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REVIEW OF ISSUES RELATING TO ELECTRIC VEHICLES	§ § § §	PUBLIC UTILITY COMMISSION OF TEXAS

FILING CLERK

COMMENTS OF GREENLOTS

Greenlots submits these comments in response to the Public Utility Commission of Texas' ("the Commission") questions issued to stakeholders on December 13, 2019 in its Project No. 49125, "Review of Issues Relating to Electric Vehicles".

Greenlots is a leading provider of electric vehicle ("EV") charging software and services committed to accelerating transportation electrification across Texas, and a wholly-owned subsidiary of Shell New Energies. The Greenlots network supports a significant percentage of the DC fast charging infrastructure in North America, and a growing amount of Level 2 charging. Greenlots' smart charging solutions are built around an open standards-based focus on future-proofing while helping site hosts, utilities, and grid operators manage dynamic electric vehicle charging loads and respond to local and system conditions.

Greenlots applauds the Commission for opening this Project to investigate issues related to EVs, and appreciates the opportunity to provide our broad, multijurisdictional perspective. Below Greenlots responds to the specific questions set forth, with the aim of illuminating pathways for maximizing the benefits associated with transportation electrification.

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).**

There is a wealth of data sources that exist related to forward-looking EV projections. These largely however have looked at the U.S. or global market in aggregate. While it is possible

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to attempt to infer from these outcomes specific to Texas, Greenlots is aware of but a single attempt to originate a forecast with Texas-specific data, or integrate into the projections Texas-specific variables or data points. In this example, ERCOT used traffic flow information from the Department of Transportation to estimate that by 2033, there will be 3 million electric cars, 80,000 electric short-haul vehicles or buses, and 20,000 long haul electric trucks on Texas' roadways.[1] However, Greenlots is hopeful for the prospect of being presented with additional analysis through this Commission process. This said, many of the factors that directly inform these types of projections are those that broadly affect the entire market – including Texas, so broader analysis is largely relevant and applicable for certain purposes. These variables include battery prices, fuel prices, production scale, new technologies, and OEM investments affecting consumer model choices.

BNEF's widely cited projections anticipate that by the mid-2020s, plug-in EVs will reach upfront price parity with traditionally fueled vehicles across most vehicle segments.[2] This will be a game-changing situation, especially considering that most EVs already are cheaper on a total cost of ownership basis due to lower fuel costs and maintenance costs. This sticker price parity will contribute to having 22 million light duty EVs on U.S. roads by 2030 by BNEF's projections, rising to 86 million by 2040, or 42% of all cars on the roads.[3]

J.P Morgan anticipates "a dramatic move away from ICE-only vehicles" where by 2025, only battery plug-in EVs and hybrid electric vehicles ("HEVs") will be sold.[4] Edison Electric Institute performed a meta-analysis of different EV forecasts, determining that by 2030, the stock of EVs on U.S. roadways will reach 18.7 million, around 7 percent of all vehicles, with annual sales being more than 20% electric, around 3.5 million.[5] The National Renewable Energy

