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**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program (D.13-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap

Rulemaking 15-03-011
(Filed March 26, 2015)

**COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL IN RESPONSE
TO ASSIGNED COMMISSIONER AND ASSIGNED ADMINISTRATIVE LAW
JUDGE'S SCOPING MEMO AND RULING**

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I. INTRODUCTION

Pursuant to the “Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Ruling” of January 5th, 2016 the Natural Resources Defense Council (NRDC) submits these comments to the California Public Utilities Commission (Commission) on questions related to the development and refinement of the Energy Storage Procurement Framework and Design Program.

NRDC is a non-profit membership organization with nearly 70,000 California members and a long-standing interest in minimizing the societal costs of the reliable energy services that a healthy California economy requires. We have participated in numerous Commission proceedings over the last 30 years with a particular focus on representing our California members’ interest in the utility industry’s delivery of cost effective energy efficiency programs, renewable energy resources, and other sustainable energy alternatives.

These comments do not attempt to respond to all of the questions enumerated in the scoping memo, but instead focus on “Question 2. Eligibility:”

What new information and/or evolving circumstances exist such that the Commission should revisit previously excluded energy storage technologies, such as controlled electric vehicle charging or pumped storage projects greater than 50 MW? The Commission will not consider comments that simply restate positions previously offered and addressed in D.14-10-045.¹

Circumstances have changed considerably since the Commission last addressed the issue of controlled electric vehicle charging in October, 2014.² Senate Bill (SB) 350 both increased the potential need for energy storage necessary by increasing the Renewable Portfolio Standard to 50 percent and includes specific directives for the Commission to accelerate transportation electrification and to leverage the energy storage inherent in electric vehicle (EV) batteries to facilitate the integration of variable renewable generation.³

¹ *Assigned Commissioner and Assigned Administrative Law Judge’s Scoping Memo and Ruling Seeking Party Comments*, Order Instituting Rulemaking to consider policy and implementation refinements to the Storage Procurement Framework and Design Program (D. 13-10-040, D. 14-10-045) and related Action Plan of the California Energy Storage Roadmap, R. 15-03-011 at 15 (filed Jan. 5, 2016).

² *Decision Approving San Diego Gas & Electric Company, Pacific Gas & Electric Company, and Southern California Edison Company’s Storage Procurement Framework and Program Applications for the 2014 Biennial Procurement Period*, Application of San Diego Gas & Electric Company (U902M) for Approval of tis Energy Storage Procurement Framework and Program as Required by Decision 13-10-040 and Related Matters, A. 14-02-006, *et al.*, at 63 (issued Oct. 22, 2014).

³ Senate Bill 350 (De Leon) - Clean Energy and Pollution Reduction Act of 2015 (https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350)

II. STORING ENERGY IN ELECTRIC VEHICLE BATTERIES SHOULD BE AN ELIGIBLE FORM OF ENERGY STORAGE IN LINE WITH NEW STATUTORY DIRECTIVES AND CHANGED CIRCUMSTANCES

Since the Commission previously addressed the issue in D.14-10-045, the statutory framework regarding utility investment and transportation electrification has changed significantly, new executive goals for zero emission vehicle deployment have been set, and the size of the potential customer-side energy storage resource that could be provided by controlled charging of electric vehicle (EV) batteries has grown significantly.⁴

A. Senate Bill 350 Increased the Need for Energy Storage and Directed the Commission to Accelerate Transportation Electrification in a Manner that Facilitates the Integration of Renewable Generation

SB 350 established a new requirement that 50 percent of the state's energy resources must come from renewable energy by 2030. Along with the multiple benefits of renewable energy resources, integrating higher level of renewables, chiefly wind and solar, makes balancing electricity generation and demand more challenging and increases the need for flexible energy storage that could be provided by EV batteries. The California Energy Commission states that "additional tools will be needed to maintain reliability including: charging zero emission vehicles at times of high renewable production, ...[and] deploying emerging storage technologies and programs that reward customers for shifting demand."⁵ V1G, which is the controlled charging of EVs to support the electric grid, is a key emerging energy storage technology that can help: (1) avoid the need for utilities to make new capital investments in generation, transmission, and distribution assets by charging vehicles when there is spare capacity on the grid; (2) absorb excess solar generation by charging during the day; and, (3) avoid exacerbating the evening peak and ramping challenges.⁶ The Commission should take advantage of the storage, power, and flexibility of EV batteries as this resource can benefit all utility customers, and help California achieve its renewable energy procurement goals at lower

⁴ *Decision Approving San Diego Gas & Electric Company, Pacific Gas & Electric Company, and Southern California Edison Company's Storage Procurement Framework and Program Applications for the 2014 Biennial Procurement Period*, Application of San Diego Gas & Electric Company (U902M) for Approval of its Energy Storage Procurement Framework and Program as Required by Decision 13-10-040 and Related Matters, A. 14-02-006, *et al.*, at 63 (issued Oct. 22, 2014).

