June 17, 2019

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: In the Matter of Minnesota Power's Petition for Approval of its Electric Vehicle Commercial Charging Rate Pilot (Docket Number E015/M-19-337)

Dear Daniel P. Wolf:

Tesla, Inc. ("Tesla") hereby submits comments pursuant to the State of Minnesota Public Utilities Commission's ("Commission") Notice of Comment Period issued on May 22, 2019 ("Notice"). Tesla thanks the Commission for the opportunity to provide public comment on Minnesota Power's ("MN Power") petition for approval of its Electric Vehicle Commercial Charging Rate Pilot.

I. Introduction

Tesla's mission is to accelerate the world's transition to sustainable energy through the development of all-electric vehicles and clean energy products including photovoltaic solar and battery storage. Tesla's vehicle line-up includes the Model S sedan, Model X crossover vehicle, and Model 3 sedan. The vehicles have all-electric range of up to 335 miles per charge, and industry leading performance and safety ratings. In 2018, Tesla delivered nearly 250,000 vehicles globally. In the coming years, Tesla is also planning to launch the Model Y crossover vehicle, a Roadster sports car, and a Class 8 Semi truck. Tesla also owns and operates an extensive Supercharger network of direct current fast chargers ("DCFC") with over 1,500 stations and more than 13,400 Supercharger connectors deployed globally. Tesla has a significant customer base in Minnesota, including in Minnesota Power's service area. Tesla and its customers have made significant investments in Minnesota through electric vehicles, solar and storage projects, the development of electric vehicle charging infrastructure networks, and maintenance of a large, local, workforce.

Upon review of MN Power's proposed Electric Vehicle Commercial Charging Rate Pilot ("Commercial EV Rate"), Tesla recommends that the Commission approve the rate as proposed, with the stipulation that MN Power continues to collaborate with stakeholders, and looks towards longer-term rate design solutions for EV charging during the Commercial EV rate's 3-year term as

suggested in MN Power's pilot expansion proposal.[1] We support this recommendation under several themes including the relevance of Tesla's charging network, whether the Commercial EV rate supports state policy objectives, it comports with rate-making principles, and how the Commercial EV Rate can catalyze fast charging station development in MN Power's service territory.

II. Tesla's Charging Network

In 2012, Tesla began developing its Supercharger network to enable customers to confidently make road trips with quick charging sessions on highly traveled routes. Tesla's Supercharger network and vehicles utilize a Tesla connector which is capable of charging vehicles with both alternating current[2] and direct current (currently up to 250 kW). When the network was being developed in 2012, other DCFC networks and connector types (CHAdeMo and Combo CCS) were limited to 50 kW charge rates, thus necessitating the development of a network capable of higher charging rates. Access to convenient and affordable charging infrastructure that provides a great customer experience is a critical component necessary for transitioning and electrifying the transportation sector.

Tesla Supercharger stations are conveniently located near desirable amenities like restaurants, shops and WiFi hot spots. Each station contains multiple Superchargers to get customers back on the road quickly. Currently, the majority of the Supercharger network operates up to 150 kW of direct current with the existing models of Tesla vehicles, and can provide more than 170 miles of range in 30 minutes. Tesla is beginning to deploy "V3" Superchargers which operate up to 250 kW and can provide up to 75 miles of range in 5 minutes. In Minnesota, there are 62 Superchargers located across 9 stations in the State, two of which are in MN Power's territory. One is at Tobies Restaurant in Hinckley and has eight charging stalls. The other is a four-stall station located at a Holiday Inn in Duluth.

Tesla owns and operates the charging stations and is the customer of record for electric service. The Supercharger network is not intended to be a profit center for Tesla. Although only Tesla vehicles can currently use the Supercharger network, the company has publicly said that it is open to allowing other automakers' vehicles to use its Superchargers. Those vehicles would need to pay a share of costs proportional to their vehicle usage, and the vehicles would need to utilize the Tesla connector or have an approved adapter. Additionally, the vehicles would need to be able to accept the same charge rate as Tesla vehicles in order to prevent congestion and wait times at stations.

