO STAFF QUESTIONS

A. Whether a rule or policy statement is necessary to implement RCW 80.28.360

A policy statement would likely provide the utilities with necessary guidance and help resolve questions unaddressed in the Commission's approval of the 2016 Avista EV charging pilot.

B. How the Commission will consider whether an investment is eligible for the incentive rate of return

HB 1853 specifies that the incentive rate of return is allowed:

1) *If the investment results in "real and tangible benefits to rate payers," and*
2) *If the investment is behind the customer meter and located where vehicles are expected to be parked for more than two hours*

In determining what benefits satisfy the first showing, the Commission may wish to consider the two-pronged test of California Public Utilities Code Section 740.8, which defines the interest of ratepayers with respect to utility investments to accelerate transportation electrification as those benefits that are consistent with both of the following:

(a) Safer, more reliable, or less costly gas or electrical service ..., including electrical service that is safer, more reliable, or less costly due to either improved use of the electric system or improved integration of renewable energy generation;

(b) Any one of the following:

(1) Improvement in energy efficiency of travel.

(2) Reduction of health and environmental impacts from air pollution.

(3) Reduction of greenhouse gas emissions related to electricity and natural

gas production and use.

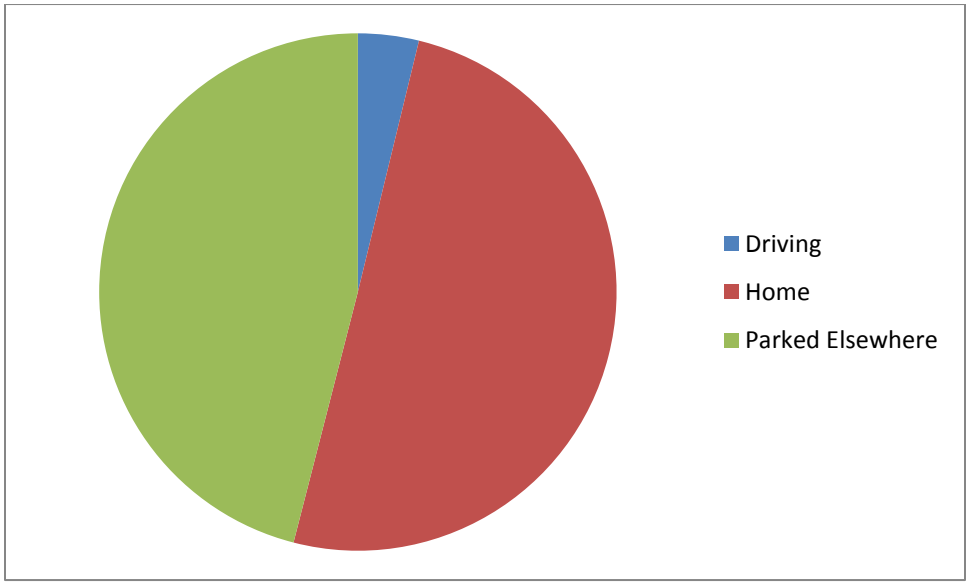
(4) Increased use of alternative fuels.

(5) Creating high-quality jobs or other economic benefits, including in disadvantaged communities...

In sum, this statutory standard of review requires both a showing of "grid benefits" under subsection (a) and a showing of "societal benefits" under subsection (b). Subsection (a) also specifies two forms of grid benefits the Commission should consider as it implements HB 1853, "improved use of the electric system" (e.g., the use of off-peak charging to take advantage of spare grid capacity), and "improved integration of renewable energy generation" (e.g., the use of workplace charging to absorb solar generation or the use of overnight residential charging to absorb wind generation).

In determining if investments are "behind the customer meter and located where vehicles are expected to be parked for more than two hours" the Commission should consider that EVs can be charged whenever they are not being driven, which is 96 percent of the average day, as shown in Figure 1, provided they have access to charging stations.

Figure 1: Estimated Percentage of Time EVs Spend by Location
(Adapted from Langton & Crisotomo, *Vehicle-Grid Integration*, California Public Utilities Commission)[2]



The average American drives 35 miles per day.[3] Using a standard 120-volt wall outlet and the

[2] Chart adapted from Adam Langton and Noel Crisotomo, *Vehicle-Grid Integration*, California Public Utilities Commission, October 2013., www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=7744.

[3] From 1970 to 2008: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2009, 2011, Table VM-1 and annual. From 2009 on, see Appendix A for Car/Light Truck Shares. (Additional resources: www.fhwa.dot.gov.)

