Docket No.: R.20-11-003

Exhibit No.:

Date: September 1, 2021

Witness: Ed Burgess

OPENING TESTIMONY OF ED BURGESS
ON BEHALF OF THE VEHICLE GRID INTEGRATION COUNCIL

I. INTRODUCTION

Q. Please state your name, title, and business address.

A. My name is Ed Burgess. I am a Senior Director at Strategen Consulting and the Senior Policy Director for the Vehicle Grid Integration Council (VGIC). My business address is 2150 Allston Way, Suite 400, Berkeley, California 94704.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Vehicle Grid Integration Council (VGIC).

Q. What is VGIC?

A. VGIC is a 501(c)6 membership-based trade association committed to advancing the role of electric vehicles ("EV") and vehicle-grid integration ("VGI") through policy development, education, outreach, and research. VGIC supports the transition to a decarbonized transportation and electric sector by ensuring the value from EV deployments and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable, and efficient electric grid.

Q. Who are VGIC's current members?

A. VGIC's members include Enel-X, Ford, General Motors, Honda, Nissan, Nuvve, Stellantis (formerly Fiat Chrysler), Toyota, dcbel, Fermata Energy, The Mobility House, Veloce, and Flexcharging.[1]

[1] The opinions expressed in this testimony reflect those of VGIC, and do not necessarily reflect the views of all of the individual VGIC member companies.

Q. Please summarize your professional background and qualifications.

A. I am a leader within Strategen's consulting practice where one of my primary responsibilities is managing the VGIC, which is one of Strategen's primary clients. In addition to VGIC, I oversee much of the firm's practice for governmental clients, non-governmental organizations, and trade associations. Strategen's team is globally recognized for its expertise in the electric power sector on issues relating to resource planning, renewable energy, energy storage, electric vehicles, utility rate design and program design, and utility business models and strategy. During my time at Strategen, I have managed or supported projects for numerous client engagements related to these issues. Before joining Strategen in 2015, I worked as an independent consultant in Arizona for several years and regularly appeared before the Arizona Corporation Commission. I also worked for Arizona State University where I helped launch their Utility of the Future initiative as well as the Energy Policy Innovation Council. I have a Professional Science Master's degree in Solar Energy Engineering and Commercialization from Arizona State University as well as a Master of Science in Sustainability, also from Arizona State. I also have a Bachelor of Arts degree in Chemistry from Princeton University.

Q. Have you ever testified before the California Public Utilities Commission, or any other state regulatory body?

A. Yes. I testified before the California Public Utilities Commission in proceedings A. 19-08-002 and A. 20-08-002 both of which pertain to PacifiCorp's 2020 and 2021 Energy Cost Adjustment Clause. I have also provided expert testimony before the Massachusetts Department of Public Utilities, the South Carolina Public Service Commission, the

Indiana Utility Regulatory Commission, the Nevada Public Utilities Commission, the Oregon Public Utilities Commission, and the Washington Utilities and Transportation Commission.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the incremental role that electric vehicles and charging stations could play in supporting grid reliability in California, and specifically in meeting Summer 2022 and 2023 emergency reliability needs. I describe the significant potential that both V1G and V2B/V2G solutions could offer in meeting these needs. I provide VGIC's assessment of the proposed EV/VGI Aggregation Pilot included in the Staff Concept Paper and offer recommendations for improving it. I also provide recommendations for other actions the Commission could take to enhance grid reliability through EVs.

II. BACKGROUND ON CURRENT AND NEAR FUTURE POTENTIAL FOR VGI TO SUPPORT GRID RELIABILITY DURING NET PEAK LOAD HOURS

Q. The Staff Concept Paper states that efforts to establish an EV/VGI Aggregation Pilot "could serve to establish a foundation for further deployment of VGI resources, which is a priority for the CPUC and EV stakeholders given the enormous potential of these resources." Does VGIC agree?

A. Yes. VGIC agrees that the creation of this pilot program represents a significant opportunity to both advance the VGI industry and deliver much needed grid reliability benefits. There is no doubt that EVs on the road today, plus those that will be by summer 2022, have the technical capability to meaningfully reduce net peak load through both V1G and V2B/V2G activities. However, market incentives to encourage these reductions

through opportunities like those proposed in the Staff Concept Paper have been slower to develop.

Q. Is VGIC confident that EVs can provide a meaningful contribution, in MW terms, to grid reliability in summer 2022 and 2023?

A. Yes. VGIC is confident that meaningful EV/EVSE contributions can become a reality along this timeframe. If the proposed EV/VGI Pilot concept is adopted (with VGIC's recommended modifications) there are no fundamental technical barriers that would prevent EVs/EVSEs from contributing. However, VGIC's optimism in this regard is also tempered by the reality that VGI solutions have not yet been deployed at such a significant scale and that there are still some unknown factors regarding overall customer acceptance and participation. Unlike power plants that have a singular function, the primary role of EVs is to support customers' transportation needs, not grid reliability needs. As such, to be successful the EV/VGI program must be designed in a manner that puts the customers' perspective first and foremost.[2] However, VGIC believes this can and should be achieved. Additionally, since this is a novel type of grid resource, any incremental participation (even if small) will be beneficial and is still worth pursuing as part of a comprehensive approach to addressing emergency reliability concerns.

