STATE OF NEW YORK

PUBLIC SERVICE COMMISSION

Joint Petition for Immediate and Long-Term Relief to Encourage Statewide Deployment of Direct Current Fast Charging Facilities for Electric Vehicles

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Case No: __________

JOINT PETITION FOR IMMEDIATE AND LONG-TERM RATE RELIEF TO ENCOURAGE STATEWIDE DEPLOYMENT OF DIRECT CURRENT FAST CHARGING FACILITIES FOR ELECTRIC VEHICLES

New York Power Authority

New York State Department of Environmental Conservation

New York State Department of Transportation

New York State Thruway Authority

Dated: April 13, 2018

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PRELIMINARY STATEMENT

New York State is relying on a dramatic increase in the use of "zero emission vehicles" ("ZEV") within the next decade to reach key environmental and energy goals. Among ZEV options, the State has concentrated its money and resources on the promotion of electric vehicles ("EVs").[1]

Increased adoption of EVs will enable New York to approach its ZEV goals over the next decade. However, reaching our goals depends on a well-developed charging infrastructure network, which includes ready access to direct current fast charging installations ("DCFCs") in public places, particularly along major State vehicle corridors.[2] While slower-charging elements of the State's overall infrastructure are evolving,[3] the current prospect for increasing numbers of public DCFCs is not encouraging.

Going forward, DCFC installations will typically be rated at 50 kilowatts ("kW") or higher and, as a result, take electric service under a rate with both demand and energy charges.[4] As a practical matter, in this period of early adoption of EVs and low utilization of DCFCs, the

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[1] Electric Vehicle ("EV") is a general term to describe all types of plug-in vehicles that use electricity to power an electric motor and can operate without gasoline. This includes battery-EVs ("BEVs") that are all electric and plug-in hybrid EVs ("PHEVs") that have both an electric motor and an internal combustion engine. EVs include light duty vehicles as well as medium and heavy duty vehicles, including delivery vehicles and buses.

[2] There are three categories of charging facilities: Level 1, Level 2, and Level 3, known more commonly as DC fast charging or DCFC. Level 1 120V takes approximately 8 hours to charge a 30 kW hour ("kWh") car battery. Level 2 240V takes approximately 4 hours to charge a 30 kWh battery. DCFC 19kW or more, takes typically less than 30 minutes to charge a 30 kWh car battery. Going forward it is expected that most DCFC will be 50 kW or more.

[3] There are currently 1,834 public Level 1 and 2 plugs in New York. U.S. Department of Energy, Electric Vehicle Charging Station Locations, Alternative Fuels Data Center (April 12, 2018), https://www.afdc.energy.gov/fuels/electricity_locations.html.

[4] *See supra* fn 2.

disproportionate contribution of demand charges to DCFC operating costs renders any business model for DCFCs infeasible.

Petitioners are State agencies and authorities that share an interest in encouraging the adoption of EVs and deployment of DCFCs across the State, including at State facilities.[5] Petitioners request that the Public Service Commission (the "PSC" or the "Commission") pursue a two-part strategy to address the challenge posed by rates that unduly restrain deployment of DCFCs.

- First, Petitioners request that the Commission direct investor-owned utilities to immediately modify their Service Classification 2 ("SC-2") or Small-General non-demand-metered tariffs such that DCFC customers: i) qualify for this non-demand-metered service classification; ii) are exempt from any kW or kWh limit that would jeopardize their entitlement to take service under that tariff; and iii) would have a one-time opportunity to elect to take service under the applicable demand-metered service classification. By accommodating DCFC customers under a service classification without a demand charge, the economic viability of DCFC facilities in this period of relatively low utilization would materially improve. Moreover, this immediate relief would constitute a timely recognition of the essential role public DCFCs play in the near term to allay "range anxiety" and unequivocal support for the larger public policy goal of rapidly increasing ZEV adoption.
- Second, Petitioners request that the Commission commence a proceeding to establish principles to guide investor-owned utilities in redesigning rates applicable to DCFC accounts and in the development of broader EV implementation plans.

By granting both elements of relief, the Commission will help enable the State to reach its ZEV adoption mandate and its related environmental and system planning objectives. At the same time, ratepayers should not be unduly burdened in this process.[6]

In what follows, Petitioners (i) set forth the law and policy that support the requested relief; (ii) explain how in these early years of EV adoption, the current economic effect of

[5] New York Power Authority; New York State Department of Environmental Conservation; New York State Department of Transportation, New York State Thruway Authority

[6] *See infra* Appendix B.

demand charges creates an unreasonable barrier to entry for DCFCs; and (iii) demonstrate how the requested relief would support immediate and long-term deployment of DCFCs.

I.

NEW YORK IS COMMITTED TO DRIVING A SUBSTANTIAL INCREASE IN EV ADOPTION WITHIN THE NEXT DECADE

Department of Environmental Conservation regulations, supported by a multi-state ZEV Memorandum of Understanding ("MOU") to which New York is a party,[7] require cumulative ZEV sales in New York to reach approximately 800,000 by 2025.[8] As of the end of November 2017, cumulative ZEV sales in New York totaled just over 30,000.[9] In more general terms, achievement of the greenhouse gas ("GHG") emission reduction targets in the State Energy Plan, most recently reaffirmed in the Governor's Executive Order 166 (June 1, 2017), anticipate similar levels of EV sales, if not more.

A. The New York ZEV mandate, re-enforced by the multi-state Memorandum of Understanding , calls for cumulative EV sales in New York to reach approximately 800,000 by 2025

In the early 1990's, New York adopted California's low-emission vehicle rules.[10] That regulatory scheme, still in effect in New York, imposes escalating annual minimum ZEV sales quotas through 2025.[11] In New York, regulations require that ZEV credits account for 22 percent of total light and medium duty vehicle sales by 2025. By the year 2025, this translates into approximately 800,000 total EVs operating in New York.[12]

Until 2018, manufacturers could meet annual ZEV quotas by transferring credits associated with ZEV sales from California. This is known as the credit "travel" provision.

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[7] *See infra* FN 14.

[8] Review of New York State Electric Vehicle Charging Station Market and Policy, Finance, and Market Development Solutions, Coalition for Green Capital, prepared for NYSERDA (October 2015) p. S-1.

[9] Alliance of Automobile Manufacturers, Advanced Technology Vehicle Sales Dashboard, *available at* https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/.(last visited March 10, 2018).

[10] *See* 6 NYCRR § 218.

[11] Automobile manufacturers earn credits by selling zero emission cars and trucks. The credit per vehicle varies with drivetrain type and electric range (credits increase with increases in zero emissions range). Because not all vehicles receive a flat one credit per vehicle, the ZEV credit percentage does not directly reflect EV sales percentages. Further, credits may be "banked," or accumulated, should a manufacturer exceed the ZEV production requirements for a given compliance year.

[12] Review of New York State Electric Vehicle Charging Station Market and Policy, Finance, and Market Development Solutions, NYSERDA, p. S-1 (October 2015); *See also* 6 NYCRR § 218-4.1; California Code of Regulations, title 13, §§ 1962, 1962.1, 1962.2.

However, starting in 2018 this travel provision will no longer be available to manufacturers for battery electric vehicles.[13] Therefore, 2018 is a crucial "inflection point", when the implementation of a regulatory framework for charging infrastructure in New York is required to enable the State to satisfy its escalating ZEV obligations.

The illustration below represents the escalating annual minimum ZEV sales quotas (as a percentage of light-duty vehicle sales) from 2018 to 2025.

Source: NESCAUM, "The ZEV Regulation and Multi-State Action Plan", presented at Utility Transportation Electrification Workshop, Boston, MA. May 11, 2016.[14]

The slope of the graph from 2018 to 2025 underscores the need for an "all hands on deck" approach to support the required levels of EV adoption in New York.

