BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Microgrids Pursuant to Senate Bill 1339 and Resiliency Strategies.	Rulemaking 19-09-009

VOTE SOLAR AND THE CLIMATE CENTER OPENING COMMENTS ON THE ASSIGNED COMMISSIONER AND ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENT ON POLICY QUESTIONS AND AN INTERIM APPROACH FOR MINIMIZING EMISSIONS FROM GENERATION DURING TRANSMISSION OUTAGES

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Note to Commission Staff and Participating Stakeholders: The comments expressed herein provide a conceptual narrative responsive only to the first few levels of the outline contained within the Assigned Commissioner and Administrative Law Judge's Ruling. We ask that Commission Staff and parties participating in this Ruling review these comments in that spirit, and consider our approach of utilizing proven DER technologies in the short-term to mitigate impacts of temporary fossil-fuel generation, while proceeding in parallel to design, test and deploy emerging vehicle-to-grid (V2G) systems that will integrate both energy and transportation sectors at various levels within the distribution system to create a community infrastructure highly resilient to both planned and unforeseen power outages.

Introduction

Vote Solar and The Climate Center (referred to hereafter as the "Joint Parties") respectfully submit these comments pursuant to Administrative Law Judge Rizzo's September 4 Ruling seeking comment on policy questions and an interim approach for minimizing emissions from generation during transmission outages. Vote Solar is a 501(c)(3) non-profit organization, working to lower solar costs and expand solar access. Vote Solar advocates for state policies and programs needed to repower our electric grid with clean energy. The Climate Center is a California 501(c)(3) nonprofit organization founded in 2001 with a mission to deliver rapid greenhouse gas (GHG) reductions at scale, starting in California.

2.1 Topics Regarding Emerging Energy Resource Alternatives

2.1.1. General Policy Questions

1. Regulatory Simplicity & Ratepayer Maximizing Ratepayer Benefit: Are there duplicative efforts relating to infrastructure hardening and resiliency planning occurring between this proceeding, Rulemaking (R.) 19-09-009, and other proceedings such as R.18-10-007, the Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901, or general rate cases, that could expose ratepayers to either duplicative or excessive costs?

The issues of resiliency planning and the minimization of emissions from generation during transmission outages raised in this proceeding overlap with matters that are being addressed in multiple other proceedings including those that deal with distributed energy resource planning and procurement, local and system resource adequacy and the hardening of grid infrastructure.

Since at least 2007, the Commission has sought to integrate demand side energy solutions and technologies across the electric distribution system to improve reliability and resilience and to meet environmental goals, including the reduction of emissions from fossil generation.[1] The Commission has long recognized that the integration of energy efficiency, self-generation and demand response are essential elements of an affordable, reliable and resilient electric system. Integrating distributed energy resources with new and existing bulk power resources, together with transmission system upgrades and expansion, has been an important challenge that the Commission clearly recognized when in November, 2016, it adopted California's Distributed Energy Resources Action Plan: Aligning Vision and Action: Aligning Vision and Action (DER Action Plan).[2] Commercialization of microgrids is a logical extension of these earlier efforts.

[1] Decision (D.07-10-032) directs that utilities Integrate customer demand-side programs, such as energy efficiency, self-generation, advanced metering, and demand response, in a coherent and efficient manner.

[2] https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Commissioners/Michael_J._Picker/2016-09-26%20DER%20Action%20Plan%20FINAL3.pdf

Community Energy Resilience Initiatives need to be Incorporated into the DER Action Plan

The DER Action Plan identified three related sets of proceedings or initiatives that impact DER deployment and hence the issue of resiliency planning to reduce harmful emissions that is currently being addressed in the Microgrid proceeding - 1) Rates and Tariffs, 2) Distribution Grid Infrastructure, Planning, Interconnection and Procurement and 3) Wholesale DER Market Integration and Interconnection.

The Joint Parties recommend that the Commission update its DER Action Plan to include the community resilience initiatives that are being implemented or are under consideration in the Microgrid proceeding. Coordination between these various proceedings can maximize ratepayer benefits and limit harmful emissions during power transmission outages. The original DER Action Plan had a four-year time horizon for Commission activities from 2017 through 2020. Since the original DER Action Plan was adopted there has been significant new legislation (SB 100), new guidance from major regulatory proceedings (Integrated Resource Planning and Resource Adequacy) as well as multiple advances in DER technologies. By updating the DER Action plan the Commission can provide guidance on how to avoid duplicative efforts while making progress on reducing greenhouse gas emissions, deploy distributed energy resources and improve community resiliency.

2. Energy Resource Cost Effectiveness & Reliability: What fuel and technology resources should the Commission consider, as preferred solutions that reduce reliance on diesel for providing power during transmission outages?

The Joint Parties recognize that a long-term commitment to deploy preferred energy solutions will be necessary to completely eliminate reliance on temporary diesel and other pollution-emitting generation during transmission outages. However, reduction in the amounts of pollution from temporary diesel generation is an important metric that should be kept front and center in this proceeding and through improved coordination with other relevant proceedings.

