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BEFORE THE PUBLIC UTILITIES

COMMISSION OF NEVADA

Rulemaking to implement the provisions of Senate Bill 145 (2017).	Docket No. 17-08021

Breanne Potter
Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, Nevada 89701

Re: Docket No. 17-08021 Comments of the Natural Resources Defense Council, Sierra Club, Southwest Energy Efficiency Project, and Western Resource Advocates

Dear Ms. Potter,

Please accept for filing the "Comments of the Natural Resources Defense Council, Sierra Club, Southwest Energy Efficiency Project, and Western Resource Advocates," in reference to Docket No. 17-08021, which are being submitted pursuant to the Public Utilities Commission of Nevada workshop of November 20th, 2017.

Executed on December 18, 2017.

Sincerely,

/s/ Max Baumhefner
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BEFORE THE PUBLIC UTILITIES

COMMISSION OF NEVADA

Rulemaking to implement the provisions of Senate Bill 145 (2017).	Docket No. 17-08021

COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL, SIERRA CLUB, SOUTHWEST ENERGY EFFICIENCY PROJECT, AND WESTERN RESOURCE ADVOCATES

December 18, 2017

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I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

In response to the request issued at the workshop held at the Public Utilities Commission of Nevada (Commission) on November 20th, 2017, the Natural Resources Defense Council (NRDC), Sierra Club, Southwest Energy Efficiency Project (SWEEP), and Western Resource Advocates (WRA) submit these comments recommending programs to be implemented pursuant to Senate Bill (SB) 145. Summary of recommendations contained in these comments:

- NV Energy should provide electrical infrastructure (via a modification to existing line extension policies) to support Nevada's use of 15 percent of VW Environmental Mititagtion Trust resources to deploy Direct Current (DC) Fast Charging stations along highway corridors. This would stretch the state's resources further, enabling a more robust DC Fast Charging network.
- NV Energy should adopt the same line extension policy to also support the investments Nevada will make in medium and heavy-duty zero-emission vehicles pursuant to the VW Environmental Mititagion Trust. This would help stretch the state's investment further, deploying more zero-emission trucks, buses, and other vehicles in the process and increasing the resulting air quality and public health benefits. This would also complement the custom grant program proposed by NV Energy to support fleets in their applications for funds originating from the VW Environemtal Mitigation Trust.
- NV Energy should develop an incentive programs to accelerate the deployment of Level 2 (240 volt) infrastructure at the workplace, public long-dwell time, and single-family home segments. NV Energy should tailor incentive amounts and delivery mechanisms to account for segment-specific barries to adoption, and should require participants to take service on time-varying rates and/or enrollment in a load management program.
- Given the challenges associated with multi-unit dwelling (MUD) deployment, NV Energy should develop a comprehensive program to directly install and potentially own and operate charging stations at MUDs, which will help ensure a broader and more diverse body of utility customers are able to realize the fuel and operating cost savings that result from access to the use of electricity as a transportation fuel.

- NV Energy should consider developing an electric school bus pilot akin to the Pacific Gas & Electric (PG&E) pilot currently pending approval in California.[1]
- NV Energy should work with taxi companies, Transportation Network Companies (TNCs) and other shared-use vehicle providers, such as General Motors' Maven, which has proven in the real world that currently available electric vehicles (EVs) are well suited for TNC duty-cycles, to help electrify shared-use vehicles.
- NV Energy should develop more advanced load management programs that take advantage of the unique combination of power and flexibility that EV charging presents, and that reward drivers for allowing their vehicles to provide grid services.
- The Commission should examine existing residential time-of-use rates available to EV drivers to better understand what factors have contributed to their limited adoption and ensure the utilities have robust programs to ensure significant customer participation.
- Sierra Pacific Power should offer a new tariff that would address artificial barriers to the deployment of DC Fast Charging stations in Northern Nevada.
- To facilitate the deployment of DC Fast Charging stations and to remove barriers to the electrification of medium and heavy-duty vehicles, NV Energy should pilot optional EV rates for commercial customers in both the Nevada Power and Sierra Pacific Power service territories that recover all or the majority of costs through time-variant energy rates, similar to what utilities in other states are now doing.
- The Commission should encourage utility customer education and outreach programs that would overcome the lack of consumer awareness that remains a critical barrier to EV adoption and should arm auto-dealers with a response to question: "How much is it going to cost me to charge this car?"
- NV Energy should consider providing incentives pursuant to the energy storage provisions of SB 145 for "V1G," which is the controlled charging of EVs to support the electric grid. Nevada's utility customers are unlikely to realize the lower costs and widespread benefits of using EV batteries as an energy storage resource unless the Commission offers V1G technology the same market stimulus (i.e., eligibility for SB