In North America there are two additional DCFC connectors on the market in addition to the Tesla connector. The CHAdeMo connector is rated at approximately 62.5 kW and has been adopted by manufacturers including Nissan, Mitsubishi and Kia. CHAdeMo announced a new version in June 2018 capable of up to 400 kW of power. The other connector is the Combo CCS connector which has

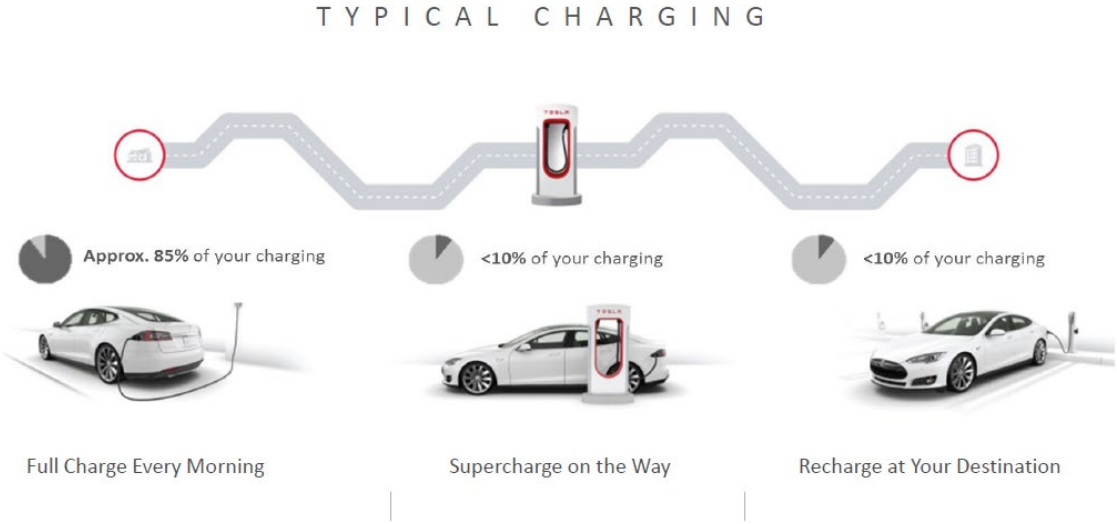
[1] Reference MN Power's Filing Section "Pilot expansion and/or transition to permanent status at a greater scale"
[2] (Level 1 and Level 2 charging at 110 volts or 240 volts up to 80 amps)

been adopted by a variety of manufacturers including GM, Ford, BMW, Hyundai and Volkswagen. Up until recently, most Combo CCS chargers and vehicles were rated at 50 kW, but chargers able to charge up to 350 kW are now being deployed. Beyond the connector type, it is important to note the capabilities of the vehicles themselves regarding the rates of charge. Not all plug-in vehicles are capable of direct current fast charging. There is only one plug-in hybrid model available today that is capable of DCFC. There are approximately a dozen purely battery electric models available for purchase today, and most but not all, are capable of DCFC. Tesla vehicles are capable of DCFC up to 250 kW, while most other DCFC capable vehicles today are limited to 50 kW, and some newer premium models charging in the 100 kW to 150 kW range.

In order to maintain high customer satisfaction, Tesla is invested in ensuring that congestion at our Superchargers does not exceed 100% of capacity. The charging experience is essential to those adopting EVs, as it enables long distance travel, mitigates range anxiety, and proves that one does not need to make a compromise by driving an EV. Therefore, as more Tesla vehicles are on the road, Tesla is re-investing in the same communities in which it initially invested, and expanding its charging network to meet demand, similar to how a utility conducts its system planning.

Finally, as Tesla noted in its response to Question 7 of the Minnesota Public Utility Commission's Investigation into Electric Vehicle Charging and Infrastructure, Tesla's Supercharger network, while expansive on a geographical basis, is only one component of its Charging Program.[3] Most charging of an EV will actually take place at home or where the vehicle predominantly sits idle, and Tesla seeks to increase access to convenient Level 2 charging at homes, workplaces and destinations.