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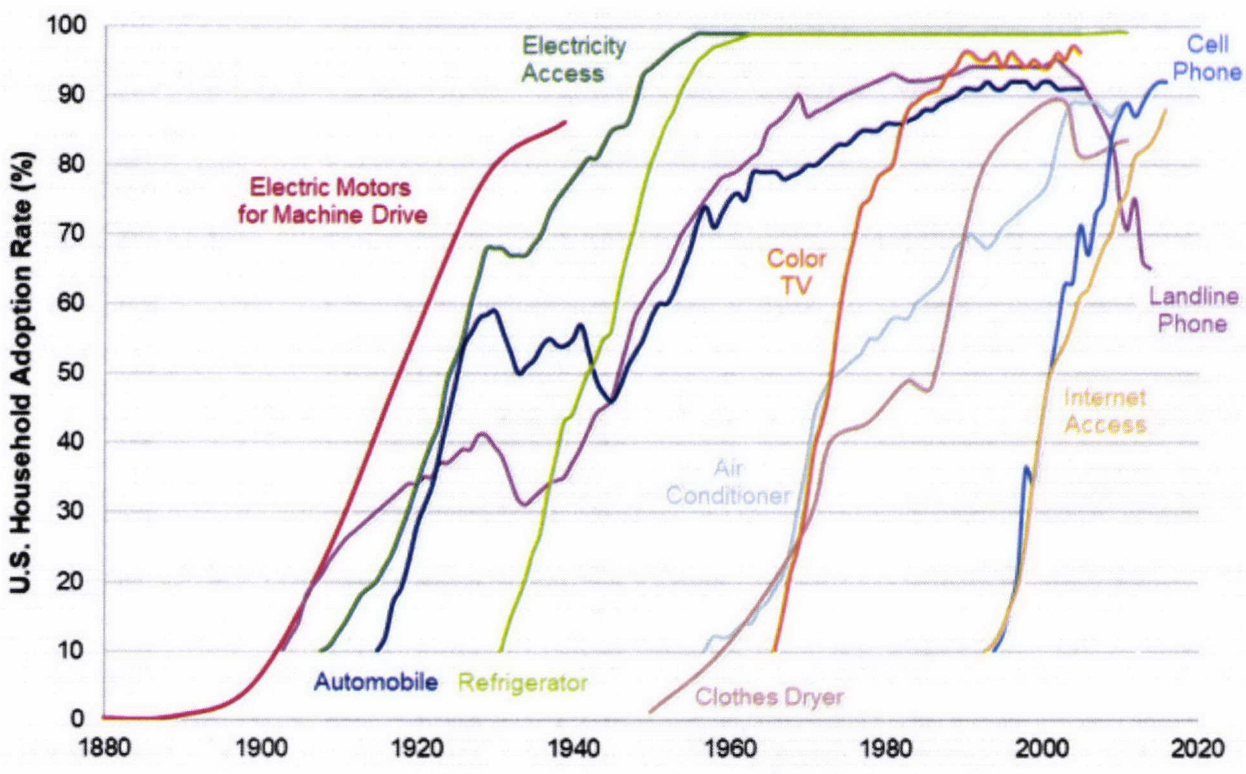
[1] ERCOT, "2018 Long-term System Assessment for the ERCOT Region", December 2018, p. 10. Available at: http://www.ercot.com/content/wcm/lists/144927/2018_LTSA_Report.pdf
[2] BNEF, "Electric Vehicle Outlook 2019". Available at: https://about.bnef.com/electric-vehicle-outlook/
[3] I.d. at p. 35.
[4] J.P. Morgan, "Driving into 2025: The Future of Electric Vehicles", October 10, 2019. Available at: https://www.jpmorgan.com/global/research/electric-vehicles
[5] EEI, "Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030", November 2018, p. 1. Available at: https://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20EV%20Forecast%20Report_Nov2018.pdf

Laboratory arrived at a similar figure of 15 million EVs on America's roadways by 2030 using linear growth to 20% of light-duty sales in 2030.[6]

Greenlots believes these estimates and forecasts to in all likelihood be overly conservative and underestimating what the future will actually bring – notably assuming that supportive policy moves forward, especially in respect to infrastructure investment. Indeed, given adoption curves associated with any transformative technology (e.g. personal computers, cell phones, internet access, etc), assuming linear growth is not a recipe for arriving at accurate future figures. Similarly, assuming that growth won't change significantly when upfront price parity is reached (in the mid-2020s as noted in BNEFs assessment above) is also a dubious assessment. In Greenlots' assessment, it is far more pragmatic to assume exponential growth and S-curve behavior associated with other electricity-driven transformational technologies:



Source: NREL[7]

[6] NREL, "National Plug-In Electric Vehicle Infrastructure Analysis", September 2017 at p. iv. Available at: https://www.nrel.gov/docs/fy17osti/69031.pdf

[7] National Renewable Energy Laboratory, "Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States", 2018, p. 16. Available at: https://www.nrel.gov/docs/fy18osti/71500.pdf

For these reasons, Greenlots encourages the Commission and stakeholders to not limit thinking and planning to the parameters defined by existing projections.

