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Fermata Energy comments on 21-RPS-02

Additional submitted attachment is included below.

FERMATA ENERGY

February 22, 2022

Response from Fermata Energy to the California Energy Commission's Request for Comments on "Renewables Portfolio Standard 10th Edition Guidebook Update," 21-RPS-02

Fermata Energy appreciates the opportunity to respond to the California Energy Commission's (CEC) request for comments to its "Renewables Portfolio Standard 10th Edition Guidebook Update," 21-RPS-02.

Fermata Energy is a leading provider of Vehicle-to-Everything (V2X) services, which includes Vehicle-to-Grid (V2G) and Vehicle-to-Building (V2B). Fermata Energy has multiple V2X deployments across the country, enabling electric vehicle (EV) owners to discharge power from the batteries onboard their EVs for onsite power. Our V2X technology benefits our users, transforming EV charging from a cost to a revenue-generating, grid-supporting asset.

Our comments focus on these questions, which were posed at the CEC February 8, 2022 webinar, "Renewables Portfolio Standard Requirements for Energy Storage Devices":

1. How is the energy landscape changing as a result of energy storage?
2. What does procurement look like for renewable facilities paired with energy storage? Do contracts account for energy losses from storage?
3. What impacts do current RPS requirements have on storage development?
4. Should the CEC develop energy storage loss accounting requirements for specific technology types, configurations, or scale?

How is the energy landscape changing as a result of energy storage?

The "Renewables Portfolio Standard 9th Edition Guidebook" was published in 2017. Since then, the market for energy storage has evolved in California due to climate-related events and electricity market transformation. The California Public Utilities Commission (CPUC) set an ambitious goal for CAISO load serving entities (LSEs) to reduce their emissions to 33 million metric tons (MMT) of CO_2 by 2030; it estimated that 16,340 MW of storage and demand response will be needed to integrate 29,440 MW of renewable generation to achieve this goal[1]. The CAISO expected a 2,500 MW energy storage capacity increase by the end of 2021, up from 550 MW in 2020[2]. This deployment of grid-scale energy storage is commendable, but these large assets lack the nimbleness of distributed batteries. If a grid-scale battery or its transmission tie goes down, it can threaten grid stability because it is not available for capacity, ramping renewables, and providing ancillary services. Distributed energy storage, on the other hand, can provide grid services and localized power during a grid outage. If California meets its

[1] CPUC. "RESOLVE Preferred System Plan (PSP) Modeling Results" https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2019-2020-irp-events-and-materials/psp-resolve-ruling-presentation.pdf

[2] CAISO. "California ISO shows dramatic impact of storage added to the grid" September 13, 2021. http://www.caiso.com/Documents/California-ISO-Shows-Dramatic-Impact-of-Storage-Added-to-the-Grid.pdf

2030 goal of putting 5 million zero emission vehicles on its roads[3], and they are all EVs, there will be 30,000 MWh of battery capacity in these cars alone[4]. While households may purchase stationary storage at lower prices than ever before[5], if they own an EV they already have a battery onboard that EV that can provide power via V2X technology.

The CEC has an opportunity, in revising the "Renewables Portfolio Standard 9th Edition Guidebook" to encourage more Californians to prepare for power outages by including V2X as a qualifying energy storage technology so they can use the batteries in their EVs to provide grid services and for resilience. In its comments to 21-RPS-02, the California Energy Storage Association (CESA) states "treatment of storage merits revision to incent cost-effective deployments that can enable deep decarbonization and ensure all energy delivered to the grid comes from renewable sources; the storage of renewable energy is independent from generation and should not be penalized in any configuration via REC accounting. This should apply to a vast set of storage technologies and applications, including V2G and electrolytic hydrogen."

Households that have EVs will be able to use V2X during grid outages for resilience. Households that have EVs should not have to purchase a stationary battery, when they already have a battery that is already onboard their EV. These batteries are larger than the 10 kWh limitation allowed in the April 2016 CPUC Decision to include 10 kWh battery systems in the Net Energy Metering (NEM) program[6]. For example, the fully electric bidirectional Nissan LEAF has a 62 kWh battery and the forthcoming fully electric Ford F-150 will have a 98 kWh standard battery pack[7]. California households will soon have many EV options for V2X, as Ford, GM, Hyundai, Lucid, Volkswagen, and several other vehicle manufacturers have announced they will offer V2X-capable EVs. Automotive offerings will soon go beyond light-duty vehicles, to include medium- and heavy-duty vehicles such as Class 6 to 8 trucks, buses, and construction equipment.