Installation of Battery Storage Systems at Make Ready Substations can Minimize Generator Operation during Outages

The Joint Parties recommend that installation of battery energy storage systems be considered at all electrical substations where PG&E has installed new Make Ready switching equipment that enables the connection of the temporary generators for islanded operation. Battery energy storage systems, together with incremental demand response and energy efficiency measures within the islanded network, can significantly reduce the number of hours diesel generators operate during an outage. Battery energy storage systems can also provide other valuable and needed services, including local and system resource adequacy when the transmission system is in a normal operational mode. Likewise, battery energy storage systems can reduce load on critical local infrastructure, extending the operational life of some components and deferring the need for costly upgrades.

A Multi-layered Planning Approach is Required to Develop Intrinsic Community Energy Resilience that Minimizes Need for Temporary Back-up Generation

The Joint Parties recommend that the Commission adopt the concept of developing concentric layers of adaptive systems as a strategy to address community needs in resiliency planning.[3] The concept draws on design principles observed in nature where multiple levels of resiliency and adaptation have evolved that protect species from threats and hazards. Accordingly, concentric-based resilience planning would start by deploying distributed energy resources (DERs) at each individual household or building, then progressively moving outward to the area served by a single service transformer, the larger neighborhood served by a distribution feeder and finally the entire area served by the distribution substation and multiple feeders where the utility may have installed Make Ready switching and protective equipment to enable islanded operation. Within this chain of interconnection from substation to individual sites, some buildings could have the ability to island, particularly those sites providing critical services to the community. Likewise, the utility could also strategically install

[3] Resilient Community: A concept and vision for community action, city planning and state policy for the 21st century. Lorenzo Kristov. January 28, 2018.

switching and back-ties that enable smaller area microgrids within the larger community microgrid served by a substation. This concentric-layered approach, by engaging multiple activities within the distribution system microgrid, could significantly reduce the need for temporary diesel generation during PSPS events.

Modification of Resource Adequacy Requirements Will Enable Microgrids that Provide Resource Capacity

The commercialization of microgrids and the replacement of temporary diesel generators will depend, to a substantial degree, on the opportunities available for microgrid participants to provide other valuable services to wholesale power markets and distribution system operators (DSOs).

Central to microgrid commercialization efforts is the manner in which the state's resource adequacy (RA) program is designed and implemented. Focus on the state's RA program has intensified since the recent week-long heat wave that triggered a Stage 3 emergency with rolling outages. The CAISO acknowledged that additional rolling outages were avoided, in large part, due to voluntary consumer conservation.[4] On a similar note, the August 19, 2020 Joint Agencies Letter to the Governor noted the important role of distributed energy resources (DERs) in reducing load and avoiding outages.[5]

These recent events not only emphasize the potential for DERs and microgrids to provide incremental resource adequacy at critical junctures but also exposes limitations in current market rules and RA program design that need coordinated consideration within and between the Microgrid proceeding and the Resource Adequacy proceeding (R.19-11-009). A key issue is that export-capable behind-the-meter resources face significant barriers to providing RA capacity. Microgrids are likely to face similar barriers unless RA program rules are modified and coordinated with a new microgrid tariff. Currently, most DERs are limited by being tied to onsite customer load, which unnecessarily caps the amount of load-reducing capacity that can be provided even if

[4] CAISO press release on August 18, 2020. http://www.caiso.com/Documents/Consumer-Conservation-Helps-Avert-Outages-Second_Straight-Day.pdf

[5] Joint Response to Governor Newsom Letter ("Joint Agency Response Letter") submitted on August 19, 2020.

there is the capability to export additional capacity to the grid.[6] Microgrids by design are linked to customer load and operate in close synchronization during islanded conditions.

Utilization of this stranded export capacity can be a valuable resource for system reliability and is a more cost effective and efficient use of resources to provide local area resilience during PSPS events and other outage conditions. Over 400 megawatts of customer energy storage is already available online.[7] Some of this storage capacity could be incorporated into microgrids and dispatched in a manner that reduces the need for mobile diesel generators. The Joint Parties encourage the Commission to adopt modifications to RA program rules to enable these existing resources to be fully integrated into microgrids to provide resiliency services.

2.2 Interim Approach for Minimizing Emissions From Generation During a Transmission Outage in 2021

Planning for the Three Timelines Identified in This Ruling Needs to Proceed in Parallel and Interact Flexibly

To transition away from reliance on diesel generation, this ALJ ruling sets forth three distinct deadlines from the date of issuance: the 2021 Fire Season (<12 months), the 2022 Fire Season (<24 months) and beyond 2022 (24 months and counting). The Joint Parties recommend that the Commission acknowledge that effective planning for all three time-frames must commence simultaneously and be implemented with a high degree of urgency and coordination. There will also likely be opportunities to test new approaches to resiliency planning in the earlier periods that can be extended and expanded in later periods. Below we propose an overarching approach and several initiatives to meet these proposed objectives within the stated timelines:

[6] The CAISO's Proxy Demand Resource model does not recognize nor credit exported energy which acts as a disincentive for facilities with batteries to conserve during times of grid stress since reducing load also reduces the amount of energy that can be credited to the storage device in programs like the Demand Response Auction Mechanism.