In light of the public health and environmental policies driving this regulatory scheme, New York and seven other states that have also adopted the same low emission vehicle regulations (including our neighboring States of New Jersey, Massachusetts, Connecticut and Vermont), have jointly committed to pursue complementary measures to support EV deployment in accordance with the regulatory mandate. In October 2013 and May 2014, these eight states became signatories to a Memorandum of Understanding (the MOU) and an Action Plan under

[13] *See* California Code of Regulations, title 13, § 1962.2, stating that fuel cell vehicle credits will still have this travel option beyond 2018.

[14] From the years 2012 until 2017, crediting under the ZEV was available to Partial Zero Emissions Vehicles (PZEVs) and Advanced Technology Partial Zero Emissions Vehicles (AT-PSEVs). PZEVs are gasoline vehicles that have specific emissions standards, and AT-PZEVs are generally hybrid-electric vehicles. Starting in the year 2018, these vehicle types will not provide vehicle manufacturers credit under the ZEV. Presumably then, the reduction in fleet credit percentage requirements from 6 percent in 2017 to 4.5 percent in 2018 is an acknowledgement of that fact, and a way to lessen potential compliance burdens on vehicle manufacturers.

which each state will pursue a series of supporting initiatives, including the elimination of regulatory barriers that hinder development of necessary charging infrastructure.[15]

New York has instituted a series of existing initiatives to support EVs: i) the Governor's Drive Clean Rebate (a $70 million rebate and outreach initiative to promote EVs); ii) NYSERDA and NYPA's joint implementation of the Governor's Charge NY program; iii) a joint NYPA/New York State Thruway Authority effort to install four DCFCs along the New York State Thruway; iv) New York State Department of Transportation's installation of four DCFCs split between two New York State Welcome Centers; v) New York State Department of Environmental Conservation's Clean Vehicles & Infrastructure program, which offers at least $1 million for electric vehicle infrastructure; and vi) New York State Clean Pass and Green Pass initiatives, which provide high-occupancy vehicle lane access and toll-fee reductions, respectively, for qualifying low and zero emissions vehicles. Recently, NYSERDA has pledged $3.5 million to support technologies and business models that accelerate electric vehicle usage and reduce the cost of installing and operating charging stations. Further, Charge NY 2.0, recently announced in the Governor's 2018 State of the State, will drive the buildout of EV charging infrastructure in order to promote EV-capable roadways and destinations.

B. The GHG emission reduction targets in the State Energy Plan, reaffirmed and further implemented in Executive Order 166, in effect require EV sales at levels no less than the ZEV Mandate levels

The 2015 State Energy Plan set a goal to reduce the State's GHG emissions 40 percent by 2030, compared to 1990 levels. By Executive Orders, the State has set a longer-range goal of achieving an 80 percent reduction in GHG emissions by 2050, compared to 1990 levels.[16] In developing strategies to meet these goals, the transportation sector warrants particular attention. The 2015 State Energy Plan specifically noted that "building a cleaner, more efficient, and sustainable transportation system is a critical component of the State's energy strategy."[17] Most sectors in New York have decreased their GHG emissions, or they have stayed relatively flat

[15] Memorandum of Understanding Between the Northeast States for Coordinated Air Use Management And the United States Department of Energy (executed on Jan. 6, 2015), *available at* https://www.zevstates.us/wp-content/uploads/2015/11/MOU-NESCAUM-USDOE.pdf; ZEV Task Force, *Multi-State Actions*, Multi-State ZEV Task Force (May 2014), https://www.zevstates.us/multi-state-actions/.
[16] *See* N.Y. Exec. Order No. 166 (June 1, 2017), https://www.governor.ny.gov/news/no-166-redoubling-new-yorks-fight-against-economic-and-environmental-threats-posed-climate.
[17] *See* N.Y. State Energy Planning Bd., The Energy to Lead: 2015 New York State Energy Plan p. 41 (2015), *available at* https://energyplan.ny.gov/Plans/2015.

since 1990. However, the transportation sector saw a 28 percent increase in GHG emissions from 1990 to 2014.[18] As a result, the transportation sector is now the largest source of GHG emissions in New York, at just over one third of total GHG emissions, while the electric sector is near 20 percent.[19]

Due to both the amount of emissions in the transportation sector and the lower emission profile from electric generation, electrification of the transportation sector provides enormous opportunities for GHG emission reductions. This is shown in a recent study that found that carbon emissions from charging and operating an electric vehicle in upstate New York is the equivalent to the emissions from a 191 mpg vehicle, a 89 mpg vehicle in New York City and Westchester county, and a 50 mpg vehicle in Long Island.[20] Given that the average light-duty vehicle in the United States rates at 25 mpg, EV adoption in New York presents significant comparative emissions avoidance.

The 2015 State Energy Plan identified a number of actions for state agencies to take to realize emissions reduction contributions from the transportation sector. Among other items, the State's policy is to continue encouraging market growth through new programs, including expanding access to fast charging on major travel corridors.[21] Thus, electrification of transportation is a priority for the State. This is explicitly acknowledged in the 2017 biennial report to the 2015 State Energy Plan: "<u>[t]he state's climate goals cannot be achieved without a rapid transition to vehicles powered by electricity</u>…"[22]

The Governor reiterated these goals in Executive Order 166 (June 1, 2017) and directed that all actions by all "Affected State Entities", including the Commission as well as the Department of Public Service ("DPS"), be "reasonably consistent with the policies stated herein, and of those expressed in the 2015 Energy Plan, to achieve such objectives."[23] Utility demand charges that inhibit the deployment of DCFCs should be revisited to be consistent with these policies.

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[18] New York State Greenhouse Gas Inventory: 1990-2014 Final Report, p. S-5.
[19] *Id*. at S-3.
[20] David Reichmuth, Union of Concerned Scientists, *New Data Shows Electric Vehicles Continue to Get Cleaner* (March 8, 2018), *available at* https://blog.ucsusa.org/dave-reichmuth/new-data-show-electric-vehicles-continue-to-get-cleaner.
[21] 2015 State Energy Plan, pp. 44, 106.
[22] *See* N.Y. State Energy Planning Bd., The Energy to Lead: Biennial Report, p. 56.
[23] EO 166, Ordering par. II.

C. The Commission has recognized the electric system benefits that will result from the anticipated shift to EVs

The Commission has recognized that the expansion of EV utilization not only supports key State environmental objectives, but key electric system planning objectives as well. Specifically, it has acknowledged the need to consider strategies to "improve load factor, and reduce carbon emissions by encouraging conversion to electric vehicles."[24] DPS Staff has also recognized that EVs will have the effects of reducing total carbon emissions and increasing electric demand.[25]

With respect to electric system benefits, a substantial increase in EVs can increase utility and system load factors and utilization of utility infrastructure, which in turn can increase utility revenue, and ultimately reduce rates for non-participating customers. Average electric delivery rates typically exceed electric delivery marginal costs by a wide margin. This means that increased consumption, such as the overnight charging of EVs in the garages and driveways of homeowners, will lead to additional utility revenues above the costs imposed by their consumption and allow for reduced rates for all customers.[26] Increased adoption of EVs, and in turn, increased EV charging, will grow the number of MWhs that flow through the electric grid and contribute towards the costs to operate and maintain the transmission and distribution system, allowing for the reduction in rates for all ratepayers. This conclusion has been supported by several studies in utility service territories across the United States.[27]

A recent study by M.J. Bradley and Associates estimates that if the ZEV Mandate goals are achieved in New York, the net present value ("NPV") of annual utility net revenues would be $213 million in 2030 or an average of $166 in additional utility net revenue from each EV (i.e., the amount that revenue collected exceeds the incremental costs to serve EVs).[28] Further, if deployment of EV infrastructure increases, including DCFC, the total net revenue benefit for

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[24] Order Adopting a Ratemaking and Utility Revenue Model Policy Framework *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Case 14-M-0101, Appendix B, p. 4.
[25] Staff White Paper on Clean Energy Standard, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Case 15-E-0302 (January 25, 2016) p. 13.
[26] Several studies have found that typical EV drivers do more than 80 percent of their charging at home. *See e.g.* Charging at Home, Department of Energy, Office of Energy Efficiency & Renewable Energy, *available at* https://www.energy.gov/eere/electricvehicles/charging-home (last accessed March 20, 2018).
[27] *See* Garrett Fitzgerald and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) pp. 23-25, 78. https://www.rmi.org/insights/reports/from_gas_to_grid
[28] Dana Lowell et al., M.J. Bradley & Associates LLC, *Electric Vehicle Cost-Benefit Analysis – Plug-In Electric Vehicle Cost-Benefit Analysis: New York* (Dec. 2016) p. 18; *See infra* Appendix B. See also Appendix B with nominal utility net revenues.

utilities is estimated to continue to increase.[29] Increased transportation electrification and increased electrical system load should translate to supplemental utility revenues that could be used to reduce ratepayer bills statewide.[30]

II.