Q. Is there a significant amount of EV/EVSE equipment deployed in California today that can already provide aggregated, unidirectional ("V1G") load reduction capabilities?

[2] One important exception to this are school buses that may not have a primary customer mobility obligation during summer months. As such, they are ideal candidates for the EV/VGI Aggregation Pilot.

A. Yes. Aggregators of EVs and EVSE in California have already demonstrated their ability to modify charging schedules. Networked EVSE have the technical capability to be dispatched by the EVSE provider (or by a utility or third-party aggregator). Similarly, many EVs – particularly those deployed in recent years – already have built-in telematics capabilities that OEMs and third-party aggregators can leverage to adjust charging schedules, if properly incentivized to do so.

At the end of 2020 there were approximately 630,000 EVs registered in California,[3] and another 121,000 have been sold through Q2 of 2021.[4] If California EV sales continue at a similar pace through Q2 2022, it is conceivable there could be close to 1 million EVs on the road in California before summer 2022. Assuming an average charging load of 5 kW per vehicle, this represents a total technical potential of 5,000 MW in instantaneous load that could theoretically be reduced via V1G.[5] Obviously the practical potential is only a small fraction of this since not all of those vehicles will be charging during the critical net peak load hours of 6-9pm, and not all EV owners will choose to participate in V1G activities. However, VGIC estimates that even under a more reasonable participation rate of 5%, approximately 247 MW of net peak load reduction from V1G might be achievable.

[3] California Energy Commission (2021). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 30, 2021. Retrieved September 1, 2021 from https://www.energy.ca.gov/zevstats

[4] Veloz (2021). 2019-2021 California Quarterly Electric Vehicle Sales. Q2 2021 Data Update. https://www.veloz.org/wp-content/uploads/2021/08/Q2_2021.pdf

[5] VGIC recognizes that a significant share of EV-owners that use Level 2 (or greater) chargers that would likely exceed 5 kW per vehicle. However many EV-owners (particularly owners of plug-in hybrid electric vehicles with smaller ranges) also primarily rely on Level 1 charging. VGIC believes that 5 kW is a reasonable estimate based on an assumed 50/50 split between Level 1 and Level 2 charging. This would be consistent with studies of home charging behavior, for example Tal, G., Lee, J., & Nicholas, M. A. (2018). Observed Charging Rates in California. UC Davis: Plug-In Hybrid & Electric Vehicle Research Center. Retrieved from https://escholarship.org/uc/item/2038613r).

Q. Is there a significant amount of EV/EVSE equipment deployed today that can already provide aggregated V2B/V2G capabilites?

A. Yes, although it is less widespread than V1G capabilities, a meaningful portion of EVs deployed today have bidirectional capabilities that would allow them to discharge to the grid, effectively doubling their ability to reduce net load peak. The most significant sources of V2G potential today are in the form of the Nissan LEAF and certain electric school buses. As of the end of 2020, there are about 25,000 Nissan Leaf vehicles registered in California that are model year 2013 or later, which have V2G capabilities.[6] VGIC estimates an additional 6,140 Nisan LEAFs could be sold in California by the end of Q2 2022. Assuming each vehicle could be discharged at 15 kW using an off-board V2X EVSE device, this equates to 469 MW in total technical potential for incremental contributions to net peak load.[7] As with V1G, not all vehicles will be able to participate at once. However VGIC estimates that a more reasonable 5% participation rate would equate to approximately a 23 MW of potential net peak contribution from today's EV fleet.

Beyond what is currently in existence, however, it is expected that several EV models being launched prior to summer 2022 and summer 2023 will have bidirectional charging capabilities. The table below summarizes the bidirectional-capable vehicles of both existing and forthcoming vehicle models and charging equipment.

[6] California Energy Commission (2021). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 30, 2021. Retrieved September 1, 2021 from https://www.energy.ca.gov/zevstats

[7] Fermata Energy. *Proven Results and Cost Savings with V2G Technology.* October 14, 2020. https://www.fermataenergy.com/news-press/proven-results-and-cost-savings-with-v2g-technology

Table 1. Bidirectional-capable vehicles on California's roads today, currently-deployed bidirectional EVSE, and forthcoming bidirectional products:

Product	**Amount Deployed / Deployment Date**	**Notes**
Nissan LEAF	25,095 as of the end of 2020,[8] plus an estimated additional 6,143 by the end of Q2 2022.[9]	-MY 2013 or later are V2G-capable -MY 2013-2015 have a 24 kWh battery, MY 2016 has a 30 kWh battery, and MY 2017-present has a 40 kWh battery and offers a 62 kWh LEAF Plus.[10] -Bidirectional mode requires EVSE with V2G-DC functionality. This is in use today.[11]
Blue Bird V2G-Capable School Bus	>100	-155 kWh battery capacity. In use today.[12]

[8] California Energy Commission (2021). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 30, 2021. Retrieved September 1, 2021 from https://www.energy.ca.gov/zevstats