Additionally, it is critical to realize that what actually happens in Texas in relation to these estimates and forecasts will not happen in a vacuum. Many of the factors that will greatly influence Texas' actual EV adoption trajectory will be linked to decisions from this Commission, the legislature, and other state entities. For example, Edison Electric Institute links its estimates (referenced on page 3) to the need to deploy 9.6 million charging ports nationally by 2030.[8] Enabling and supportive policies, or lack thereof, especially with respect to the deployment of EV charging infrastructure, are directly linked to both EV adoption and the maximization of benefits associated with transportation electrification, as has been proven across many jurisdictions. Indeed, what the state actually achieves will be directly related to what actions are undertaken, or not undertaken.

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).**

The National Renewable Energy Laboratory indicates that electrified transportation may result in between 58 to 336 TWh of additional electricity consumption annually by 2030 across the US, depending on the rate and type of vehicle deployment.[9] BNEF estimates that globally electricity demand from all types of EVs rises from 74 TWh in 2019 to 635 TWh in 2030, rising to 2,233 TWh in 2040.[10] Of this 2040 figure, 1,634 TWh is anticipated to come from passenger

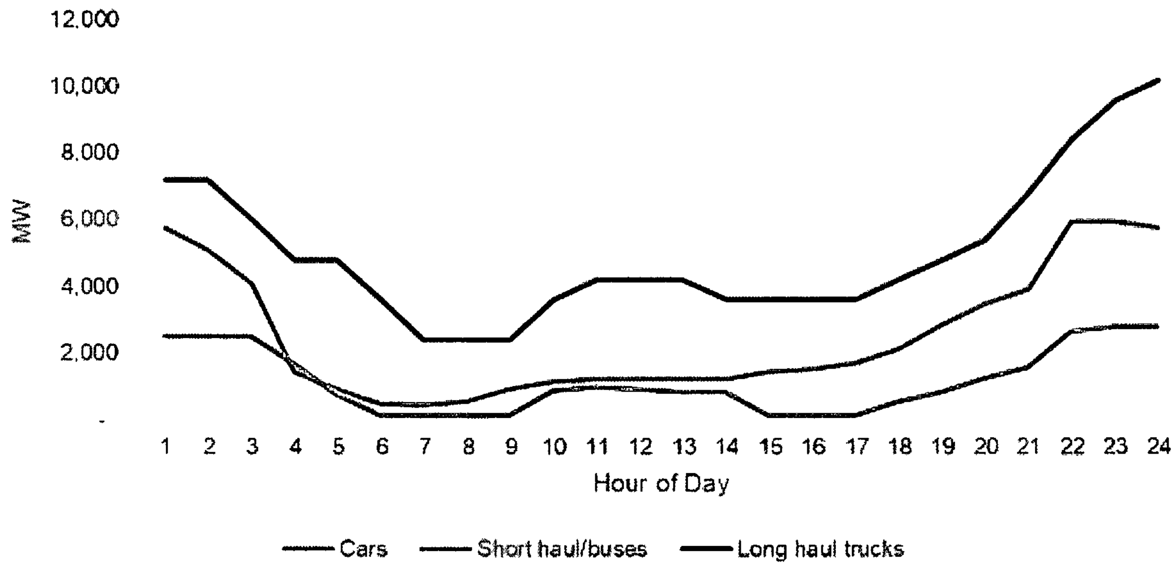
[8] EEI, "Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030", November 2018, p. 8. Available at: https://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20EV%20Forecast%20Report_Nov2018.pdf

[9] Smart Electric Power Association, "A Comprehensive Guide to Electric Vehicle Managed Charging", May 2019, p. 10, citing National Renewable Energy Laboratory, "Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States", 2018, Available at: https://www.nrel.gov/docs/fy18osti/71500.pdf and https://sepapower.org/resource/a-comprehensive-guide-to-electric-vehicle-managed-charging/

[10] BNEF, "Electric Vehicle Outlook 2019" at p. 93. Available at: https://about.bnef.com/electric-vehicle-outlook/

EVs, 383 TWh from commercial trucks, and 216 TWh from electric buses.[11] In the U.S. this is estimated to account for 11% of total electricity consumption by 2040.[12]

In terms of Texas-specific figures, ERCOT's "Emerging Technology scenario" estimates that by 2033, peak charging demand reaches 18,500 MW at midnight, comprising almost 30% of total system demand, distributed across vehicle type and time of day as illustrated here:



Source: ERCOT[13]

As discussed in response to the previous question, Greenlots generally finds such projections to be conservative, with ultimate outcomes being largely dependent on not just market evolution, but also specific federal, state, or local action, particularly in relation to supporting the development of charging infrastructure.

