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VIA ELECTRONIC FILING

April 21, 2021

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Electrification and the Grid of the Future
Docket No. AD21-12-000
Pre-Technical Conference Comments of ChargePoint, Inc.

Dear Ms. Bose,

Attached for electronic filing in the above-referenced matter, please find comments by ChargePoint, Inc.

Respectfully,

Anne Smart
Vice President, Public Policy
ChargePoint

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Electrification and the Grid of the Future **Docket No. AD21-12-000**

Pre-Technical Conference Comments of ChargePoint, Inc.

ChargePoint, Inc. ("ChargePoint") respectfully submits these comments in response to the Supplemental Notice of Technical Conference that the Federal Energy Regulatory Commission ("FERC") issued in advance of the technical conference to be held on April 29, 2021.[1] As stated in the Notice, the purpose of the technical conference is to initiate a dialog between Commissioners and stakeholders on how to prepare for an increasingly electrified future. Specifically, the conference will address: projections, drivers, and risks of electrification in the United States; the extent to which electrification may influence or necessitate additional transmission and generation infrastructure; whether and how newly electrified sources of energy demand (e.g., electric vehicles, smart thermostats, etc.) could provide grid services and enhance reliability; and the role of state and federal coordination as electrification advances.[2]

ChargePoint offers these comments to facilitate the Commission's consideration of the issues surrounding increased transportation electrification and the grid services these resources may provide. ChargePoint Encourages FERC to provide necessary guidance through the implementation of FERC Order No. 2222 to unlock the potential for electric vehicles ("EVs") and EV supply equipment ("EVSE") to provide valuable grid services in both wholesale and retail markets.

I. Background

1. About ChargePoint

ChargePoint is a world leading electric vehicle (EV) charging network, providing scalable solutions for every charging scenario from home and multifamily to workplace, parking, hospitality, retail and transport fleets of all types. ChargePoint's cloud subscription platform and software-defined charging hardware is designed to enable businesses to support drivers, add the latest software features and expand fleet needs with minimal disruption to overall business.

ChargePoint's hardware offerings include Level 2 (L2) and DC fast charging (DCFC) products, and ChargePoint provides a range of options across those charging levels for specific use cases including light duty, medium duty, and transit fleets, multi-unit dwellings, residential (multi-family and single family), destination, workplace, and more. ChargePoint's software and cloud services enable EV charging

[1] Electrification and the Grid of the Future Docket, Supplemental Notice of Technical Conference, Docket No. AD21-12-000 (April 14, 2021) ("Supplemental Notice").
[2] Electrification and the Grid of the Future Docket, Notice of Technical Conference, Docket No. AD21-12-000 (March 2, 2021) ("Notice").

station site hosts to manage charging onsite with features like Waitlist, access control, charging analytics, and real-time availability. With modular design to help minimize downtime and make maintenance and repair more seamless, all products are UL-listed and CE (EU) certified, while Level 2 solutions are ENERGY STAR® certified.

ChargePoint's primary business model consists of selling smart charging solutions directly to businesses and organizations while offering tools that empower station owners to deploy EV charging designed for their individual application and use case. ChargePoint provides charging network services and data-driven, cloud-enabled capabilities that enable site hosts to better manage their charging assets and optimize services. For example, with those network capabilities, site hosts can view data on charging station utilization, frequency and duration of charging sessions, set access controls to the stations, and set pricing for charging services. These features are designed to maximize utilization and align the EV driver experience with the specific use case associated with the specific site host. Additionally, ChargePoint has designed its network to allow other parties, such as electric utilities, the ability to access charging data and conduct load management to enable efficient EV load integration onto the electric grid.

2. Electric vehicle adoption is increasing across the U.S.

EV adoption has accelerated in recent years due to technological, economic, and policy developments at the national, state, and local levels. The last decade has seen an immense increase, not just in the total volume of EVs sold, but in the models, manufacturers, and vehicle classes. Whereas 2011 saw fewer than 18,000 plug-in EVs sold in the United States, annual EV sales rose to over 325,000 in 2019, according to data from Argonne National Lab.[3] The increased adoption of EVs has led to an acceleration of the necessary charging infrastructure to support charging at home, work, and in transit.