[1] *See* Testimony of David Sawaya at 2-10 (PDF pages 42-46) on behalf of Pacific Gas & Electric Company, A.17-01-020 *et al.* (filed January 20, 2017), California Public Utilities Commission.

145 incentives) as provided to stationary storage technologies. NV Energy should also pursue "vehicle-to-grid" or "V2G," which both stores energy in EV batteries and puts energy back onto the grid, as an energy storage resource.

Please see Attachment A for suggested modifications to the regulations proposed by NV Energy.

II. PROGRAMATIC RECOMMENDATIONS

A. Provision of Electrical Infrastructure to Support Nevada's VW Environmental Mititagtion Trust Investments

1. Direct Current Fast Charging

DC Fast Charging stations will be increasingly important to expanding EV market as more affordable longer-range pure battery electric vehicles (BEVs) such as the Chevrolet Bolt EV and the Tesla Model 3, which have bigger batteries and are more capable of intercity travel, hit showrooms across Nevada, with many more models to follow from other manufacturers. A wide deployment of DC Fast Charging stations will be needed to unlock the market potential of these vehicles. As Tesla's real-world experience demonstrates, would-be EV buyers need to know there is a network of DC Fast Charging stations available to meet travel needs that cannot be satisfied with long dwell-time charging. Consumer research shows the lack of "robust DC fast charging infrastructure is seriously inhibiting the value, utility and sales potential" of BEVs.[2] Even if a robust DC Fast Charging network were in place, most drivers of first generation vehicles with approximately 80 miles of range would be reluctant to undertake trips that would require multiple stops to recharge, with each stop taking about 30 minutes. The 200 plus mile range of second-generation affordable BEVs makes longer trips possible with a single stop (that may have occurred regardless to get lunch, coffee, or to use restrooms) to recharge. Battery range improvements therefore promise to remove a significant impediment to the expansion of the EV market, but that promise will only be partially realized absent a robust DC Fast Charging network. As noted in a recent report by the Rocky Mountain Institute, the DC Fast Charging segment is particularly in need of utility support to overcome persistent barriers to private

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

investment.[3] Some of these barriers include: the high cost of DC Fast Charging installation, variability in demand charge magnitude and applicability, the relative inexperience utilities and regulators have in this new sector, the uneven distribution of costs for charging stations, inequitable investments, and a balkanized network of stations.[4]

We support the concept discussed at the Commission's recent workshop for NV Energy to provide electrical infrastructure (via a modification to existing line extension policies) to support Nevada's use of 15 percent of VW Environmental Mititagtion Trust resources to deploy DC Fast Charging stations along highway corridors. This would stretch the state's resources further, enabling a more robust DC Fast Charging network. To help future-proof that investment, we recommend that supporting electrical infrastructure be sized to accommodate charging plazas with multiple DC Fast Charging stations that can deliver 150kW or greater power levels.

2. Medium and Heavy-Duty Zero Emission Vehicles

The use of VW Environmental Mitigation Trust funds to deploy zero-emission medium and heavy-duty vehicles will accelerate the transition away from diesel engines that are responsible for particulate pollution identified by the World Health Organization as a carcinogen.[5] Various medium and heavy-duty vehicle categories are "ripe" for deployment, including electric buses and other commercially available vehicles that also provide a platform for technology development that will eventually transfer to other medium and heavy-duty vehicle categories.[6] Electric buses provide significant emissions benefits, which will only grow as Nevada's grid moves increasingly toward renewable resources.