⁵ California Energy Commission, "California's 2030 Climate Commitment: Renewable Resources For Half Of The State's Electricity By 2030," http://www.energy.ca.gov/commission/fact_sheets/documents/Fact_Sheet_-_50_Percent_Renewables.pdf

⁶ V1G is distinct from V2G, which refers to the bidirectional flow of power enabling EVs to both charge from the grid *and* discharge back to the grid. V1G, on the other hand, refers only to one-way power flow.

cost.

B. Senate Bill 350 Directs the Commission to Leverage Widespread Transportation Electrification as a Resource for California to Achieve its Clean Energy and Climate Goals

SB 350 amended Public Utilities Code (PUC) Section 701.1 to define transportation electrification as a principal goal of utility resource planning and investment, on par with renewable energy and energy efficiency:

*The Legislature finds and declares that, in addition to other ratepayer protection objectives, a principal goal of electric and natural gas utilities' resource planning and investment shall be ... to improve the environment and to encourage the diversity of energy sources through improvements in energy efficiency, development of renewable energy resources, ...and widespread transportation electrification.*⁷

Determining what resources are eligible to fulfil the Commission's energy storage procurement requirements is fundamentally an exercise in shaping utility resource planning and investment. Accordingly, per PUC Section 701.1, a "principal goal" of that exercise shall be to "improve the environment and to encourage the diversity of energy sources through...widespread transportation electrification." Excluding the V1G as an eligible resource for utilities to procure in fulfilling the Commission's energy storage procurement mandate contradicts that clear legislative directive.

SB 350 also established PUC Section 740.12, which includes the following subsection 740.12(a)(1)(G):

Deploying electric vehicles should assist in grid management, integrating generation from eligible renewable energy resources, and reducing fuel costs for vehicle drivers who charge in a manner consistent with electrical grid conditions.

The primary goal of the Commission's energy storage regulation is to manage the grid to integrate generation from eligible renewable resources. Per PUC Section 740.12, the Commission should ensure electric vehicles assist in that effort in a manner that reduces fuel costs for drivers who charge in a manner consistent with electrical grid conditions. Note that PUC Section 740.12(a)(1)(G) does not require that EV drivers put energy stored in their batteries back onto the grid, only that they store energy in those batteries in a manner that is consistent with grid conditions.

The Commission must take PUC Section 740.12(a)(1)(G) into account because PUC

⁷ California Public Utilities Code § 701.1(a)(1). Emphasis added.

Section 740.12(a)(2) specifies (emphasis added):

It is the policy of the state and the intent of the Legislature to encourage transportation electrification, as a means to achieve ambient air quality standards and the state's climate goals. Agencies designing and implementing regulations, guidelines, plans, and funding programs to reduce greenhouse gas emissions shall take the findings described in (1) into account.

The Commission's "Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program and related Action Plan of the California Energy Storage Roadmap" is an agency designing and implementing guidelines and plans to reduce greenhouse gas emissions by facilitating the integration of variable renewable resources. Accordingly, per PUC Section 740.12(a)(2), in designing and implementing those guidelines and that plan to determine what resources are eligible, the Commission must take into account PUC Section 740.12(a)(1)(G)'s finding that charging EVs in a manner consistent with grid conditions should assist in grid management and in integrating renewable resources.

C. The Potential to Store Energy by Managing the Charging of EV Batteries has Increased Significantly Since the Commission Last Ruled on the Eligibility of Energy Storage Resources

Since the Commission last considered this issue in October 2014, approximately 74,000 more EV's have hit California's streets.⁸ In other words, since the Commission's last ruling on this matter, utility customers purchased almost two more gigawatt-hours of energy storage in the form of batteries in EVs.⁹ The potential energy storage resource on four wheels in California is now almost five gigawatt-hours.¹⁰ That resource will continue to grow, especially in light of new executive targets, growing battery capacities, and increasing rates of charge, as discussed immediately below.

