# New Jersey Board of Public Utilities

# New Jersey Electric Vehicle Infrastructure Stakeholder Group

## Task 1 Comments from

## Tesla, Inc.

**October 16, 2017**

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The New Jersey Board of Public Utilities ("Board") announced the creation of the New Jersey Vehicle Infrastructure Stakeholder Group ("EV Stakeholder Group") on August 23, 2017. The Board established an informal proceeding to solicit comments and input from stakeholders to assist the Board in the development of their electric vehicle ("EV") infrastructure policies. The Board directed its staff to prepare a draft report addressing stakeholder inputs and to provide recommendations to the Board on potential EV infrastructure policies and development, including potential EV tariffs and rate designs, within 180 days.

In its announcement for the September 15, 2017 EV Stakeholder Group kickoff meeting, the Board staff noted that it is soliciting written comments on a variety of EV and EVSE technical and policy topics. At the kickoff meeting, staff provided Task 1 questions with comments and responses due October 16, 2017, and Task 2 questions which require a response by November 30, 2017.

Tesla is a leading manufacturer of electric vehicles and provider of electric vehicle supply equipment ("EVSE"). One of Tesla's stated goals is to advance the transition to electric transportation. The Board's EV Stakeholder Group and subsequent draft report is a fundamental step towards that transition. Given Tesla's experience with EVs and deploying EVSE, Tesla is eager to the assist the Board and its staff in the development of potential EV infrastructure policies that can increase the adoption of EVs and maximize the benefits to all New Jerseyans. Tesla hereby submits comments to the Board staff regarding Task 1 questions, the current state of Tesla vehicles and EVSE, and technical and policy considerations for EV infrastructure development in New Jersey. The Task 1 questions include whether EVs fall under the definition of demand side management and energy efficiency as set forth at N.J.S.A. 48:3-51 and/or N.J.S.A. 48:3-98.1.d, and whether owners and operators of EVSE that provide electric vehicle charging services be regulated as electric utilities or are they operators providing charging as a service?

## About Tesla and EVSE solutions

Tesla was founded in 2003 by a group of engineers who wanted to prove that people didn't need to compromise to drive electric vehicles—that electric vehicles can be better, quicker, and more fun to drive than gasoline cars. Tesla currently produces three all-electric vehicles. The Model S sedan is one of

the safest cars on the road. It is the quickest four-door sedan ever built capable of accelerating from zero to 60 mph in as little as 2.5 seconds, and has range of up to 335 miles per charge. The Model X is the safest and quickest sport utility vehicles ever tested. It can seat up to 7, accelerate from zero to 60 mph in as little as 2.9 seconds, and has a range of up to 295 miles per charge. Tesla expects to deliver about 100,000 Model S and X vehicles in 2017. The final vehicle in Tesla's current lineup is the Model 3, which began production in July 2017. Model 3 is a smaller, simpler, and more affordable electric car. The Model 3 has a range of up to 310 miles and has a starting price of $35,000. As of August 2017, Tesla has received more than 455,000 net pre-orders for the Model 3, indicating that the market for EV's has reached the mainstream.

There are currently three main levels of charging available to EV customers. These levels are categorized according to their power or voltage. The table below summarizes the three levels of charging service.

| Level of Service | Type of Charge | Typical Charging location | Typical Power Rating* | Time to charge a new generation battery EV | Driving distance added per hour |
|---|---|---|---|---|---|
| **Level 1** | Trickle charge (110V) | Home | 1 - 1.4 kW | 34(+) hours | 3.3 miles |
| **Level 2** | Standard charge (240V) | Home/Work | 6.6 kW | 4 - 7 hours | 29 miles |
| **Level 3** | Fast charge (DC) (400V) | Public Site | 50-100+ kW | ½ to 1 hour. | 125 - 400 miles |

Tesla believes a critical component of the adoption of electric vehicles is to create a seamless and convenient charging experience wherever customers choose to travel. Tesla offers a line of charging solutions for Level 1, Level 2, and Level 3 charging types. Tesla vehicles come with an adapter allowing for Level 1 charging from a standard 3-prong 110 volt outlet.

For Level 2 charging, Tesla provides customers with an adapter for NEMA 14-50 outlets (receptacle that is used for electric stoves) that operate at 240 volts and a 50 amp circuit. Customers also receive an adapter enabling customers to utilize J1772 charging stations. Tesla offers "Wall Connectors" which is a charging station that operates at 240 volts and up to 100 amps. Wall Connectors can provide up to 52 miles of range per hour. Wall Connectors can be installed in homes, offices, indoors or outdoors. They also serve as the EVSE for Tesla's Destination Charging network. Tesla provides the first two Wall Connectors at no cost to qualifying full-service hotels, resorts, and restaurants directly marketed to attract

Tesla owners. This provides an incentive for Tesla drivers to visit these locations and trips may be planned around charging points. There are currently more than 9,000 destination chargers globally and there are about 50 Destination Chargers across nearly 30 locations in New Jersey.