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[3] *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand*, Rocky Mountain Institute, 2017.

[4] *Id.*

[5] Sara Chandler, Joel Espino, Jimmy O'Dea, *Delivering Opportunity*, Union of Concerned Scientists and the Greenlining Institute, May, 2017, p. ES-1.

[6] For example, California's Air Resources Board ("CARB"), in formulating a strategy to accelerate broader transportation electrification, called for a focus on "deploying zero-emission vehicles in heavier applications that are currently well-suited for broad market development, such as transit buses, airport shuttles, and last mile delivery [trucks]" in addition to light-duty vehicles, given the market readiness and availability of these technologies. In the off-road categories, CARB's initial targets for electrification are airport ground support equipment, forklifts, and cargo-handling equipment at ports given the ripeness of these technologies. *See* CARB, "Revised Proposed 2016 State Strategy for the State Implementation Plan" at 83, 105, 112; CARB, "Draft Technology Assessment: Medium- and Heavy-Duty Battery Electric Trucks and Buses" (Oct. 2015) (noting availability of electric buses and last mile delivery trucks); CARB, "Technology Assessment: Mobile Cargo Handling Equipment" (Nov. 2015).

The Commission should adopt the same line extension policy discussed above with respect to DC Fast Charging to also support the investments Nevada will make in medium and heavy-duty zero-emission vehicles pursuant to the VW Environmental Mititagion Trust. Utility provision of supporting electrical infrastructure will help stretch the state's investment further, deploying more zero-emission trucks, buses, and other vehicles in the process and increasing the resulting air quality and public health benefits. This would also complement the custom grant program proposed by NV Energy to support fleets in their applications for funds originating from the VW Environemtal Mitigation Trust.

B. Incentives for Level 2 Charging Stations at Workplaces, Public Long-Dwell Time Locations, and Single Family Homes

Incentive programs akin to what has been proposed by staff could be effective to accelerate the deployment of Level 2 (240 volt) infrastructure at the workplace, public long-dwell time, and single-family home segments. NV Energy should tailor incentive amounts and delivery mechanisms to account for segment-specific barries to adoption. The receipt of incentives pursuant to SB 145 should be conditioned upon taking service on time-variant rates and/or participation in load management programs. Charging stations deployed with the assistance of incentives pursuant to SB 145 should use open charging standards or protocols for both front-end and back-end interoperability, and data developed by third parties from behind-the-meter devices should be made available to NV Energy and should be reported to the Commission. Below, we discuss considerations for potential incentive programs that are segment-specific.

1. Workplaces

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 participating workplaces.[7] Likewise, the Department of Energy concluded employees of companies that participated in its "Workplace Charging Challenge" were 20 times more likely to drive a EV than the average worker.[8]

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

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

Workplace charging can also effectively double the electric miles driven daily by EVs. This is especially important for plug-in hybrid EVs that can operate on both electricity derived from the grid or gasoline.

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 by ensuring EVs are connected to the grid when solar generation peaks. Nevada's EV drivers have already purchased batteries that collectively represent a significant energy storage resource that could be used to absorb peak renewable generation. The Commission should take advantage of that sunk-investment to benefit all utility customers. A workplace incentive program that takes advantage of NV Energy's relationships with commercial customers and that incorporates load management to match EV load to renewable generation could help accelerate the EV market in Nevada and lower the costs of managing an increasingly dynamic grid.

2. Public Long-Dwell Time

While DC Fast Charging stations are better situated for most public charging applications, the Commssion should also consider that Level 2 stations can be appropriate at "long-dwell time" public sites such as state parks, park-and-ride lots, fleet parking lots, and some parking garages, where vehicles are parked for extended periods and the additional cost associated with DC Fast Charging stations is not warranted. Level 2 infrastructure at visible public locations can also increase general consumer awareness and enable trips that would otherwise not be possible. An incentive program to deploy Level 2 public stations should focus on such long-dwell time locations and avoid retail outlets and other locations where drivers would not normally park for an extended period of time.