Data from the Energy Information Administration's ("EIA") Annual Energy Outlook 2020 indicates total annual electric vehicle sales (cars and light trucks) are expected to grow from 362,00 in 2020 to 782,000 in 2030.[4] In 2020, those sales broke down as 307,000 cars (85%) and 55,000 light trucks (15%). Over the ensuing decade, EIA projects electric car sales to increase 9% per year to reach 680,000 (87% of total electric vehicle sales), while electric truck sales increase 6% per year to reach 102,000 (13% of electric vehicle sales). These trends are enabled by the continued release of new models being made available across the whole range of vehicle classes and increases in access to charging infrastructure.

Accelerated adoption of EVs is not limited to light-duty vehicles. Multiple medium and heavy-duty ("MD/HD") vehicles have been announced and will hit the market within the next few years, including: Freightliner eM2 106 and eCascadia (medium duty delivery truck and heavy duty highway tractor, respectively),[5] Peterbilt Motors 220EV (medium duty truck),[6] Navistar eMV (medium duty truck),[7] Mack Trucks LR BEV (heavy duty refuse truck),[8] Tesla Semi (heavy duty truck),[9] and Volvo

[3] Assessment of Light-duty Plug-in Electric Vehicles in the United States, 2010-2019: https://publications.anl.gov/anlpubs/2020/06/158307.pdf
[4] Light-Duty Vehicle Sales, U.S. EIA: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=48-AEO2020&cases=ref2020&sourcekey=0.
[5] https://freightliner.com/e-mobility/.
[6] https://www.peterbilt.com/about/news-events/peterbilt-unveils-model-220ev-ces.
[7] https://news.navistar.com/2019-10-28-Navistar-Launches-New-Business-Unit-NEXT-eMobility-Solutions.
[8] https://www.macktrucks.com/mack-news/2019/mack-trucks-unveils-fully-electric-mack-lr--refuse-demonstration-model/.
[9] https://www.tesla.com/semi.

VNR (heavy duty regional-haul truck).[10] Bloomberg estimates that 80 percent of transit buses globally will be electric by 2040.[11] CALSTART's Zero-Emission Technology Inventory estimates there will be 195 medium and heavy duty EV models available or announced by 2023, which is nearly double the number in 2019.[12] Compared to light duty vehicles, these MD/HD vehicles have larger batteries, which increases their ability to provide grid services at the distribution and transmission level when not otherwise in use. Further, many of these vehicles operate with predictable schedules, making them excellent candidates for demand response or other load management programs to contribute to a more resilient electric grid. If conducted at scale, gigawatt hours of flexible distributed energy resources can be added to the energy markets, providing numerous benefits across the U.S.

Based on growing demand in the EV market, Brattle estimates the U.S. will need to deploy up to 1.2 million public Level 2 chargers and 60,000 DC fast chargers in addition to nearly 10 million residential Level 2 chargers.[13] As the market expands and adoption increases, the way that these vehicles utilize and interact with the electric grid, both at the distribution and transmission level, will evolve.

II. Comments

1. What grid services can newly electrified resources provide or otherwise facilitate? For example, what grid services can consumer electric vehicles or electric vehicle fleets most effectively provide today? What is the current state of development for vehicle-to-grid technologies, and will further advancements enable consumer electric vehicles or electric vehicle fleets to provide additional grid services in the future?

Electric vehicles represent discrete and controllable load on the distribution grid and can provide benefits to the electric system. As the National Association of Regulatory Utility Commission (NARUC) recently reported, "[b]ecause EV load is flexible, if charging can be moved to times of low demand or abundant renewable generation, EVs represent a significant opportunity for increased grid flexibility." The Regulatory Assistance Project similarly finds that EV load is capable of responding quickly to a signal, as well as being inherently flexible over time, therefore EVs are flexible over the course of a day as well as "within minutes and seconds." EV load is a particularly good match to support increased volumes of variable energy resources like wind and solar on the grid, because it can be moved to times when variable renewable energy resources are more prevalent. Vehicle batteries can also serve as backup power resources to customers' homes or facilities or send power back to the grid during times of peak demand.

Active and passive managed charging programs are currently being utilized across the country to ensure this new load from a growing fleet of EVs is integrated in a way that provides grid benefits. Managed charging refers to techniques to manage the time and rate of EV charging load.[14] Time of use rates, which are very common for residential customers, are a form of passive managed charging. In

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[10] https://www.volvotrucks.us/news-and-stories/press-releases/2018/december/volvo-trucks-to-demonstrate-volvo-vnr-electric-models-in-2019-and-commercialize-in-2020/.