Due to increasingly frequent and intense wildfires, the CPUC revised Public Safety Power Shutoff (PSPS) guidelines on the de-energization of power lines on June 24, 2021 in Decision

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[3] California Executive Order B-48-18. https://www.library.ca.gov/wp-content/uploads/GovernmentPublications/executive-order-proclamation/39-B-48-18.pdf

[4] Assuming the average usable capacity of full electric vehicles is 60 kWh, based on the Electric Vehicle Database website. https://ev-database.org/cheatsheet/useable-battery-capacity-electric-car

[5] Battery prices decreased by 89 percent from 2010 to 2020. In 2020 alone, battery prices decreased by 13 percent. Bloomberg New Energy Finance Electric Vehicle Outlook 2021. https://about.newenergyfinance.com/electric-vehicle-outlook/

[6] CPU. "Decision adopting net energy metering bill credit estimation methodology for generating facilities paired with small storage devices," Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues. Rule Making 12-11-005. Date of Issuance 4/28/2016. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M161/K480/161480050.PDF

[7] Hoffman, Connor. "Ford Confirms 2022 F-150 Lightning EV Battery Specs" *Car and Driver*. December 17, 2021. https://www.caranddriver.com/news/a38552140/2022-ford-f-150-lightning-battery-specs-revealed/

(D.) 21-06-034. California's Fourth Climate Change Assessment[8] estimates the average statewide burn area will increase by 77 percent through 2100 and wildfire insurance costs to rise by 18 percent by 2055. Therefore, one may expect PSPS events to become more frequent as well. California ratepayers will benefit from programs that incentivize battery adoption. In February 2022, the Orange County Fire Authority Chief said "we no longer have a fire season–we have a fire year."[9] The CEC should take steps to incentivize Californians to use any available battery energy storage, including batteries available in EVs, for resilience in the face of extreme climate change events.

V2X is recognized as a technology that can provide grid services at scale during PSPS. The CPUC Emergency Reliability proceeding (R.20-11-003), initiated after the August 2020 blackouts in California due to extreme summer heat, recently enabled V1G and V2G to provide grid services via an electric vehicle/vehicle-grid integration (EV/VGI) Aggregator Pilot (Subgroup A.5) within the Emergency Load Reduction Program. The EV/VGI Aggregators Pilot is an important development for VGI in CA, as it represents a significant near-term opportunity to demonstrate the potential for VGI to provide grid services at scale and to be compensated for doing so. If this effort is successful, it is likely to unlock future market opportunities for VGI .

Co-locating battery energy storage with NEM renewable generation creates an opportunity for a California household to store and self-consume NEM renewable generation during PSPS, and charge their car with renewable power to reduce transportation emissions. If the household can net meter their solar generation on blue-sky days, when there is no PSPS, they may be able to better afford a battery to pair with their NEM eligible renewable generation, or leverage their EV battery to store and self-consume NEM eligible renewable generation by discharging the EV battery for power at home or for carbon-free mobility.

California is a V2X industry leader, home to the SCE-EPRI demonstrations in 2015-2018[10], and the 2015-2016 PG&E-BMW pilot[11]. The V2X industry has rapidly grown–there are now over 6,100 V2X chargers deployed worldwide[12]. Today, V2X solution providers include Fermata Energy, Nuvve, Indra, The Mobility House, Wallbox, EVGo, Hitachi, MagnumCap, and Rhombus Energy Solutions. V2X projects abound across vehicle manufacturers (BlueBird School Bus, BMW, BYD, Fiat-Chrysler, Ford, GM, Lion, Mitsubishi, Nissan, Renault, Smith Trucks, Toyota, and others), utilities (PG&E, SCE, UKPN, Alliander, Energinet, and others) and large electricity users such as the U.S. Department of Defense.

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[8] California Climate Assessment website. https://climateassessment.ca.gov/state/overview/
[9] Associated Press. "California coastal blaze a grim omen for 2022 wildfire season: 'We're in for a long year ahead'" *Desert Sun*. February 10, 2022. 11:21 AM. https://www.desertsun.com/story/news/environment/wildfires/2022/02/10/california-wildfire-hundreds-evacuate-fire-burns-near-laguna-beach-zillow-multimillion-dollar-homes/6738988001/
[10] EPRI. "Technology Assessment & Delivery: EV-Grid Solution" https://www.dret-ca.com/wp-content/uploads/2020/08/EV-Grid-Handout_EPC-14-086.pdf
[11] Morris, Charles. "PG&E, BMW release findings from V2G pilot" *Charged Electric Vehicles Magazine*. June 26, 2017. https://chargedevs.com/newswire/pge-bmw-release-findings-from-v2g-pilot/
[12] Vehicle to Grid Hub. Website. https://www.v2g-hub.com/insights#graphs

What does procurement look like for renewable facilities paired with energy storage? Do contracts account for energy losses from storage?