3. Single Family Homes

Home charging is the foundational vehicle-charging category. According to the National Academies of Sciences, it is a "virtual necessity" for EV ownership.[9] The home is also the location where cars are most often parked, where most charging occurs, and where drivers are likely to have the most control over fueling their vehicles. As a result, the opportunities for load

[9] National Research Council of the National Academies of Sciences, *Overcoming Barriers to the Deployment of Plug-in Electric Vehicles*, the National Academies Press at 9 (2015).

management are greatest at home. Off-peak overnight residential charging also presents the greatest opportunity to improve the utilization of the electric grid and put downward pressure on electric rates and utility bills in the process.

However, real-world experience demonstrates that, if they are not given an incentive to charge during off-peak hours, EV drivers will generally plug-in and charge upon arriving home from work, exacerbating evening system peak demand. In fact, the EV drivers relying on Level 1 (120 volt) charging cord sets that come with their vehicles will often be forced to begin charging during evening peak hours to ensure they receive a full charge overnight. Using GM's estimate of four miles per hour of charging on Level 1, it would take nearly 60 hours to recharge a fully depleted Bolt EV.[10] Accordingly, the automaker is recommending Level 2 charging.[11] The flexibility provided by Level 2 charging will be increasingly important to ensure daily driving needs can be met with off-peak charging. However, the costs and complexity associated with purchasing and installing Level 2 equipment needed to fit charging within "off-peak" and "super-off-peak" windows can be prohibitive. In sum, would-be EV drivers are faced with a dilemma as to whether to incur the up-front expense to buy and install equipment needed to match EV charging to grid conditions and to provide the fuel cost savings that numerous surveys reveal are the most important motivator of EV purchase decisions.[12] A utility incentive program could resolve this dilemma and facilitate charging that improves the utilization of the grid. Receipt of incentives should be conditioned upon taking service on a time-variant rate.

The Commission should note that passive rebate programs do not appear to be sufficient in the residential context. Los Angeles Water and Power has offered a rebate for residential customers to install EVSE since 2011; only 500-600 customers per year participate in the program. In 2011, the Indiana Utility Regulatory Commission approved a EV pilot program for the Northern Indiana Public Service Company that provides rebates of up to $1,650 for home charging stations for 250 customers and an electricity rider which modified the applicable

[10] https://www.chevyevlife.com/bolt-ev-charging-guide/#basic
[11] *Id.*
[12] Center for Sustainable Energy, *California Plug-in Electric Vehicle Owner Survey Dashboard*; Steele, David E., J.D. Power and Associates, "Predicting Progress: What We Are Learning About Why People Buy and Do Not Buy EVs," Electric Drive Transportation Association 2013 Annual Meeting, Washington, D.C., June 11, 2013; Maritz Research, "Consumers' Thoughts, Attitudes, and Potential Acceptance of Electric Vehicles," National Research Council meeting, Washington, D.C., August 13, 2013.

residential tariff to allow for free charging overnight. In 2014, less than 250 rebates had been issued, and the utility filed to extend the pilot to 2017.[13] NV Energy should develop robust customer education and outreach efforts to ensure significant participation and incentives made available pursuant to SB 145 should be bundled with turn-key installation services that ease the process and ensure the safe installation of charging stations.

C. Direct Instalation of Level 2 Charging at Multi-Unit Dwellings

For several reasons, prospective EV owners that live in multi-unit dwellings (MUDs) face unique challenges to access vehicle charging: parking lots are often common or shared spaces, complicating authorization to install charging stations and billing arrangements; the costs of installing infrastructure at a distance from the building is more expensive; and, in the case of renters, investments in charging infrastructure may not be recoverable within their expected tenure. These issues present an opportunity for utilities to leverage existing customer relationships, knowledge of the electric grid, and economies of scale to deploy charging stations in this critical but underserved market.