[7] The Self-Generation Incentive Program reports that 213 MW of storage has been installed through this program. Another 234 MW of BTM storage has been procured by investor-owned utilities pursuant to Assembly Bill 2514.

Near-Term Utilization of Energy Efficiency and Demand Response Measures, in Combination with the Development of Targeted Energy Storage Capacity, will Minimize Need for Temporary Back-up Generation

Over the next 12-24 months, design and implementation of carbon-free alternatives to fully offset temporary diesel generation at the scale needed will be challenging. Therefore, the Joint Parties strongly urge the Commission to begin implementing energy efficiency and demand response measures within islandable networks that would reduce the hours of operation for temporary diesel generators, as well as incentivizing accelerated deployment of solar plus storage systems on individual buildings and community facilities such as fairgrounds or schools that can provide vital services during periods of service disruption or community threat. Temporary natural gas generation resources could be used in some places instead of diesel for limited periods if there is gas delivery service near to a substation location.

With regard to implementing energy efficiency measures, the Joint Parties recommend moving building standards toward the Passive House methodology[8], in partnership with the US DOE Zero Energy Ready Home program, which results in reductions in HVAC energy by approximately 80%, and vastly improves indoor air quality through continuous "energy recovery ventilation" which provides filtered fresh air up to HEPA levels. This also provides health benefits in the way of smoke contaminants and airborne viruses being continually exhausted from within the structure.

Efforts to reduce local air pollution and carbon emissions should be conducted in coordination with the Low Carbon Fuel Standard (LCFS), Alternative Diesel Fuels (ADF) and other relevant programs under California Air Resources Board (CARB) direction.[9] In conjunction with carbon-neutral generation, complementary deployments of energy storage capacity, charged by either solar or excess generator capacity, should also be considered to minimize emissions from diesel generators by reducing run-time during outage scenarios of shorter duration.

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[8] www.PHIUS.org, https://www.energy.gov/eere/buildings/zero-energy-ready-homes

[9] California Air Resources Board (CARB), Low Carbon Fuel Standard | California Air Resources Board) and (Alternative Diesel Fuels | California Air Resources Board).

2.3. Process for Transitioning to Clean Temporary Generation in 2022 and Beyond

Innovative Development of Vehicle to Grid (V2G) Technologies, in Coordination with CARB Clean Vehicle Programs, can Replace the Use of Diesel Generators During Transmission Outages.

The following section discusses the opportunity to leverage innovation in transportation technologies and infrastructure to address community resiliency needs during transmission system outages. The Joint Parties strongly recommend that efforts commence to deploy vehicle-to-grid (V2G) systems at the same or even greater level of penetration and distribution as other DER assets due to their ability to scale rapidly, perform multiple tasks and provide multiple values.

There are new technologies currently undergoing CEC certification and integration into projects by Q4 2020, which will enable deployment of V2B and V2G technologies at residences and small businesses. This trend will allow light-duty (and eventually medium and heavy-duty) EVs to not only provide on-site energy storage and back-up generation, but also allow aggregation as virtual power plant (VPP) assets which can perform ancillary services to the grid or a local microgrid.

The added resilience and monetization values created for EV owners will accelerate the adoption of EVs across public and private sectors, and organically expand VPP proliferation by virtue of the added services and value streams created. At scale, EV aggregation into VPPs have the potential to levelize energy demand, supply, and cost. This democratization of energy resources will create equitable systems, as all participants become “prosumers’, and effective incentivization through properly designed tariffs will be essential to accelerate market adoption. Fleets of V2G-enabled EVs can provide resilience for critical sites and infrastructure, and for the community.

The Joint Parties also strongly recommend that the Commission work closely with the California Air Resources Board (CARB) as they implement their Advanced Clean Truck Rule and other related programs.[10] As a first step, the Joint Parties recommend that prior to the 2022 fire season, the Commission order PG&E to pilot the

[10] Advanced Clean Trucks | California Air Resources Board

use of V2G generation capacity by repurposing local heavy-duty EVs developed under in alignment with CARB's clean vehicle programs.

RFI Proceeding: the First Step in Developing a V2G Framework

To begin advancing towards this goal, the Commission should quickly commence a Request for Information (RFI) in this proceeding, specifically directed to EV manufacturers and V2G equipment suppliers, to standardize the interconnection of light, medium, and heavy-duty EVs at both Make Ready substations and other locations that serve critical loads. This RFI should further consider a fast-track timeline to implement initial pilot projects that prove conceptual design and commercial viability, and formulate compensation mechanisms to incentivize widespread adoption and use of V2G-enabled fleet vehicles through contractual obligations to provide back-up generation services during outages.

Both battery-electric vehicles (BEVs) and fuel-cell electric vehicles (FCEVs) technologies offer attributes that address different grid needs. The ability of FCEVs to generate electricity for extended periods of time, assuming a sufficient source of hydrogen, presents an opportunity to provide flexible, zero-emission services at distribution substations and other points of interconnection within the distribution grid. Battery-electric vehicles or permanent battery storage systems can also provide load-following services on either an interim or permanent basis.