TO REACH THE STATE'S TARGETED LEVELS OF EV SALES WILL REQUIRE STRATEGIC DEPLOYMENT OF DCFCs

A. "Range anxiety" materially restricts EV sales

For potential EV buyers, a significant concern is "range anxiety".[31] Range anxiety may arise in the decision to purchase an EV not only in regard to its estimated range, but also in relation to concerns regarding the availability of public charging. Such public charging stations are perceived to be necessary for extended in-town trips (such as multiple kids sports games), in emergency situations (such as failing to overnight charge at home), or long-distance trips. Range anxiety can also limit the use of an EV after purchase, diminishing the expected benefits. A survey found that 80 percent of EV drivers in one state felt limited in their ability to travel due to the lack of public charging.[32] Further, certain consumers, such as occupants of multi-family buildings, may not have access to home charging, and therefore, will mostly be reliant on public charging.

The most common EVs can travel well over 100 miles on a single charge, which satisfies the daily range demand of most consumers.[33] However, consumers will often make purchases based upon the most demanding use of the vehicle, no matter how sporadic. This is illustrated by individuals who purchase a vehicle to carry project equipment, vacation supplies, or tow a trailer just a few times a year, despite the fact that these vehicles exceed the daily needs of the

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[29] *Id.* Although the NPV of projected annual utility net revenues as a result of the addition of EV infrastructure will increase, it is projected that the net revenue per EV will level-off to $102-$112 per EV in the year 2050 under such same assumptions.
[30] *See infra* Appendix B to this Petition.
[31] *Range Anxiety still deterrent in electric car sales*, The Weekly Driver (April 23, 2014) https://theweeklydriver.com/2014/04/range-anxiety-still-deterent-electric-car-sales/
[32] Denver Dep't of Pub. Health & Env't [DDPHE], *Opportunities for Vehicle Electrification in the Denver Metro area and Across Colorado: Overcoming Charging Challenges to Maximize Air Quality Benefits* (2017), *available at* https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/EV/FinalEVReportES.pdf
[33] David L. Chandler, *Can today's EVs make a dent in climate change? Electric vehicles can meet drivers' needs enough to replace nearly 90 percent of vehicles now on the road*, MIT News (August 15, 2016), *available at* http://news.mit.edu/2016/electric-vehicles-make-dent-climate-change-0815.

consumer. It follows then, that most consumers will only purchase an EV if its range and public charging infrastructure can meet the user's typical daily needs.

B. DCFCs are key to reducing range anxiety

Provision of access to an extensive and accessible network of DCFC stations can help alleviate range anxiety. This would address actual EV range issues and, just as importantly, address the perception that range is a problem for EVs. Studies have found correlations between DCFC charging stations and EV sales.[34] In fact, a recent review of reports on EV incentive effectiveness has as its first recommendation: install more charging stations, including DCFC stations in metro areas and along major travel corridors, which "are likely to have an outsized effect on [EV] adoption in the next few years."[35]

The United States Department of Energy's National Renewable Energy Lab ("NREL") conducted analysis to estimate the minimum DCFC coverage required to dispel range anxiety concerns by providing a safety net of DCFC.[36] It found that there would need to be 3.4 DCFC plugs in order to support 1,000 BEVs.[37] One of the major conclusions was that planners should focus on providing adequate charging coverage, particularly with DCFC.[38] Presently in New York State, there are only 78 DCFC plugs at 44 stations that are publically available to all EV drivers.[39] There are an additional 120 DCFC plugs that are available exclusively for Tesla EVs.[40] However, New York will need approximately 1,500 total DCFC plugs to adequately support the amount of projected BEVs likely operating under the ZEV mandate regulations in 2025.[41]

Given the empirical data in other states, as DCFC facilities in New York become more common, consumers' "range anxiety" should dissipate, and mainstream adoption of EVs in New York should increase.

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[34] Mark Singer, Nat'l Renewable Energy Lab., *Consumer Views on Plug-in Electric Vehicles – National Benchmark Report* (Jan. 2016) pp. 18, 20; CalETC, *Evaluating Methods to Encourage Plug-in Electric Vehicle Adoption: A Review of Reports on PEV Incentive Effectiveness for California Utilities* p. 23. Prepared by Plug In America (Oct. 2016), *available at* https://pluginamerica.org/wp-content/uploads/2016/11/PEV-Incentive-Review-October-2016.pdf; Kansas City Power and Light executives believe that an extensive investment in public charging eliminated range anxiety in its service territory and lead to an increased adoption of EVs. See Garrett Fitzgerald, and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) p. 31.
[35] *Evaluating Methods to Encourage Plug-in Electric Vehicle Adoption,* Plug In America (October, 2016) p. 23.
[36] *See* U.S. Dep't of Energy, Office of Energy Efficiency & Renewable Energy, *National Plug-In Electric Vehicle Infrastructure Analysis* (September 2017) p. viii.
[37] *Id*. at xi.
[38] *See id.*
[39] Alternative Fuels Data Center, U.S. Department of Energy, Electric Vehicle Charging Stations (as of April 12, 2018) https://www.afdc.energy.gov/fuels/electricity_locations.html.
[40] *Id*.
[41] *See infra* Appendix B to this Petition. *See also*, U.S. Dep't of Energy, Office of Energy Efficiency & Renewable Energy, *National Plug-In Electric Vehicle Infrastructure Analysis* (September 2017).

III.

THE IMPACT OF DEMAND CHARGES ON DCFC ELECTRICITY COSTS FRUSTRATES CONSTRUCTION AND OPERATION OF DCFCs

A. The cost of electricity is a major component of DCFC owning and operating costs

Operation and maintenance costs for DCFC include charges for electricity, software subscriptions, station management, billing, and preventative and corrective maintenance. Some studies have estimated that non-electric operating costs for DCFC will range from $2,000 to $5,000 per year.[42] However, the primary driver of operating costs is the amount of electricity use and the applicable electric tariff.[43] Since DCFC installations are rated in excess of 19 kW, and will likely be 50 kW or more,[44] they take service under service classes that include both demand and energy charge components. As a direct result, when DCFC utilization rates are very low, demand charges in New York and elsewhere can account for up to 80 to 90 percent of a station's monthly electricity bill.[45] A study estimated that electric operating costs for DCFC located in Vermont with 168 charging events in a month will be approximately $31,000 a year under a utility tariff with a demand charge. In contrast, the study found that under different utility tariffs without a demand charge, but with higher kWh rates, that cost would be $9,000 to $10,000 per year.[46]

B. In this period of low DCFC utilization, the impact of demand charges renders the DCFC business case largely infeasible

Presently, due to low utilization (load factor), high demand charges and installation costs, the NPV of a DCFC installation in New York is negative under many utilization levels. A negative NPV discourages investment in DCFC, particularly at this early stage of market