[9] Assuming one third of all US Nissan LEAFs sales are in California (see https://insideevs.com/news/327907/one-third-of-nissan-leafs-in-us-were-sold-in-california/), and that quarterly US sales beginning in Q1 2021 are equal to 2,925 (see https://insideevs.com/news/498344/us-nissan-leaf-sales-q12021/)

[10] 2013 Nissan LEAF Press Kit: Overview https://canada.nissannews.com/en-CA/releases/ca-2013-nissan-leaf-press-kit. 2016 Nissan LEAF 30 kWh. https://www.caranddriver.com/reviews/a15101006/2016-nissan-leaf-30kwh-instrumented-test-review/. 2022 Nissan LEAF Range, Charging & Battery. https://www.nissanusa.com/vehicles/electric-cars/leaf/features/range-charging-battery.html

[11] See, for example, Shay Hlavaty. *New Partnership Combines Electric Carsharing with Vehicle-to-Grid Technology.* The Alliance Center. March 11, 2021. https://www.fermataenergy.com/news-press/new-partnership-combines-electric-carsharing-with-vehicle-to-grid-technology-alliance-center-colorado-carshare-fermata-energy

[12] Nuvve Corporation. *Blue Bird Delivers North America's First-Ever Commercial Application of Vehicle-to-Grid Technology in Electric School Bus Partnership with Nuvve and Illinois School Districts.* March 23, 2021. https://nuvve.com/blue-bird-v2g-electric-bus-with-nuvve-and-illinois-school-districts/

Mitsubishi Outlander PHEV	1,750[13]	-Each Outlander PHEV is equipped with a 12 kWh battery pack[14]
Thomas Built Buses Saf-T-Liner C2 Jouley	Unknown	-Up to 226 kWh of battery capacity[15]
Ford F-150 Lightning	Spring 2022; 120,000 pre-orders[16]	-Offers V2H backup power using 9.6 kW bi-directional charger[17]
Lucid Motors Air	Likely Q4 2021/Q1 2022[18]	-Offers V2G-AC capabilities, although barriers to mass-scale V2G-AC persist[19]
Volkswagen ID	2022	-To offer V2G capabilities[20]

[13] California Energy Commission (2021). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 30, 2021. Retrieved September 1, 2021 from https://www.energy.ca.gov/zevstats

[14] Roberto Baldwin. *2021 Mitsubishi Outlander PHEV Gets Bigger Motor and Battery at Same Price.* Car and Driver. February 25, 2021. https://www.caranddriver.com/news/a35605985/2021-mitsubishi-outlander-plug-in-hybrid-upgrade/

[15] Thomas Built Buses / Daimler Trucks North America LLC (2021). The Safe-T-Liner C2 Jouley Electric School Bus. Retrieved September 1, 2021 from https://thomasbuiltbuses.com/school-buses/saf-t-liner-c2-jouley/

[16] Mark Kane. *Ford F-150 Lightning Reservations Reach 120,000.* InsideEVs. July 28, 2021. https://insideevs.com/news/523153/ford-f150-lightning-reservations-120000/

[17] Ford Motor Company (2021). 2022 Ford F-150 Lightning: Ford Intelligent Backup Power. Retrieved September 1, 2021 from https://www.ford.com/trucks/f150/f150-lightning/2022/

[18] Andrei Nedelea. *Is Lucid Preparing to Kick Off Air Dream Edition Deliveries?*. InsideEVs. August 19, 2021. https://insideevs.com/news/527609/lucid-air-dream-edition-deliveries/

[19] Note that V2G-AC systems do not have a standard interconnection pathway in California. Decision 20-09-035 directed the investor-owned utilities ("IOUs") to establish a temporary interconnection pathway for V2G-AC systems. On May 28, 2021, the IOUs jointly filed Advice Letter 3774-E, 4510-E, and 6209-E, which requested approval of a temporary interconnection pathway for V2G AC pilots.

Product announcement available at: Lucid Motors. *Lucid Air to be the Fastest Charging EV, Featuring 900 V+ Architecture Delivering a Charging Rate of Up to 20 Miles Per Minute.* August 19, 2020. https://www.lucidmotors.com/media-room/lucid-air-fastest-charging-ev

[20] Charles Morris. *VW to enable bidirectional charging on all EVs on its MEB platform starting next year.* Charged Electric Vehicles Magazine. April 8, 2021. https://chargedevs.com/newswire/vw-to-enable-bidirectional-charging-on-all-evs-on-its-meb-platform-starting-next-year/. "The Volkswagen Group says it could produce as many as 300,000 bidirectional charging-enabled vehicles next year, including models from VW, Audi, Skoda, and Seat-Cupra.

