

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



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Order Instituting Rulemaking to Continue  
the Development of Rates and  
Infrastructure for Vehicle Electrification

Rulemaking 18-12-006

**OPENING COMMENTS OF FERMATA ENERGY LLC ON THE PROPOSED  
DECISION ADOPTING PLUG-IN ELECTRIC VEHICLE SUBMETERING  
PROTOCOL AND ELECTRIC VEHICLE SUPPLY EQUIPMENT  
COMMUNICATION PROTOCOLS**

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July 20, 2022

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In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission (“Commission”), Fermata Energy LLC (d/b/a “Fermata Energy”) hereby submits Opening Comments on the *Proposed Decision Adopting Plug-In Electric Vehicle Submetering Protocol and Electric Vehicle Supply Equipment Communication Protocols* (“PD”), issued on June 30, 2022.

**I. Introduction**

Fermata Energy LLC (“Fermata Energy”), established in 2011, was created for the dual purposes of accelerating the adoption of electric vehicles (“EV”) and the transition to a renewable energy future. As an equipment manufacturer and service provider, Fermata Energy is one of very few technology companies actively working to advance commercial implementation of Vehicle-to-Grid (“V2G”). We design, supply, and operate technology that integrates EVs with buildings and the electricity grid, turning EVs into valuable storage assets that combat climate change, increase energy resilience, and reduce energy costs. Fermata Energy is the only company that is providing Vehicle-to-Grid (“V2G”) services commercially today in the US with light duty vehicles. Fermata Energy enables utilities to more rapidly integrate renewable energy onto the grid, and Vehicle-to-Building (V2B) and V2G revenue makes EVs more cost-effective.

In addition to developing the hardware and software required to perform V2X activities, Fermata Energy has spent nearly 10 years studying how V2X can unlock additional value streams

from EVs, including those that are commercially viable today without regulatory intervention and how to best monetize these value streams. Fermata Energy has extensive experience with analyzing use cases, monetization mechanisms, and business models to maximize the benefits of V2X technologies.

V2X technology in California has significant potential to provide mobile, dispatchable capacity. V2X presents a growing yet currently untapped resource to help support grid resilience and reliability. V2X technology at scale can deliver the following benefits:

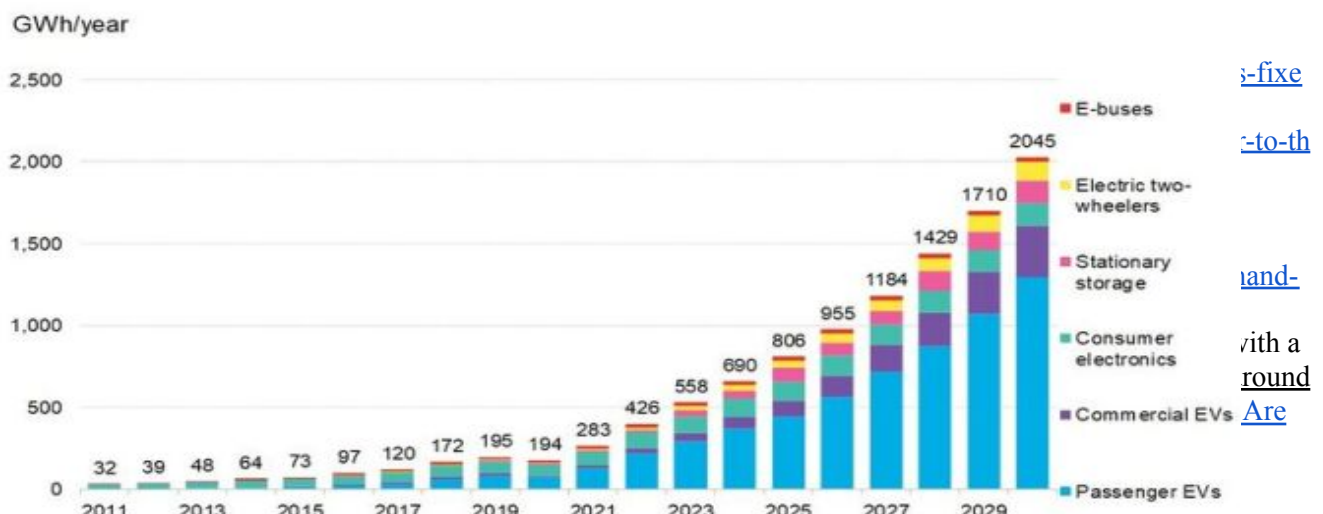
- Clean, affordable, and reliable transportation
- Lower the cost of electricity bills
- Help the transition to renewable energy
- Free, backup power solutions that would normally cost tens of thousands of dollars.
- Enables EV owners to earn revenue from demand response and other services that help integrate and grow renewable energy on the grid