[42] Vt. Agency of Transp. [VTrans], *Electric Vehicle DC Fast Charging on Vermont Highway Corridors* Prepared by Vt. Energy Inv. Corp. & DuBois & King (Nov. 2017) pp. 18, 19, *available at* http://vtrans.vermont.gov/sites/aot/files/planning/documents/DC%20Highway%20Corridor%20Report_112217_Final_FULLVERSION-web.pdf.
[43] Electricity Rate Tariff Options for Minimizing Direct Current Fast Charger Demand Charges, Final Report, Energetic Incorporated, prepared for NYSERDA (December 2015) p. 1; See Garrett Fitzgerald and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) p. 43, 44; Electric Vehicle DC Fast Charging on VT Highway Corridors, November 2017, pp. 18, 19; Fraser Basin Council, *The BC Electric Vehicle Infrastructure Project: DC Fast Charging*, Plug In BC (August 2014), p. 2 (*available at* http://pluginbc.ca/wp/wp-content/uploads/2014/08/FAQ-EV-DCFC-pilot_August1_2014.pdf).
[44] See *supra* fn 2.
[45] Electricity Rate Tariff Options for Minimizing Direct Current Fast Charger Demand Charges, Final Report, Energetic Incorporated, prepared for NYSERDA (December 2015) p. 1; See Garrett Fitzgerald and Chris Nelder. *Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) pp. 43, 44.
[46] Electric Vehicle DC Fast Charging on VT Highway Corridors, November 2017, pp. 18, 19.

development for EVs.[47] Other studies that analyzed DCFC have also found that under most conditions, direct revenue from charging is insufficient for a DCFC owner/operator to achieve profitability under standard tariffs.[48] Although DCFCs have relatively high capacity factors when in use, their monthly load factor, as compared to most other demand-billed services, is extremely low, resulting in high demand charges per kWh.

Take, for example, a 150 kW DCFC. An operator in National Grid's service territory will incur a demand charge of $1,500 per month ($10 per kW multiplied by 150 kW)[49] with just one instance of usage. However, a typical EV driver may incur a fee from the charging station of about $8.25 in order to charge the EV enough to travel 100 miles.[50] Assuming that there are 30 charging instances on that DCFC for the month (which is above current usage numbers at New York State Thruway DCFC),[51] the owner/operator of the DCFC will obtain revenue of just $247.50 for the month ($8.25 x 30 charging events). Even if the amount charged was closer to that of filling a gasoline vehicle, and resulted in a $20 fee (making EVs significantly more costly per mile to operate), the owner/operator of the DCFC would obtain revenue of just $620 for the month ($20 x 30 charging events). This falls far short of covering the base $1,500 demand charge for electricity the DCFC incurred from the first EV charge.

These monthly demand charges, coupled with low utilization, present an untenable financial burden for DCFC investment and development, and are a large contributor to the present negative NPV of DCFC.

C. As applied to DCFCs, applicable rates are not cost-based

Current rate design does not consider the unique load profile of DCFCs or the currently limited costs these facilities impose on the electric system. By failing to account for these "facts on the ground", current rate design imposes a barrier to entry for DCFC infrastructure.

[47] Review of New York State Electric Vehicle Charging Station Market and Policy, Finance, and Market Development Solutions, Coalition for Green Capital, prepared for NYSERDA (October 2015), pp. 38-43; Electricity Rate Tariff Options for Minimizing Direct Current Fast Charger Demand Charges, Final Report, Energetic Incorporated, prepared for NYSERDA (December 2015) p. 1.
[48] Francort et al., Idaho National Laboratory, *Considerations for Corridor and Community DC Fast Charging Complex System Design* (May 2017) pp. 11, 12, 33, 34.
[49] A 10 dollar per kW charge is based upon National Grid's SC-3, secondary customers, demand charge of $10.03.
[50] *See*, Garrett Fitzgerald and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) p. 27.
[51] *See*, Review of New York State Electric Vehicle Charging Station Market and Policy, Finance, and Market Development Solutions, Coalition for Green Capital, prepared for NYSERDA (October 2015) p. 39 (1.6 charging events per week in 2014). *See infra* Appendix A.

Current charging data concerning existing DCFCs on the New York State Thruway show extremely low load factors, that at no time were two chargers used at the same time, and that there is no consistent usage pattern for DCFCs.[52] These stations operate at their full capacity for only short periods of time, and the demand component is expected to be largely independent from the volume of kWh drawn by customers utilizing the charging stations. This same load profile is found not only in data collected in New York, but also in other states with developing EV markets as well. In Connecticut, two DCFCs on a highway corridor similar to the New York State Thruway have shown average load factors below 2 and 4 percent, with the highest average usage occurring during mornings.[53] In Oregon, initial data for DCFCs in Pacific Power's service territory show an average load factor of 1.77 percent, meaning each charging station was used for less than half an hour per day.[54] Given current low DCFC load factors, and that the overall DCFC load profile is comparatively intermittent and random compared to the usual drivers of customer demand, DCFC have coincident utilization rates lower than most other customers. As DCFC load factors increase, it is unlikely that all DCFC would be utilized at the same point in time, or that the combined peak usage of DCFCs will coincide with the time of electric system delivery peak. The usage will remain intermittent and each type of location (highway corridor, retail, municipal, gas station) will likely have its own unique load profile.[55]

Currently, most commercial rates collect a very high percentage of delivery service revenues from the monthly demand charge, and little to no delivery service revenues from kWh charges. This means, in most cases, a customer with an individual peak of 150 kW and a 95 percent load factor pays no more for delivery service than a customer with the same 150 kW and a 4 percent load factor. The high load factor customer is much more often operating at or near its 150 kW peak than a low load factor customer, and is therefore much more likely to be using power during the times of, and contributing to, system stress (peak or near peak). In other words, the usage of a high load factor 150 kW customer is much more likely to contribute to the need for an expensive shared transmission and substation facility upgrade than the low load factor 150

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[52] *See infra* Appendix A.
[53] Two Year Update, *Request of CL&P for Approval of Electric Vehicle Rate Rider* Pilot, CT PURA Docket No. 13-12-11, June 24, 2016
[54] Staff Report, *In the Matter of Pacificorp, dba Pacific Power, Advice No. 16-020 (ADV 485), Schedule 45 Public DC Fast Charger Deliver Service Optional Transition Rate* at 4, Pub. Util. Comm'n of Or. Docket No. UE 328, May 8, 2017.
[55] Joint Utilities of New York, *Electric Vehicle Supply Equipment: Summary of September 28, 2017 Stakeholder Meeting* (2017) slide 22, *available at* http://jointutilitiesofny.org/wp-content/uploads/2017/10/Joint-Utilities-of-New-York-Summary-of-EVSE-Stakeholder-EG-Meeting-09-28-2017-Draft-v.2.pdf (presenting load profiles of public charging).

kW customer. Given the cost-causing differences between those two types of customers, current demand-metered commercial rates create an unnecessary barrier for the growth of innovative technology that provide outsized public benefits that initially have low load factors.

In fact, the PSC has established rate design principles for customers whose demands on the delivery system are "more intermittent and random,"[56] such as DCFC. This was done for customers with on-site generation, in the Commission's adoption of standby rates. Similarly, the Commission should recognize that the extremely low load factors of DCFC means that standard delivery rates for commercial customers do not accurately capture the costs imposed on the transmission and distribution system by low load factor DCFCs. Therefore, these cost allocations should be changed, especially for the heavily shared upstream components of the delivery system, such as transmission and, perhaps, substations.

IV.

