

June 21, 2023

Email to: IRPDataRequest@cpuc.ca.gov

Subject: VGIC's Informal Comments regarding the Draft 2022-2023 Integrated Resource Planning ("IRP") Inputs and Assumptions ("I&A")

Re: Informal Comments of the Vehicle Grid Integration Council Regarding the Draft 2022-2023 Integrated Resource Planning Inputs and Assumptions

The Vehicle Grid Integration Council ("VGIC") appreciates the opportunity to comment on the California Public Utilities Commission's ("CPUC") Draft 2022-2023 Integrated Resource Planning ("IRP") Inputs and Assumptions ("I&A"). VGIC appreciates the CPUC and Energy Division ("ED") staff's commitment and efforts to engage stakeholders on this critical initiative.

VGIC is a 501(c)6 membership-based advocacy group 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 flexible EV charging and discharging is recognized and compensated to achieve a more reliable, affordable, and efficient electric grid. VGIC has actively engaged in policy and research efforts to understand the need and opportunity for VGI better. As such, we offer the below recommendations for ED staff's consideration.

I. INTRODUCTION & SUMMARY.

VGIC commends the ED for its efforts to evolve the treatment of EVs within the IRP from rudimentary load assumptions to modeling incremental VGI within the IRP. EVs are unlike any other modifiable load or dispatchable resource type because individual EVs represent a more significant potential load shift and energy storage capacity than the typical customer-sited distributed energy resource ("DER"). Moreover, the deployment of EVs and flexible EV charging and discharging solutions is expected to grow at an extraordinary rate due to underlying policy drivers and regulations like the California Air Resources Board's ("CARB") Advanced Clean Cars II regulation. As a result, the statewide fleet of deployed EVs and installed EV chargers will offer immense latent load flexibility and energy storage capacity that may eclipse California's need for stationary energy storage and availability of other DERs, even at very modest EV customer participation rates.

While VGIC commends the critical improvements to the IRP process, we recommend that the ED and E3 staff take additional steps to better model VGI within the IRP. VGIC's comments can be summarized as follows:

- VGIC strongly supports the updated assumptions for Level 2 ("L2") charging capability.

- VGIC strongly supports the updated assumptions for residential program enrollment scenarios.
- VGIC reiterates its recommendation to incorporate electric school buses (“ESBs”) in addition to Light Duty Vehicles (“LDV”) based on recent findings about ESB deployment.
- VGIC respectfully requests the IRP modeling team conduct a sensitivity analysis for a higher level of V2G potential as a percentage of V1G potential.
- VGIC looks forward to working with the IRP modeling team to continue strengthening inputs and assumptions for the current and future cycles.

II. COMMENTS.

A. **VGIC strongly supports the updated assumptions for L2 charging capability.**

VGIC appreciates the ED staff’s focus on applying appropriate treatment to EVs and further considering the capabilities of EV charging equipment within the IRP modeling effort. As mentioned in VGIC’s October 6 informal comments on the IRP I&A Modeling Advisory Group (“MAG”) presentation, assuming a 5 kW weighted average for L2 charging power as originally presented by ED staff would be an overly conservative assumption.¹ Having said that, VGIC strongly supports the updated assumption of using a 7 kW weighted average for the default EV charger capacity, given that this updated assumption better aligns with the California Energy Commission’s (“CEC”) AB 2127 report.²

B. **VGIC strongly supports the updated assumptions for residential program enrollment scenarios.**

VGIC recognizes that considering VGI resources in this IRP cycle is no small feat and reiterates its appreciation for the work performed by ED staff in collaboration with E3 to produce the Draft 2022-2023 IRP I&A. Specifically, VGIC commends the updated assumption for residential program enrollment scenarios, which uses more appropriate and applicable programs to gauge residential program enrollment. In previous comments, VGIC highlighted that using LBNL’s propensity scores for air conditioning programs as the basis for VGI participation rates would not accurately reflect VGI participation rates due to a significant difference between the programs. Air conditioning or “smart thermostat” programs might struggle with participation due to perceived or actual inconvenience the customer might experience if they’re unable to turn down their thermostat during intense heat waves, which can lead to material impacts on customer comfort and well-being.³ In

¹ Informal Comments of the Vehicle Grid Integration Council Regarding the September 22nd Modeling Advisory Group Meeting on Input and Assumptions. Page 5. <https://www.vgicouncil.org/s/2022-10-06-VGICs-Informal-Comments-on-IA-MAG-Meeting.pdf>

² AB 2127 Report at page 12. <https://efiling.energy.ca.gov/getdocument.aspx?tn=238853>

³ Informal Comments of the Vehicle Grid Integration Council Regarding the September 22nd Modeling Advisory Group Meeting on Input and Assumptions. Page 6.

sharp contrast, the Draft IRP I&A appropriately notes that “VGI programs are less interruptive to customers than DR programs since they are mostly designed not to interrupt drivers’ driving needs and change driving behaviors, thus resulting in higher enrollment potential.”⁴ That said, VGIC strongly supports using EV-TOU participation rates as a basis for developing enrollment scenarios in the IRP I&A. Moreover, VGIC recommends that ED staff continue to revisit this topic in future IRP cycles as the VGI market matures and more participation data is available to ensure that the most accurate VGI program enrollment forecast is considered.