D. California has Adopted New Goals for Zero Emission Vehicle Deployment Since the Commission Last Ruled on the Eligibility of Energy Storage Resources

Late last year, Governor Brown signed a pact with 12 other North American and European governments, including Germany, the United Kingdom, Connecticut, Maryland and

⁸ Estimate of sales from November 1, 2014 to February 1, 2016 based on sales data from the California New Car Dealers Association.

⁹ Estimate of average battery size derived from a fleet mix shown in data from the Department of Energy's Alternative Fuels Data Center.

¹⁰ Estimate derived from sales data from the California New Car Dealers Association and an average battery size derived from a fleet mix shown in data from the Department of Energy's Alternative Fuels Data Center.

New York, for all new vehicles sold to be “zero-emission” vehicles by 2050.¹¹ This builds upon the governor’s earlier goal for California to have 1.5 million zero emission vehicles on the road by 2025.¹²

We are now reaching the scale required to make controlled electric vehicle charging a reliable and significant form of energy storage. In addition, the larger battery capacity of EVs now entering California’s market will make controlled charging an even more viable storage resource. Since the Commission last ruled on the eligibility of V1G, the Nissan LEAF’s battery increased from 24 kWh to 30 kWh. The Telsa Model S is now available with a 90kWh battery. Later this year, production of the Chevrolet Bolt will begin, an affordable car with a 60kWh battery. Likewise, more and more EVs are now capable of charging at higher power levels (6.6-20 kW using 240V AC home chargers, or 50-120kW using public DC chargers). The Commission should reconsider how best to leverage this growing customer investment as it could prove a significant and cost-effective form of distributed energy storage.

E. Utilities have Procured Ice Energy Storage Which Provides the Same Energy Storage Services as Controlled Charging of Electric Vehicles

In partial fulfillment of the Commission’s energy storage regulations, Southern California Edison (“SCE”) procured 25.6MW of ice energy storage, categorized as “behind-the-meter thermal energy storage.”¹³ Controlled charging of electric vehicles (V1G) is essentially “behind-the-meter chemical energy storage.” It functions in the same manner as ice storage, taking electricity off-the grid during off-peak hours, storing it, and using it later to provide energy services when needed. Neither technology puts electricity back onto the grid.

Ice storage is described by as follows: “freezing water at night, it uses the energy stored in ice to cool buildings during peak hours.”¹⁴ V1G can also store off-peak electricity during the night, when wind production often peaks. In addition, especially with the accelerated deployment of charging stations at workplaces that will result from the SCE and the SDG&E EV charging infrastructure deployment programs recently adopted by the Commission, V1G will be increasingly available to store excess solar energy during the day.

¹¹ Office of Governor Edmund Brown - <https://www.gov.ca.gov/news.php?id=19235>

¹² Executive Order B-16-2012 on March 23, 2012

¹³ Southern California Edison, Load Capacity Requirements RFO - https://www.sce.com/wps/portal/home/procurement/solicitation/lcr!/ut/p/b0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOK9PF0cDd1NjDz9nQxdDRyDPS1cXD1cDYL9zfQLsh0VAQ4EJ6E!/

¹⁴ *Ibid.*

V1G meets the statutory definition of energy storage because it is as “a commercially available technology that is capable of absorbing energy, storing it for a period of time, and thereafter dispatching the energy,” and because it is a distributed, cost effective resource that can “reduce emissions of greenhouse gases, reduce demand for peak electrical generation, defer or substitute for an investment in generation, transmission, or distribution assets, or improve the reliable operation of the electrical transmission or distribution grid.”¹⁵

Neither ice storage nor V1G offer the same level of grid support as bi-directional energy storage technologies that can return electricity to the grid to meet peak demand. However, V1G can soak up excess wind overnight and excess solar generation in the afternoon and avoid exacerbating the evening peak. Both excess supply of renewables and evening ramping constraints are pressing state-wide issues, as evidenced by their frequent consideration within the Commission’s Long Term Procurement Proceeding and in various proceedings at the California Independent System Operator.