THE REQUESTED RELIEF REASONABLY ADDRESSES BOTH THE NEAR TERM AND LONGER TERM CHALLENGES

A. Shifting DCFC customers to a non-demand-metered rate is fully justified

1. Such a shift would advance public policy at a critical juncture

Beginning in 2018, and through 2025 (the end of the current ZEV mandate period), automobile manufacturers with a presence in New York are required to substantially increase the amount of ZEV sales each year. With only 78 entirely public DCFC plugs installed to date, action is needed immediately; the infrastructure must be built first before consumers' "range anxiety" can be addressed. Through the middle of 2017, ZEVs accounted for less than one percent of all new vehicle sales in New York, but under the adopted regulations, ZEV sale credits are required to be 4.5 percent of such sales in 2018.[57] Further, in five years annual ZEV sale credits will be required to be 17 percent of new vehicles sold, and ultimately 22 percent at the end of 2025. Thus, action to increase DCFC deployment is required to ramp-up ZEV sales in New York to meet established ZEV requirements.

[56] Press Release, N.Y. Pub. Serv. Comm'n, PSC Votes to Approve New Rates for Standby Electric Service (July 23, 2003),http://www3.dps.ny.gov/pscweb/WebFileRoom.nsf/Web/486AC43A8DF18844852572C8005D93BC/$File/pr03055.pdf?OpenElement).
[57] *See* California Code of Regulations, title 13, § 1962.2; *See supra* note 8 (explaining how ZEV sale credits work).

Elimination of demand charges, and enabling DCFC to take service under the SC-2 or Small General non-demand-metered service classification will, in effect, be a significant incentive for DCFC investment, and continued operation of DCFC.[58] With increased EV market penetration in line with the ZEV requirements, well-placed DCFCs should have utilization levels that will allow operators to transition to the modified rates also requested under Section III. C. herein. Further, increased EV adoption, made possible by increased penetration of DCFC from the elimination of demand charges should yield net positive value to utility ratepayers at approximately $175 million to $109 million due to the increased demand and throughput from EV charging in the year 2025 alone.[59] It is important to note that these figures do not include the value of emissions avoidance, where EV adoption is projected to provide societal benefits equivalent to $64 million.[60]

2. A rate without a demand charge would likely spur deployment of DCFC in most of the State

A NYSERDA-funded study found that demand charges account for half of the economic cost of DCFC and that eliminating the demand charge could create a positive NPV for that infrastructure.[61] Eliminating the demand charge was significantly more effective than lowering the electricity cost or providing a grant to support DCFC.[62] The shift in service classification to a non-demand rate should bring about positive NPVs for DCFCs under many likely operating assumptions, thus increasing their attractiveness as an investment.

More specific analysis suggests that shifting to a service class without a demand rate would likely incent development of DCFC in all areas of the State except the Con Edison service territory. In the case of Con Edison, a relatively modest additional incentive would be required. Petitioners suggest that the Commission authorize Consolidated Edison of New York, Inc. (Con Edison) to redirect Business Incentive Rate (BIR) discounts Con Edison has already proposed be used to spur DCFC development as the basis for a further discount on the SC-2 or Small General

[58] *See infra* Section IV A 2; In order to avoid market inequities, and the closure of existing DCFC, the option for DCFC to take service under SC-2 or the Small General non-demand rate should be extended to all public DCFC regardless of installation date.
[59] *See infra* Appendix B.
[60] *See id.*
[61] Review of New York State Electric Vehicle Charging Station Market and Policy, Finance, and Market Development Solutions, Coalition for Green Capital, prepared for NYSERDA (October 2015), p. 46.
[62] *Id*.

non-demand-metered rate that would otherwise apply to DCFC under SC-2.[63] This use of available discounts would likely result in a positive impact on DCFC deployment as intended by Con Edison's December 2017 filing.[64]

While the precise terms of the existing SC-2 or Small-General tariffs may differ among the utilities, one common feature would need to be addressed at the outset. Each tariff includes a not-to-exceed cap, expressed in kW or kWh. Exceedance triggers loss of entitlement to take service under the SC-2 or Small General non-demand-metered tariff, and the likely placement of the customer in a rate with a demand charge. Clearly, to preserve the benefit driving the proposed relief, these caps need to be waived for DCFC customers.[65] On the other hand, as DCFC utilization increases and the relatively high energy rates of the Small General service class threaten to eliminate any economic advantage of remaining in the Small General service class, DCFC customers should have a one-time opportunity to shift to a service class with a demand rate (and lower energy charge) in order to maintain economic viability.

Consistent with the movement of other customers to a non-demand-metered rate, Petitioners request similar treatment for NYPA DCFC accounts under Con Edison's tariff applicable to NYPA accounts.[66] Thus existing and new DCFC accounts that are NYPA customers would, like their Con Edison counterparts, receive service under a non-demand-metered rate.

3. Commission precedent supports demand charge discounts in support of beneficial technology

Authorizing a shift in service classification for DCFCs would not be the first time the PSC recognized that rate flexibility is necessary to encourage emerging beneficial energy technology, to attract new customers, or to induce existing customers to expand load in a manner

[63] Con Edison Letter to the Commission Concerning Proposed Tariff Changes, *Proposed Expansion of the Business Incentive Rate to Include an Electric Vehicle Quick Charging Station Program*, December 28, 2017.
[64] *See infra* Appendix C.
[65] The Commission will also need to give guidance to utilities on how to set rates for the applicable non-demand service classifications, including rates applicable to NYPA accounts, so that the increased load and potential change in load profile do not adversely impact current SC-2 ratepayers or undue to the incentive for DCFC to invest and operate in the utility service territory. One consideration is whether the increased revenues from residential and workplace charging could be used to offset any impact in the SC-2 or Small General service class.
[66] Con Edison, *Schedule for PASNY Delivery Service*, Rate I non-demand-metered service and Westchester street lighting, "PSC NO. 12 – Electricity", effective February 20, 2012, *available at* https://www.coned.com/_external/cerates/documents/PSC12-PASNY/PASNYPSC12.pdf.

beneficial to all ratepayers. The Commission has done so with the continuation of standby rate exemptions and flexible rate service contracts.[67]

In the standby rate proceeding, the Commission provided rate relief to encourage the development of beneficial distributed generation ("DG") and small efficient combined heat and power units, where the number and magnitude of DG installations was growing slowly and the availability of rate options was needed to assist in DG development.[68] In the year 2015, the PSC extended this exemption for four years, and stated that its goal is to "promote the future development of the designated technologies; [and] to continue and encourage this trend, particularly in light of the objectives adopted in the REV proceeding."[69] Further, it increased the standby rate MW limit in order to continue the adoption of these technologies, particularly in light of the State's policy objectives under REV.[70] DCFC is a technology that needs similar consideration to spur its adoption in light of the State's policy objectives.

Concerning flexible rate contracts, the Commission has allowed utilities to provide temporary reductions in delivery charges in instances where new load would benefit all ratepayers.[71] The PSC directed that in order to offer a flexible rate contract, there would need to be both a demonstration of the necessity for attracting or retaining load and of benefits to non-participating ratepayers.[72]

Similarly, once EV adoption grows as a result of the development of DCFC infrastructure, additional residential and workplace consumption from EV charging should result in positive net revenues for the utility and significant benefit to ratepayers. The potential benefits for ratepayers as a result of EV adoption are shown through numerous studies[73] including the

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[67] Order Continuing and Expanding the Standby Rate Exemption, *In the Matter of the Continuation of Standby Rate Exemptions*, Case 14-E-0488 (April 20, 2015) [hereinafter *Standby Rate Exemptions*]; Order Approving Guidelines for Flexible Rate Service Contracts, *Proceeding on Motion of the Commission to Reexamine Policies and Tariffs for Flexible Rate Contract Service to Economic Development Customers*, Case 03-E-1761 (April 14, 2005) p. 10 [hereinafter *Flexible Rate Contract Service*].
[68] Order Continuing and Modifying in Part the Standby Rate Exemption, *Standby Rate Exemptions for Beneficial Distributed Generation*, Case 09-E-0109 (May 18, 2009) p. 2.
[69] Order Continuing and Expanding the Standby Rate Exemption, *In the Matter of the Continuation of Standby Rate Exemptions*, Case 14-E-0488 (April 20, 2015) pp. 7-8.
[70] The PSC limited the exemption to four years mindful of the impact of such rate relief on other ratepayers. *Standby Rate Exemptions* p. 8.
[71] *Flexible Rate Contract Service* p. 10, Appendix p. 2-3.
[72] *Id*.
[73] *See* Garrett Fitzgerald and Chris Nelder. *From Gas to Grid: Building Charging Infrastructure to Power Electric Vehicle Demand. Rocky Mountain Institute* (2017) pp. 23-25, 78.