"Level 1" charging cords that are provided with every EV, 35 miles' worth of electricity can be delivered in nine hours of low-power charging that can easily be accomplished during off-peak hours for the electricity grid. Using "Level 2" charging equipment, which plugs into a 240-volt outlet (like those used by clothes dryers), 35 miles of electricity can be delivered in two hours. This provides an immense amount of flexibility, considering the typical EV is parked for 23 hours a day.

With respect to locations where vehicles are almost certainly going to be parked for greater than two hours, we recommend the Commission prioritize workplace and multi-unit dwellings, in line with the consensus of experts reflected in a recent report of the National Research Council of the National Academies of Sciences (commissioned by the Department of Energy at the direction of the U.S. Congress) entitled, "Overcoming Barriers to the Deployment of Plug-in Electric Vehicles," which characterizes home and workplace charging as follows:

> *First, home charging is a virtual necessity for all EV classes given that the vehicle is typically parked at a residence for the longest portion of the day. Accordingly, the home is (and will likely remain) the most important location for charging infrastructure, and homeowners who own EVs have a clear incentive to install home charging. Residences that do not have access to a dedicated parking spot or one with access to electricity clearly have challenges to overcome to make EV ownership practical for them.*
>
> *Second, charging at workplaces offers an important opportunity to encourage EV adoption and increase (electric vehicle miles travelled). Specifically, it could double the daily travel distance that is fueled by electricity if combined with home charging and could in principle make possible the use of limited-range (battery electric vehicles) when no home charging is available.*[4]

The National Research Council report also documents the utility of these two charging infrastructure segments for specific classes of EVs:

- Limited-range plug-in hybrid electric vehicles ("minimal PHEVs"), such as the first generation Toyota Plug-in Prius, which has an all-electric range of six miles[5]
- Extended-range plug-in hybrid electric vehicles ("extended-range PHEVs"), such as the Chevrolet Volt, which has an all-electric range of 53 miles
- Typical battery electric vehicles ("limited-range BEVs"), such as the Nissan LEAF, which has a range of 84 miles or 107 miles (depending on the model)
- Long-range battery electric vehicles ("Long-range BEVs"), such the Tesla Model S,

[4] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press, 2015, p. 6.

[5] The newly released 2017 Toyota Prius Prime has an all-electric range of 25 miles.

which has an all-electric range of up to 270 miles, and the forthcoming Tesla Model 3 and Chevrolet Bolt, which will both have ranges in excess of 200 miles.

The report concludes home charging is a "virtual necessity" for all classes of EVs, and that workplace charging can expand the market for all types of EVs, extend the range of pure battery electric vehicles, and increase the "eVMT" (electric vehicle miles traveled) and the value proposition of plug-in hybrid electric vehicles. Table 1, which illustrates these conclusions, is reproduced below from the relevant table in the National Research Council Report:

Table 1: "Effect of Charging-Infrastructure Categories on Mainstream EV Owners by EV Class"[6]

Infrastructure Category	EV Class	Effect of Infrastructure on Mainstream EV Owners
Home (Level 1 or Level 2 AC)	Long-range BEV	Virtual Necessity
	Limited-range BEV	Virtual Necessity
	Range-extended PHEV	Virtual Necessity
	Minimal PHEV	Virtual Necessity
Workplace (Level 1 or Level 2 AC)	Long-range BEV	Range extension, expands market
	Limited-range BEV	Range extension, expands market
	Range-extended PHEV	Increases eVMT and value proposition; expands market
	Minimal PHEV	Increases eVMT and value proposition; expands market

In sum, the Commission should prioritize multi-unit dwellings and workplaces for incentive rate-of-return investments to reflect the broad consensus of experts that doing so is critical to accelerate the EV market. Considerations specific to these two priority segments are discussed below.

1. *Increasing Access to Electricity at Multi-Unit Dwellings is Necessary to Achieve a Mass Market for Plug-in Electric Vehicles*

Drivers are very unlikely to purchase plug-in vehicles if they cannot plug-in at home, where cars are typically parked for 12 hours out the day.[7] Unfortunately, less than half of U.S. vehicles have reliable access to a dedicated off-street parking space at an owned residence where charging infrastructure could be installed.[8] To-date, almost 90 percent of EV drivers live in single-family detached homes.[9] As the National Research Council notes: "Lack of access to

[6] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press, 2015, p. 85.

[7] *See* Adam Langton and Noel Crisotomo, *Vehicle-Grid Integration*, California Public Utilities Commission, October, 2013, p. 5; *see also* Marcus Alexander, *Transportation Statistics Analysis for Electric Transportation*, Electric Power Research Institute, December, 2011.

[8] Traut et al., US Residential Charging Potential for Electric Vehicles, (Transportation Research Part D), November, 2013.