Figure 1: EV Charging by Location



[3] Minnesota Public Utility Commission. Docket No. E-999/CI-17-879. Tesla Comments (July 27, 2018). Pages 10-11. Available at https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=eDocketsResult&userType=public#{5021DD64-0000-C434-ABE5-F229E4EDA17A}

III. Minnesota State Policy Objectives

There are several state policies and efforts underway that support MN Power's proposal to implement a Commercial EV rate. Of those efforts are the Minnesota Pubic Utility Commission Order on its Inquiry into Electric Vehicle Charging and Infrastructure ("MPUC EV Charging Order"), the state's Clean Air Act State Implementation Plan, the MPCA and the Minnesota American Lung Association study on the impact of vehicle emissions, Minnesota Department of Transportation's ("MnDOT") Pathways to Decarbonization study, the Next Generation Energy Act goals[4] in conjunction with Minnesota's Renewable Electricity Standard.[5] Combining these policies and efforts all together, MN Power's Commercial EV rate directly supports the state's objectives, analysis, and policies of reducing emissions and greenhouse gases.

While there is no direct statutory mandate to support EV adoption or EV charging infrastructure, the policies above collectively highlight a story seeking the need for utilities to put forward policies that support the current portfolio of EV charging stations in MN Power's territory as well as supporting new stations.

The greenhouse gas emissions-reduction goal set by Minnesota statute establishes a goal of reducing GHGs by 30 percent below 2005 levels by 2025, which is at risk of being met.[6] Though the MPUC EV Charging Order is the most direct requirement for finding ways to increase EV charging, the greenhouse gas reduction goal is the most explicit policy that provides a sense of urgency for more EV charging infrastructure to be deployed in order to support nascent EV adoption, enabling more consumers and consumer types to access EVs to reduce greenhouse gas emissions.

As the MPCA outlines in its Greenhouse Gas Emissions report,[7] fossil fuel use is the largest source of carbon dioxide emissions in the state, therefore every vehicle that is converted from gas to electric will directly help MN achieve its GHG reduction goals. For example, every vehicle that is displaced by an EV will save an average of 7 tons of CO2 per year.[8] With roughly 8,000 EVs on the road out of 7.2 million registered vehicles in Minnesota,[9] even getting 1 percent of MN's vehicles will provide significant GHG savings. Therefore, it is important to link MN Power's proposal to GHG reductions

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[4] Minnesota Statute 216H.02 Greenhouse gas emissions control. https://www.revisor.mn.gov/statutes/cite/216H.02

[5] Minnesota Statute 216B.1691 Renewable energy objectives. https://www.revisor.mn.gov/statutes/cite/216B.1691

[6] Minnesota Pollution Control Agency. Biennial Report to Legislature on Greenhouse gas emissions in Minnesota: 1990-2016 (January 2019). Page 15. Available at https://www.pca.state.mn.us/sites/default/files/lraq-2sy19.pdf

[7] Minnesota Pollution Control Agency, "Greenhouse Gas Emissions: 1990-2014; Progress toward Next Generation Energy Act goals" (January 2017). Available at https://www.pca.state.mn.us/sites/default/files/lraq-2sy17.pdf

[8] Minnesota Pollution Control Agency. Electric Vehicles. Retrieved on June 17, 2019 at https://www.pca.state.mn.us/air/electric-vehicles . The average vehicle currently generates 11 tons of CO2 versus the average Electric Vehicle produces 4 tons of CO2, 11 – 4 = 7 tons of CO2 savings.

[9] MnDOT. 2017 Minnesota Transportation Trivia & Facts (2017). Available at http://www.dot.state.mn.us/trafficeng/publ/traiviacard/trivia17/2017minnesotatransportationtriviafacts.jpg

efforts as it will help cover a portion of the state with lower EV adoption rates. If more EVs are adopted in the northeastern region of the state through enabling more EV charging infrastructure, EV adoption can increase in a more geographically-equitable manner. A simple EV rate that supports commercial charging underscores this effort.