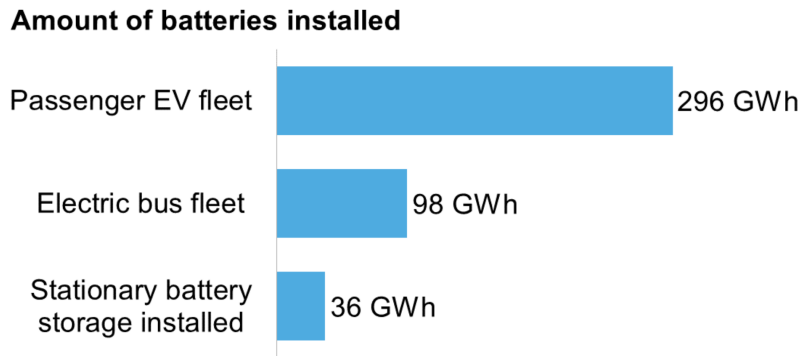
As PG&E's CEO Patti Poppe noted in an October 2021 interview with the *Los Angeles Times*:

*"The electric vehicles on the road in PG&E's service area today have 6,700 megawatts of capacity... But imagine a Flex Alert being averted because we actually leverage the supply that's available in vehicles to power homes and business. Sixty-seven hundred megawatts — that's three Diablo Canyon nuclear power plants. It's on the road today, and we are not using it as a power source. We're only using it as a power draw."*<sup>1</sup>

Data from Bloomberg New Energy Finance (Figures 1 and 2 below) show over 10 million battery-powered EVs on the road globally at the end of 2020, with a combined 296-gigawatt hours of lithium-ion batteries installed in them. That's a lot of batteries driving around – 8 times more than the number of stationary grid-scale batteries installed globally.<sup>2</sup>

**Figure 1 and Figure 2<sup>3,4</sup>**





Source: BloombergNEF  
Data as of 1 January 2021

## **II. High Level Support for the Submetering Provisions in the Proposed Decision, but Request for More Clarity from the Commission on Implementation**

Fermata Energy in general supports the need for submetering as the requirement for separate meters and separate service drops is an obstacle to the scalability of V2G. Without a submetering protocol in place, behind the meter (“BTM”) V2X activities cannot be eligible to receive proper compensation in utility-specific EV rates and programs. In the absence of a well-developed and implemented submetering protocol, customers with EVSE installed behind the meter are also restricted from taking advantage of EV-specific charging rates, such as TOU of rates and Automated Load Management (ALM). This decision will unlock the potential of many EVSE currently installed BTM to participate in TOU rates and ALM. Importantly, this PD addresses today’s problem of EVSE at a facility being installed on separate service drops and with separate meters, resulting in the EVSE in the parking lot being separately metered from the main building. If bidirectional EVSE are installed on a separate service drop for the parking lot and not connected to the building load, they are unable to provide critical and cost-effective grid services including demand charge management, demand response, and backup power. Because V2B systems are designed to power buildings during outage events and to provide customer bill management, they require a direct connection to a building’s electrical panel and are considered behind-the-meter.

However, Fermata respectfully requests that the final decision provide more clarity regarding implementation. For example, the proposed decision (PD) should clarify how programs will be reformed so that separate service drops or separate meters are not required for utility make ready program qualification. The PD should address how to link two accounts at a site (e.g., parking lot and main building) for demand charge management and other behind the meter V2X services. Other important but unanswered questions include defining how the proposed accuracy standard for

submetering applies to the Emergency Load Reduction Program. Another issue is how export compensation for V2G will work with submeters, because separately metered EVSE should not be required under future utility pilots and programs. If the Commission does not address these implementation issues in the final decision, we respectfully request the Commission require workshops to examine these implementation issues, and any other issues we have not mentioned.