New York specific study cited above in Section I. C.,[74] and will likely be supported within future NYSERDA-funded work.

4. Other states have taken similar action on demand charges for DCFCs

In other jurisdictions where these same issues have been addressed, utility regulatory commissions have reduced or flexibly imposed demand charges for DCFCs. The Hawaiian Electric Company[75] and Connecticut Light & Power[76] have adopted five-year pilot programs for EV charging, where the demand charge is replaced with a higher kWh charge cost component.

Pacific Power in Oregon has a different approach, in that it discounts demand charges for customers that install DCFC. With the election of this rate, a customer pays ten percent of the demand charge starting May 15, 2017. After each successive year, the customer's demand charge bill increases an additional ten percent until May 15, 2026, when it will pay the full 100 percent demand charge allocation.[77] Pacific Power describes this as a "Demand Charge Transition Discount," with the idea that current lower demand charges will reduce barriers to DCFC deployment, and that in ten years' time, DCFC services will widespread enough to provide sufficient EV charging infrastructure.

Recently, Southern California Edison ("SCE") has proposed a ten-year plan to suspend demand charges for DCFC for the next five years, and phase them back in over a subsequent five-year period.[78] At the end of the ten-year program, the total demand charge will only be sixty percent of the current demand charge while the remainder of the distribution costs would be collected through a higher kWh rate. This ten-year proposal would impose rate certainty, and would allow DCFC development to accelerate.

All of these proposals share a driving market observation: the chilling effect of high demand charges on the early-stage expansion of necessary DCFC infrastructure.

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[74] Dana Lowell et al., M.J. Bradley & Associates LLC, *Electric Vehicle Cost-Benefit Analysis – Plug-In Electric Vehicle Cost-Benefit Analysis: New York* (Dec. 2016) p. 18.

[75] Haw. Elec. Co., *Commercial Public Electric Vehicle Charging Facility Service Pilot: Schedule EV-F, available at* https://www.hawaiianelectric.com/Documents/my_account/rates/hawaiian_electric_rates/heco_rates_ev_f.pdf.

[76] Decision, *Request of CL&P for Approval of Electric Vehicle Rate Rider* Pilot, CT PURA Docket No. 13-12-11, June 24, 2016.

[77] *In the Matter of Pacificcorp, dba Pacific Power, Advice No. 16-020 (ADV 485), Schedule 45 Public DC Fast Charger Deliver Service Optional Transition Rate* at 4, Pub. Util. Comm'n of Or. Docket No. UE 328, April 20, 2017, *available at* https://www.pacificpower.net/content/dam/pacific_power/doc/About_Us/Rates_Regulation/Oregon/Approved_Tariffs/Rate_Schedules/Public_DC_Fast_Charger_Optional_Transitional_Rate_Delivery_Service.pdf.

[78] S. Cal. Edison Co. (Jan. 20, 2017) Cal. P.U.C. No. A.14-10-___ (Testimony of Southern California Edison Company in Support of its Application of Southern California Edison Company [U 338-E] For Approval of its 2017 Transportation Electrification Proposals), *available at* http://on.sce.com/2kXeu1X.

B. A generic proceeding will enable the Commission and stakeholders to reconcile achievement of environmental and electric system goals with ratepayer and other stakeholder interests

1. Such a proceeding would enable the Commission to consider and remove the inequities of current rate design as applied to DCFCs

In order to remedy the rate issues caused by DCFC, the PSC should consider moving a substantial amount of revenue collection for shared distribution and transmission infrastructure from monthly demand charges to kWh charges.[79] Doing so will reflect the lower costs per kW of serving low load factor customers compared to high load factor customers. Low load factor customers will still pay more per kWh than high load factor customers, as they should.

Using just one rate element, the monthly demand charge, to collect transmission and distribution system costs greatly limits the ability to match rates paid by customers to costs imposed on the system by customers. Adding a second rate element, a price per kWh, enables a significant improvement to more accurately reflect the impact of the customer based on its load factor. Rates could send an even more accurate price signal by the addition of a third element: a time-of-use kWh rate.[80] Such a rate would apply during only a small proportion of the hours of the year when the utility's system facilities are peaking. In the long-run, as EV charging becomes a more important load for transmission and distribution companies, these pricing methodologies will become an essential tool for both managing EV load and avoiding much of the added system costs that additional EV load could otherwise create. The PSC should consider time-of-use kWh rates for DCFCs in the near future.[81]

Given that the demand for DCFC is typically 50 kW and above (going forward it will likely be 150kW or higher), it is likely that all DCFC customers will be in service classes that are eligible for flexible rate service contracts, where marginal costs are in many cases lower than the

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[79] This is separation of shared costs is already being done under the standby rates between the contract and daily-as used demand charges.

[80] San Diego Gas & Electric has proposed such a rate for EV charging. Garrett Fitzgerald & Chris Nelder, Rocky Mountain Institute, *EVGO Fleet and Tariff Analysis, Phase 1: California, I* (2017) p.11, *available at* https://www.rmi.org/wp-content/uploads/2017/04/eLab_EVgo_Fleet_and_Tariff_Analysis_2017.pdf.; San Diego Gas & Electric (Jan. 20, 2017) Cal. P.U.C. Docket No. A.17-01-020 (Application of San Diego Gas & Electric Company for Authority to Implement Priority Review and Standard Review Proposals to Accelerate Widespread Transportation Electrification), *available at* https://www.sdge.com/sites/default/files/regulatory/SDGE%20Application%20For%20Approval%20of%20SB%20350%20Transportation%20Electrification%20Proposals_0.pdf .

[81] Garrett Fitzgerald & Chris Nelder, Rocky Mountain Institute, *EVGO Fleet and Tariff Analysis, Phase 1: California, I* (2017), p. 21.

standard base delivery rates.[82] This demonstrates that the current demand charges for DCFC could be lowered, yet remain above the marginal cost for delivery. Consistently, the Commission has justly championed rate flexibility to retain load and meet public policy objectives to bring rates closer to the marginal cost of delivery; it should continue to do so in this case.[83] DCFC, which is integral to achievement of New York's public policy objectives, represents a large potential added load that needs rate flexibility to accelerate its growth.

2. Such a proceeding would enable the Commission to evaluate the applicability of strategies employed in other jurisdictions for loads similar to DCFCs

Rates that use both kW and kWh charges to collect delivery system costs exist in other jurisdictions for load profiles similar to DCFC service.[84] For example, Xcel Energy in Colorado has a service class familiarly called "low load factor high demand" that has reduced demand charges and increased kWh rates.[85] Under the Xcel Energy rate, only distribution charges remain in a demand charge, and the generation and transmission charges are collected through the kWh rate. This results in a reduction of demand charge rates by approximately 72 percent during the summer months and 64 percent during the winter months. This rate design is such that increases in the customer's load factor will result in attendant increases in their contribution to delivery system costs. Thus, customers with lower utilization rates will see proper, cost-based reductions through this service classification.