While there are some aspects to integrating EV load that can present challenges, on the whole the Commission and stakeholders should consider this a significant opportunity rather than a burden. Given the flexibility of EV load, there is significant opportunity to use it as a tool to increase system utilization and efficiency to the benefit of the entire system and everyone who uses it, not just EV drivers. These benefits are not just theoretical. In parts of the country with higher EV penetration, EV load is already delivering significant benefits. For example, while the market structure is different than in much of Texas, according to a recent study by Synapse

[11] I.d.
[12] I.d. at p. 94.
[13] ERCOT, "2018 Long-term System Assessment for the ERCOT Region", December 2018, p. 10-11. Available at: http://www.ercot.com/content/wcm/lists/144927/2018_LTSA_Report.pdf

Energy Economics, which analyzed transportation electrification load from 2012 through 2017 across two of the largest utilities in California, in excess of $500 million in direct revenue accrued to the system as a result of this added load.[14] Importantly, this figured does not include any broader societal benefits, and is far in excess of the cost to serve and the costs associated with the programs offered that support transportation electrification.[15] The study found that "A key reason why revenues from EVs outweigh the costs is that EV customers — particularly those on TOU rates — tend to charge during off-peak hours."[16] Indeed this basic form of load management represents only the tip of the iceberg in terms of what is possible with vehicle grid integration ("VGI") technologies and load management strategies, as discussed in response to subsequent questions. So while certain forms of emerging EV load may present new challenges – especially including interconnection and distribution system capacity investment needs, the market is equipped with solutions to address them. These solutions can turn these challenges into grid assets, reshape EV load profiles, whether they be observed or anticipated in the future as represented in ERCOT's projection above, and achieve even deeper benefits than those illustrated in the Synapse study.

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.**

Greenlots defers largely to the utilities/TDUs and their analysis of this consideration in their respective service territories. We note, however, that this concern largely has yet to manifest itself in jurisdictions and geographies with the most EVs in the country, nor has it seemed a significant concern. In areas/pockets where this or similar concerns have arisen, it is treated as any other source of new load, using the utility programs, policies and procedures to bring that new load onto the grid, and building and paying for any needed service upgrades. While these processes may vary utility to utility or jurisdiction to jurisdiction, this is not a new

[14] Synapse Energy Economics, "Electric Vehicles are Driving Rates Down", February, 2019. Available at https://www.synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf
[15] I.d.
[16] I.d. at p. 4.

phenomenon for utilities to handle, and indeed "hot spots" or any other sort of load pocket can be triggered by many other activities and industries, including concentrations of data centers, factories, mining, refining and manufacturing. This said, there are certainly challenges, such as those being seen in New York where the engineering and investment to provide new capacity for electric buses in infrastructure-constrained areas has been a significant undertaking.

While Greenlots agrees that it is prudent to begin thinking about this consideration in the context of utility distribution system planning, it does not rise to a level of near-term concern that utilities aren't already equipped to handle. For example, as fleets begin to electrify, it is likely prudent to look at areas with clusters of logistics or distribution centers that often are concentrated by interstate interchanges, ports or airports, in the context of their distribution system planning. Greenlots understands that some Texas TDUs are already doing this. Ultimately this is new, additive load, representing new revenue streams to pay for any needed grid upgrades, that in other jurisdictions has shown itself to also benefit other users of the grid and bring broader benefits to the system as a whole when managed, as noted in response to Question 3.

Moreover, already-commercialized load management and smart charging technologies can manage EV load, both at the site level, and in support of distribution and transmission system conditions, as discussed in greater detail in response to later questions. As this market evolves, there will be opportunities for utility and regulatory policies to do so also. For example, some jurisdictions are looking at ways to improve line extension policies to better support and account for new EV loads. Others are working to increase value and create programs for smart charging to mitigate and prevent the types of challenges underlying this question on a variety of different scales. Greenlots encourages the Commission, utilities, and stakeholders to be involved in this rapidly changing landscape and look for and take advantage of such opportunities as they reveal themselves, or indeed, become necessary.