Multiple Uses of V2G infrastructure can Significantly Mitigate Resilience Costs

Through tight coordination with CARB and other state agencies, local governments and public/private vehicle fleet operators, the costs of using medium duty and heavy-duty electric vehicles for temporary generation can be defrayed through contracts for their contingent utilization during PSPS events. During normal "Blue Sky" conditions, these transportation assets otherwise provide zero-carbon transport services to nearby communities.[11]

For example, assuming a grid-connectable fuel cell electric truck (FCET) provides emergency power for 10% of its operable hours and is otherwise deployed for

[11] https://www.sciencedirect.com/science/article/pii/S0306261918301636 and https://www.youtube.com/watch?v=t3mvOkHb2Ns&feature=youtu.be&t=19m41s

transportation purposes each year, a shared approach incorporating normal and emergency functions should significantly mitigate the cost of providing temporary generation during a transmission outage.

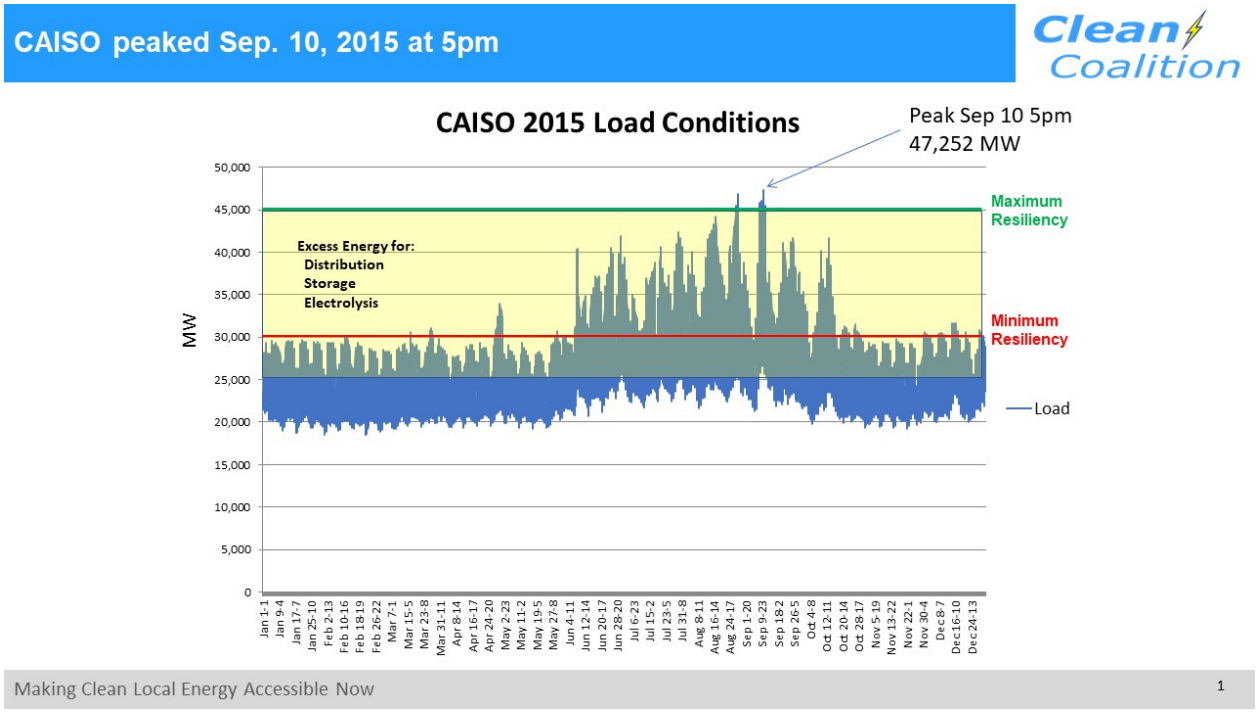
In contrast, the total cost of a vehicle providing dedicated mobile diesel generation for emergency purposes only would equal the entire annual lease cost of the vehicle and generation plant, plus the cost of diesel and external health and environmental costs of concentrated emissions to adjacent populated areas. It is essential to note that in this example, the annual lease cost of mobile diesel generators would include a substantial amount of standby "dead-time" where these assets are not used but must be stored and regularly maintained, whereas repurposing existing transport vehicles requires payment only for time actually used, plus a de minimis standby fee or other charge providing consideration for maintaining these assets in a ready state for their intended purpose over the contract term.

V2G Provides an Opportunity to Advance Development of Renewable Hydrogen for Resilient Local Power Generation

Today, the vast majority (99.6%) of commercial hydrogen production comes from hydrocarbons. Around 71% is produced via the reforming of natural gas, with most of the remaining balance produced from coal via gasification. In 2020, the production of green hydrogen through electrolysis only constitutes 0.1% of global hydrogen production.[12]

California's deep commitment to grid decarbonization through development of renewable generation resources creates an excellent opportunity to advance the commercialization of renewable hydrogen using excess electricity that might otherwise be curtailed. Production of renewable hydrogen for highly resilient distributed energy systems is an opportunity that should be incorporated into this proceeding, and the Joint Parties recommend that renewable hydrogen production be incorporated in community resiliency projects targeting renewable generation capacity to meet annual peak loads as represented in the image below.