The Petitioners do not dispute that the costs of distribution facilities close to the customer should be recovered via demand charges. However, with respect to facilities farther upstream from a customer, such as distribution substations and transmission lines shared by many customers, rates should be structured to enable a substantial portion of their cost recovery through kWh charges instead of through existing demand charges. Such rate design would better take into account unique DCFC load profiles.

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[82] *See e.g*. PSC NO: 220 Electricity Niagara Mohawk Corporation, Service Classification No. 12, Special Contract Rates.
[83] *See*, *Flexible Rate Contract Service.*
[84] For example, Portland General Electric's Schedule 38 replaced demand charge entirely with high energy rate. It was adopted for customers with intermittent demand such as churches and restaurants. *Portland General Electric Company*, P.U.C. Oregon No. E-18 (Dec. 21, 2017) (Advice No. 17-34, Schedule 38 – Large Nonresidential Optional Time-of-day Standard Service); *See also* Pub. Serv. Co. of Colo., *Colorado Commercial and Industrial: Gas and Electric Rate Schedule Summaries*, Xcel Energy, https://www.xcelenergy.com/staticfiles/xe/Regulatory/COBusRates.pdf (last visited March 10, 2018).
[85] Pub. Serv. Co. of Colo., *Colorado Commercial and Industrial: Gas and Electric Rate Schedule Summaries*, Xcel Energy, https://www.xcelenergy.com/staticfiles/xe/Regulatory/COBusRates.pdf (last visited March 10, 2018).

3. Utilities should be required to develop long-term EV plans

Utilities should be required to implement long-term DCFC rate plans, much like those implemented in California and Oregon, to provide a glide path for DCFC that aligns with the timeline for the ZEV mandate and eventual higher DCFC utilization. This would give DCFC developers relative certainty regarding the future demand charge operation costs for DCFC. The utilities and stakeholders should be tasked with developing more appropriate DCFC rates consistent with the changes advocated in Section III above.

However, the Commission should consider not only the development of stand-alone EV tariffs to make DCFC viable; it should also consider the establishment of a proceeding for a broader and more comprehensive plan for EVs in general, including medium and heavy-duty vehicles like Battery Electric Buses ("BEBs"). Replacing the roughly 5,750 diesel drivetrain buses with BEBs in New York City has the potential to reduce CO_2 emissions by roughly 500,000 metric tons per year,[86] and reduce bus particulate matter emissions within New York City by 98 percent.[87]

The State of California has instituted such approach, and the California Public Utilities Commission ("CPUC") required its electrical corporations[88] to submit EV action plans.[89] These plans respond to the call from the California State Legislature for "widespread transportation electrification" in order, among other things, to reduce greenhouse gas emissions, improve air quality and stimulate innovation and competition in the EV space.[90] In its response to the CPUC, SCE submitted the proposed DCFC rate structure described in the section above. The development of a similar plan submission structure, unique to each utility's circumstances, could be a part of the required EV action plans. Other actions that could be taken under the plans could include mapping of utility distribution systems to highlight parts of the system capable of hosting

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[86] Judah Aber, Colum. Univ., *Electric Bus Analysis for New York City Transit* (May 2016) p. 13, *available at* http://www.columbia.edu/~ja3041/Electric%20Bus%20Analysis%20for%20NYC%20Transit%20by%20J%20Aber%20Columbia%20University%20-%20May%202016.pdf.

[87] *Id*. at 18.

[88] "Electrical corporation" is defined under California Public Utility Code § 218 as "every corporation or person owning, controlling, operating or managing an electric plant for compensation with this state."

[89] Cal. Pub. Util. Comm'n,, *Assigned Commissioner's Ruling Regarding the Filing of the Transportation Electrification Applications Pursuant to Senate Bill 350*, Rulemaking 13-11-007 (Sept. 14, 2016).

[90] *See id*. at. 4-6.

DCFC with limited upgrades,[91] a program for the utilities to implement 'make-ready' infrastructure upgrades for charging,[92] or a program to allow for the avoidance of interconnection costs through smart controls or batteries that could curtail demand from a multi-plug charging station.

[91] Morgan Metcalf, Pacific Gas and Electric Company, *Direct Current (DC) Fast Charging Mapping, Electric Program Investment Charge*, Electric Program Investment Charge (Sept. 31, 2016), *available at https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-are-doing/electric-program-investment-charge/EPIC-1.25.pdf*.
[92] This could be done at a lower guaranteed rate of return, with incentives for chargers with high utilization rates.

CONCLUSION

For the reasons set forth above, the Commission should grant both elements of the relief requested by the Petitioners in order to encourage deployment of DCFC infrastructure and EV adoption.

Respectfully submitted,

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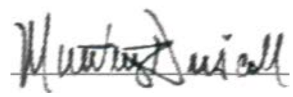

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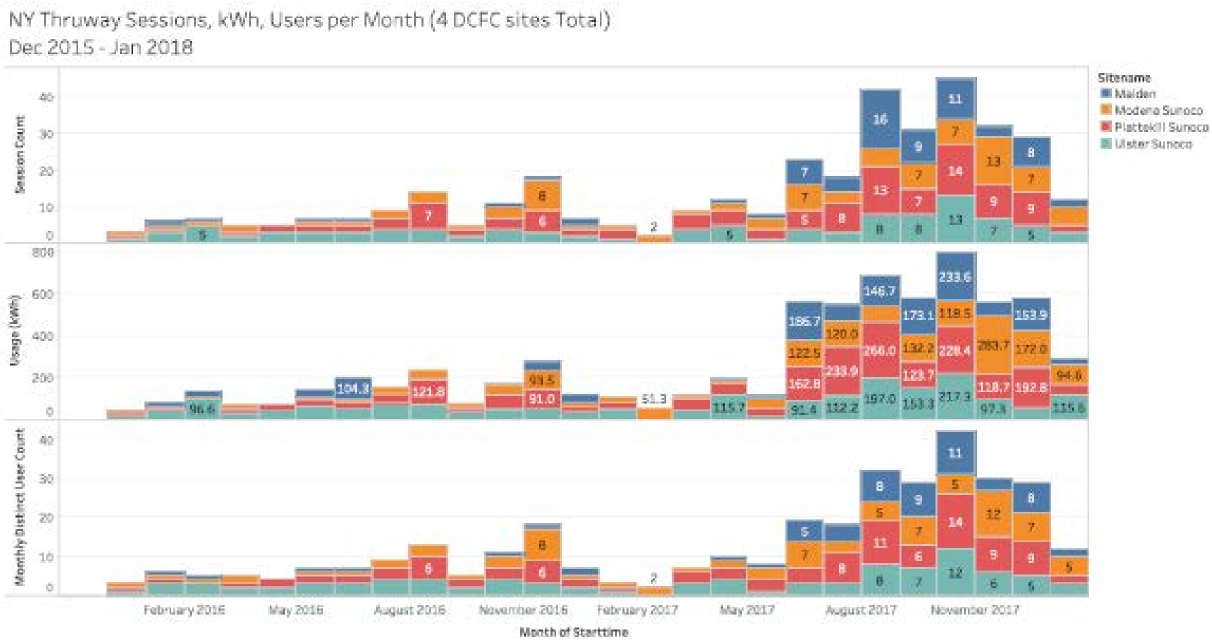
April 13, 2018