C. VGIC reiterates its recommendation to incorporate electric school buses in addition to LDVs.

VGIC understands limiting the modeling to LDVs given that LDVs are projected to comprise the majority of transportation load by 2035 (i.e., 82%).⁵ However, VGIC reiterates its recommendation to incorporate electric school buses (“ESBs”) in IRP modeling, given that ESBs represent an ideal Vehicle-to-Grid (“V2G”) use case due to the predictable and consistent alignment between ESB dwell times and summer system peaks. The ESB market is growing at a rapid pace. The World Resources Institute (“WRI”) conducted an extensive data collection effort that revealed California has 526 ESB committed as of June 2021.⁶ As of December 2022, that number has increased to 1,852 ESB.⁷ Overall, WRI has observed a **doubling** in ESB commitments from September 2022 to December 2022, largely due to the EPA’s Clean School Bus Program funding. Four of the school districts with the five largest ESB commitments are in California. VGIC believes the exceptional anticipated growth in latent battery capacity from ESBs and the significant alignment between dwell time and system peak merits consideration in the IRP modeling effort.

As noted above, California can expect 1,852 ESBs to be deployed by 2025. Meanwhile, WRI and School Bus Fleet Magazine have found that a majority of these ESBs will be Type C and Type D, which come equipped with between 126 kWh and 315 kWh of battery capacity.⁸ These buses are typically sold with 20 kW, 60 kW, or 120 kW charging stations,⁹

⁴ 2022-2023 Integrated Resource Plan Inputs & Assumptions. June 6, 2023. Page 105.

https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2023-irp-cycle-events-and-materials/draft_2023_i_and_a.pdf

⁵ 2022-2023 Integrated Resource Plan Inputs & Assumptions. June 6, 2023. Page 103.

⁶ Lydia Freehafer, Leah Lazer. *The State of Electric School Bus Adoption in the US*. April 26, 2023. <https://www.wri.org/insights/where-electric-school-buses-us>. Raw data available at: https://datasets.wri.org/dataset/electric_school_bus_adoption

⁷ Lazer, L. and L. Freehafer. March 2023. “A Dataset of Electric School Bus Adoption in the United States.” Washington, DC: World Resources Institute. https://datasets.wri.org/dataset/electric_school_bus_adoption

⁸ Alissa Huntington, Jessica Wang, Phillip Burgoyne-Allen, Emmett Werthmann and Eleanor Jackson. June 2022. “Electric School Bus U.S. Market Study and Buyer’s Guide: A Resource for School Bus Operators Pursuing Fleet Electrification.” Washington, DC: World Resources Institute. See pages 21-23.

<https://files.wri.org/d8/s3fs-public/2022-08/electric-school-bus-us-market-study-buyers-guide.pdf?VersionId=eU.ZS.cHfSm5amd2VnUej22wtMhKyXLL>

⁹ ESB charger specification sheets for 20 kW, 60 kW, and 120 kW.

Lion Electric Company ESB 20kW onboard charger. See: <https://thelionelectric.com/documents/en/LionC-SpecSheet-202305-SCREEN-ENUS.pdf>

and the currently available bidirectional charging products are 60 kW¹⁰ and 125 kW.¹¹ For load and generation profiles for the IRP modeling effort, VGIC recommends leveraging load and generation profiles from existing ESB deployments, including managed charging and bidirectional charging pilots such as those implemented by SDG&E. VGIC believes these inputs could support modeling and offers its time and network to help collect any additional inputs needed.

D. VGIC respectfully requests that the IRP modeling team conduct a sensitivity analysis for a higher level of V2G potential as a percentage of V1G potential.

In discussing V2G potential, the June 2023 updated inputs and assumptions states, “however, sensitivity analysis with higher V2G penetration levels could be explored to inform a broader range of potential VGI outcomes.”¹² VGIC respectfully requests that the IRP modeling team conduct one or more sensitivity analyses to model higher values of V2G potential as a percentage of V1G potential. This will be an incredibly meaningful effort to inform ongoing CPUC and CEC initiatives aiming to better understand V2G resource potential.