[12] Wood Mackenzie, "The rise of the hydrogen economy," https://www.woodmac.com/nslp/hydrogen-guide/.



Background image courtesy of Clean Coalition

In this situation, a particular site would target on-site renewable generation capacity to meet peak loads as indicated by the green “Maximum Resiliency” line, with a planned conversion of excess energy into hydrogen during the off-peak conditions to fuel fleet vehicles or for resale into the hydrogen refueling market.

Robust development of solar generation can be used for on-site storage, export to adjacent locations or conversion to hydrogen through electrolysis, creating a "resiliency reserve" while also offering additional revenue streams by supplying local hydrogen refueling stations in accordance with California’s 33% renewable hydrogen mandate. A central element of this renewable hydrogen strategy would be to plan for municipal and/or commercial-industrial microgrids that incorporate local electrolysis and fleet refueling capabilities. These sources of renewable hydrogen can be part of “resiliency hubs” that support back-up generation provided to distribution substations or other areas of critical need.

While hydrogen V2G resiliency pilots will initially rely on current supplies of hydrogen steam-reformed from methane, development of local electrolysis capacity over time must be made a priority to support the evolution of carbon-free energy and

transportation systems. Again, excess site generation in highly resilient microgrid configurations can meet multiple community needs, including site reliability, replenishing energy storage capacity, and producing hydrogen for long-duration storage. A key design objective should be to use or store all available sources of renewable electricity with little or no curtailment.

Achieving this objective requires a means of compensating distributed generation for the high resilience value of DERs that remain available during extended power disruptions, where local generation is the only resource left to energize the affected grid area. Again, the operating cost of these mobile DERs would be defrayed by increased market demand for medium/heavy-duty FCEVs in the transportation sector and renewable hydrogen that can be sold to refueling stations and transportation operators, as well as stationary fuel cell facilities.

An Essential Element is a Microgrid Tariff that Accurately Calculates the Value of Resiliency Services

The value of resiliency services can be calculated in several ways. One method would be to determine the potential human and economic damage that would otherwise occur during lengthy transmission outages without effective intervention. Another would be to evaluate the health consequence of the extensive use of diesel generators to meet load during the transmission outages. Using these metrics, some recent estimates show the value of resiliency services to be in the billions.[13]

A reasonable estimate of the cost of unserved load should be used in determining the cost effectiveness of local clean generation used to provide resiliency services. Given the high value of avoiding lengthy service disruptions across numerous vulnerable communities, any compensation structure should include payment for the standby value that assures the resources are available to meet critical loads during extended outage conditions. This combination of revenue sources should provide appropriate investment incentives for V2G-enabled ZEVs.

[13] CNBC, "PG&E power outage could cost the California economy more than $2 billion,"October 10, 2019..

Examples of Opportunities to Use V2G Infrastructure for Resilience Services at Various Points within the Distribution System

Heavy-duty EVs, both in the commercial transport and public transit sectors, could be repurposed to offer generation capacity at substations and critical facilities during outages. Peak generation capacity for FCEV transit buses and heavy-duty trucks are expected to be approximately 150-450 KW.[14] For example, the Kenworth T680 FCET is currently "fed by a pair of 114-kilowatt (153-horsepower) Toyota Mirai fuel-cell stacks and a 12-kwh Toshiba lithium-ion battery pack to store energy for use when maximum power is required. Together, those components can deliver maximum power of 500 kW (670 hp)."[15] Similarly, school buses, with their unique schedule and duty cycle, could be deployed under emergency conditions for back-up generation during the day while not in use.

Small fleets of heavy-duty FCETs have the potential to offer a carbon-free equivalent during outages. Hooked up to rotating mobile hydrogen storage vehicles or a pipeline supply, it is conceivable that such vehicles could deliver zero-carbon energy for an indefinite period. What will be needed in this scenario is (1) an internal bus connecting the power train to the grid, (2) a supply line connecting the FCET to a pipeline or truck carrying hydrogen storage tanks, (3) the appropriate interconnection configuration at the substation or other point of grid interconnection, and (4) a compensation mechanism to build local FCEV capacity that can be used to maintain critical grid functions during an extended outage.

The concept of FCEVs providing emergency generation services is not novel. Toyota and Honda recently announced a joint effort to "create a mobile power generation/output system, Moving e, that consists of a fuel cell bus that can carry a large amount of hydrogen, portable external power output devices and portable batteries, and will begin demonstration testing of the system's ability to deliver electricity anytime and anywhere."[16] While this project contemplates a dedicated vehicle using

[14] Ballard / NAFCE, "Fuel Cell Electric Trucks: An Analysis of Hybrid Vehicle Specifications for Regional Freight Transport," June 2020 p.13.
[15] Green Car Reports, "Toyota and Kenworth to Build 10 Fuel-Cell Semis for LA Port Duty," January 9, 2019.
[16] "Toyota and Honda to Begin Demonstration Testing of a Mobile Power Generation/Output

only onboard hydrogen and distributing power via portable battery packs, it is clear that the fuel cell stack in the bus would be capable of generating significant power for an extended period if sufficiently supplied with hydrogen via a mobile storage or pipeline delivery system.