Nuvve PowerPort[21]	Available today	-Offers V2G-AC capabilities, 19.2 kW, although barriers to mass-scale V2G-AC persist
Nuvve DC Heavy Duty Charging Station[22]	Available today	-Offers V2G-DC capabilities, 60 kW -UL 1741-SA certified, eligible for interconnection under CA Rule 21
Fermata FE-15	Available today	-Offers V2G-DC capabilities, 15 kW[23]
Fermata FE-20	Likely early 2022	-To offer V2G-DC capabilities, 20 kW
dcbel r16	Q4 2021	-Will offer V2G-DC or -AC capabilities, 7.6 kW[24] -Pending UL 1741-SA certification, eligible for interconnection under CA Rule 21
Rhombus RES-D2, RES-D3, RES-DCVC60, RES-DCVC125[25]	Available today	-Offers V2G-DC ranging from 60 up to 250 kW -RES-DCVC models are UL 1741-SA certified, eligible

[21] Nuvve Corporation (2020). Nuvve PowerPort Specifications Sheet. Retrieved September 1, 2021 from: https://nuvve.com/wp-content/uploads/2020/05/nuvve-powerport-spec-sheet-us-ul-energystar-certified-v5.0-may-2020.pdf

[22] Nuvve Corporation (2020). Nuvve DC Heavy Duty Charging Station Specifications Sheet. Retrieved September 1, 2021 from: https://nuvve.com/wp-content/uploads/2020/04/nuvve-dc-heavy-duty-spec-sheet-1.0.pdf

[23] Fermata Energy. *Proven Results and Cost Savings with V2G Technology.* October 14, 2020. https://www.fermataenergy.com/news-press/proven-results-and-cost-savings-with-v2g-technology

[24] dcbel. dcbel r16 Specifications Sheet. Retrieved September 1, 2021 from: https://www.dcbel.energy/wp-content/uploads/ossiaco-data-sheet-2021.pdf

[25] Rhombus Energy Solutions. V2G Charging, Control, and Management 50-500 kW: Bidirectional. Retrieved September 1, 2021 from: https://rhombusenergysolutions.com/products

		for interconnection under CA Rule 21
Wallbox	Unknown	-Offers V2G-DC, 7.4 kW[26]

III. VGIC IS GENERALLY SUPPORTIVE OF THE EV/VGI AGGREGATION PILOT PROPOSED IN THE ENERGY DIVISION STAFF CONCEPT PAPER, BUT BELIEVES IT COULD BE IMPROVED UPON

Q. Have you reviewed the Energy Division Staff Concept Paper on Proposals for Summer 2022 and 2023 Reliability Enhancements, and specifically, have you reviewed the proposed Electric Vehicle/Vehicle to Grid Integration (EV/VGI) Aggregation Pilot?

A. Yes.

Q. What is VGIC's perspective on the EV/VGI Aggregation Pilot proposal?

A. VGIC is very encouraged by this initial proposal and is interested in working with Energy Division and other stakeholders to improve it and ultimately adopt it for implementation in 2022 and 2023.

Q. Are there specific features of the proposal that you find especially attractive?

A. Yes, there are several important features, including the following:

1) The establishment of a minimum number of dispatch hours per season (i.e., 30 hours), provides substantial certainty to aggregators in terms of the level of compensation they can expect to receive for participation.

[26] Wallbox. Quasar DC Charger: Electrical Specifications. Retrieved September 1, 2021 from: https://wallbox.com/en_us/quasar-dc-charger

2) The use of virtual load aggregation will help overcome a perennial barrier to EV participation in traditional DR programs – specifically the fact that many EVSEs are on separate meters and therefore have no meaningful baseline.

3) As with 2 above, the use of EVSE meters or submeters to support incremental load reduction ("ILR") settlement will similarly help to overcome traditional barriers to EV participation in load reduction programs in the absence of a submetering protocol.

4) The inclusion of V2G as an option is also a significant step forward for advancing not only near-term grid reliability, but also creating a longer-term incentive and regulatory certainty for EV and EVSE providers to develop V2G products that deliver grid services.

Q. Do you think any potential metering inaccuracies that could arise from the use of submeters should be a concern in this case?

A. No. Any inaccuracies are likely to be extremely small. In fact, some EVSE equipment has been tested to demonstrate an accuracy range within 1%.[27] Whatever small percentage of metering inaccuracy that might arise from submetering appears to be an acceptable risk when weighed against the prospect of rotating outages due to extreme weather.

Q. If successful, what do you think the reliability and cost impacts of this proposal could be?

[27] See for example: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M348/K580/348580310.PDF

A. VGIC has conducted an analysis of the potential impact of this program and we believe it could provide a meaningful contribution to California's net peak load needs. Additionally, we think the potential cost impacts are within reason and would likely be on par with other emergency reliability efforts. VGIC's analysis is detailed below in Section 5.

IV. RECOMMENDED MODIFICATIONS TO STAFF'S PROPOSED EV/VGI AGGREGATION PILOT

Q. Are there features of the staff proposal you believe could be improved upon regarding V2G?

A. Yes. There are several recommendations I would suggest to improve the EV/VGI Pilot proposed in the Staff Concept Paper.

1) First, the proposal seems to arbitrarily limit V2G capabilities in multiple ways. For example, the proposal states that "The virtual load aggregation of all stand-alone EVSEs and the related host site must not be negative at any time." It is unclear to VGIC why this restriction is necessary and it appears counterproductive to the goal of reducing net load peak. If a virtual load aggregation records a negative value on its metered load, that would simply mean that the EV/EVSE is discharging to the grid and is actually increasing its contribution towards reducing the net peak. VGIC believes this behavior should be encouraged, rather than excluded, and should also be compensated accordingly.