There is reason to believe that a rebate or "make-ready" model may not provide the turn-key solution needed at MUDs. Consider that MUDs only account for four percent of site-hosts in Southern California Edison's (SCE) *Charge Ready* "make-ready" pilot, despite SCE's increased outreach to potential site hosts in that segment.[14] The period for site-host enrolment in *Charge Ready* is closed; accordingly, that percentage cannot go up. In that make-ready program, site hosts are responsible for contracting with third-party providers of charging stations for purchase and installation. In contrast, about 37 percent of San Diego Gas & Electric's (SDG&E) likely site-hosts in the *Power Your Drive* pilot, which also targets MUDs and workplaces, but includes utility ownership of charging stations, are MUDs, suggesting the utility ownership model works better in this market segment.[15] The site-host enrollment period for SDG&E's program is still open, but there is no reason to expect the balance of MUDs to workplaces to shift significantly. Given the challenges associated with MUD deployment, NV Energy should develop a

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[13] *Verified Direct Testimony of Cynthia C. Jackson*, Petitioner's Exhibit No. 1, Cause No. 44828, Northern Indiana Public Service Company, August 5, 2016.
[14] SCE presentation, *Charge Ready Advisory Board*, November 7, 2017.
[15] *Electric Vehicle-Grid Integration Pilot Program (Power Your Drive) Semi-Annual Report of San Diego Gas & Electric Company*, September 18, 2017.

comprehensive program to directly install and potentially own and operate charging stations at MUDs, which will help ensure a broader and more diverse body of utility customers are able to realize the fuel and operating cost savings that result from access to the use of electricity as a transportation fuel.

D. Specific Pilot Programs

1. Grid-Integrated School Buses

NV Energy should consider developing an electric school bus pilot akin to the Pacific Gas & Electric (PG&E) pilot currently pending approval in California.[16] Electrifying school buses addresses a particularly vulnerable population—children. NRDC and the Coalition for Clean Air brought attention to this risk in 2001, in the report, *No Breathing in the Aisles*, which documented exposures to children passengers that pose "23 to 46 times the cancer risk level considered significant under federal law."[17] The predictable duty-cycle of school buses also makes them particularly well suited to charge during both off-peak over-night hours and during peak solar output hours. When not in use during summer school breaks, they could also potentially be redeployed as a form of stationary storage to facilitate the integration of summer-peaking solar resources.

2. Electrifying Shared Use and Taxi Fleets

Shared-use vehicles comprise a rapidly increasing percentage of total vehicle-miles-travelled, as illustrated by the fact Lyft launched in 2012, provided one million rides in 2013, and 204 million rides in 2016.[18] Converting those fleets to zero-emission vehicles may not address other policy questions related to congestion, equity, and urban planning, but it would have a profound impact upon the emissions associated with those fleets. In fact, given their growth trajectories, those fleets must be electrified to meet emissions reduction goals.

Taxis and ridesharing and ride-hailing services (collectively, "Transportation Network Companies" or "TNCs") are increasingly important opportunities for people to experience riding

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[16] *See* Testimony of David Sawaya at 2-10 (PDF pages 42-46) on behalf of Pacific Gas & Electric Company, A.17-01-020 *et al.* (filed January 20, 2017), California Public Utilities Commission.
[17] *No Breathing in the Aisles*, Natural Resources Defense Council and Coalition for Clean Air, January, 2001, p. 1.
[18] Emily Castor, *Mobility as a Service: Selling Electrified Miles, Not Cars,* presented at the California Plug in Vehicle Collaborative, November, 2016.

or driving an EV. In short, using EVs in the taxi or TNC context creates continuous ride-and-drive opportunities. Utilities can play a role by partnering with taxi companies and TNCs and supporting the deployment of infrastructure to support electric rideshare or ride-hailing vehicles, and in the ride-hailing context, even by providing direct incentives to drivers of EVs. Ride-sharing can also improve access to clean transportation in low-income neighborhoods. For example, BlueLA and BlueIndy—two ride-share programs in Los Angeles and Indianapolis, respectively—offer 24/7 access to a network of affordable shared electric vehicles placed strategically in low-income neighborhoods. NV Energy should work with taxi companies, TNCs and other shared-use vehicle providers, such as General Motors' Maven, which has proven in the real world that Bolt EVs are well suited for TNC duty-cycles, to help electrify shared-use vehicles.