Tesla has also developed a "Supercharger" network of direct current (DC) Level 3 'fast chargers.' Stations typically have multiple Superchargers to get customers back on the road quickly. Superchargers are located near restaurants, shopping centers, and Wi-Fi hotspots. Superchargers can operate up to 120 kilowatts and can charge an EV to about 80 percent in 30–45 minutes. There are currently over 1,008 Supercharger Stations with 7,032 Superchargers globally. In New Jersey there are currently 8 Supercharger Stations with 54 Superchargers.

**Considerations for New Jersey Charging Infrastructure**

According to a recent analysis by ChargEVC, the sale of electric vehicles is growing rapidly in New Jersey, with registration of model year 2016 plug-in electric vehicles (PEVs) up 79 percent over 2015 to over 10,000 to date[1]. With several hundred thousand Model 3's already pre-ordered, this number is expected to increase significantly from 2018 onwards as Model 3 production ramps up to a rate of 10,000 cars per week at some point in 2018.

There are around 250 public and a little over 200 private (home or workplace) chargers in New Jersey,[2] which are either 110V Level 1 or 240V Level 2 chargers. Level-2 chargers are found in homes and workplaces and take between 4–7 hours to fully charge a standard EV. There are currently approximately 45 DC 'Fast Charging' Stations (including 8 Tesla Supercharger stations) in New Jersey. The more DC fast charging stations there are, the easier it is for drivers to consider driving on long distance trips where Level-1 or -2 charging may be too long for some drivers to wait while charging during road trips.

With the impending influx of EV's in New Jersey, it is vital that the charging network be able to sustain the requirements of current and future EV drivers. A would-be consumer may be more inclined to shy away from an EV purchase solely due to the inability to charge at home or at work.[3] Tesla recommends that the Board, New Jersey utilities, and other stakeholders identify and develop programs to deploy convenient charging solutions wherever customers choose, whether it is at home, work, frequent

[1] New Jersey Sees Record Increase in Plug-In Electric Vehicle Registration. September 8, 2017. http://www.chargevc.org/new-jersey-sees-record-increase-in-plug-in-electric-vehicle-registration/
[2] https://www.plugshare.com/
[3] ChargEVC Roadmap Drives Massive Benefits for New Jersey. September 14, 2017. http://www.chargevc.org/chargevc-roadmap-drives-massive-benefits-for-new-jersey/

destinations, or for long-distance travel. For example, New Jersey is a busy travel corridor and targeting investment of DC Fast Charging stations can encourage more drivers to convert to EV's knowing there are stops within New Jersey where they can 'top up' and continue on their journey. Nearly 67 percent of all the miles driven in New Jersey occur on only 50 roads. Therefore, New Jersey can efficiently address state-wide charging issues if wise public charging investments are made throughout the state.

**Making Multi-Unit Dwellings (MUDs) and Commercial Buildings 'EV-Ready'**

Another important consideration for the Board is EVSE deployment for residents of multi-unit dwellings. A larger share of the American public is now migrating to cities to live and work. Forty-three percent of new construction is focused on multi-unit buildings[4] and there is a growing trend for the population to live in apartment complexes with dedicated parking. Ensuring that these parking structures are made EV-ready is critical to the mass adoption of EV's. Earlier this year, a federal working group examining infrastructure readiness for Natural Resources Canada stated in its final report that, "[t]he most significant barrier presented by MUDs is the common lack of electrical [power] capacity and distributed subpanels to support broad EVSE deployment."

Unlike filling up a standard gasoline car, most EV drivers (80 percent) typically charge at home or at work. The "time to charge" is an important consideration for consumers when deciding whether to go electric. This is especially true for condominium households which often rely on a single vehicle for multiple daily trips. Level-2 charging times provide an additional sense of reliability and convenience for these consumers. Level-1 charging may work in limited scenarios where customers have very minimal commutes, but it is not a viable option for the mass market of EV consumers.

For a parking structure to be made 'EV-Ready' will require upgrading the electrical capacity to 240V at 40 Amps (Level-2) from the standard 110V (Level-1) typically seen. This requires upgrading the conductor size, running electrical conduit/wire, and adding service panels throughout the parking lot ending at terminals designated for EV parking spaces. Once the electrical capacity upgrade is complete, Tesla or other vendors can attach EVSEs to the electrical system to allow drivers to charge their EVs.