2) Second, the proposal states that "V2G discharge is prohibited outside of the IOU dispatched hours." Again, the rationale for this restriction is unclear. In fact, this appears to place unnecessary restrictions on additional value streams that could encourage customers to adopt V2G capabilities. For example, PG&E has recently proposed several V2X pilot programs.[28] It is conceivable that some of the grid exports associated with these pilots may occur during off-peak seasons that would have no bearing on summer net peak load. Restricting export during these times would simply discourage participation in the EV/VGI Aggregation Pilot since it would close off other potential value streams. VGIC does acknowledge that some restrictions could be helpful in ensuring that EVs have a sufficient state of charge to maximize their contribution during the full 6-9 pm net peak load window. However, this restriction could be much more limited (e.g., to afternoon hours during summer) without jeopardizing the reliability contribution.

Q. Are there other use cases that the EV/VGI Aggregation Pilot does not specifically address?

A. Yes. The proposal is clear that it is focused on aggregators utilizing "networks of V1G or bi-directionally capable charging stations."[29] While this is a laudable effort that VGIC supports, it leaves out a very important use case that could significantly support summer net peak load, namely, vehicle-to-building or "V2B" with isolation techniques. More

[28] Pacific Gas & Electric Company Advice Letter 6259-E: *Request for Approval of PG&E's VGI Pilots in Compliance with Decision 20-12-029.* July 15, 2021. https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_6259-E.pdf

[29] Brian Stevens. *Email Ruling Issuing Commission Developed Staff Concepts Proposal Document and Seeking Comment in Opening Testimony Due September 1, 2021.* Rulemaking 20-11-003. August 16, 2021. Page 10.

specifically, some vehicles may be able to provide backup power to a home or business, while invoking isolation technologies that "island" the customer from the grid. This can potentially be done in conjunction with other behind-the-meter resources (e.g. on-site generation and battery storage), which has the potential to do much more than simply reduce EV charging load during net peak load hours, since it will also reduce the building's load at that time. While this may be implicitly considered to some degree in Staff's proposal, it could be useful to state it more explicitly, and also coordinate this effort with ongoing efforts underway to advance low-cost isolation techniques in the Microgrid proceeding (R. 19-09-009).[30] It is worth noting, that there is current work under way to develop the UL 3010 standard which would coordinate DER dispatch under islanded operations and manage an orderly reconnection process.[31] It is VGIC's understanding this standards development work could be on track for completion within the first half of 2022.

Q. Does VGIC believe the proposed ELRP compensation level of $2/kWh (increased from $1/kWh) is sufficient to support meaningful participation in the EV/VGI Pilot?

A. VGIC believes this is a very important step in the right direction and believes it may be sufficient to support aggregator interest in participation. However, this may not necessarily be sufficient to encourage both aggregator interest and EV customer

[30] *See, for example,* Advice Letter 3734-E of San Diego Gas & Electric Company, 6153-E of Pacific Gas and Electric Company, and 4462-E of Southern California Edison Company, and Supplemental Advice Letter 3734-E-A of San Diego Gas & Electric Company, 6153-E-A of Pacific Gas and Electric Company, and 4462-E-A of Southern California Edison Company: *Joint Utility Evaluation Process and Criteria to Assess Microgrid Different Isolation Technologies Pursuant to Decision 21-01-018.*

[31] For more information, see ANSI/CAN/UL 3010: Standard for Single Site Energy Systems. https://www.scc.ca/en/standards/notices-of-intent/ul/standard-for-safety-for-single-site-energy-systems

participation. As such, it may be appropriate to supplement this ELRP payment with a discrete customer enrollment rebate or incentive. For example, VGIC would support an additional rebate/bill credit provided directly to participating EV customers or EVSE site hosts of $20/month. Alternatively, this benefit could be provided to customers through a more marketable approach such as a free gift card to a retail or online store. The $20/month incentive would be appropriate for a typical residential customer due to the more limited net peak load contribution per vehicle, whereas a higher incentive level would also be appropriate for a larger-sized vehicle such as a school bus. In the case of a school bus, VGIC recommends a $240/month incentive based on an assumed 60 kW charging level (versus 5 kW for residential).[32]

To qualify, EV/EVSE owners could sign up through a website/app/EV display interface. This could include marketing efforts through both the IOUs and/or the EV/EVSE providers. Participants would then be added to each EV/EVSE company's aggregation pool and linked to an IOU customer account. The bill credit would be automatically applied to that customer account regardless of sign-up option. EV/EVSE companies could also provide their own direct marketing for this (including any supplemental rebates the EV/EVSE companies wish to offer). Meanwhile, EV/EVSE aggregators would then earn payment based on ILR performance of their aggregation pool. Each IOU could provide a standard offer contract for participating EV/EVSE aggregator companies.

Q. Does VGIC believe the proposed 30-hour minimum number of dispatch hours per season is appropriate?

[32] See Table 1 for available products, including several commercial offerings for 60 kW V2G-DC chargers.