3. Smart Charging

NV Energy should develop more advanced load management programs that take advantage of the unique combination of power and flexibility that EV charging presents, and that reward drivers for allowing their vehicles to provide grid services. The utility should consider a pilot program akin to the BMW-PG&E "iChargeForward" program, which has demonstrated the use of the combination of remotely controlled charging and vehicle batteries redeployed as stationary storage to alleviate congestion on a specific distribution circuit.[19] Such a pilot could be developed in the context of implementing the energy storage provisions of SB 145, as described in section II.G of these comments.

E. Where Rates are Not Optimized for Transportation Electrification Use Cases, New Rates Should Be Proposed

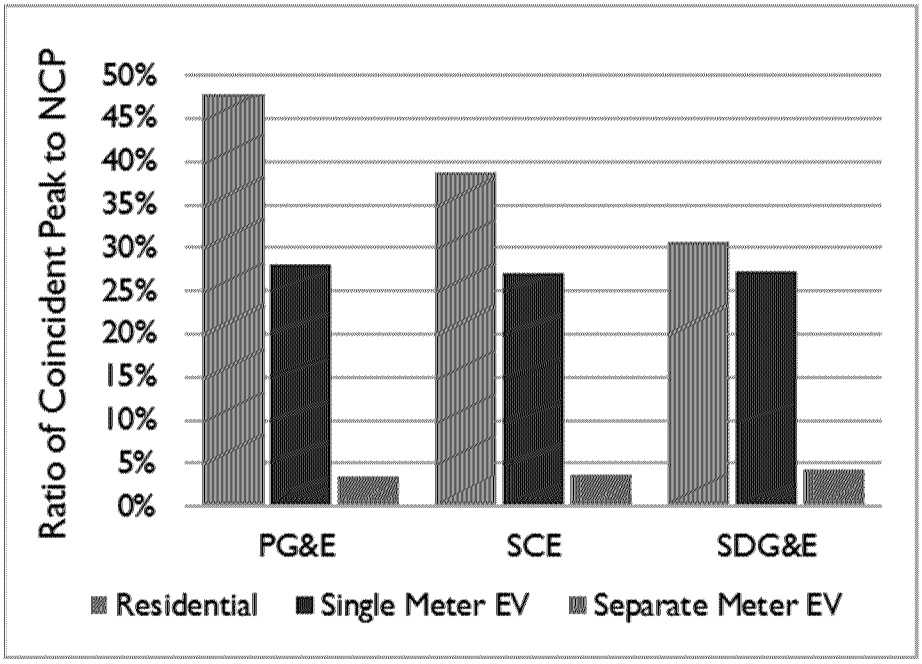
1. The Use of Time-Varying Rates to Shift Charging Behavior

Time-varying rates can provide a foundational form of load management to ensure that transportation electrification does not strain the grid, but instead improves grid utilization to the benefit of all utility customers. Simple time-of-use rates (TOU) have proven extremely effective

[19] *BMW i ChargeForward: PG&E's Electric Vehicle Smart Charging Pilot Final Report*, available at: http://www.pgecurrents.com/wp-content/uploads/2017/06/PGE-BMW-iChargeForward-Final-Report.pdf

at shifting EV load to "super-off-peak" hours in the real world.[20] There is no need for additional pilots to test that fundamental proposition; rather, the lesson should be incorporated into program design going forward. Since TOU rates send expected, pre-defined price signals, they encourage regular and prolonged behavior modifications that benefit the overall grid. See Figure 1 for data from three utilities with hundreds of thousands of EVs in their collective service territories.