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).**

Greenlots reiterates that the beauty and power of EV load is its significant flexibility, and the ability to shift and shape it to the benefit of site hosts, operators, and the broader grid. While certain EV load is more flexible than others, both in terms of class/use case, and charging technology or power level, there are managed charging strategies, technologies, and opportunities for most every application. As a result, while academically there may be certain characteristics or traits associated with different types of EV load, each can vary, and each can be shaped to different degrees provided the charger is adequately "smart" and equipped with the necessary technology, as discussed later.

There are a variety of existing resources that provide good rundowns of the broader characteristics associated with certain types of EV loads and technologies. In particular, Advanced Energy Economy's "EVs 101: A Regulatory Primer for America's Electric Transportation Future, What Utility Commissioners Need to Know About the Accelerating Electric Vehicle Market", which Greenlots contributed to, provides a good overview and discussion of this in the section on "PEV Charging Basics".[17]

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?

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

Greenlots addresses Questions 5 and 8 together due to their similarities and overlap. In Greenlots' view, the development of vehicle-grid integration ("VGI") technologies will be the most important and impactful over this 10-year time horizon. This is true both in terms of the value that VGI can provide in mitigating EV charging grid impacts and maximizing grid benefits, and in terms of the need to put in place the policies, programs, and market structures that can help unlock and facilitate these abilities. While there will be improvements in charging hardware, in terms of charging speed, power level, and form (e.g. wireless charging), these will all represent mostly incremental improvements that the market should be able to naturally value and adopt as appropriate, while having less potential effect on electricity markets.

[17] At p. 12-15. Available at: https://info.aee.net/hubfs/EV%20Issue%20Brief_PDF_9.20.18.pdf

VGI encapsulates both vehicle-to-grid functionality ("V2G") utilizing two-way flow of energy between the EV and the grid, and also "V1G" functionality, which refers to VGI only using one-way flows of energy from the grid to the EV, also called managed charging or smart charging. Managed or smart charging can also refer to passive forms of VGI, such as rate design or time-of-use rates to indirectly induce a certain charging behavior.V1G generally refers to active forms of smart/managed charging utilizing direct load control or signals from distribution or transmission grid operators and/or aggregators to shift charging or vary charging speed, both up and down, in response to dynamic grid conditions, and is not dependent on uncertain customer response to price signals. As a result, this approach can be more impactful than passive, rate design approaches, and represents greater value and potential for participation in wholesale markets.

There remain a variety of barriers to V2G, including vehicle manufacturer sensitivities related to accessing the battery for these purposes and related warranty concerns, the need for additional DC/AC conversion hardware, and defining and proving out specific use cases and their value. There are also challenges related to competing technical standards and protocols, and the hardware capabilities necessary to facilitate this functionality. As a result, V2G to date has largely been limited to pilots, such as those using school busses to provide V2G grid services during times when they aren't being used for transporting students. Other fleet applications will likely be the most near-term applications due to their scale and magnitude, once the noted challenges are overcome.

The good news is that V1G technology and capabilities are already widely commercialized and available today and can provide a significant percentage of the value of V2G without the added complexity, challenges and technical barriers. As such, Greenlots encourages a near-term focus on creating value and programs for these services both to mitigate possible grid impacts from EV charging, and to unlock additional grid benefits. As part of this, it will be important to ensure that charging hardware being deployed has these "smarts" and capabilities. Smart, networked chargers are also key to facilitating more advanced time-of-use ("TOU") or dynamic pricing, enable consumers to be able to easily respond to advanced rates and charging programs utilizing pre-defined, but potentially evolving and reconfigurable hands-off "set it and forget it" preferences.

Looking not too far down the road, and recognizing the value provided by technological solutions already being deployed in EV charging hardware and software today, it is easy to see a future where the needs addressed and values historically provided by rate design are instead provided by these technological solutions in a more effective and robust manner. Indeed, direct, actively managed V1G charging programs are not limited to just complementing rate design, but can instead go further and be a more effective alternative strategic solution for maximizing EV load management outcomes.

While EV load and the VGI value it can provide is already providing significant value to distribution grids across the country, there remains a variety of barriers for participation in wholesale markets. EV charging is a distributed energy resource ("DER") and faces many of the same challenges to wholesale market participation as other DERs. As a result, addressing barriers to broader DER aggregation and participation in the ERCOT market will also help to pave the way for VGI to provide value to the Texas bulk electricity system.