A. VGIC believes this is a good starting point. While we have no specific objection to the 30-hour minimum, we are also open to using a different minimum number so long as it also provides sufficient certainty to aggregators. Additionally, VGIC believes it may be useful to consider other limitations on the hours that are selected for dispatch. For example, since the most acute net peak load needs are between the hours of 6-9pm, it might be useful to consider limiting dispatch to a maximum of 3 hours on a single day. This would help ensure that a sufficient amount of overnight charging can still occur such that customer mobility needs are not compromised.

Q. Does VGIC believe the 25 kW minimum aggregation size threshold is appropriate?

A. VGIC believes this is reasonable, but suggests that a 15 kW minimum is a more appropriate minimum size threshold to maximize participation from EVs, given the product nameplate capacities listed in Table 1 above.

V. ANALYSIS OF POTENTIAL CONTRIBUTION

Q. You mentioned that you had conducted some analysis of the potential contribution that this EV/VGI Pilot could provide to addressing net load peak shortfalls. Can you provide more detail on your analysis?

A. Yes. According to CA vehicle registration data, the current number of EVs in California at the end of 2020 was approximately 630,000, and at the current pace of sales, this could increase to nearly 1,000,000 by summer 2022. Many of these vehicles may already have inherent telematics capabilities, (or EVSE network communications) that would enable

aggregators to reduce charging load for participating customers (i.e., V1G). Assuming that a typical home charger is 5kW (which approximates the current balance of L1 and L2 chargers), and a participation rate of about 5% of total vehicles, VGIC estimates that there is a potential for 247 MW in net peak load reduction from V1G at existing vehicles. Additionally, there are approximately 25,000 existing vehicles that have V2G capabilities (primarily in the form of the Nissan Leaf). VGIC projects that this number could increase to 31,000 by summer 2022. Assuming a similar 5% participation rate from these vehicles, an additional 23 MW could be added from V2G capabilities, for a total EV/VGI pilot potential of 271 MW.

Q. What are the biggest uncertainties around these potential contribution levels?

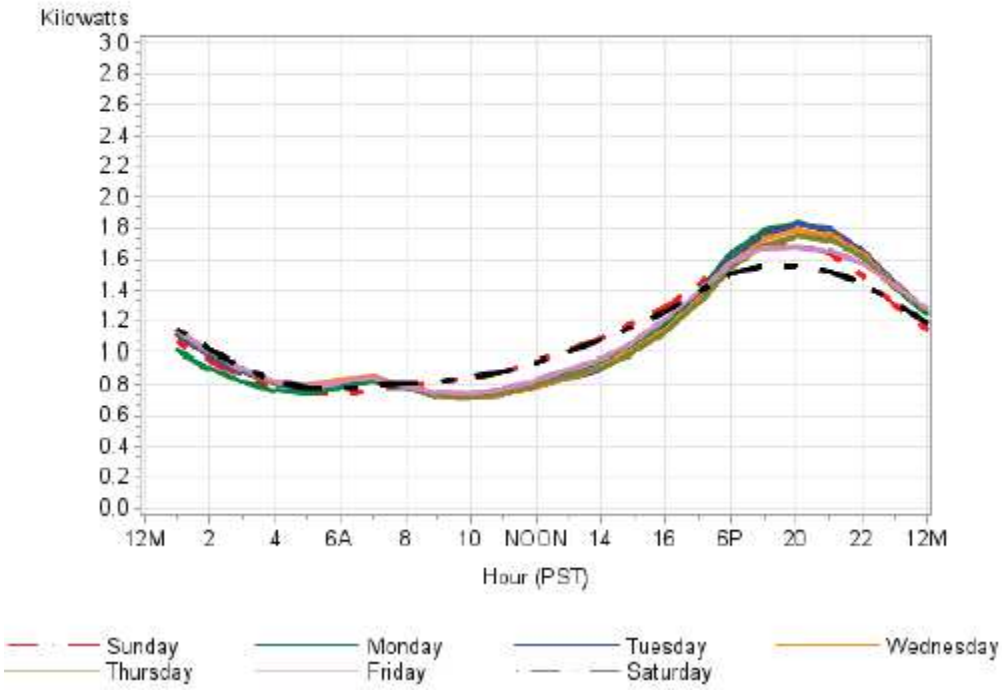
A. A. By far the biggest uncertainty relates to customer participation rates. Since VGI solutions have not been deployed at scale in California, it is impossible to determine if participation rates would be higher or lower than the 5% level assumed above, though VGIC believes this is a sensible guess. VGIC notes that any incremental amount of V1G or V2G resource would be beneficial and should be considered a "no regrets" option.

Q. What gives you confidence that 5% is within reason?

A. There are two primary reasons. First, there appears to be a large number of EVs that would normally charge during the summer net load peak hours of 6-9pm. This timeframe coincides with regular commute patterns such that a significant share of EV owners will likely be arriving at their home charging station during or prior to this period and would have the opportunity to begin charging. While many EV owners do already delay charging to take advantage of EV time of use rates, this behavior is certainly not

universal. For example, the chart below shows the load profile for 27,857 accounts on SCE's system that were known to own an EV.[33]

Chart SCE – 9: Single Meter, SF PEV Owners[50] on a Non-TOU Rate – Average Hourly Load Profile for Each Day of the Week



Second, based on communications with VGIC members (who would likely share in the marketing and recruitment efforts), we believe this is a reasonably conservative estimate of achievable participation rates through a program like the EV/VGI Pilot.

