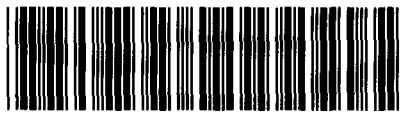

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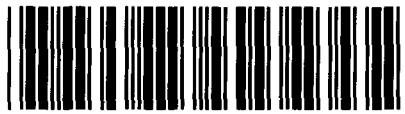

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January 31, 2020

Ms. Ana Trevino
Public Utility Commission of Texas
1701 N. Congress Ave., Room 8-100
Austin, TX 78711-3326

RE: Project No. 49125, Review of Issues Relating to Electric Vehicles

Dear Ms. Trevino:

ChargePoint is the nation's leading electric vehicle (EV) charging network, with charging solutions for every charging need and all the places EV drivers go: at home, work, around town and on the road. With more than 106,000 independently owned charging spots, ChargePoint drivers have completed more than 71 million charging sessions and driven more than 1.6 billion electric fueled miles. In Texas, ChargePoint's network includes more than 3,000 public and semi-public charging spots.

ChargePoint designs, manufactures, and deploys residential and commercial Level 2 (L2) and DCFC electric vehicle charging stations, cloud-based software applications, data analytics, and related customer and driver services aimed at creating a robust, scalable, and grid-friendly EV charging ecosystem. ChargePoint sells our EV charging equipment and network services to a wide variety of customers, including residential EV owners, employers, commercial and industrial businesses, cities and public agencies, ports, schools, public transit, delivery truck fleet operators, and multi-unit dwelling owners. We offer a broad array of products and services that can serve light, medium, or heavy-duty electric vehicles.

ChargePoint appreciates this opportunity to provide the enclosed comments to the Commission on this important issue and looks forward to additional conversations with the Commission and stakeholders as the review continues.

Sincerely,

Justin Wilson
Director, Public Policy
ChargePoint, Inc.

11

General Data

1. The Commission requests that parties provide current data sources and projections for the expected deployment of electric vehicles in Texas over the next ten years. If available, the data sources should attribute the projections by vehicle class (i.e. personal, commercial short-haul including fleets and buses, and commercial long-haul electric vehicles).

ChargePoint understands that several other parties are expected to provide projections for the adoption of electric vehicles in Texas over the next ten years. ChargePoint encourages the Commission to examine several scenarios for electric vehicle adoption based on comments in this proceeding. As with any forecast, EV adoption may be somewhat predictable in the near term (1-3 years), however, we anticipate a wide variation in projections beyond the near term.

Because electric vehicle adoption will depend on several factors, including state policy, electric vehicle production capacity, local model availability, fuel prices (including liquid fuels and electricity), and how quickly drivers replace their vehicles, we encourage the Commission to regularly re-examine these projections and work with State agencies and third-parties to refine the projections on a regular basis.

2. Please provide any current data sources and information on the expected amount of new load attributable to electric vehicles over the next ten years. If available, the data sources should attribute this load by vehicle class (i.e. personal, commercial short-haul including fleets and buses, and commercial long-haul electric vehicles).

New load attributable to electric vehicles will be dependent on the number of electric vehicles, class of those vehicles, and the miles driven per class. While the total new load could be significant in terms of total energy, this load will materialize incrementally, over a number of years. For example, without opining on the accuracy of ERCOT's 2018 Long Term System Assessment, if it were assumed that in 2033 electric vehicles would add up to 6,000 MW of charging demand during peak times as ERCOT suggest, the annual capacity additions needed to meet that peak demand is less than 1% over the 13 year period.[1,2]

The incremental nature of this additional load is manageable through thoughtful planning of the distribution and transmission system. Additionally, it is important to note

[1] ERCOT, 2018 Long-term System Assessment for the ERCOT Region, December 2018, Page 10.
[2] Annual peak capacity additions calculated using 2019 system peak of 74,820 MW referenced at January 30, 2020 Texas House State Affairs Interim Committee Meeting.

that this load has the potential to be highly flexible. There will be significant opportunities for both retail energy providers and for traditional utilities to develop rates and programs to help shift and shape the load attributable to electric vehicles to benefit grid and energy operations. If the proper, market-based price signals are in place, new load attributable to electric vehicles can be a win for consumers through lower fuel prices, a win for distribution utilities through greater utilization of fixed assets, and a win for energy providers through additional kWh sales.