[9] Center for Sustainable Energy, *California Plug-in Electric Vehicle Owner Survey Dashboard*.

charging infrastructure at home will constitute a significant barrier to EV deployment for households without a dedicated parking spot or for whom the parking location is far from access to electricity."[10] It is essential for the EV market to move beyond single family detached homes to scale up to meet long-term climate and air quality goals. Installing charging stations at apartment buildings and other multi-unit dwellings could unlock the potential for a broader, younger, and more diverse market for EVs.

2. Deploying Charging Stations at Workplaces Can Drive Sales, Increase Electric Miles Driven, and Ensure EVs are Available to Absorb Excess Solar Generation

The range-extending function and visibility of charging stations in the social context of a workplace can spur additional vehicle sales. Nissan credits a workplace charging initiative with a five-fold increase in monthly EV purchases by employees at Cisco Systems, Coca Cola, Google, Microsoft, and Oracle.[11] Likewise, the Department of Energy recently concluded employees of companies that participated in its "Workplace Charging Challenge" were 20 times more likely to drive a EV than the average worker.[12]

Workplace charging can effectively double the electric miles driven on a daily basis by EVs. This is especially important for PHEVs that can operate on both electricity derived from the grid or gasoline, such as those listed in which have shorter all-electric ranges than BEVs. There are currently only two PHEVs with all electric ranges that exceed the U.S. daily average driving distance of 35 miles. It should also be noted that annual averages that include many days when cars are not driven mask the fact cars are often driven well in excess of the average and that weekday and weekend driving patterns differ significantly.[13] A more sophisticated analysis of household driving patterns conducted by the Electric Power Research Institute (EPRI) reveals that one-in-four weekdays cars are driven, they are driven more than 40 miles, which exceeds the electric range of all but two PHEVs on the market.[14] Workplace charging can ensure many of those longer trips can still be achieved without the use of gasoline.

---

[10] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press, 2015, p. 116.

[11] Brandon White, Senior Manager of EV Sales Operations, Nissan North America, at EPRI Plug-in 2014, "Taking the 'Work' Out of Workplace Charging."

[12] U.S. Department of Energy, *Workplace Charging Challenge – Progress Update 2014: Employers Take Charge*.

[13] 1970-2008: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2009, Washington, DC, 2011, Table VM-1 and annual. 2009-on: See Appendix A for Car/Light Truck Shares. (Additional resources: www.fhwa.dot.gov).

[14] Marcus Alexander, *Transportation Statistics Analysis for Electric Transportation*, Electric Power Research Institute, December, 2011.

Workplace charging can also improve the utility of BEVs and help alleviate "range anxiety" (the fear of being stranded with an empty battery) for drivers who want to make the occasional longer trip after work. EPRI's analysis reveals that one-in-ten weekdays a vehicle is driven, it is driven in excess of 70 miles, which approaches the point at which many drivers of the pure-battery electric vehicles would begin to suffer from range anxiety, with about ten miles of fuel left to reach a destination with a charging station. The fear of being stranded is not just a source of anxiety for those who have already purchased BEVs, but a significant barrier to a mass market for BEVs.

In sum, workplace charging can drive the adoption of both BEVs and PHEVs, as summarized by the National Research Council:

> *Charging at workplaces provides an important opportunity to encourage the adoption of EVs and increase eVMT. BEV drivers could potentially double their daily range as long as their vehicles could be fully charged both at work and at home, and PHEV drivers could potentially double their all-electric miles. Extending the electric range of PHEVs with workplace charging improves the value proposition for PHEV drivers because electric fueling is less expensive than gasoline. For BEVs and PHEVs, workplace charging could expand the number of people whose needs could be served by a EV, thereby expanding the market for EVs. Workplace charging might also allow households that lack access to residential charging the opportunity to commute with a EV.* [15]

Workplace charging is also essential to allow the Commission to leverage the growing customer investment in EVs to support the integration of variable renewable generation. Washington EV drivers have already purchased batteries that collectively represent about 400 megawatt-hours of advanced chemical energy storage that could be used to address this new load shape by absorbing afternoon solar generation and overnight wind generation.[16] The Commission should take advantage of that sunk-investment to benefit all utility customers. Combining both workplace and residential charging will provide maximum availability to help cost-effectively integrate renewables. Workplace and home charging are needed to make this possible; EVs that are not connected to the grid cannot support the grid.

---

[15] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press, 2015, p. 117.

[16] Assuming sales-weighted average battery size of 24.6 kWh, based on sales data from the Department of Energy's Alternative Fuels Data Center and the Washington State Department of Transportation's estimate of 16,000 EVs in the state.