Q. Are there any additional uncertainties regarding V2G?

A. Yes. An additional uncertainty specific to V2G capabilities is the availability of bidirectional chargers. VGIC believes that reliable revenue streams, such as the ELRP payment and VGIC's proposed customer rebate, will support the development of robust

[33] Joint IOU Electric Vehicle Load Research - 7th Report - Filed on April 2, 2019 (CEC Docket No. 19-IEPR-04), https://efiling.energy.ca.gov/GetDocument.aspx?tn=228787-14&DocumentContentId=60075

and sufficient supply chains for bidirectional chargers and could therefore accelerate their deployment, but this is not guaranteed.

Q. Under these assumed participation levels, have you estimated the potential cost to support the EV/VGI pilots?

A. Yes. Assuming the $2/kWh ELRP payment over 30 dispatch hours and $20/month monthly rebate, I estimate that the total pilot cost to support the 271 MW contribution level I estimated above could be on the order of $28 million, which equates to about $103/kW-yr in capacity costs. This level of funding does not include any set asides for marketing, education, and outreach activities which may also be needed to maximize enrollment and participation.

Q. Do you think this is a reasonable cost to support grid reliability from a novel set of resources?

A. Yes. The 2019 Resource Adequacy Report shows that traditional RA capacity costs for existing resources are in the $45-60/kW-yr range, while new build resources are approximately $100/kW-yr and as high as $183/kW-yr.[34] Even if the cost is slightly above other potential capacity resources, VGIC believes this is appropriate since the pilot is attempting to leverage an entirely novel class of grid resources – namely EVs – to support reliability. As such, some premium is appropriate as a means of supporting market transformation and encouraging EV/EVSE providers to develop products and services that can meet this need over the longer term.

[34] Lakey, Jonathan, Brant, Simone, et al. *2019 Resource Adequacy Report.* March 2021. California Public Utilities Commission Energy Division. https://www.cpuc.ca.gov/RA/. Page 22.

VI. PATHWAYS FOR CONTRACTING AND EXECUTION

Q. What practical steps do you think the IOUs would need to take to secure resources through the proposed EV/VGI Aggregation Pilot?

A. There are several steps that would need to occur, and which the IOUs may need to be directed by the Commission to pursue. These include the following items:

- Develop a standard offer contract for aggregators participating in the EV/VGI Pilot
- Develop a protocol for identifying and communicating the dispatch hours that would be relatively easy to implement in the near-term
- Develop a process for virtually aggregating standalone EVSE meter data with host site load to calculate the ILR for settlement purposes
- Develop a process for collecting EV/EVSE submeter data from participants that use EV- or EVSE-based measurement.
- Develop an EV customer enrollment and participation portal (for some customers who enroll through their EV/EVSP company, this may not be needed)
- Conduct marketing, education, and outreach to recruit participants, including third-party aggregators, to the program.

VGIC looks forward to working with the Energy Division Staff, IOUs, and other stakeholders on implementing these necessary steps to ensure the EV/VGI Aggregation Pilot is successful.

Q. How can the Commission assist in making sure these steps are accomplished?

A. VGIC recommends that the Commission establish a proposed "go-live" date for the EV/VGI pilot in 2022 or 2023 (e.g., July 2022). This will help to focus the attention of the industry and the IOUs on completing the steps above, as well as inform any product development that is already occurring. Additionally, it may be beneficial for most aspects of the program to be implemented through a third-party administrator to ensure greater consistency and simplicity, rather than requiring aggregators to interface with each IOUs separately.

VII. OTHER NEAR-TERM ACTIONS THAT WOULD LEVERAGE EVS FOR MEETING NET LOAD PEAK IN 2022 AND 2023

Q. Beyond the proposed EV/VGI Aggregation Pilot, are there other near-term actions that the CPUC should take to ensure EV's can maximize their contribution to net load peak?

A. Yes. There are several actions that VGIC would recommend. These include the following four described in more detail below:

1. Adopt a Temporary Submetering Pathway Beyond the EV/VGI Aggregation Pilot

VGIC believes the Commission could unlock incremental net load reductions by establishing a temporary pathway to measure load reduction and EV discharging via technology within the EVSE and EV for the purposes of settlement. Notably, FERC

recently approved the CAISO's methodology for EVSE submetering.[35] IOUs have previously expressed concern over metering accuracy issues related to using EVSE submeters. However, VGIC notes that these potential accuracy issues are (1) based on flawed and out-of-date studies, and (2) less paramount than enabling this resource for reliability purposes. Simply put, the Governor's Emergency Proclamation highlights the threat that current and anticipated extreme weather conditions pose to grid reliability, and this threat dwarfs the potential metering accuracy concerns that have been posed by IOUs. Adopting a temporary submetering pathway will enable EV/EVSE that are co-metered with site load to enroll in dedicated EV TOU rates.