## **II. The PD Must be Technology Neutral Per the Directive in SB 676**

Per Public Utilities Code 740.16 (b)(2) (enacted with SB 676 in 2019), “ Electric vehicle grid integration strategies shall not require the use of any specific technology,” which effectively limits the types of vehicle-to-grid integration requirements that the Commission can adopt. This limitation has not been examined or debated enough, as many vehicle grid integration strategies have multiple technological solutions. From a utility consumer, equity, and EV consumer point of view, multiple solutions could be needed because competition could lead to lower prices. Examples of competing technologies include V2X (V2G, V2B, V2H) vs managed charging, 2) communication pathways involving the EV and the grid with EV based telematics or communication pathways involving the EV, the EV supply equipment and the grid, and 3) CHAdeMO vs CCS-1 vs CCS-2 connectors. These competing technologies must be discussed and debated in a holistic way and the CPUC, per SB 676, does not require the specific use of any VGI technology. However, the PD fails this test by mandating CCS communication protocols and connector requirements. In addition, without a holistic discussion of the competing solutions, the Commission could create unintended consequences such as making charging harder for low-income EV drivers or adding costs. We discuss some of the above examples more below.

## **III. The EVSE Communication Protocols and Connector Requirements in the PD are Premature and Should Not be Adopted at This Time**

### **A. The record on many issues impacting EVSE communication protocols and connector requirements is inadequate for the Commission to make a decision.**

As explained below, much has changed since the round of comments on the transportation electrification framework in R. 18-12-006 a few years ago on the issues of EVSE communication protocols which are not reflected in the PD. In addition, the issue of how to commercialize V2X and connectors for AC and DC charging has not been debated substantially in the DRIVE OIR. Below are examples of recent developments that illustrate the complexity of fast changing nature of the issues surrounding communication protocols and connectors:

- There is a much better understanding of use cases for V2X with light-, medium- and heavy-duty vehicles and many product announcements from V2X firms and EV manufacturers
- The California Public Utilities Commission, the California Energy Commission, several offices within the US Department of Energy, the International Brotherhood of Electrical Workers - Chapter 11, National Electrical Contractors Association - Los Angeles, the Joint IOUs, several V2X services providers (including Fermata Energy, Nuvve Holding Corporation, Rhombus,), automotive OEMs (Nissan Group of the Americas, Phoenix, Zeem Solutions, General Motors LLC, Ford Motor Company, Lucid Group, Inc., First Student, Inc., Lion Electric Company) and several California municipal utilities (Los Angeles Department of Water and Power, Sacramento Municipal Utility District), The City of Lancaster and the City of Lancaster Community Choice Aggregator, the City of Los Angeles, in April 2022 signed an MOU on advancing V2X with the United States Department of Energy.<sup>5</sup> Other participants who did not sign onto the MOU, such as the California Air Resources Board, California Independent System Operator, and California Transportation Commission, also attended the V2X MOU workshop.
- The United States Department of Transportation's Federal Highway Administration in June 2022 published charging requirements for primary corridors funded by the Public Law 118-68, specifically the national EV formula program (also known as "NEVI") and comments are due August 22, 2022.<sup>6</sup> A final decision on issues such as use of certain communication protocols, cybersecurity and connectors will not be known for a while.
- The updated version of ISO 15118 was recently published in May 2022.<sup>7</sup>
- Additional attention, especially by the federal government, has been placed on cybersecurity and this impacts both cloud aggregators, EVs and EVSE serving the EV charging industry<sup>8</sup>
- The requirements of Rule 21 and the Smart Inverter Working Group have evolved for both AC and DC charging. The PD appears to be in conflict with the CPUC's own rules about the use of IEEE 2030.5 communications for distributed energy resources (DER) which includes EVs when implementing AC V2G.