Figure 1: EV Customers on TOU Rates Consume Little During System Peak Hours[21]



Both "EV-only" TOU rates, which utilize a separate or sub-meter, and "whole-home" TOU rates, where all electricity use is billed by time-of-use on a single meter, are viable options. Whole-home time-varying rates designed with EV load in mind can provide a foundation for successful load management, but may not provide the price transparency of EV-specific TOU rates and involve uncertainty regarding net benefits.[22] Moreover, EV-specific rates may be

[20] See, for example, The Department of Energy's EV Project, which has tracked the charging behavior of thousands of EVs since 2011, has shown that in areas with time-of-use ("TOU") rates and effective utility education and outreach, the majority of EV charging occurs during off-peak hours. This was not the case in areas without TOU rates, where EV demand generally peaked in the early evening, exacerbating early-evening system-wide peak demand. See Schey, et al., *A First Look at the Impact of Electric Vehicle Charging on the Electric Grid, The EV Project at EVS26* (May 2012).

[21] Synapse Economics, *Electric Vehicles Are Not Crashing the Grid: Lessons from California*, prepared on behalf of NRDC, November 2017.

[22] MJ Bradley & Associates, *Electricity Pricing Strategies to Reduce Grid Impacts from Plug-in Electric Vehicle Charging in New York State* at 8 (2015) (recommending that whole-home TOU rates should be designed to be

needed to allow for dynamic pricing. EVs are relatively unique in their potential to respond to dynamic prices, and customers may be reticent to subject their entire home load (which generally lacks the capability to respond autonomously) to dynamic pricing.

Historically, for access to EV-only TOU rates, the installation of a second utility meter has been required, which can be a prohibitive cost for the prospective EV driver.[23] However, placing EV load on EV-specific rates need not require a second utility service meter. Sub-meters can be embedded within electric vehicle supply equipment ("EVSE," colloquially, "charging station"), EVs themselves, or even circuit breakers. In California, sub-metering for EV drivers has undergone extensive testing as a simpler metering option for EV drivers. SDG&E is already relying upon sub-meters embedded within EVSE for billing purposes in its "Power Your Drive," which aims to install 3,500 charging stations at workplaces and MUDs that will take service on a dynamic "grid-integrated" rate.[24] The utility also has a proposal before the California Public Utilities Commission (CPUC) that would deploy 90,000 charging stations at single-family and smaller MUDs, and would use embedded sub-meters for billing purposes. The CPUC is expected to issue a decision on that program, and separate proposals by PG&E and SCE to provide approximately $750 million in supporting electrical infrastructure to electrify medium and heavy-duty vehicles, in May, 2018.

Dynamic rates—which more closely reflect the cost of energy generation and delivery at a given time—can maximize fuel cost savings and shape EV charging in response to real-time grid conditions, lowering the cost of integrating variable resources. They can be effective for charging in "long-dwell time" locations, such as the home or workplace, where drivers can either program their EVs or their charging stations to respond to those dynamic price signals without the need for manual intervention. For example, SDG&E is currently incorporating dynamic rates at the ~3,500 charging stations the utility is deploying at MUDs, workplaces and other "long-

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revenue neutral for the majority of customers when compared to the standard rate, but result in a lower bill for the EV driver who charges during off-peak hours but does not shift any non-EV load).

[23] *Id.* at 8.

[24] San Diego Gas & Electric Power Your Drive program, information regarding this pilot available at https://www.sdge.com/clean-energy/electric-vehicles/poweryourdrive.

dwell time" locations.[25] Drivers will see a day-ahead electricity price through a app and web-based tools, and be able to set parameters for an automated response to the rate.