Resiliency using a V2G strategy is also not limited to large-scale applications at distribution substations. The Joint Parties recommend that the Commission also consider programs and initiatives to support the development of local electrolysis capacity at privately-owned sites that could supply FCEVs to maximize resilience and offer emergency services during disruptions. For example, a large commercial/industrial business with high transportation requirements could install dedicated solar generation to electrolyze hydrogen to self-fuel its EV fleet. In an outage scenario, this business can either export excess energy to adjacent properties using existing grid interconnections or dispatch a percentage of its fleet to supply critical back-up services at a variety of sites, receiving compensation via a resiliency tariff rider that acknowledges the high value of these services during outages. Such a premium should also form the basis for a standby charge or other compensation that will appropriately incentivize fleet operators while mitigating the potentially high opportunity cost during grid emergencies.

Within a local distribution system, the value of the stored energy in EVs can be utilized by residential and small business owners for peak shaving and load shifting grid services or as a virtual power plant (VPP) providing services to others. This opportunity would raise the value proposition for owning an EV and create a virtuous cycle through incentivizing adoption of EVs alongside workplace solar + charging, with use of bidirectional V2G solar inverters.[17]

System to Deliver a Secure Supply of Electricity in Times of Disaster," August 31, 2020.

[17] H. Vahedi and K. Al-Haddad, "PUC5 inverter - a promising topology for single-phase and three-phase applications," *IECON 2016 - 42nd Annual Conference of the IEEE Industrial Electronics Society*, Florence, 2016, pp. 6522-6527, doi: 10.1109/IECON.2016.7793810. See also Paul Shepherd, "Power Grid-Connected Vehicle to Home (V2H) System Enables VPPs," October 10, 2018 and "Nuvve Corporation's Vehicle-to-Grid (V2G) Platform Enables New Phase of Project Providing Grid Services in Japan," September 10, 2020."

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Effective V2G Deployment Requires Unprecedented Engagement, Cooperation and Coordination with Local Communities

The ambitious strategy for V2G resources described in these comments cannot be achieved without an unprecedented level of cooperation and coordination among state regulatory agencies (CPUC, CARB, CEC), local governments (city/county councils/supervisors, school districts and transit agencies), Community Choice Agencies (CCAs) and commercial-industrial interests. This need for broad cooperation among state agencies, local government and the private sector is why community engagement has been a recurrent theme expressed in opening and reply comments by many parties in this proceeding. It is clear that achieving both optimal benefits and cost effectiveness will require identifying and capturing synergies between state goals and local resources. The Joint Parties urge the Commission to look beyond its goals for the electric system and enroll other state agencies in promoting community resiliency and meeting other societal objectives such as decarbonizing transportation.

The Multi-Agency VGI Working Group Report Can Serve as A Central Reference Guide for Developing V2G Resiliency

The Final Report of the Joint Agencies Vehicle-Grid Integration Working Group released on June 30th of this year (the "VGI Report") can serve as a central resource and reference guide for the design and implementation of zero-carbon back-up generation.[18] The VGI Report, jointly developed by the Commission, the California Independent System Operator (CAISO), California Energy Commission (CEC), and California Air Resources Board (CARB), sets forth a comprehensive review of VGI use cases and policy recommendations, and has as one of its prime objectives "Improving grid resiliency and security, including for public safety power shutoff (PSPS) events."[19]

The Joint Parties believe a number of use cases and policy recommendations in the VGI Report can be directly applied to creating customer and system back-up resiliency, while also accelerating the use of heavy-duty transit and commercial EVs as

[18] California Public Utilities Commission DRIVE OIR Rulemaking (R. 18-12-006), "Final Report of the Joint Agencies Vehicle-Grid Integration Working Group," June 30, 2020 (the "VGI Report").
[19] VGI Report, p. 6

zero-carbon generation resources during grid outages.[20]

Below are selected excerpts (with relevant portions highlighted) from the VGI Report that reinforce how VGI technology, specifically V2G applications, can replace fossil-fuel back-up generation and provide an agile, resilient response during outages:

> ***Page 7: Focus on V2G and Medium- and Heavy-Duty Vehicles.*** *"The Working Group made a conscious effort to explore and promote medium and heavy-duty and V2G use cases. Through this effort the Working Group recognized the benefits unique to these use cases and emphasized recommendations to overcome barriers for them… an important result is that there are many potential VGI use cases that can provide value, and that the potential market for VGI solutions is diverse and interwoven across a broad swath of the transportation and power sectors… California should take an inclusive and collaborative approach to VGI opportunities given the evolving nature of the regulatory and market landscape."*
>
> ***Page 14: Why is VGI Important?*** *"The Working Group also noted the ubiquitous nature of VGI potential across all customers and businesses, given the acceleration of EV adoption, and the unique role of VGI in fostering EV adoption. That is, VGI can reduce the total cost of ownership of electric vehicles, unlock new value propositions and revenue streams, and facilitate charging infrastructure investments. VGI-enabled EVs can also provide grid reliability services and help limit overall electricity system cost increases by providing lower-cost alternatives to traditional supply-side resources, and by mitigating the cost impacts of rising EV and renewable energy adoption. [Of the] several potentially unique attributes of VGI that can distinguish VGI from other traditional DERs and also provide complementary benefits to traditional DERs is... Resiliency. There are unique resiliency benefits, at both the building-level and community-level, to counteract Public Safety Power Shutoffs (PSPS)."*
>
> ***Pages 26-27: V2G Use Cases.*** *Note: of the seven high-scoring subsets of use cases involving V2G technology, three involved*