C. How should other relevant statutes and Commission rules and standards apply to utility investment in EVSE

No response at this time.

D. Whether the Commission should consider or adopt other policies to improve access to electric vehicle supply equipment and allow a competitive market for charging services to develop

While Level 1 and Level 2 charging is well suited for long dwell time locations that clearly would satisfy two hour showing needed for the incentive rate-of-return under HB 1853, the Commission should also consider standard rate-of-return investments in faster charging at public locations where vehicles will not be parked for hours. Researchers from Cornell University who analyzed network effects associated with quarterly EV sales in 353 metro areas found, "the increased availability of public charging stations has a statistically and economically significant impact on EV adoption decisions."[17] According to surveys conducted at such locations in the San Francisco Bay Area by NRG's EVgo, when given the choice, drivers prefer Direct Current (DC) fast charging 12-to-1 over Level 2 charging.[18] Washington's network of DC fast charging stations must be significantly expanded in order to accelerate the market for BEVs that cannot rely upon gasoline to make the occasional longer trip.

Consumer research shows the lack of "robust DC fast charging infrastructure is seriously inhibiting the value, utility and sales potential" of BEVs.[19] In sum, without access to a reliable network of DC fast charging stations to give consumers the confidence they need, many will not purchase pure BEVs. According to market research done by Nissan, having sufficient fast charging infrastructure in place would double the number of LEAF owners who would re-purchase a BEV.[20] Nissan also saw a marked increase in LEAF sales in 2013 when they deployed a large number of DC fast charging stations across North America and Europe.[21] Similarly, Tesla officials report their DC fast charging network has been critical to growing sales of the Model S

---

[17] Li et al., *The Market for Electric Vehicles: Indirect Network Effects and Policy Impacts*, Cornell University, February, 2015.

[18] Charles Morris, *Given the choice, EV drivers prefer DC fast charging 12-to-1 over Level 2*, Charged EVs Magazine, November 12, 2015.

[19] Norman Hajjar, *New Survey Data: BEV Drivers and the Desire for DC Fast Charging*, California Plug-in Electric Vehicle Collaborative, March 11, 2014.

[20] Peterson, David, "1700 Fast Chargers by 2016", presentation to the California EV Collaborative, Nissan North America, March 10, 2015. Slide 5 citing Nissan's Market Intelligence Report

[21] Rovito, M., Charged Electric Vehicles Magazine, "Will Nissan's No Charge to Charge program drive LEAF sales?" July 3, 2014.

sedan.[22] However, deploying fueling infrastructure is not the core business of automakers, who did not enter the gas station business to sell gasoline powered vehicles. Likewise, while state and federal programs have supported much of the existing charging network, public funding alone will likely not be sufficient to meet the scale of the challenge. Unfortunately, without extremely high-utilization rates, it is difficult for independent firms to realize a profit in the time frame required for most private enterprises.[23]

Advances in battery technology that enable affordable longer range BEVs, such as the forthcoming Chevrolet Bolt, will not reduce, but increase the need for DC fast charging stations. Most consumers will not attempt to make the occasional intercity trip using limited-range BEVs, because recharging multiple times, even with DC fast charging stations, would significantly extend the time required to reach a destination. However, the Tesla DC fast charging network is evidence the combination of longer-range vehicles and the availability of DC fast charging can both enable vehicle sales and intercity travel. Tesla reports that usage rates of its DC fast charger network for road trips increased five times this summer relative to the previous summer.[24] As more automakers introduce vehicles that can complete the occasional longer trip while re-fueling during stops that would likely be made regardless to eat meals, use restrooms, or buy coffee, demand for DC fast charging stations will increase significantly.

IV. CONCLUSION

HB 1853 presents the Commission with a singular chance to help insulate drivers from the wild fluctuations of the global oil market, arrest a dangerous experiment with the chemistry of the earth's atmosphere, and protect our lungs from harmful tailpipe pollution. The Commission should seize this opportunity.

Dated: November 23, 2016 Respectfully submitted,

Max Baumhefner
Natural Resources Defense Council
111 Sutter Street, 21st Floor
San Francisco CA, 94104
mbaumhefner@nrdc.org

[22] Cal Lankton, Director of EV Infrastructure, Tesla Motor Company, at EPRI Plug-in 2014, "Plenary Panel: Technology Marches On - The Impact of New Vehicle and Infrastructure Technologies."
[23] The EV Project, *Lessons Learned on the EV Project and DC Fast Charging*, April, 2013.
[24] Nicholas Brown, *Tesla Supercharge Use Increased 5x Over In 1 Year*, CleanTechnica, September, 2015.