Utilities are in a unique position to help solve the MUD EV infrastructure problem by promoting the technical and financial needs of the underlying capacity upgrades required for MUDs. Utilities can do this by implementing innovative rebate programs offered directly to the MUD for the upgrade and/or

[4] Highlights of Annual 2016 Characteristics of New Housing. The United States Census. https://www.census.gov/construction/chars/highlights.html

recovering their costs through rates. Several utilities such as Alliant Energy[5] and Sacramento Municipal Utility District (SMUD)[6] have offered such programs in the past and prove as excellent models for Level 2 MUD infrastructure upgrade rebates. Such an arrangement is a truly symbiotic relationship, wherein the utility, the EV customer, and the multi-unit dwelling all benefit.

**Accelerating EV Deployment Will Provide Benefits of EVs to the Grid and Society**

The Board's consideration of EV and EV infrastructure is timely given the increasing number of EVs on the road and availability of new EV models. The growth of EVs also provides New Jersey with an opportunity to reduce electricity costs and local air emissions to the benefit of all New Jerseyans.

Electric vehicles can provide a range of benefits to EV drivers, but also non-EV owners and society as a whole. These benefits include fuel cost savings, reduced ground-level ozone and greenhouse gas emissions and reduced costs associated with those emissions. According to the American Lung Association of California, emissions from a vehicle's full tank of gasoline (16 gallons) leads to $11.82 in health costs and $6.55 in climate impacts for society.[7]

Moreover, the increase in electricity sales due to electric vehicles can result in a *reduction* in electricity rates for all ratepayers. A recent Rocky Mountain Institute report reviewed and normalized cost benefit analyses of transportation electrification.[8] The report found that fuel savings benefits of EVs can range from $10,700 to $16,528 over the lifetime of each EV.[9] The ratepayer benefit ranges from $744 to $9607 over the lifetime of each EV. The positive ratepayer benefits shows that EV programs generate more utility revenue than the marginal cost to serve customers, which means pursuing further EV adoption puts downward pressure on electricity rates.

The Board, New Jersey's electric utilities, and other stakeholders will play important roles in the development of a robust EV market in New Jersey. The stakeholder group can work together to identify develop infrastructure development strategies, potential demand response programs, and EV rate programs.

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[5] Alliant. Electric Vehicle Chargers and Rebates. https://www.alliantenergy.com/InnovativeEnergySolutions/SmartEnergyProducts/ElectricVehicles/EVHomeChargersandRebates

[6] https://www.smud.org/en/business/environment/plug-in-electric-vehicles/multifamily-charging.htm

[7] Bonnie Holmes-Gen and Will Barrett. *Clean Air Future: Health and Climate Benefits of Zero Emission Vehicles*. The American Lung Association of California. 2016.

[8] Fitzgerald, Garrett and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand.* Rocky Mountain Institute, 2017.

[9] *Id*.

**Do EVs fall under the definition of demand side management and energy efficiency?**

At the September 15, 2017 kickoff meeting, stakeholders were asked to provide comments as to whether EVs fall under the definition of demand side management and energy efficiency as set forth at N.J.S.A. 48:3-51 and/or N.J.S.A 48:3-98.1.d. Tesla believes that EVs can fall under the definitions set forth in both N.J.S.A. 48:3-51 and N.J.S.A. 48:3-98.1.d.

N.J.S.A. 48:3-51 states: "'Demand Side Management' means the management of customer demand for energy service through the implementation of cost-effective energy efficiency technologies, including, but not limited to installed conservation, load management, and energy efficiency measures on and in the residential, industrial, institutional, and governmental premises and facilities in the State." EVs can fall under this definition because vehicle charging can be a load management tool that helps increase the load factor of the system. For example, EV charging can be controlled or scheduled to occur during specific times such as charging during off-peak periods. Although vehicles are mobile, the charging of the vehicles occurs at residential, industrial, institutional, or governmental premises and facilities within the State.

N.J.S.A. 48:3-98.1.d states that "'Energy efficiency and conservation program' means any regulated program, including customer and community education and outreach, approved by the board pursuant to this section for the purpose of conserving energy or making the use of electricity or natural gas more efficient by New Jersey consumers, whether residential, commercial, industrial or governmental agencies." Tesla believes that EV programs can be considered energy efficiency and conservation programs as they have the ability to reduce overall energy usage when compared to internal combustion engines ("ICE") vehicles.