The MPUC EV Charging Order requires regulated Minnesota utilities to come forward with EV program proposals that support the increase of EV charging infrastructure. Apart of this Order, the Commission determined several key findings as outlined in MN Power's filing; EVs have the potential to provide a number of benefits to the state, there are barriers to widespread adoption of EVs due to lack of EV charging infrastructure, and there is a need to educate and develop utility-based EV proposals.[10] Minnesota Power's Commercial EV rate supports these measures and Tesla firmly advocates that by approving MN Power's pilot as proposed, this rate will bring forward benefits for developing and fostering EVs and EV charging infrastructure.

The remaining studies under development by the MPCA and MnDOT may not necessarily propose policy recommendations but the evidence becomes clearer that now more than ever it is imperative for finding ways to increase EV charging infrastructure deployment.

IV. Rate-making Principles

According to MPUC ratemaking precedent, there are several principles that rate design proposal should comply with to determine that the rate is just and reasonable. For example, in the Alternative Rate Design Stakeholder Process for Xcel Energy, MPUC staff consolidated a list of rate design principles from prior Commission Orders and Minnesota statutes.[11] Of these principles, MN Power's demand charge discount matches several such as the rate;[12]

- Is more *tied to marginal costs* since there is now a coincident demand charge element;
- *Should be equitable, generally based on cost-causation principles and avoided cross subsidies, unless it is necessary to meet explicit state policy goals* as this rate (as demonstrated below) instead reduces the high energy costs Commercial EV charging incurs and makes these energy costs more relative to other customers that fall within the commercial and industrial classes;
- *Should encourage conservation and energy efficiency* by providing the necessary billing information to understand how the demand credit is calculated. A customer should still know what their actual billed demand is and will work to reduce this amount given the time limit on

[10] Minnesota Public Utility Commission. Docket No. E-999/CI-17-879. Order Making Findings and Requiring Filings (February 1, 2019). Available at https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={10BBAA68-0000-C413-9799-DF3ED0978E75}&documentTitle=20192-149933-01

[11] Minnesota Public Utility Commission. Docket E002-M-15-662. In the Matter of an Alternative Rate Design Stakeholder Process for Xcel Energy. Notice Seeking Comment (February 16, 2016). Available at https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={9B03B3DF-2424-4F87-8D35-0DB2754E5F1E}&documentTitle=201611-126350-01

[12] *Id.*

the rate of 3-years. The customer will remain price conscious and thus reduce energy consumption where possible;

- *Should reduce coincident system peak demand* through a time of use price signal;
- *Is stable, understandable, and provides customer choices* by being easy to calculate, predict, as well as being optional;
- And *encourages economically efficient decision-making* given the rate adds a time of use pricing component for a charging station to respond to;[13]

As MN Power collects more data on EV charging stations and the rate, MN Power can seek to refine and improve the rate over time.

V. Other Commercial EV Rates approved

To help drive EV adoption and maximize ratepayer benefits, several utility commissions across the country have also directed utilities to implement Commercial or DCFC-applicable charging rates that include a reduced demand charge. The table below includes descriptions of recent charging rates approved by utility.

Table 1: Examples of Commercial EV Charging Rates Approved by Public Utility Commissions

Utility	EV Charging Rate Design
Southern California Edison, CA	Approved demand-charge free rate for all non-residential DCFC load for a five-year period, followed by the phase-in of a modest demand charge over the following five years. Time-of-use (TOU) volumetric energy charges increased to recover costs previously recovered in the demand charge.
Eversource, CT	Approved demand-charge free rate for all DCFC charging load with increase in volumetric energy charge to recover costs previously recovered in the demand charge. No limit on term of rate offering.
NV Energy (North and South territories), NV	Approved DCFC rate with a ten-year transitional demand charge (2019-2028).
Con Edison, NY	Approved economic development rate for DCFC, that includes a bill discount for seven years.
Pacific Power, OR	Approved rate beginning with a demand charge discount of 90%, phasing in at 10% per year until the demand charge is restored at 100%. Volumetric energy charges are adjusted to recover costs previously recovered in demand charges.
PECO, PA	Approved five-year pilot rate in which the customer receives a fixed demand credit, initially equal to 50% of the combined maximum nameplate capacity rating for all DCFCs connected to the service to the customer's billed distribution demand.
National Grid, RI (and under Department Review in MA)	Approved five-year demand charge discount that starts at 100% and declines to 66% discount in year four and a 33% discount in year five.