However, dynamic rates may not be appropriate for all charging applications, or in all market segments. For example, in the case of public charging, the customer-of-record (i.e., the utility customer paying the energy costs) is not generally the end-user (i.e., the EV driver). Itinerant EV drivers cannot easily be armed with the tools needed to "set-and-forget" in response to dynamic price signals, nor will they necessarily have the flexibility to do so. Drivers who arrive at a public DC Fast Charging station would be unhappy to discover that the price of electricity has suddenly quadrupled. Simpler TOU rates, which could be published on websites such as Plugshare and which could be learned by drivers easily are more appropriate for public Level 2 or DC Fast Charging. [26]

NV Energy currently offers time-varying rates for a EV customers, but only a fraction of such customers are taking service on such rates. The Commission should examine these rates to better understand what factors have contributed to their limited adoption. The EV rates for both Sierra Pacific Power and Nevada Power provide a strong on-peak to off-peak ratio (about a six-to-one ratio). This differential should be sufficient to send a strong price signal to EV drivers and shift the vast majority of EV owners using this rate to charge during off peak hours. In addition, the per kWh price is low enough to provide EV owners a modest incentive to not use the regular residential rates. The Commission also ensure the utilities have robust programs to ensure significant customer participation. EV rates only work if EV load takes service on those rates.

2. The Economic Viability of DC Fast Charging in Nevada Hinges Upon Rate Design and Varies Significantly by Service Territory

Demand charges can undermine the business case for high-power EV charging infrastructure investments to support light, medium, and heavy-duty vehicles, particularly where utilization is likely to be low in the near-term (e.g., DC Fast Charging stations that are necessary to enable distance travel and will influence EV purchase decisions, but are located on more

[25] *See Decision Regarding Underlying Vehicle Grid Integration Application and Motion to Adopt Settlement Agreement,* D.16-01- 045 (filed January 28, 2016), California Public Utilities Commission.
[26] PlugShare is the most commonly used web- and app-based tool that helps drivers locate charging stations and aggregates details about specific stations, including applicable fees.

remote stretches of highway).[27] We do not recommend that transportation electrification loads be subsidized, but that rate design should be optimized to account for the intended use cases. Because demand charges do a poor job of reflecting actual distribution system costs, and because energy costs are better reflected in time-varying volumetric rates, reforming demand charges in general is good policy.[28] Many demand charges over-collect by including non-facilities-related costs that should be collected in volumetric rates. Likewise, non-coincident demand charges are not generally cost-based. In addition, TOU rates with a sufficient on-peak to off-peak price ratio can send nearly the same price signal to reduce peak demand as a rate with a coincident demand charge, but without the complexity associated with charging for both kilowatt-hours and kilowatts. In contrast to purely volumetric rates, rates with demand charges can also frustrate the ability of a DC Fast Charging site-host to recover electricity costs from itinerant EV drivers because the site-host cannot know what his ultimate bill will be until the end of a billing cycle and cannot therefore recover those costs in advance.

Before considering what steps could be taken with regards to rate structure to encourage greater numbers of fast charging stations and greater adoption of EVs it makes sense to review how NV Energy's current rates impact fast charging stations in Nevada. While NV Energy does offer various rates and riders that are specific to EV charging, they all focus on the energy rates and not the demand charges.

The vast majority of current DC Fast Charging stations operate at up to 50 kW of demand but have relatively low utilization. Table 1 illustrates the discrepancy in the costs associated with operating a separately metered DC Fast Charging station in the Sierra Pacific and Nevada Power service territories. For this example, we have assumed two 50kW ports per site, with a maximum demand of 100 kW and a monthly utilization of 1,000 kWh. Demand and facility charges are based on peak demand in kW and energy charges on electricity consumption in kWh. Based on the monthly bill, the final column shows the per kWh fee the station operator would need to recover from EV to simply break-even on electricity costs (putting aside other significant costs).

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[27] *See, e.g.,* NYSERDA, *Electricity Rate Tariff Options for Minimizing Direct Current Fast Charger Demand Charges*.

[28] *See Borenstein, Severin, The Economics of Fixed Cost Recovery by Utilities*, Energy Institute at Haas Working Paper 272R (July 2016).