Procurement models for eligible renewable facilities paired with energy storage depend upon allowable configurations. Battery energy storage systems, whether stationary storage or V2X EVs, should be allowed to charge directly from the grid in addition to charging from eligible renewable facilities. There is no reason for a California household to purchase a battery for the sole purpose of storing and self-consuming NEM eligible renewable generation when that battery can also be used to provide grid reliability by importing grid power during solar peaks and exporting power during demand peaks including the evening ramp period. The configurations of renewable facilities paired with energy storage shown below enable V2X to provide grid services, considering the goals of the revised NEM tariff.

The December 2021 CPUC Proposed Decision revising NEM tariff and subtariffs[13] outlines a net billing tariff as a successor to the NEM tariff. The details of the net billing tariff are still being discussed in the NEM docket. However, we use the following understanding of the net billing tariff goals to formulate our recommendations for potential configurations of renewable facilities paired with V2X-enabled EVs:

- The net billing tariff intends to incentivize NEM customers to pair storage with their renewable facilities and operate them in a manner that increases grid reliability.
- Whereas under the existing NEM tariff values electricity exports to the electrical system at the customer retail price, the net billing tariff will revise it based on the value it provides to the grid at the time of export.

We recommend updates to the “Directly connected to the facility” configurations depicted on page 40 of the “Renewables Portfolio Standard 9th Edition Guidebook” (Figure 1).

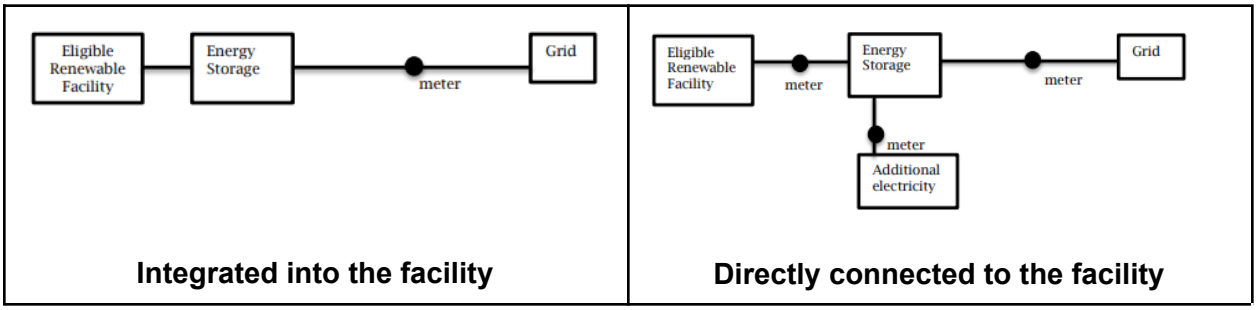

Figure 1. Configurations of eligible renewable facilities + energy storage in the Renewables Portfolio Standard 9th Edition Guidebook

“Integrated into the facility” bars the customer’s energy storage from being charged from the grid and “Directly connected to the facility” accounts for customer energy storage charging from the

[13] CPU. “Decision Revising Net Energy Metering Tariff and Subtariffs” filed December 13, 2021 under the “Order Instituting Rulemaking to Revisit Net Energy Metering Tariffs Pursuant to Decision 16-01-044, and to Address Other Issues Related to Net Energy Metering.” Rulemaking 20-08-020. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M430/K903/430903088.PDF

grid through the allowance of “Additional electricity.” Our recommendations focus on “Directly connected to the facility” configurations.

We urge the CEC to not limit NEM customers to having their EV “integrated into the facility” because it will preclude the customers from optimally managing the battery onboard their EV for reliability and resilience. We offer two example scenarios for consideration:

> Scenario 1. A NEM customer discharges their EV by driving for errands and then uses power from the battery at home during peak evening demand. If the distribution utility has a service outage after the peak evening demand, the NEM customer would have no opportunity to recharge their EV.
>
> Scenario 2. A NEM customer with an EV needs to make a long trip that requires 50 kWh of stored energy (around 150 to 200 miles). The NEM customer has a typical residential solar array (5 kW) that, at 30% capacity factor, produces ~40 kWh on a perfect sunny day. If the NEM customer is limited to only charging from solar, they would need more than 24 hours of charging to make the trip and would be highly dependent on weather. They also would not be able to provide any grid support during this period without compromising their trip.