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<sup>5</sup> <https://www.energy.gov/sites/default/files/2022-04/OTT%20V2X%20MOU%20Final%20%281%29.pdf>

<sup>6</sup> <https://www.govinfo.gov/content/pkg/FR-2022-06-22/pdf/2022-13291.pdf>

<sup>7</sup> <https://www.iso.org/standard/77845.html> Accessed July 20, 2022

<sup>8</sup> For example, see the comments by EPRI on this subject. <https://efiling.energy.ca.gov/GetDocument.aspx?tn=240941&DocumentContentId=74787> Accessed July 20, 2022

- Automaker plans on the implementation of the Open Vehicle Grid Integration Platform (“OVGIP”) telematics are much clearer.<sup>9</sup>

**B. The PD discriminates against low-income drivers who use EVs with CHAdeMO connectors and drivers could benefit from V2X solutions today.**

CHAdeMO is a critical, certified standard used by EV drivers throughout the United States today. Over 40,000 Nissan LEAFs and other CHAdeMO-equipped vehicles are operating in California and are able to reliably provide bidirectional VGI services.<sup>10</sup> In addition, Nissan LEAFs are increasingly important to the used light duty EV market, with vehicles driven by second and third owners. Understanding and supporting the affordable used EV market presents an opportunity for the Commission to increase access to EVs by low- and moderate income drivers. If the Commission forces the market to move to CCS, low- and moderate income drivers operating used LEAFs will not have access to public DC fast chargers and other DC fast chargers at limited access locations such as multi-unit dwellings and workplaces.

Currently, bidirectional charging in the United States is operational with the CHAdeMO standard, a certified global standard that is used with the Nissan LEAF and other vehicles. CCS is not currently available for light-duty V2X bidirectional charging in the United States. Fermata Energy is conducting R&D for V2X with the CCS standard, which reportedly experiences communications losses during charging. Moreover, there are issues with CCS implementation for medium-heavy duty bidirectional charging.

With this understanding and the goal to accelerate adoption of and increased access to EVs, we urge the Commission to recognize that having one standard as the “first choice” standard for public charging infrastructure defeats these goals; it will create public confusion and constrain consumer choice, and limit low and moderate income drivers’ access to charging as well as the many benefits that can come from bidirectional charging. Given the importance the Commission places in VGI per SB 676 and its participation in advancing V2X (including the recent MOU), CHAdeMO connectors are currently the only path forward for light duty V2X for drivers of any income level. In addition CHAdeMO connectors are critical to the success of the recently approved PG&E pilot and for light duty EVs to participate in the approved Emergency Load Reduction Program as well as future pilots proposed or envisioned by the utilities to advance V2X in the near-term.<sup>11</sup> Fermata

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<sup>9</sup> <https://sumitomoelectric.com/press/2021/12/prs111> Accessed July 20, 2022, and “Open Standards-Based Vehicle-to-Grid: Value Assessment” June 2019, <https://www.epri.com/research/products/000000003002014771>

<sup>10</sup> <https://www.arb.ca.gov/lists/com-attach/490-accii2022-UTxRNIQsBQIRZVNk.pdf> at 3

<sup>11</sup> See Advice Letter 6259-E and Resolution E-5192.

Energy respectfully recommends that the final Decision should exempt DC EVSE from the proposed CCS requirement.

**C. The CHAdeMO Association letter to the California Air Resources Board (CARB) details technical issues with the CCS-1 standard that require consideration by the Commission before issuing any connector requirements**

On May 31, 2022 the CHAdeMO Association wrote this letter to CARB.<sup>12</sup> The CHAdeMO association currently has over 500 members.<sup>13</sup> Here are the key points they make regarding the issues with CCS-1.

*In summary, these are the deficiencies of CCS-1 Fast Charging Standard:*

- *Not global standard, North America only*
- *No support for legacy vehicles – no adaptors*
- *No support [for] bi-directional (VGI) power flow*
- *PLC communication signals subject to denial-of-service attack*
- *No independent certification and compliance verification*
- *No development path for unification of existing or future fast charging standards.*<sup>14</sup>

*CCS-1 is not a globally unified standard – it is limited to the North American market. Though similarly named, “CCS” has compatibility problem between EU (CCS-2) and USA (CCS-1) – the two connectors are geometrically different and not interchangeable. If CCS is unified in the future, it is possible that CCS-1 for US will disappear causing problems with older vehicles and/or stranded vehicle charging infrastructure assets.*