It is important the Commission reconsider the role V1G can have in easing these growing grid constraints. The Commission should consider the benefits that aggregated management of electric vehicle charging *can* provide to the grid to ease the duck curve, and allow V1G to compete on its own merits with other forms of energy storage. There is no other single customer side “smart appliance” that combines the potential for immense flexibility with significant capacity for both power and storage.

Moreover, we urge the Commission to recognize the cost-effective nature of V1G. The five gigawatt-hours of chemical energy storage on four wheels that exists in California has already been bought-and-paid for by utility customers. This sunk investment in vehicle batteries grows with every new EV purchase and represents a unique opportunity to support the electric grid at little cost and in a manner that rewards individual customers for investing in the cleanest vehicles on the road. Because those batteries have already been purchased for transportation purposes, using V1G to optimize the grid may be accomplished at a lower cost than single-purpose stationary grid resources. The Commission and other parties with an interest in minimizing costs to utility customers should not support artificial constraints on the pool of potentially cost-effective and environmentally beneficial storage resources.

¹⁵ California Public Utilities Code § 2835(a).

F. Including Controlled Vehicle Charging as an Eligible Form of Energy Storage Would Provide a Necessary Market Signal that Could Spur V1G Development and Innovation, and Lower Costs

Despite rapid growth in EV deployment, there has been limited growth in the use of aggregated management of electric vehicle charging as an energy storage resource. In order to encourage large-scale market transformation of V1G and unlock the potential of this energy storage technology, the market needs a clear signal. Including controlled charging of electric vehicles as an eligible form of energy storage would provide such a signal. This simple measure would alert the market of the potential long-term contracts, spur development and innovation, and potentially reduce costs. California 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 in meeting the energy storage mandate) as provided to stationary storage technologies.

G. Developing V1G is a Necessary First Step Along the Path to V2G Capabilities

We recognize the Commission’s broader goal of developing “vehicle-to-grid” (V2G, which both stores energy in EV batteries and puts energy back onto the grid) as an energy storage resource. In order to make progress toward V2G, it is imperative to first understand the vehicle charging market – including, consumer preferences and behavior, and the technology – by developing and studying the functionality and limits of V1G. We encourage the Commission to recognize that V1G is not only an energy storage resource, but it also is an important measure to gently introduce EV drivers to the potential dual role (i.e., transportation and grid support) of their vehicles. Widespread experience with V1G (beyond pilot programs) will help establish a broad level of comfort among EV drivers with controlled charging. In this way, V1G is a necessary first consumer experience that could prepare drivers to participate in more advanced services like V2G.

H. Given Statutory Directives for the Commission to Accelerate Widespread Transportation Electrification in a Manner that Facilitates the Integration of Renewable Energy and to Prioritize Transportation Electrification in Utility Resource Planning and Investment, the Commission Should Prioritize V1G as an Eligible Energy Storage Resource

The current policy of excluding V1G as a customer-side resource, which could provide the same grid support services as other forms of eligible energy storage, potentially at lower cost, contradicts the legislative directives included in SB 350 for the Commission to accelerate widespread transportation electrification to meet 2023 federal air quality standards, to achieve

the Charge Ahead California Initiative's goal of deploying one million EVs by 2023, and to reduce emissions of greenhouse gases 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.¹⁶ Likewise, excluding V1G in the Commission's energy storage regulations undermines PUC Section 740.12's directive to use EV load to assist in grid management and in the integration of renewable resources. Excluding V1G as a resource for utilities to procure in fulfilling the energy storage procurement requirement also contradicts PUC Section 701.1's directive that encouraging widespread transportation electrification be a principal goal of utility resource planning and investment.

In light of these legislative directives, the Commission should not exclude V1G. In fact, it should be prioritized as a scalable customer-side resource that also has the ancillary benefit of reducing California's dependence on petroleum. Likewise, the potential for V1G to lower the costs of meeting the energy storage mandate and to reward individual utility customers for investing in the cleanest vehicles available should cause the Commission to prioritize V1G.

III. CONCLUSION

NRDC urges the Commission to consider the new circumstances described above, and how utilizing controlled electric vehicle charging as an energy storage technology could enable the Commission to achieve its guiding principles set forth in D.14-10-045 of optimizing the grid, integrating renewable energy, and reducing greenhouse gas emissions in a cost-effective and reliable manner.

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Respectfully submitted,

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¹⁶ California Public Utilities Code § 740.12.