[13] Although, Tesla suggests that a smaller peak window is likely more appropriate, Tesla finds that MN Power's study plan to be appropriate to prospectively determine what the appropriate rate should be overtime.

VI. MN Power's Commercial EV Rate

MN Power's Commercial EV Rate is designed as an initial rate for Commercial and Industrial customers that host or operate EV charging stations. The rate is set for a three-year period with the intention for MN Power to study and analyze the consumption patterns and their associated costs of service. The design of the rate itself is intended to be simple, which ensures that various types of charging station operators or entities can utilize this rate. MN Power's objectives for their proposed Commercial EV rate is supported by its survey of its customers, where it made from Tesla's standpoint, a critical conclusion about the current status of EV charging station developments, where, "Many of these customers … will require time to adapt and experiment for optimal usage."

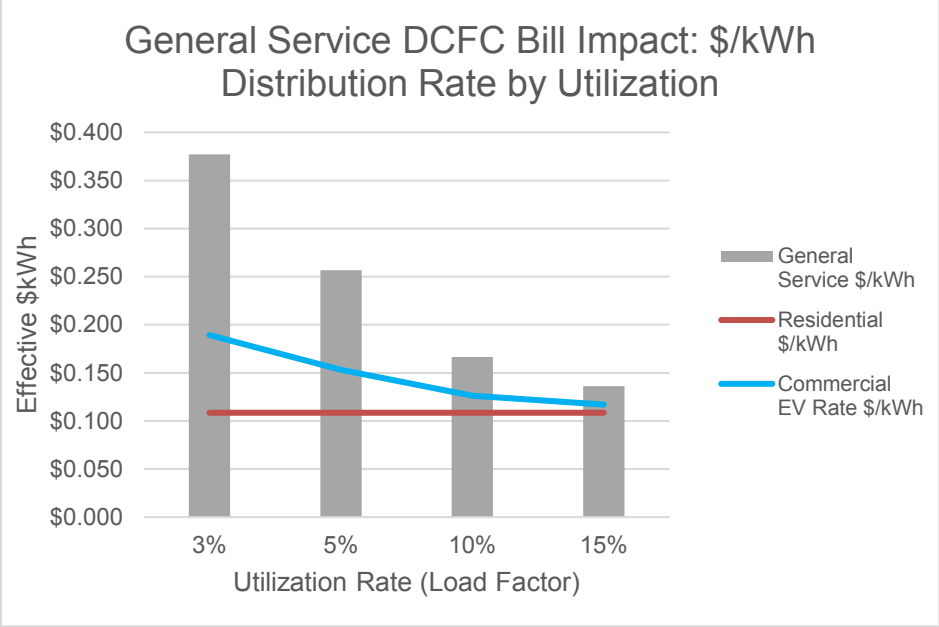
The Rocky Mountain Institute ("RMI") studied how demand charges impact the economic viability of EV fast charging stations.[14] RMI found that demand charges can be responsible for over 90% of a charging station's electricity costs. The report recommends reducing or removing demand charges for public EV fast charging stations, and that nearly all generation, transmission and distribution costs be recovered through volumetric rates. RMI argues that this is appropriate, even if some of the costs are recovered from the general customer base, because the charging stations provide a public good.

Depending on tariff type and load factor or utilization, the energy costs for fast charging customers, or customers with EV charging infrastructure, is more expensive under the current commercial rates than if they were served on a residential rate. Additionally, the current costs to charge are restricting the ability for wider adoption of EVs and deployment of EV infrastructure.

In the Chart below, it shows that for sites that have a load factor or utilization rate of less than 15 percent, their energy costs on a per kWh basis are higher than the current per kWh distribution cost for residential customers. However, for higher load factors, the cost is less. The comparison to the residential rate is a benchmark of what an EV owner would pay for their distribution costs at home versus what a DCFC station site host would have to pay for distribution costs given its low utilization.