3. Please identify any anticipated load "hot spots" in the state for electric vehicle charging. Please specify whether these hot spots are expected to result from personal, commercial short-haul, or commercial long-haul electric vehicle deployment and charging.

Electric vehicle adoption for both personal, commercial short-haul, and commercial long-haul can happen in clusters and there is the potential for the charging of those vehicles to also happen simultaneously. An example of this would be several individuals in the same neighborhood adopting electric vehicles at approximately the same time or the electrification of a commercial short or long-haul fleet.

At the outset it is important to note that the term "hot spot" for electric vehicle charging should not be taken as a negative. Quite the opposite, a hot spot of electric vehicle charging has the opportunity to increase utilization of existing distribution and generation assets, which can result in additional revenues to utilities and energy providers. ChargePoint believes that with proper planning utilities will be able to identify potential hot spots and address any new system needs through the normal process of maintaining and upgrading the distribution system.

Because personal electric vehicle adoption will happen at a modest pace, electric distribution utilities should be able to manage the increase in electric vehicles in residential areas of the system relatively easily by monitoring distribution system information and also gathering data through state or independent sources. There are several providers of zip-code or census-tract vehicle registration data. While there may be new data inputs or additional analysis needed, distribution utilities are accustomed to this sort of planning.

Commercial short-haul adoption will require additional coordination between distribution utilities and their customers. It will be important for utilities and customers to plan for increased adoption in the commercial short-haul fleet. Distribution utilities should begin outreach now, to understand any plans for electrification of commercial short-haul operations and incorporate those plans into their existing planning process. While there is some uncertainty of exactly when particular short-haul fleet operations may electrify,

the trend is clear that many of these operations are expected to electrify in the mid-to-late 2020s. Distribution utilities should begin to incorporate customer electrification plans into their on-going distribution system maintenance and construction plans.

The commercial long-haul fleet is very likely to develop in stages as long-haul fleet operators gain comfort with heavy-duty electric vehicles. Commercial long-haul fleets are likely to charge at distribution centers or fleet hubs as fleet operators gain confidence in the vehicle technology. As with the commercial short-haul fleet, distribution utilities should work with customers to understand the charging needs and adoption timeline in order to incorporate that data into existing planning processes.

4. Describe the observed or anticipated load profiles and impacts of various types of electric vehicle charging stations (e.g. residential Level 1, Level 2, and Level 3 DC Fast charging) and the class of the vehicle charging (i.e., personal, commercial short-haul including fleets and buses, and commercial long-haul electric vehicles).

There are many factors that influence the load profiles and impacts of electric vehicle charging, including the power level of the charging station, the on-board electronics of the EV, capacity of the EV batteries, and energy management solutions employed. While there is some variation around the definitions of Level 1, Level 2, and DC Fast Charging ("DCFC" or "Level 3"), the figure below shows basic specifications for electric vehicle charging, typical rate of charge, and uses cases.

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EV Charging Basics

	Level 1	Level 2	DC Fast
Electrical Specs	110 – 120 Volts AC 12 – 16 Amps (home appliance)	208/240 Volts AC 32 Amps (home washer/dryer, commercial standard)	208 to 480 Volts DC 70 – 125 Amps (commercial standard)
Range Per Hour of Charging	~3 – 5 miles	~12 – 25 miles	100 - 200 miles +
Typical Time for Full Charge	18+ hours	~2 - 4 hours	~15 - 45 mins
Use Cases	Use cases are limited and may not be suitable for large capacity vehicles or driver expectations.	Wide variety of uses including at work, home, and around town. Suitable for many fleet applications.	Interstate and highway travel where short stops are necessary. Also used by fleet / heavy duty applications

When trying to determine the anticipated load profile of EV charging, perhaps the most important considerations are the use case and energy management solutions employed. Data suggest that approximately 50-80% of EV charging will take place at home.[3] Home charging can be cost effective and easy for consumers. In many instances, a driver with home charging can leave their home each day with a full or nearly full battery. With smart charging, an EV driver can plug-in when they return home for the evening and the charging equipment can begin charging at pre-programmed times.[4] By shifting load to hours of the day when there is excess generation and/or distribution capacity, utilities and energy providers can better utilize their assets and avoid additional capital expenditures.