VGIC believes it is reasonable to model at least one sensitivity for higher V2G potential based on three incorrect assumptions made by the updated inputs and assumptions. Firstly, the updated inputs and assumptions document references FERC Order 2222 as an example policy framework on which scaling V2G hinges. V2G compensation mechanisms, including ELRP, PG&E’s V2X Pilots, PG&E’s DAH RTP Export Rate, and SDG&E’s proposed Export Compensation Rate, are fast emerging. None of them are currently tied to the FERC Order 2222 implementation timeline.

Second, the updated inputs and assumptions document states the 50% in 2050 “is entirely for planning purposes, considering that not all OEMs are willing to enable vehicles to be V2G capable and warranty battery for grid use by 2050 and not all drivers will want to use their vehicles as a grid asset.” Today, more than 50% of OEMs, representing *far greater* than 50% of California EV sales, have publicly stated they will enable vehicles to be V2G

Nuvve ESB 60 kW charger. See: https://nuvve.com/wp-content/uploads/2022/01/nuvve-dcfc-res-hd60-v2g-spec-sheet-jan2022_r2.pdf

Blue Bird Corporation ESB 120kW charger. See: <https://inchargeus.com/wp-content/uploads/2022/12/inCharge-spec-sheet-ice120-221130.pdf>.

¹⁰ Nuvve, “Nuvve DC Heavy Duty Charging Station,” Version 6.0, January 2022. See: https://nuvve.com/wp-content/uploads/2022/01/nuvve-dcfc-res-hd60-v2g-spec-sheet-jan2022_r2.pdf

¹¹ BorgWarner, “RES-DCVC125-480 EV DC Fast Charging Power Conversion System (PCS),” Rev 11082022, 2022. See: https://d1c96hlcey6qkb.cloudfront.net/89fabced-d43f-4899-8f1a-3631233e4bb0/9f9cd76638914a89b116ac79fece6d23?response-content-disposition=inline%3B%20filename%2A%3DUTF-8%27%27Product%2520Sheet%2520Rhombus%2520RES-DCVC125-480%2520PCS.pdf&response-content-type=application%2Fpdf&Expires=1687392000&Signature=QVltsgObKKrmxI11-bmZ4choq-6uhMSR3cwZ3EdhPHB4YOmlv2q9n9qcrX7uJohwaNvA~oqQXzfoNjKMuaKCl-JEsDoWV-YMzAnTRqSU4arRwH6D5tYrQ84NjyebvjinG3oA~h4u7ys41EXzq~pCBULw3IJ5HSVEN8U3wZFwypyCdga7rubZqeghgf2uw4g12fYootypUnsqEwXyxxLHa5yaOjvfN3BSYe92c~QtGDSCYtaJAGnPFaS0kXSNyTvhAjhiKCzKPM~a1rnl-g54U8qC3HaR9b1m7Mqc56uVh-fndkLD~ZdVBDP5tieX49dTi1wMjBYMKTFc5C8NxxP8Q_&Key-Pair-Id=APKAI33AGAEAYCXFBDTA

¹² Inputs & Assumptions, 2022-2023 IRP, June, 2023, pg. 107.

capable. Light-duty vehicle OEMs that have made these statements include Nissan, Ford, Chevrolet, GMC, Hyundai, Kia, Volkswagen, Lucid, Audi, Volvo, Polestar, Rivian, and Tesla. In the competitive US automotive market, public statements made by major automakers regarding future vehicle capabilities are not made lightly. Regarding the second statement that not all drivers will want to use their vehicles as a grid asset, this is already accounted for in the V1G potential curve.

Third, scaling V2G does require technology readiness, as noted in the updated inputs and assumptions. However, the technology readiness level (“TRL”) of V2G is currently a 9: *Actual System Proven in Operational Environment*. V2G technology is currently operational across the world, including in SDG&E’s service territory, Colorado, Illinois, New Hampshire, Virginia, North Carolina, and in many places in Europe.

With this in mind, VGIC respectfully requests the IRP modeling team conduct a “V2G_High” sensitivity analysis that assumes a ramp-up in V2G potential as a percentage of V1G potential from 10% in 2025 to 90% in 2050.

E. VGIC looks forward to working with the IRP modeling team to continue strengthening inputs and assumptions of the current and future cycles.

VGIC understands the complexity of accurately incorporating all aspects of an emerging market into a model. That said, VGIC commends ED staff and the IRP modeling team for the extensive work performed to accurately model future transportation electrification for the sake of the IRP cycle. To that end, VGIC appreciates the opportunity to provide the above recommendations and looks forward to working with ED staff and the IRP modeling team to continue strengthening inputs and assumptions of the current and future cycles.

III. CONCLUSION.

VGIC appreciates the opportunity to provide these informal comments on the ED’s Draft 2022-2023 IRP Inputs & Assumptions. We look forward to further collaboration with the Energy Division and other stakeholders in this docket.

Respectfully submitted,
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