*2. CCS-1 lacks VGI capability. The State of California and the US Department of Energy<sup>15</sup> are expending a great deal of time and resources to evaluate and plan the implementation and utilization of VGI technologies. (ISOR pp.32-33) Currently, the CCS-1 standard has not developed bi-directional capability – it depends on updates to SAE and ISO15118 standards. Please note, there are proprietary solutions using the CCS connector, such as marketed by Rhombus Energy Solutions, that “require custom communication and control development.”<sup>16</sup> Therefore, Staff’s proposal to standardize to CCS-1 – without a developed and tested bi-directional VGI capability - could prevent or at least would delay the implementation of VGI. Conversely, companies such as Fermata Energy<sup>17</sup> are currently testing and operating fleets of vehicles using CHAdeMO’s proven bi-directional capability. Over 40,000 Nissan Leafs and other CHAdeMO equipped vehicles are operating in California and able to reliably provide bi-directional VGI services. These services could easily offset the purchase price and charging of*

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<sup>12</sup> <https://www.arb.ca.gov/lists/com-attach/490-accii2022-UTxRNIOsBQIRZVNk.pdf>

<sup>13</sup> Regular, special and supporting members.

<https://www.chademo.com/wp2016/wp-content/uploads/pdf/memberlist2022.pdf>

<sup>14</sup> <https://www.arb.ca.gov/lists/com-attach/490-accii2022-UTxRNIOsBQIRZVNk.pdf> at 5.

<sup>15</sup> US Department of Energy, “Department of Energy Announces First of Its Kind Collaboration to Accelerate “Vehicle-to-Everything” Technologies.” Date of Release: April 20, 2022.

<sup>16</sup> Rhombus Energy Solutions, “RES-D2-CS20 Electric Vehicle (EV) DC Fast Charger Disenser Datasheet, Accessed May 31,, 2022, <https://rhombusenergysolutions.com/2021/03/res-d2-cs20-v2g-dc-dispenser>

<sup>17</sup> Fermata Energy, “Press & Media Kit”: Accessed May 31, 2022, <https://www.fermataenergy.com/press>



*a used CHAdeMO equipped electric vehicles – a viable solution to providing electric vehicles in disadvantaged and low-income communities.*

3. CCS's power line carrier (PLC) communication signals over the J1772 AC pins of the connector are not secure and subject to denial-of-service attack. Recently, a group of academics from the University of Oxford and Armasuisse S+T investigated the effects of BROKENWIRE,<sup>18</sup> an attack against the Combined Charging System (CCS) that could potentially disrupt the ability to charge electric vehicles at scale. The method interferes with the control communications between the vehicle and charger to wirelessly stop the charging sessions from as far as 151ft. After testing in a controlled laboratory environment, they conducted extensive real-world evaluation, including seven EVs and 18 charging stations. This demonstration, using only off-the-shelf equipment and with little knowledge, suggest that the use of PLC for charging communication is a serious design flaw that leaves millions of vehicles vulnerable.

4. CCS-I lack independent certification and verification of compliance with the standard causes significant consumer dissatisfaction. Staff notes consumer frustration with infrastructure and charging is number one reason for ZEV discontinuance. They suggest, among other things, a measure that increase consistency. (ISOR p.55) CHAdeMO, the only DCFC standard with an impartial third-party certification system, believes certification can guarantee the safety and ensure interoperability across any CHAdeMO chargers and vehicles. It can also facilitate any companies in various regions of the world to develop safe and interoperable CHAdeMO devices, fostering the development of locally made but globally conformed high-quality charging infrastructure. In contrast, CharIN, the global association dedicated to promoting the Combined Charging System (CCS), states:

*CharIN's next goal (after development of the Megawatt Charging System (MCS)) is to define requirements for the evolution of CCS related standards and for the certification of CCS based products.<sup>19</sup>*

*Therefore, CCS-I does not have an independent certification and compliance verification system.*

5. CCS-I has no capability for adapters to support CHAdeMO and Tesla equipped vehicles. CCS-I<sup>20</sup> has no plans for backward compatibility or adapters for existing vehicles using CANbus communications and, therefore, cannot support legacy vehicles using the other standards.

6. These are pioneering times for medium and heavy-duty BEV trucks charging technologies in support of the ZEV Truck Mandate. New technological solutions need to be developed and new charging stations will need to be constructed to support to Ultra-high-power charging. The opportunity is ripe to co-develop a new, robust and backward compatible charging standard such as the ChaoJi standard that would service all types of vehicles. Therefore, instead mandating CCS-I with its known limitations (CharIN is developing the separate MCS to charge trucks), the future development of a unified vehicle DCFC charging should be allowed to develop unhindered.