[11] Bloomberg New Energy Finance, *Electric Buses in Cities*, (Mar. 29, 2018), available at *https://assets.bbhub.io/professional/sites/24/2018/05/Electric-Buses-in-Cities-Report-BNEF-C40-Citi.pdf*.

[12] CALSTART, Zero-Emissions Technology Inventory, "Model availability to double by 2023," (June 3, 2020), available at https://globaldrivetozero.org/tools/zeti-analytics/.

[13] Brattle Group*, Getting to 20 Million EVs by 2030 Opportunities for the Electricity Industry in Preparing for an EV Future*, (June 2020), available at: https://brattlefiles.blob.core.windows.net/files/19421_brattle_-_opportunities_for_the_electricity_industry_in_ev_transition_-_final.pdf.

[14] Managed charging may also be referred to as V1G, intelligent charging, adaptive charging, or smart charging.

contrast, active managed charging enables a centralized entity or the customer to take direct control of charging load. These approaches allow utilities or aggregators to start, limit, or stop the rate of charge temporarily during times of high demand without materially impacting overall EV charging. When applied over an EV fleet or other aggregated group of unrelated EVs, this load management technique can provide significant system benefits as well as system-wide cost savings. Networked charging stations and cloud services provide the ability for EV charging site hosts to conduct load management in real time. Load management events can be scheduled to expire after a period of time, returning the equipment to normal maximum power output, or the event can be rescinded at any time. Demand response events can be programmed to occur for individual charging ports or any desired groups of ports. EV TOU rates can serve as a bridge between passive and active managed charging options by showing customers how, in exchange for providing grid benefits by controlling their charging, they may be able to save money.

Value of load management for different EV charging use cases

The types and levels of benefits to the grid from EV charging taking place under a load management program will vary greatly by EV charging use case. It is important for policymakers to "right-size" the load management approach for each use case weighing factors such as potential coincidence with peak load, absolute proportion of charging in such use case, EV driver's flexibility in charging time and requirement, program complexity, and alignment of incentives throughout the EV charging ecosystem. Effective load management techniques including managed charging must consider the charging customer's needs and preferences.

- **Residential charging** is perfectly suited for demand-side management programs due to the long dwell times available for charging, the ability to shift charging within that time period, and the EV driver typically serving as their own "site host." EV drivers charge their vehicles at home 64% of the time.[15] Numerous studies have shown that residential charging is very responsive to TOU rates.

- **Fleet charging** is an ideal use case to support demand-side management and smart charging of EVs. This is due to long dwell times, certainty around vehicle operational needs, and the direct relationship between the vehicle's owner and the charging station's owner.

- **Workplace** charging presents opportunities to shape charging during the day due to the extended dwell times and repeat users of such charging stations. Workplace charging can be incentivized to avoid early morning peaks or to serve as a "sponge" for overgeneration of solar in the middle of the day.

- **Public Charging** is the least optimal use case for load management programs for a few key reasons. First, a very small percentage of total EV charging is, or will be, conducted at publicly available stations. Only 2-3% of charging takes place outside of home and workplace,[16] and such charging is often randomized and occurs throughout the day. Public charging is also less flexible due to the need for long-distance drivers to get back on the road.

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[15] Smart, John, *Lessons Learned About Workplace Charging in the EV Project*, Idaho National Labs.
[16] *Id.*

2. **What technological capabilities (e.g., interoperability) are required for newly electrified resources to provide grid services? What is the current state of development for these capabilities? What could speed up or slow down such development?**

Smart, networked L2 and DCFC chargers will be vital to ensuring that EV charging benefits the grid by enabling electric utilities and third-parties to have advanced remote load management controls to facilitate off-peak charging and other managed charging strategies. Further, embedded metering within the EV charger can enable near-term EV charging opportunities at a lower cost to customers than installing a second EV-specific meter or replacing a whole-home non-smart meter with an AMI meter. AMI is not necessary to utilize embedded metering, but embedded metering can complement grid modernization efforts. A smart charger can also collect interval data to inform usage patterns, and provide enhanced network communication capabilities between the EV driver and the utility, or third-party systems. These capabilities can be of significant importance to customers to enable charging, as well as to utilities since the smart station provides a wealth of information related to charging behaviors and load profiles that can enable various demand side management programs. Metering embedded in smart charging stations can provide the following important capabilities to satisfy utility and customer needs while maintaining security:

- Precise accuracy across all supported current and temperature ranges;
- Measurement of energy delivered to vehicle only, separate from any other loads;
- Granular clock-aligned interval data;
- Capability to receive remote firmware updates;
- Real-time power monitoring;
- Secure communication between the charging station and a utility or third-party server;
- Local storage of charging data on the charging station; and
- Compliance with cybersecurity requirements.