For example, the 2017 Tesla Model S 75D has an EPA rating of 103 miles per gallon-equivalent ("MPGe"), while the EPA reported that the average fuel economy for model year 2015 vehicles was 24.8 miles per gallon ("MPG").[10] The EPA developed the MPGe metric to provide an apples-to-apples comparison of the relative efficiency of an electric vehicle to an ICE vehicle. The EPA uses 33.7 kilowatt hours as the equivalent energy content of 1 gallon of gasoline.[11] To further compare whether EVs can reduce energy consumption, upstream energy consumption from the electricity generation sector can be

[10] *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2016*, U.S. Environmental Protection Agency, (issued November, 2016) (available at: https://www.epa.gov/fuel-economy-trends/trends-report).
[11] *New Fuel Economy and Environment Labels for a New Generation of Vehicles.* May 2011. Office of Transportation and Air Quality. EPA-420-F-11-017.

considered. In the example above, the large Tesla Model S is 4.15 times more efficient than the average ICE vehicle, which, put another way, would mean that driving a Tesla Model S reduces total energy use relative to an average ICE vehicle as long as the upstream electricity sector is more than 24.1 percent efficient at converting energy to electricity (and associated losses during transmission of that electricity).[12] That efficiency equates to an effective power plant heat rate of 14,175 BTU/kWh, which is very high compared to new natural gas combined cycles that have heat rates of 6,500 BTU/kWh or less. Indeed, according to the latest EIA data New Jersey's electricity generation fleet is much more efficient, with the State's combined fossil fleet operating at over 43.4% efficiency (heat rate of 7859 BTU/kWh).[13]

**Should operators of EVSE be regulated as electric utilities?**

No. Tesla believes that EVSE operators are providing a service to EV drivers, and that drivers should pay for energy delivered to their vehicle. Tesla's costs for the Supercharger network depend on both operational and electricity costs, and Tesla offers Supercharging to customers below the price that it costs Tesla to provide the service. Many existing Tesla customers are provided with complimentary Supercharging. When complimentary charging is not available, Tesla prices the service on a per kilowatt-hour ("kWh") basis for the global network. In some regions, including in New Jersey, regulations and requirements make it difficult for companies that are not utilities to sell electricity for vehicle charging on a kWh basis. In those cases, Tesla charges customers per minute they are connected to a charging station and drawing power. For Tesla drivers that pay for charging in New Jersey, they are charged $0.20 per minute when the rate of charge is over 60 kW. When the rate of charge falls below 60 kW, they are charged $0.10 per minute.

N.J.S.A. 48:2-13 states that (with emphasis added) "[t]he term 'public utility' shall include every individual, copartnership, association, corporation or joint stock company, their lessees, trustees or receivers appointed by any court whatsoever, their successors, heirs or assigns, that now or hereafter may own, operate, manage or control within this State any railroad, street railway, traction railway, autobus,

[12] To arrive at a Model S being 4.15 times more efficient than the average ICE vehicle, 103 is divided by 24.8. To calculate a break-even of 24.1% electricity sector efficiency, the number of BTU per kWh (3412) was multiplied by 4.15. That results in 14,175 BTU of energy consumed per kWh of electricity produced. The efficiency of 24.1% is 3412 BTU of output divided by 14,175 BTU of input.

[13] EIA, 2015 Net Generation by State by Type of Producer by Energy Source (data from Forms EIA-906, EIA-920, and EIA-923), and 2015 Fossil Fuel Consumption for Electricity Generation by Year, Industry Type and State (data from Forms EIA-906, EIA-920, and EIA-923). To calculate the heat rate, the total energy consumed (in BTU) at New Jersey's coal, natural gas, petroleum, and "other gases" electricity generating facilities were divided by the total energy produced (kWh) at New Jersey's coal, natural gas, petroleum and "other gasses" electricity generation facilities. To calculate the efficiency, energy content of a kWh (3412 BTU/kWh) was divided by the heat rate (7859 BTU/kWh).

charter bus operation, special bus operation, canal, express, subway, pipeline, gas, **electricity distribution**, water, oil, sewer, solid waste collection, solid waste disposal, telephone or telegraph system, plant or equipment for public use, under privileges granted or hereafter to be granted by this State or by any political subdivision thereof." Tesla believes that the kWh provided through EVSE are going solely to vehicles and are a service that provides mobility. On the other hand, electricity sold from a utility or retail energy provider can be used for a variety of purposes, including air conditioning, lighting, cooking, and other items.

**Conclusion/closing**

Adoption of electric vehicles is expected to continue increasing in the coming years as customer awareness increases and vehicle manufacturers increase the number of models available. Electric vehicle charging infrastructure is critical to sustaining that growth and transitioning to mass electrification of transportation. That increase in EVs drives the need for additional charging infrastructure, and the more charging options there are, the easier it is for drivers to consider purchasing an EV. The Board and utilities are well positioned to address the key challenge of electric vehicle infrastructure. Tesla recommends that the Board, New Jersey utilities, and other stakeholders identify and develop programs to deploy convenient charging solutions wherever customers choose, whether it is at home, work, reoccurring destinations, or for long-distance travel. Tesla looks forward to working with the Board, staff, utilities, and other stakeholders to reach this end.