The staff concept VGI pilot would allow for the virtual pairing of EVSE load with site load. Modeled after this concept, VGIC recommends that any upcoming Decision under Phase 2 of R.20-11-003 should require the IOUs, as part of or as a supplement to their fall DR portfolio applications, propose a temporary pathway for EV- and EVSE-based measurement. Aligning this temporary pathway with the process proposed for the EV/VGI Aggregation Pilot in the staff concept paper will ensure consistency across programs.

2. Expedite approval of VGI-supporting rate constructs

VGIC is currently a party to the PG&E DAHRTP Pilot Application (A.20-10-011), which as VGIC understands it, is under review by the Commission. VGIC believes dynamic rates are one of the most promising near-term opportunities to unlock incremental V1G

[35] *Order Accepting Tariff Revisions* issued on September 30, 2020 in Docket No. 20-2443-000 at 8. http://www.caiso.com/Documents/Sep30-2020-LetterOrderAccepting-EnergyStorageandDistributedEnergyResourceStakeholderESDERPhase3-ER20-2443.pdf

load reductions. As such, PG&E's DAHRTP Pilot Application should be approved by the Commission as soon as possible, and the Decision should direct PG&E to implement the rate no later than spring 2022 to ensure resources can respond to DAHRTP price signals during summer 2022.

In addition, VGIC recommends the Commission direct PG&E to temporarily award credits for EV exports under PG&E's DAHRTP pilot. VGIC's Reply Brief in A.20-10-012 details the complete justification for awarding these credits, and notes that it would be a worthwhile expansion.[36] Temporary allowing for export crediting should also be expanded to SDG&E's Power Your Drive VGI Pilot, which has proven to be a successful rate in impacting charging behavior and promoting VGI activities.

Lastly, VGIC recommends the Commission also direct PG&E to temporarily expand the DAHRTP offering to residential customers. Allowing residential customers the option to enroll in PG&E's DAHRTP pilot has been recommended by parties in A.20-10-011.

3. Expedite approval of VGI Pilots.

As noted in the IOUs' Advice Letters seeking approval of proposed VGI pilots, the proposed pilots were based on the recommendations from the CPUC's 2019-2020 VGI Working Group, which brought together a range of stakeholders on a regular basis for roughly a year. Following the conclusion of the VGI Working Group, several parties filed comments in R.18-12-006 detailing VGI pilot and demonstration needs. In December, 2020, D.20-12-029 directed the IOUs to conduct a VGI pilots stocktake and workshop to

[36] *Reply Brief of the VGIC.* July 23, 2021. Application 20-10-011.

provide input on up to $35 million in VGI pilots. Following the first VGI Pilots workshop in March, 2021, the IOUs reached out to individual stakeholders to solicit input on VGI Pilots, held a second workshop, and sought additional informal feedback from stakeholders prior to filing the Advice Letters. All told, VGIC believes the VGI Pilots represent the culmination of over two years of focused stakeholder engagement, and that the record of R.18-12-006 is well-developed in support of each proposed VGI Pilot.

Moreover, all but two (i.e., V2H backup power and V2M microgrid) proposed VGI Pilots would support reliability goals. With this in mind, while we understand the Energy Division Transportation Electrification staff has limited time and resources, we believe expedited approval of the VGI Pilots is a critical yet relatively straight-forward opportunity to swiftly support summer 2022 reliability and meaningfully advance VGI in the long-term.

4. Temporarily waive limited aspects of Rule 21 interconnection smart inverter requirements that prevent V2G-DC participation

While VGIC recognizes that the Commission recently codified a standard interconnection pathway for V2G-DC EVSE, there are still practical barriers for certain commercial V2G-DC products. For example, some devices are presently UL certified, but not specifically certified to the exact Rule 21 specifications (i.e., UL 1741 SA) that include smart inverter capabilities.[37] Temporarily waiving this smart inverter requirement would allow existing V2G enabling products like those listed above in Table 1 to provide

[37] See Table 1 above.

V2G/V2B services. VGIC anticipates that this waiver would only apply to a very limited number of products since most vendors are planning to incorporate UL 1741-SA certification in their product pipeline. However, for existing products, this waiver may be necessary to support near-term grid reliability needs. VGIC recommends the waiver be awarded to V2G-DC EVSE vendors that can attest to the safety and reliability of their systems by citing current deployments and/or custom software configurations. Additionally, simplified Rule 21 interconnection requirements for non-exporting configurations (including those coupled with other DERs) should also be considered.

VIII. CONCLUSION

Q. Does this conclude your testimony?

A. Yes.

Appendix A:

Declaration of Ed Burgess in Support of Opening Testimony on Behalf of the Vehicle Grid Integration Council

DECLARATION OF ED BURGESS IN SUPPORT OF OPENING TESTIMONY ON BEHALF OF THE VEHICLE GRID INTEGRATION COUNCIL

I, Ed Burgess, am the Senior Policy Director for the Vehicle Grid Integration Council (VGIC). Having worked for VGIC since its founding in 2020, I am currently managing policy and regulatory affairs for VGIC and its 13 member companies. My business address is 2150 Allston Way, Suite 400, Berkeley, CA 94704. I declare under penalty of perjury that the foregoing facts in this document are true and correct.

Executed on September 1, 2021 at Berkeley, California.

Ed Burgess