NIST Handbook ("HB") 44 Section 3.40 provides the basis for EVSE internal meter calibration. Smart charging stations that comply with NIST HB 44 provide at least 1% accuracy in the laboratory and 2% accuracy in the field. California has developed policy to implement the HB 44 guidelines, and other states are beginning to follow suit. Widespread adoption of this code will enable consistency and reliable performance across the country.

The key benefits of leveraging embedded metering capabilities in smart charging stations are the substantial cost and time-savings stemming from avoiding the need to purchase and install a second meter. This enables immediate or near-term participation in utility TOU rate programs, dynamic rate programs, and managed charging programs. For the customer, the use of embedded metering provides a seamless experience utilizing the built-in capabilities of the customer's smart charging station investment to communicate directly with the utility, and in some cases helping the customer to realize additional fuel cost savings.

The embedded metering capabilities that ChargePoint and other competitive solution providers offer have already been vetted for accuracy[17] and are currently in use to support a number of utility TOU rate billing and load management programs.[18] In order for EVs to efficiently and effectively provide grid

[17] *See, e.g.*, Minn. PUC Docket No. E002/M-17-817.
[18] *See*, MD PSC Docket No. 9478, Order No. 88997 (Jan. 14, 2019) ("the Commission directs the Utilities to utilize the "smart" features of such technology to their maximum potential, like advanced metering, to develop and

services, it will be important for regional market operators to develop and implement rules enabling EVs to participate in the markets through the charger's embedded metering.

ChargePoint is a strong supporter of interoperability and open standards and supports FERC and regional market operators developing rules that require market resources, such as EVs and EVSE, to conform with existing standards in order to be eligible to participate in the markets. Utilities across the country have the ability to integrate EVs and EVSE into demand response programs through OpenADR and application programming interfaces (APIs) and these same methods could be utilized to enable EVs and EVSE to participate in regional energy markets.

ChargePoint cautions against mandating standards that have not be approved by an international standards making body. The established standards making process provides careful and critical examination of technical issues while enabling hardware and software manufacturers to align with requirements in timelines appropriate for market development. Prematurely requiring market participants to conform to pending standards as a requirement to participate in regional energy markets could increase the risk of stranded assets, and potentially limit the ability of EVs and EVSE to contribute to a more resilient and reliable energy grid. For these reasons, it would be premature for FERC and the regional market operators to require ISO 15118 communications for EVSE to participate in energy markets.[19] Additionally, it would be inappropriate for FERC to signal that ISO 15118 is the de facto standard, particularly since the majority of electric vehicles do not support power management through ISO 15118. Furthermore, there are serious shortcomings with ISO 15118 that must be addressed internationally before charging products should be certified.[20] The Society of Automotive Engineers (SAE) recently announced that it would be addressing one of these shortcomings, related to PKI security.[21] Significant progress is being made to develop future versions of ISO/IEC 15118 through the ISO/IEC Joint Working Group and address the cybersecurity risks posed by the current and upcoming versions of ISO/IEC 15118, in the SAE EV Charging PKI Collaborative Research Project. The SAE PKI work is currently scheduled to be completed in the second half of 2022. ChargePoint offers this as an example of potential negative market impacts of jumping ahead of international processes.

3. What challenges exist to deploying newly electrified resources to provide grid services in the RTO/ISO and non-RTO/ISO regions?

While markets function best when they are technology agnostic, they must also evolve and remain flexible to integrate newer forms of DERs, such as EVs, to maximize competition and efficient pricing outcomes. This is no different than the need for any product to keep pace with technological advances. For example, demand response ("DR") baseline rules challenge the ability of behind the meter technologies that frequently dispatch (e.g. electric buses, etc.) to participate in regional markets thereby

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implement time variant rate, load management, and demand response programs"); Northern States Power Company-Wisconsin, Final Decision, Wisc. PSC Docket No. 4220-TE-104 (July 16, 2020); https://www.cpuc.ca.gov/general.aspx?id=7728.

[19] ISO 15118 has not been adopted or approved by any international or national standards organizations such as ANSI or ISO/IEC. Currently, no nationally or internationally recognized standards bodies have adopted or approved any standards for communication between an EV charging station and an EV charging network.