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<sup>18</sup> Sebastian Kohler, Richard Baker, Martin Strohmeier, Ivan Martinovic, "Brokenwire", Accessed: May 31, 2022, <https://www.brokenwire.fail/>

<sup>19</sup> CharIN, "Cross-industry, global, non-profit and holistic", Accessed: May 31, 2022, <https://www.charin.global/>

<sup>20</sup> CharIN, "Position Paper of Charging Interface Initiative e.V. CharIN's view on adaptors within the Combined Charging System", Accessed: May 31, 2022

7. Both CHAdeMO and Tesla are supported by early adopter BEV OEMs. Mitsubishi Motors, Nissan and Tesla all introduced BEVs prior to 2010 and worked to develop fast charging stations to promote sales of BEVs. Tesla, and to a lesser extent Nissan, established their own network of fast chargers in the US and globally. In 2009, CHAdeMO partnered with Pacific Gas and Electric (PG&E) and CARB to install the first North American public Quickchargers in Vacaville California. This historic charger, donated to the City of Vacaville by CHAdeMO, demonstrated BEVs were capable of long-distance travel. Both Mitsubishi Motors and Nissan Motors utilized this charging station for early vehicle demonstrations and R&D. Most importantly, numerous early Nissan Leaf owners used this charging station and became early advocates for public fast charging systems such as the West Coast Electric Highway. Later, this station became part of the California-Japan project “DRIVEtheARC” (Advanced Recharging Corridor) Project from Monterey to Lake Tahoe “surf-to-ski emission-free”.

In contrast, the SAE standard effort to establish a DCFC standard (CCS-I) deliberately ignored the existing CHAdeMO standard resulting market confusion and delaying the construction of fast charging network essential to the sales of BEVs.<sup>21</sup>

**D. If the Commission decides to proceed with EVSE provisions, CCS should not be required for DC Fast Charging or at minimum, at least one dual-port (CCS and CHAdeMO) EVSE should be required for every four EVSE.**

Above we request that no decision be made on EVSE communication protocols and connector requirements. If the Commission decides to make requirements on this topic, we request that CCS not be required for public access and multi-unit dwelling DC fast charging or that for every four EVSE installed that one EVSE with dual-ports (CCS and CHAdeMO) be installed.

#### **IV. Support for a New or Existing OIR to Address Long-Term Barriers to V2G**

Fermata respectfully recommends the Commission address the many long-term barriers to V2G in the DRIVE OIR or another appropriate OIR. We have requested this in the ELRP and SGIP OIRs but have not seen our recommendation implemented. However, with the Commission and the California Energy Commissioner signing the V2X Memorandum of Understanding with US DOE and twenty-one other parties, including major utilities, automakers, V2X services providers and many others, we believe the time is right to comprehensively address the need to accelerate V2X. Some parts of this PD are welcome from a V2X perspective, but other parts, as we explain above, are not. Without addressing these barriers, V2G technology will be constrained in its ability to provide cost effective solutions to public safety power shutoffs, peak reduction, and the transition to renewable energy after 2024.

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<sup>21</sup> <https://www.arb.ca.gov/lists/com-attach/490-accii2022-UTxRNIQsBOIRZVnK.pdf> at 2-5.

For example, some forms of V2X, such as V2B, which can provide critical services such as backup power/resiliency, do not qualify for make-ready funding. Many utility make-ready infrastructure programs fund front-of-the-meter equipment, requiring chargers to use a separate service drop and to be individually metered on an EV rate. Because V2B systems are designed to power buildings during outage events and to provide customer bill management, they require a direct connection to a building's electrical panel and are considered behind-the-meter. As a result, they do not qualify for many Make Ready programs. While the site preparation/installation costs for a bidirectional charger are comparable to that of V1G EVSE, without access to make-ready funding, bidirectional EVSE are at a major disadvantage. A solution to this problem could be to let V2X qualify for make-ready programs even when installed behind the meter and on the customers' existing electrical service. We strongly believe that certain V2B use cases, such as demand charge management, demand response, and backup power, must be eligible for make ready programs.

## **V. CONCLUSION**

Fermata Energy appreciates the opportunity to provide these reply comments on the PD. We look forward to further collaboration with the Commission and stakeholders on this initiative.

Dated: July 20, 2021

Respectfully submitted,

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