We recommend a V2X “Direct Connection” configuration (Figure 2) that enables V2X drivers to charge with a mix of the eligible renewable facility and grid/additional electricity resource, and to discharge their vehicle back to the building or the grid. Although the CEC says that virtual net metering is outside the current scope of discussion for the RPS, we urge the CEC to consider configurations that allow customers to virtually net meter energy storage or V2X EVs that are on service drops that are separate from the eligible renewable facility.

In Figure 2, the V2X charger operates behind a switch fed from the building service panel to charge from and discharge to the building, as needed, to meet building loads or to discharge to the grid while also maintaining a battery state of charge that is suitable to meet the driver’s transportation needs. This configuration illustrates the required metering to calculate net billing electricity consumption as the net hourly export of electricity at the point of common coupling (PCC) less the consumption of electricity consumed by the V2X EV: Meter 1 - Meter 3. We recommend subtracting Meter 3 because the electricity consumed by V2X EV operations accounts for the EV mobility, not EV export to the grid. If the EV owner does not drive their EV in a given month, the net billing electricity consumption is simply the reading from Meter 1.

We suggest the CEC consider allowing submetering, using the V2X charger meter and/or EV telematics, for Meter 4. Using the V2X charger meter or EV telematics to measure charging and discharging would reduce metering costs for NEM customers who adopt V2X technology.

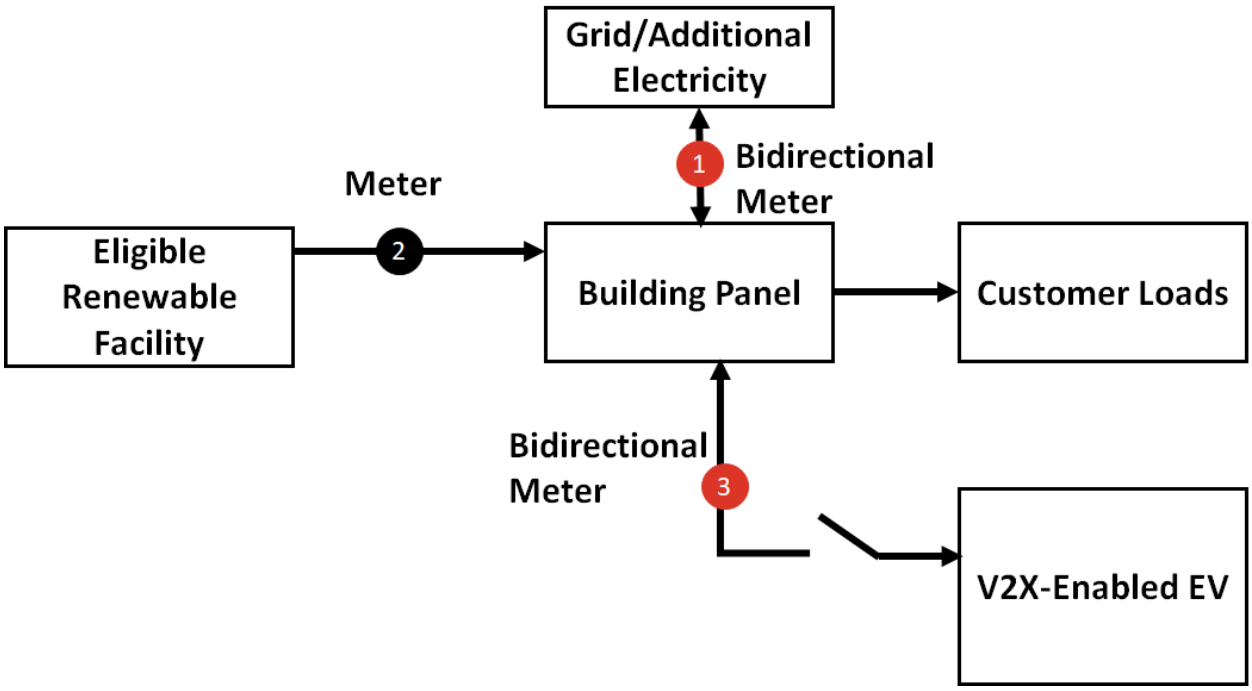

Figure 2. V2X-Enabled EV "Directly Connected to the facility" charging with a mix of eligible renewable facility and grid-sourced electricity. The flows of electricity are numbered: (1) = bidirectional hourly import or export at point of common coupling (PCC), (2) = monthly eligible renewable generation, (3) net bidirectional monthly V2X EV battery consumption.