[20] Practical Considerations for Implementation and Scaling ISO 15118 into a Secure EV Charging Ecosystem. (May 2019). Available at: https://www.chargepoint.com/files/15118whitepaper.pdf.

[21] https://www.sae.org/news/press-room/2020/05/sae-international-to-launch-industry-driven-sae-ev-charging-public-key-infrastructure-project.

limiting these resources from providing grid benefits. DR baseline methodology seeks to ensure that load reduction is meaningful to the grid during a DR event. It is a straight-forward approach to understanding the value of DR resources relative to "normal" demand, and can be scaled easily. It works well for stationary resources with consistent load that can implement either automated or manual short- term strategies to reduce demand. However, this approach assumes that a site always has consistent load, and can provide a load reduction during a DR event relative to the consistent load. Further, this approach assumes the resource is stationary and incentives are based on performance relative to baseline. Demand reduction from EV participants may not be valued or incentivized accurately when measured against recent days. RTO/ISO baseline methodologies will need to be re-examined as more non-stationary DERs, such as EVs, are deployed. Not properly accounting for the unique attributes of these resources will limit the ability for EVs to participate in the markets to provide grid services. This re-examination will become increasingly important as deployment of medium and heavy-duty EVs expands.

EVs as a grid resource present an additional challenge that does not necessarily exist with other DERs or grid resources. EVs, especially EV fleets, must be reliable and ready when needed. As such, driver and fleet operator mobility needs come first. If drivers and fleet operators are subjected to onerous requirements to participate in load management programs, they may forego participation which will diminish the ability for EVs to provide valuable grid services. As FERC, and the ISO/RTOs develop programs and policies to incentivize EVs to participate in the markets, it will be vital to maintain a positive driver/operator experience.

As EV charging station and network operators build out national networks, consistent program and policy development across RTO/ISO regions will further enable EVs to provide grid services. The fact that EVs are mobile, and may travel between RTO/ISO boarders, presents an additional challenge if market rules are developed in a piecemeal manner. We recommend FERC consider the mobile nature of EVs when developing polices that enable EVs to participate in DR and load management programs.

FERC's historic Order No. 2222 is an important initial step to help usher in the electric grid of the future and promote increased competition in electric markets by removing the barriers to preventing EV and other DERs from providing grid services in the markets run by regional grid operators. The regional grid operators are currently taking necessary steps to revise their tariffs to provide enhanced opportunity for DERs to provide grid services, enhance grid reliability, increase competition, encourage innovation and drive down costs for consumers. ChargePoint appreciates these efforts and looks forward to continued engagement on these critical issues.

4. **What barriers, if any, exist to newly electrified resources providing grid services in wholesale or retail markets?**

A significant barrier to EVs providing grid services in wholesale and retail markets is the fact that only 36 states, Washington, D.C., and the City of Austin Texas have determined that EV charging is a service, rather than the resale of electricity, enabling operators of EV charging stations to have the option to charge a fee for the charging service provided to electric vehicle drivers. This includes states with regulated and restructured electricity markets. The ability to "charge for charging" enables owners of charging stations to recover some of the cost of providing this charging service, including the cost of purchasing the hardware, network and billing services, and installing these stations. It also enables owners of charging stations to price their charging services by a variety of methods, including on a per-kilowatt-hour (kWh) basis. The ability to price EV charging services on a per-kWh basis enables site hosts to incentivize the most efficient and equitable use of EV charging stations and minimize potential impacts to the electric grid. Flexibility in setting charging pricing supports innovation in the EV charging market. By the same token, maintaining direct or indirect limitations on how a charging station owner or operator may charge drivers constricts customer choice, discourages innovative and customer-friendly approaches to parking and billing for EV charging services, and also limits the ability of the growing number of EVs to provide grid services.

The lack of clarity on the ability to charge for EV charging services in 14 states may limit EV charging providers from participating in wholesale and retail markets in those states. We understand that exempting private EV charging stations owners from state statute is not within FERC's jurisdiction, but we highlight it as a significant obstacle to providing grid services in wholesale or retail markets.

III. Conclusion

ChargePoint appreciates the opportunity to provide these comments and looks forward to working with the Commission, regional market operators, and industry stakeholders to develop and implement policies that accelerate transportation electrification and enable charging load to support the grid and enhance reliability.

Respectfully submitted,

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Dated: April 21, 2021