These are all challenges that are addressable, and indeed, resolving barriers to technology-facilitated smart charging stands to deliver deep and needed EV load management value both to distribution and wholesale systems. According to Navigant Research, by 2030, it is estimated that VGI revenue from grid service markets is expected to reach $1.4 billion globally, but that "strong growth depends on removal of technical and regulatory hurdles".[18] Greenlots agrees, and encourages the Commission and stakeholders to focus on addressing these challenges.

For a good reference document and comprehensive overview of VGI, managed charging and related topics and issues, Greenlots recommends Smart Electric Power Alliance's "A Comprehensive Guide to Electric Vehicle Managed Charging".[19]

6. The Commission requests that parties provide a detailed explanation on the following items: (a) The anticipated impacts of electric vehicle charging, including residential and commercial charging stations on the distribution system in the next

[18] Navigant Research, "Vehicle Grid Integration Revenue from Grid Service Markets Is Expected to Reach $1.4 Billion by 2030", Dec 19, 2019. Available at: https://www.navigantresearch.com/news-and-views/vehicle-grid-integration-revenue-from-grid-service-markets-is-expected-to-reach-14-billion-by-2030
[19] SEPA, "A Comprehensive Guide to Electric Vehicle Managed Charging", May 2019. Available at: https://sepapower.org/resource/a-comprehensive-guide-to-electric-vehicle-managed-charging/

ten years; (b) The anticipated impact of electric vehicle charging stations on the transmission system in the next ten years; and (c) The anticipated impact of electric vehicle charging stations on long-term system planning at the regional transmission organization level, given a widespread adoption scenario.

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 forecasts to incorporate this impact?**

Greenlots addresses Questions 6 and 7 together due to their similarities and overlap. Greenlots references our comments in relation to such projections as discussed in response to Questions 1 and 2, and our high level comments throughout that while Greenlots largely sees EV adoption and load estimates to be conservative, that there is tremendous ability to manage and shape this load to become a grid benefit, while mitigating any acute impacts. Noting this, we largely defer to the state's utilities/TDUs and ERCOT regarding more detailed analysis and related forecasting and planning.

It is important to note however, that while these entities may be closer to these issues, that there may be a lack of depth of expertise here, especially amongst ERCOT utilities and in the ERCOT system due to market design and structural constraints limiting the roles of different participants. Non-ERCOT utilities indeed may have certain deeper experience, in particular those that have seen greater EV adoption in their service areas and have been more involved in supporting EV adoption and integrating EV load.

As noted in response to Question 1, that EV adoption will depend on Texas' actions, so too will the extent of grid impacts and realization of grid benefits depend on the state's actions, with the results not existing in a vacuum. The extent to which advanced load management, as discussed in response to Questions 3-5, is supported and utilized will largely define the results.

Indeed, the development of rates and programs that send accurate price signals to EV loads reflecting local or grid constraints and conditions is essential to align the increased electrification of the transportation system with the interests of the utility system and the broader public. EV TOU rates represent a rather blunt but, in some cases, appropriate beginning instrument to deliver these price signals, especially at low levels of EV market penetration. However, other strategies, including actively managed smart charging and real-time or dynamic pricing represent more accurate instruments that can better utilize and dispatch flexible EV loads at charging stations with longer dwell times, such as residences and workplaces, to better maximize system-wide benefits and cost reductions. Other dynamic pricing instruments and managed charging approaches can also be deployed in higher power charging and shorter dwell time contexts, including DC fast charging. For these reasons, Greenlots encourages the Commission to look beyond TOU rate design and towards technology-facilitated smart/managed charging approaches from the outset in mitigating any grid impacts, to instead maximize benefits from EV load.

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.