Similarly, many fleet operators will charge their electric vehicles at the times when their employees are not typically working – often the evening and night hours. In this instance, where a fleet operator may have several vehicles, smart charging can provide similar benefits as home charging. In addition to load shifting through programmed charging times, energy management can also reduce or limit power levels to the overall fleet, effectively limiting the total demand at a particular location.

Workplace charging is also an important component of the EV charging ecosystem. Research has shown that, on average, when workplace charging is available, EV drivers that commute to work use the workplace charging equipment for 15-25% of their needs.[5] Workplace charging can also be managed to minimize negative impacts on the grid. While the opportunity to load shift to the most off-peak hours may not be available at traditional 9am – 5pm workplaces, managed charging can move potential load several hours during the workday to avoid system peaks or for use when intermittent resources are available in excess of demand. Additionally, with energy management limits can be placed on individual chargers or a workplace's total charging at any given time to ensure total demand does not exceed certain levels.

Finally, public charging, both Level 2 and DCFC, are critical to the EV charging ecosystem. Public charging most resembles traditional fueling. It is difficult to plan when exactly public charging will take place or the power requirements on the grid. However, it is important to remember that the availability of public charging is essential to encourage EV adoption and the benefits and flexibility that come with managed home and workplace charging.

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[3] Hardman et al., A review of consumer preferences of and integrations with electric vehicle charging infrastructure, Transportation Research, 2018, Page 515. Available at: www.elsevier.com/locate/trd.
[4] A "Smart Charger" can generally be defined as a charging station (residential or commercial) that has the ability to connect to the internet. "Smart Charging" uses the charger's ability to connect to the internet to enable a host of functions including: pre-programmed charging times, load management, demand response, and integration with utility billing systems.
[5] Hardman et al., Page 515.

5. What, if any emerging vehicle charging technologies are anticipated to be commercially available in the next ten years that could impact electricity markets in Texas?

While the EV charging industry will doubtless introduce exciting new technologies in the next ten years, ChargePoint encourages the Commission to focus in the near term on finding ways to realize the full benefits of technologies that are available today through smart charging applications such as load shifting, energy management and demand response. Most importantly, many utilities and retail energy providers have yet to take full advantage of the capabilities of smart charging. With the proper customer incentives in place, utilities and retail energy providers can encourage off-peak charging or reward customers for allowing the utility to throttle their charging similar to a demand response program. Through smart charging offerings and programs, utilities and retail energy providers can use smart chargers to turn EVs into flexible loads that increase electricity sales and utilization on the grid without significantly contributing to peak demand. In this way, smart charging can put downward pressure on rates by allowing utilities to spread their fixed costs across a greater number of kilowatt-hour sales. ChargePoint recommends that the Commission and Texas' utilities and retail energy providers focus on developing programs and incentive structures that facilitate smart charging.