[20] VGI Report, pp. 27 (V2G use cases for back-up resiliency), 28 (policy category 5: "Accelerate use of EVs for bi-directional non-grid-export power and PSPS resiliency and backup"), 31 (policy recommendations 5.02, 6.07, 7.03, 7.04 and 7.05), 34 (policy recommendations 5.01, 6.03, 10.06), 37 (Policy Recommendation Overlaps and Connections), 39 (policy recommendations 5.03, 7.13, 7.14 and 1.20), 43 (Conclusion and Next Steps: further define and explore "complex" or "multi-use application" (multiple application) use cases that can "stack" or combine the values of multiple services and benefits").

back-up resiliency and one for grid upgrade deferral benefits in both residential and commercial environments.

Page 28: Policies Needed for Deployment of Additional Use Cases.

Policy Category 5: Accelerate use of EVs for bi-directional non-grid-export power and PSPS resiliency and backup.

Policy Category 6: Develop EV bi-directional grid-export power including interconnection rules.

Policy Category 7: Fund and launch demonstrations and other activities to accelerate and validate commercialization.

Page 31: Short-Term Policy Recommendations with Strongest Agreement.

5.02: Pilot funding for EV backup power to customers not on microgrids, including goals for pilots in 2021-2022; utilities to consider feasibility of EVs for emergency backup in PSPS plans and resiliency solutions.

6.07: Pilot funding for EV backup power to customers not on microgrids, including state-wide goals for at least 100 EVs by 2021 and 500 EVs by 2022; utilities to consider the feasibility of EVs for emergency backup generation in PSPS plans and resiliency solutions.

7.03: Focusing on resiliency and backup application in workplace and multi-unit dwellings, leverage EPIC funding to pilot use-cases to understand and reduce costs and to streamline ease of implementation.

7.04: Create pilots to demonstrate V2G's ability to provide the same energy storage services as stationary systems and let V2G systems participate in pilots for stationary storage.

7.05: Special programs and pilots for municipal fleets to pilot V2G as mobile resiliency.

Of these 23 short-term recommendations with strongest agreement, virtually all had broad "convergence" among all policy survey respondents. Such convergence means that all respondents agreed with each other – that there was a high degree of consistency among the responses. Recommendations 2.08 on coordinated incentives, 7.05 on municipal fleet pilots, and 9.02 on public awareness had

particularly strong convergence.

Pages 43-44: Conclusion and Next Steps. ". . . VGI is a unique and effective convening umbrella or venue for fostering collaboration between the electric power and EV/charging sectors, and among many types of industry, government, advocacy, research, and utility and CCA stakeholders. The next steps beyond this report for California state agencies, the California ISO, utilities, community choice aggregators and other load-serving entities, and other VGI stakeholders could include: . . . Continue inter-agency efforts to advance VGI understanding, piloting, and large-scale deployment, leveraging private and public funds for that effort. Efforts should be inclusive and cover a wide variety of VGI solutions at different levels of maturity and readiness. . . . Map the use cases put forth by the Working Group onto existing and planned California policies and programs for transportation electrification and identify gaps in policies and programs for addressing priority use cases."

The above excerpts focus on the ability of private and public transportation assets, through VGI technologies, to significantly reduce and potentially eliminate the need for dedicated back-up generation during a grid outage. The Joint Parties believe that sometimes the best answers for critical problems can be found by looking across different sectors of the economy and society.

Assuming sufficient and rapid local interconnection capacity can be facilitated through this Microgrid proceeding, the Joint Parties believe that medium and heavy duty EVs, strategically deployed at distribution substations or points of local grid interconnection and at local critical facilities, can discharge large amounts of power into the distribution grid to support critical grid functions that minimize the need to use remedial action schemes (rotating outages). At the other end of the distribution spectrum, V2G interconnection of light-duty vehicles ("LDVs") at residential, multi-family and smaller commercial-industrial microgrids can provide electric service behind-the-meter to reduce grid stress.

The recent release of the VGI Report, followed by the issuance of this Ruling, presents a medium-term opportunity to eliminate the need for temporary diesel generation while advancing both grid resilience and zero-emission vehicles on a wide variety of fronts. We urge the Commission to consider the synergies presented by this

strategy and to act with dispatch to implement its completion within the stated timelines.