Standardization and interoperability are critical considerations for the Commission and stakeholders to be aware of in the development of public charging infrastructure, in creating positive customer charging experiences with EV drivers, and in supporting competition and innovation in the EV charging product and services market. There are three primary dimensions of standardization and interoperability:

1. <u>Those related to the physical charging port connectors</u>. For Level 2 charging, there is broad industry standardization around the SAE J1772 (IEC Type 1) connector. For DC Fast Charging ("DCFC"), the industry is coalescing around the CCS connector, with the exception of a few Asian automakers continuing to use the CHAdeMO connector. Most public DCFC stations provide ports for both CCS and CHAdeMO-equipped vehicles. While Tesla vehicles have their own connector, adaptors exist so that they may use J1772 and CHAdeMO public charging ports. There are additional standards supporting overhead heavy-duty charging.
2. <u>Payment interoperability/standardization and driver roaming</u>. Roaming agreements amongst different EV charging station network operators are proliferating, allowing members of one network to use other networks without having to create a separate account. Open Charge Point Interface ("OCIP") is the

primary payment interoperability protocol used to facilitate these inter-network roaming agreements and functionality in North America. The ability for public charging stations to accept credit card payments is also a foundational element of payment interoperability for those that are not members of an applicable charging network, for those without smartphones, and in a number of other situations.

3. Hardware/software communication interoperability and standardization. While the industry is coalescing around the Open Charge Point Protocol ("OCPP") for communication between the charger and back-end software networks, some operators continue to use proprietary communication protocols. Other important open protocols for the Commission to be aware of are OpenADR, often used for communicating smart charging/demand response signals to network operators, and ISO I5118, the protocol many automakers are adopting to support V2G functionality (as discussed in response to Questions 5 & 8) as well as so-called "plug and charge" (the ability of the vehicle to automatically communicate with the charger over the charging cable to authenticate payment, charging/needs preferences, etc.).

As might be inferred from the brief overview of these three dimensions of interoperability above, hardware/software communication interoperability and standardization largely remain the biggest challenge for the industry and policymakers. OCPP is the leading and freely available universal communication protocol that enables component vendors and network operators to mix and match interoperable hardware and software. Utilizing OCPP therefore both mitigates stranded asset risk and provides site hosts with the flexibility and optionality to switch between OCPP-compliant vendors of both hardware and software, providing for competition and customer choice beyond the initial point of purchase.

Due to relatively light regulatory oversight of this space to date, the application of this protocol by some market participants is inadequate to ensure this full flexibility and ongoing customer choice. This has the potential of significantly limiting future flexibility for switching hardware and software, and in so doing, limit the potential for ongoing competition for both software and new hardware models. As competition is often the driver of innovation, and innovation often results in increased customer choice, such a dynamic can have profoundly negative impacts on hardware and software markets and products.

Utilizing OCPP imposes no ceiling in adding additional functionality or features on top of it; representing a floor upon which more can be built should a particular vendor choose to. Additionally, while a self-certification process has been available for quite some time, the Open Charge Alliance (OCA) – the open and transparent organization that oversees the protocol – has implemented a third-party certification program, and the third-party test lab in the US provides independent certification. Finally, the International Electrotechnical Commission (IEC) is already working with stakeholders to develop OCPP 2.0 into an IEC version (IEC 63110), representing OCPP's ascension pathway to becoming recognized and adopted by a traditional international standards body.

Finally, Greenlots notes that in some instances, hardware-software interoperability has been limited by vendors contractually, even when the underlying hardware may be OCPP certified/compliant, much like a cell phone that is locked to a certain network, requiring permission from that network operator to be unlocked. Greenlots urges the Commission to be aware of and potentially monitor this practice as appropriate.

The adoption of open protocols and standards is essential to support transportation electrification, grow the market for EVs and EV charging products and services, enhance the driver/customer experience, integrate with the electricity system, and lower the cost of ownership of both EVs and EV charging infrastructure. The proliferation of open standards and communication methodologies provides a platform and ecosystem for innovation and customer choice that is critical to guarding against stranded assets and protecting the prudency of public investments.

Conclusion

Greenlots appreciates the opportunity to provide these comments, and the Commission's consideration of them. The Commission and the state will face critical decisions ahead in how best to support the development and proliferation of transportation electrification in Texas, in how to manage EV loads to utilize their flexibility and ability to deliver significant benefits to the electric system, and in how best to support driver needs and an open, interoperable EV charging ecosystem. Greenlots stands at the ready to support the Commission's ongoing investigation, analysis and future efforts in supporting and planning for Texas' electric transportation future.

Respectfully submitted, this 3rd day of February, 2020.

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