Grid Impacts

6. The Commission request that parties provide a detailed explanation on the following items:

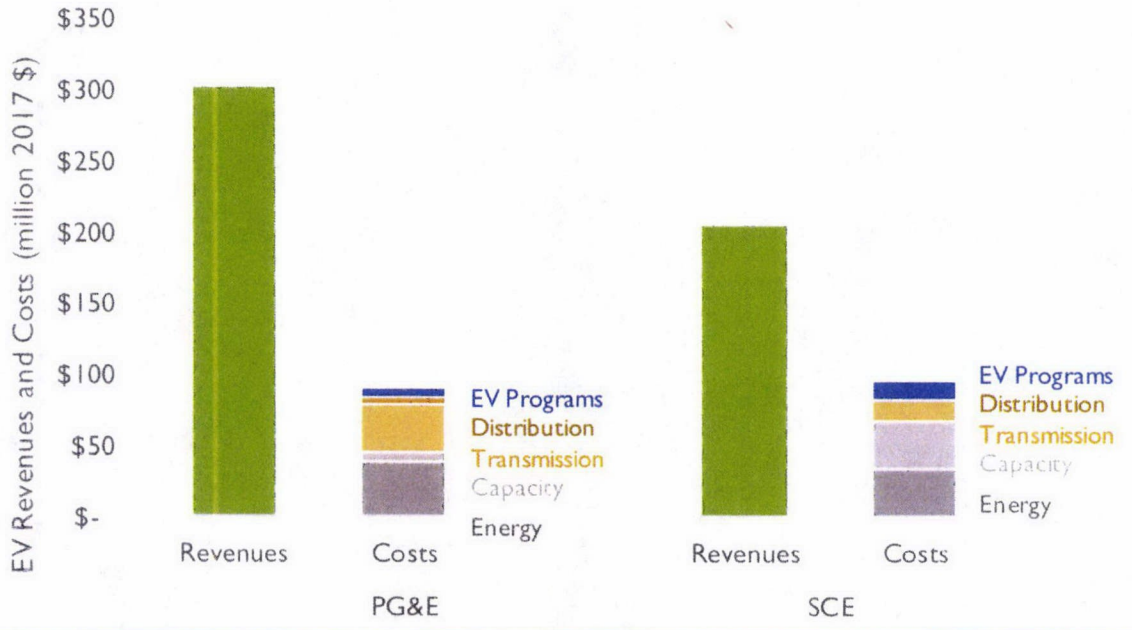
- **The anticipated impacts of electric vehicle charging, including residential and commercial charging stations on the distribution system in the next ten years;**
- **The anticipated impact of electric vehicle charging stations on the transmission system in the next ten years; and**
- **The anticipated impact of electric vehicle charging stations on long-term system planning at the regional transmission organization level, given a widespread adoption scenario.**

It is reasonable to expect that the net impact of EV charging on the distribution system over the next ten years will be positive. Synapse Energy Economics recently studied the total utility costs and revenues attributable to EV charging in PG&E's and SCE's service territories in California.[6] As can be seen in the figure below from Synapse's study, the revenues from EV charging far exceed both utilities' costs of providing the energy used to charge the vehicles (even including the utilities' incentive programs). By increasing revenues without significantly increasing utilities' costs of providing service, increased EV charging in Texas can be expected to put downward pressure on rates for all

[6] https://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf

customers. While Texas's electricity system is structured differently than PG&E's and SCE's it is comprised of the same separate components used to create the value and cost used in this analysis.

Figure 4. PG&E and SCE Revenues and Costs of EV Charging, 2012-2017



As discussed earlier, ChargePoint expects that EV charging's contribution to increased energy demand will be incremental. If managed charging technologies are employed, EV charging's contribution to increased peak demand will be further reduced. ChargePoint believes that regular planning processes that take into account various scenarios and assumptions regarding the rate of EV adoption and various charging scenarios will ensure that the net impact of EV charging on Texas' grid will be positive.

7. What is the overall anticipated impact of electric vehicle charging in the next ten years in terms of energy and peak demand? What changes, if any, should be made to energy and peak demand forecast to incorporate this impact?

As EV adoption grows, it will undoubtedly contribute to increasing demand for energy in Texas. This growth will be incremental, however, and ChargePoint expects that distribution utilities and energy providers will be able to accommodate the increasing demand for energy through their normal planning processes. As discussed above, utilities and energy providers can monitor data sources such as vehicle registration data to inform their planning.

EV adoption will not necessarily contribute to significant growth in peak demand. As discussed above, through smart charging and proper incentives and/or market structures, EVs can be flexible loads that charge primarily off-peak. Smart charging programs can also encourage EV charging to occur when there is excess wind or solar generation on the system. While some on-peak charging such as in highway and other public charging applications will be inevitable, its contribution to peak demand be incremental as well. As also discussed above, the availability of public charging, is critical to encourage EV adoption and the benefits of managed charging.