What impacts do current RPS requirements have on storage development?
Current RPS requirements favor small stationary storage technology at the expense of larger storage and V2X technology. Limiting RPS requirements to stationary storage that is less than 10 kWh comes at the expense of California ratepayers. Given the dire need for energy storage in light of increasingly extreme and frequent climate-driven weather, the CEC should revise the RPS requirements to include larger storage, and mobile storage such as that enabled by V2X technology. Fermata Energy advises the CEC to continue allowing "directly connected to the facility" configurations, and that the CEC should revisit the 10 kWh limitation on battery energy storage capacity. If the CEC takes these two steps, it will make it possible for eligible renewable facilities to adopt and deploy new storage technologies such as V2X-enabled EVs. It will also enable utilities additional compliance with the 2019 SB No. 676, "Transportation electrification: electric vehicles: grid integration"[14] that requires publicly owned electric utilities to consider "establishing electric vehicle grid integration strategies that are in the best interests of ratepayers and that reflect the local publicly owned electric utility's estimated electrical demand attributable to EV charging, as applicable."

Should the CEC develop energy storage loss accounting requirements for specific technology types, configurations, or scale?

[14] Senate Bill No. 676, 2019-2020 Reg. Sess. (Cal. 2019)

As shown in Figure 2, Fermata Energy proposes deploying V2X "Directly Connected to the facility" in a manner that charges the V2X-enabled EV with a mix of electricity from the eligible renewable facility and the grid/additional electricity source. This configuration allows the V2X EV to operate as an asset to the grid by storing low-carbon electricity, while operating as an "addition or enhancement" to the eligible renewable facility. This accounting method would be applied to V2X-enabled EVs that have batteries larger than 10 kWh.

To enable V2X EVs to operate as an asset that optimizes renewable integration to the grid and ensure that the NEM customer's export to the grid is low carbon, the CEC should develop energy storage loss accounting that incentivizes V2X EVs to charge at times when the marginal greenhouse gas emission rates of grid electricity are lower than the average emission rate. Developing such accounting enables the CEC to track the greenhouse gases associated with the grid-sourced electricity used to charge V2X EVs, and discharged back to the grid. Fermata Energy recommends the CEC consider and examine the California Air Resources Board (CARB) Low Carbon Fuel Standard (LCFS) Smart Charging Lookup Table Pathway[15] and the CARB 2022 Carbon Intensity Values for California Average Grid Electricity Used as a Transportation Fuel in California and Electricity Supplied Under the Smart Charging or Smart Electrolysis Provision[16] as a potential method for calculating and reporting electricity per hour used for smart charging, to be used to calculate related greenhouse gas emissions.

If the CEC allows a configuration such as the one recommended in Figure 2, it will be possible to apply our proposed accounting method of net hourly export of electricity at the PCC less the consumption of electricity consumed by the V2X EV. Further, if the CEC adds a means for V2X EVs to account for the carbon content of the grid-sourced electricity used for charging, the EV battery is not just storing electricity from an eligible renewable generator but also supporting integration of renewable generation into the grid.

Next Steps

Fermata Energy appreciates the opportunity to respond to the CEC's request for comments. We welcome the opportunity to share our experience in designing, deploying, and operating V2X projects to assist CEC in its consideration of revising the Renewable Portfolio Standards Guidebook. Our Director of Grid Solutions and Strategic Partnerships, Melissa Chan (melissa(at)fermataenergy(dot)com), may be contacted to further discuss our response. We would be happy to provide a complete briefing.

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[15] CARB. "California Environmental Protection Agency Air Resources Board Low Carbon Fuel Standard: Application and Reporting Instructions for Smart Charging Lookup Table Pathway" Release Date: October, 2019.
https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/guidance/smartcharging_userguide.pdf

[16] CARB."Low Carbon Fuel Standard Annual Updates to Lookup Table Pathways: 2022 Carbon Intensity Values for California Average Grid Electricity Used as a Transportation Fuel in California and Electricity Supplied Under the Smart Charging or Smart Electrolysis Provision" January 24, 2022.
https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/2022_elec_update.pdf