Executive Order N-79-20: a Top-Down Mandate for Accelerated Transition to a Zero-Emission Transportation Sector

The clearest signal yet delivered to accelerate California to a zero-emission transportation system came this past Wednesday, September 23rd, when Gov. Newsom signed Executive Order N-79-20, which seeks to eliminate in-state sales of all passenger, light-duty, drayage, and off-road vehicles and equipment using internal combustion engine (ICE) technology by 2035, with the same goal to be reached for medium and heavy-duty ICE vehicles and equipment by 2045.[21]

Executive Order N-79-20[22], in both its preambles and resolutions, makes clear its intent to accelerate this transition on a number of fronts:

- Section 3 requires the Commission, in collaboration with other state and local agencies and the private sector to "develop a Zero-Emissions Vehicle Market Development Strategy by January 31, 2021, and update every three years thereafter, that: Ensures coordinated and expeditious implementation of the system of policies, programs and regulations necessary to achieve the goals and orders established by this Order."
- Section 4 requires the Commission, in concert with other agencies, to "use existing authorities to accelerate deployment of affordable fueling and charging options for zero-emission vehicles, in ways that serve all communities and in particular low-income and disadvantaged communities, consistent with State and federal law."
- Section 6 mandates that state agencies "by July 15, 2021 identify near term actions, and investment strategies, to improve clean transportation, sustainable freight and transit options, while continuing a "fix-it-first" approach to our transportation system, including where feasible: . . . Supporting light,

[21] Office of Governor Gavin Newsom, "https://www.gov.ca.gov/2020/09/23/governor-newsom-announces-california-will-phase-out-gasoline-powered-cars-drastically-reduce-demand-for-fossil-fuel-in-californias-fight-against-climate-change/," September 23, 2020.
[22] EO N-79-20 can be downloaded at: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.

medium, and heavy duty zero-emission vehicles and infrastructure as part of larger transportation projects, where appropriate."

All these mandates are in complete alignment with, and will be facilitated by, incorporation of a broad spectrum of V2G technologies that render ZEVs as both emissions-free transportation and energy resilience assets at multiple levels within the distribution grid. Furthermore, the Joint Parties believe that the unique attributes offered by medium to heavy-duty V2G could potentially accelerate medium to heavy-duty EV adoption to comply within the 2035 timeline.

Clearly, V2G applications should be a central element of the required Zero-Emissions Vehicle Market Development Strategy as mandated in Section 3 and would be greatly facilitated by the information gathered in the proposed RFI proceeding as outlined earlier. Similarly, communicating the need to develop microgrids with on-site charging and refueling capacity advances the goals in Section 4. Finally, targeting applications in the commercial-industrial sector helps achieve the aim contemplated in Section 6, while also providing environmental and economic relief to adjacent communities which historically are disadvantaged in both areas.

Conclusion

The more we integrate distributed energy resources on to the grid, the more resilient a community can become. When DERs share power with and through grid infrastructure, the possibility exists to create resilient and equitable community microgrids. When DERs become more distributed and mobile, flexibility and resilience can be raised to a higher level. Consider the evacuations taking place amid increasingly ravenous fires. The energy infrastructure is usually damaged to some degree. If a significant portion of community-owned EVs with bidirectional charge/discharge capabilities were available during an outage, people using the energy stored within the EV can be taken to safety, use and charge/refuel their EV at remote locations and then return later to reenergize their homes and businesses, and share precious stored energy once the emergency subsides and the local grid regains functionality. Similarly, mobile generation assets located in surrounding communities could be brought to bear at a location suffering from planned or unplanned outages. The only limiting factor

would be the availability of fuel or charging infrastructure within proximity to the impacted area.

Mass adoption of EVs is considered challenging because of the infrastructure requirements needed for charging and refueling. However, once EVs become bidirectional, they can become a grid asset that can help balance local loads through charging and discharging at appropriate intervals. Whether at work or at home, EVs can charge during the day from surplus solar energy, storing clean solar energy and flattening the load curve, and discharge that clean power to the home and/or grid in the evening peak hours, when the need is critical.

Given the current fragile and tenuous state of California's economy, infrastructure, workforce, and climate-impacted environment, it is essential that all stakeholders, but particularly the state regulatory agencies, conduct a full inventory and assessment of current programs to identify and leverage synergies to create holistic solutions cutting across multiple public sectors. The Joint Parties believe that the VGI Report provides a template for development, implementation and most importantly, acceleration of state goals in both energy and transportation that also are in alignment with Executive Order N-79-20. By bringing resources from both sectors to bear on this issue of resiliency, the Commission, in collaboration with the ARB, CEC and CAISO, can work efficiently and expeditiously to realize a wide range of state objectives within their overlapping timelines.

Short-term, strategic deployment of battery energy storage, in lieu of and in tandem with minimal mobile fossil-fired generation resources, should minimize damaging emissions during many outages except the most extreme scenarios. Concurrent with this effort, pilots utilizing V2G technologies should be initiated on a fast track basis with commercialization targets within a 2-3 year timeframe. Realizing this objective will require tariffs or other compensation mechanisms that recognize the high value of emergency back-up services and zero-emission health benefits.

In concluding, the Joint Parties note that the COVID-19 pandemic imposed a significant, unforeseen economic burden on our state, and all paths forward in all sectors must be charted with economic recovery in mind as a key corollary benefit. The Joint Parties believe that developing and incentivizing VGI infrastructure to both

enhance grid resiliency while reducing transportation emissions will also create tremendous economic benefits for local communities and the state of California. Successful implementation will require both state and local action through a community energy resilience planning process that ensures community needs and goals are served.

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Respectfully submitted,

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