It is important to remember that upgrading and maintaining the grid is a constant process. Informed by reasonable forecasts for EV adoption, the existing process for upgrading and maintaining the grid will allow utilities to successfully integrate and serve this new load without significant changes to the process itself and at low customer cost.

8. What are the capabilities of electric vehicle related technologies, such as vehicle-to-grid, to participate in wholesale electricity markets?

As flexible loads with the potential to respond to demand response signals, smart EV chargers with managed charging capabilities have the potential to participate in wholesale electricity markets. Like other DERs, with the appropriate market rules in place, EV charging providers could provide significant value through demand response, capacity markets and ancillary services markets.

ChargePoint encourages the Commission to ensure that there are no barriers to EV charging providers participating in wholesale energy markets alongside other DERs.

9. Please explain any preferred or best practice facilities siting and design standards for commercial electric vehicle charging stations and why such standards are recommended.

Electric vehicle charging stations take many forms. As discussed above electric vehicle charging stations are deployed in a variety of types (Level 2 and DCFC) and use cases (home, workplace, public). Charging stations may be comprised of a single port at a home or small business to hundreds of Level 2 ports at workplaces or tens of DCFC ports at a fleet depot. In all these cases electric vehicle charging stations are constructed and operated under numerous planning, construction, and safety guidelines at local, state, and federal levels. Additionally, when the installation of charging stations requires upgrades to utility service, they go through standard utility processes to ensure appropriate connection to the distribution system. ChargePoint recommends a continuation of the status quo related to design standards.

In order to more efficiently facilitate the build out of the charging infrastructure in Texas, ChargePoint recommends that the Commission, distribution utilities, and charging providers explore avenues to make additional distribution system information available to charging companies in order to shorten the time necessary to find appropriate sites for public charging equipment. ChargePoint acknowledges the current process in place for connecting new charging equipment and the need to treat additional distribution system information sensitively, however, we also believe that additional efficiencies could be developed with appropriate information safeguards in place.

Policy makers are frequently asked about the availability of electric vehicle charging infrastructure and if that infrastructure can meet the needs of EV drivers. To analyze this issue, the US Department of Energy in collaboration with the National Renewable Energy Laboratory and the California Energy Commission developed the EVI-Pro Lite tool. EVI Pro Lite allows a user to estimate the charging infrastructure needs for a state and/or major urban areas.

To understand the current adequacy of the charging infrastructure in Texas, ChargePoint used the EVI Pro Lite tool to model need charging infrastructure in Texas. As you can see from the figure below, based on an estimated 55,000 EVs in Texas at the end of 2019, the known charging infrastructure in Texas is adequate to meet the needs of Texas EV drivers. While the number of Workplace Level 2 plugs is unknown, you can see that there is an abundance of Public Level 2 and Public DCFC Ports.

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Texas EVI Pro Lite Modeling – Current EV Adoption

Based on 55K EVs, 80% access to home charging, and remaining default EVI Pro Lite assumptions

EVSE Type	Number of Ports
Workplace Level 2	2,320
Public Level 2	1,851
Public DCFC	476

EVI Pro Lite: https://afdc.energy.gov/evi-pro-lite

Current Known Charging Infrastructure in Texas

EVSE Type	Number of Ports
Workplace Level 2	Unknown
Public Level 2	3,054
Public DCFC	646

Alternative Fueling Station Locator: https://afdc.energy.gov/stations/#/find/nearest

As demonstrated by the EVI Pro Lite modeling, the status quo is meeting the market needs of Texas EV drivers. ChargePoint understands the desire to build out the charging infrastructure to promote EV adoption and facilitate statewide travel. As other state agencies develop programs to expedite this build out, distribution utilities and the PUC should update their planning process with this new charging infrastructure.

Private charging companies are investing heavily in Texas, as is demonstrated by the data above. This deliberate build out of the charging infrastructure is leveraging private capital to meet the needs of Texas EV drivers. As additional EVs are added to Texas roads and electric vehicle charging station utilization increases, ChargePoint is confident that the private market will continue to meet the needs of Texas EV drivers.