[14] Fitzgerald, Garrett and Chris Nelder. EVgo Fleet and Tariff Analysis. RMI. 2017. Page 1. https://www.rmi.org/wpcontent/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.

Chart 1: Bill Impact for DCFC Station



The demand credit that MN Power intends to offer on the demand charge minimizes the impact of the General Service rate, where the credit that sets the demand charge is to be capped at 30 percent of the bill, it is now likely more comparative to the average effective $/kWh customer found in its commercial and industrial rate class, and more relative to the residential rate.

Putting forward a simple rate is important to gain robust enrollment of EV charging stations for MN Power to conduct their proposed study, as load patterns in MN Power may be unique compared to other territories. For example, charging stations sited in MN Power may or may not be seasonal due to driving patterns, or highly utilized versus not depending on where the site is geographically located. From an EV driver or EV charging station perspective it is necessary to reach all types of driving patterns and behaviors, which underscores the ability for more individuals to adopt to EVs, even in territories that may be having lower adoption rates or are more rural.

VII. Catalyzing Expansion of EV Charging Infrastructure

MN Power proposing this rate is taking a leading role in supporting commercial EV charging in the state. MN Power's Commercial EV rate pilot is intended to serve various types of customers; both heavy duty through Duluth's public transit program, prospective EV fleets for commercial businesses, and charging intended to be available to light-duty vehicles. The diverse number of Commercial end users that can take advantage of this rate will generate more interest in developing and installing EV charging stations in MN Power's territory, which will further support more EV adoption.

From a ratepayer perspective, EV charging station infrastructure will increase the amount of energy sales within the Company's jurisdiction, thus putting downward pressure on rates for all ratepayers. MJ Bradley & Associates developed a cost-benefit study of the growth of electric vehicles in the state

of Minnesota,[15] and found that by 2030, Minnesota should expect utility net revenues of $14-$55 million per year due to increased EV adoption. With this new revenue, the utilities will have the opportunity to decrease rates for all customers because as energy sales and revenues increase from EVs along with utility system utilization, the per unit cost of power can decline. However, this increased adoption of EVs requires affordable, available and accessible public charging.

VIII. Conclusion

Tesla supports MN Power's efforts to put forward a staged pilot that starts with a simple Commercial EV Rate and then moves to study the sites that take service under the rate prior to making more dynamic rate recommendations. Therefore, Tesla recommends that the Commission approve MN Power's Commercial EV Rate as proposed.

Tesla thanks the Commission for the opportunity to provide comment.

Sincerely,

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ksheldon@tesla.com

[15] MJ Bradley & Associates. Electric Vehicle Cost-Benefit Analysis, Plug-in Electric Vehicle Cost-Benefit Analysis: Minnesota (August 2018). Available at https://www.mjbradley.com/sites/default/files/MN%20PEV%20CB%20Analysis%20FINAL%2015aug18.pdf

Table 1: MN Power EV Commercial Rate Calculations

Analysis of MN Power Commercial EV Rate

Profile Gen. 2 Supercharger

Stall	2 Chargers
Stall Nameplate Load (kW)	145
# of Stalls	8
Charger Tesla DCFC Station Nameplate (kW)	1160
Est. Max Peak Demand @ 80% Nameplate (kW)	928

Rate Calculation

Utilization Rate	5%
Tariff Information	
Rate ->	**G-3**
$/kW	$6.50
$/kWh	$0.08
Modeled Demand	
Max Monthly Demand	928
Max kWhs	33408
@ 5% Utilization	
Bill	$8,576
$/kWh @ Max	$0.257
30% Demand Cap	$2,572.71
Billed Demand Charge $	$6,032.00
Bill Credit	**$3,459.29**
Total Bill Post Demnad Credit	**$5,116.39**
Effective kWh rate	$0.15

Rate Impact Summary by Utilization Rate

Utilization Rate	General Service $/kWh	Delta	Residential $/kWh	Commercial EV Rate $/kWh
3%	$0.377	247%	$0.109	$0.189
5%	$0.257	137%	$0.109	$0.153
10%	$0.166	53%	$0.109	$0.126
15%	$0.136	26%	$0.109	$0.117