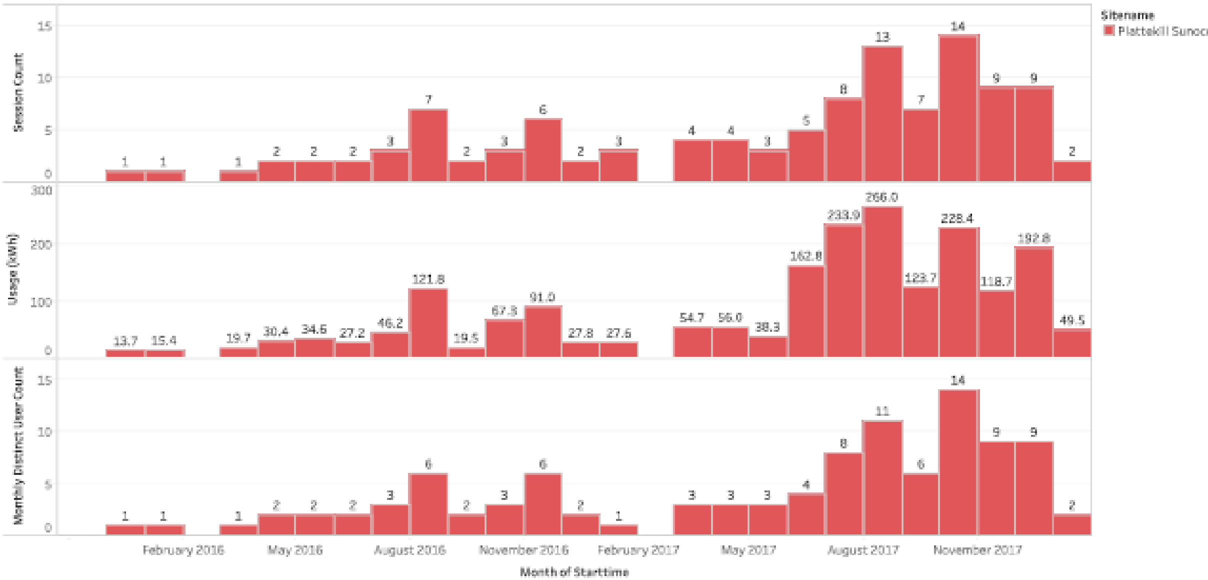
APPENDIX A

New York State Thruway Service Area DCFC Usage Data



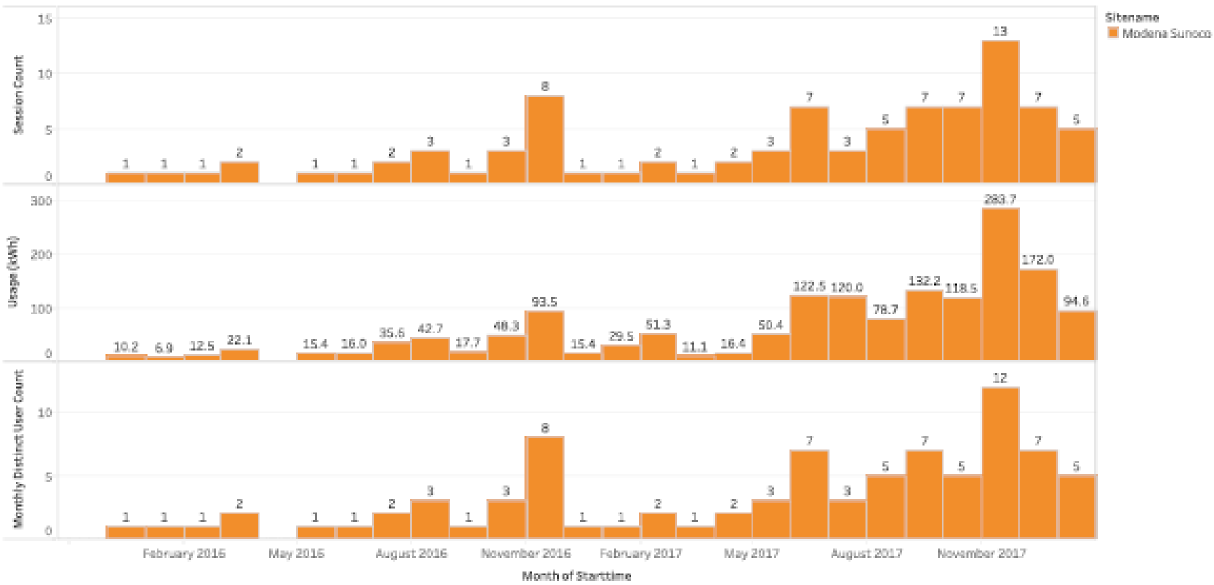
The plots of count of SessionId, sum of Energyusage and distinct count of UserId for Starttime Month. Color shows details about Sitename. The data is filtered on Energyusage, Deviceevseid and Starttime. The Energyusage filter ranges from 0.5 to 150. The Deviceevseid filter keeps 63147, 63148, 63149 and 63152. The Starttime filter ranges from 12/23/2015 3:36:16 PM to 1/31/2018 11:59:59 PM.

NY Thruway Sessions, kWh, Users per Month
Plattekill Sunoco
Dec 2015 - Jan 2018



The plots of count of Sessionid, sum of Energyusage and distinct count of Userid for Starttime Month. Color shows details about Sitename. The data is filtered on Energyusage, Deviceevseid and Starttime. The Energyusage filter ranges from 0.5 to 150. The Deviceevseid filter keeps 63147. The Starttime filter ranges from 12/23/2015 3:36:16 PM to 1/31/2018 11:59:59 PM.

NY Thruway Sessions, kWh, Users per Month
Modena Sunoco
Dec 2015 - Jan 2018

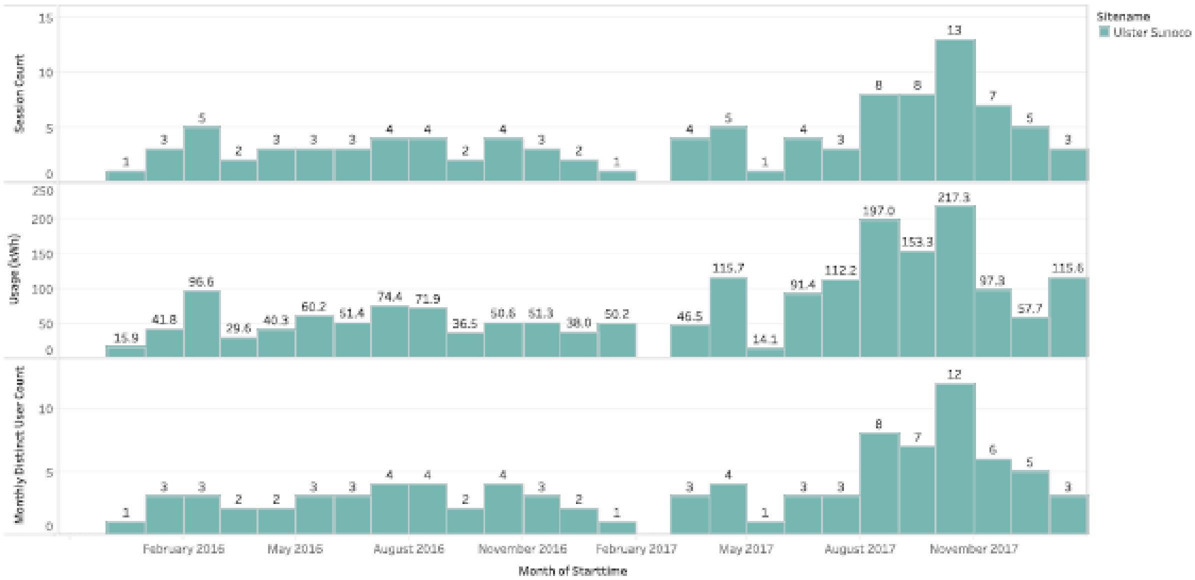


The plots of count of Sessionid, sum of Energyusage and distinct count of Userid for Starttime Month. Color shows details about Sitename. The data is filtered on Energyusage, Deviceevseid and Starttime. The Energyusage filter ranges from 0.5 to 150. The Deviceevseid filter keeps 63148. The Starttime filter ranges from 12/23/2015 3:36:16 PM to 1/31/2018 11:59:59 PM.

NY Thruway Sessions, kWh, Users per Month

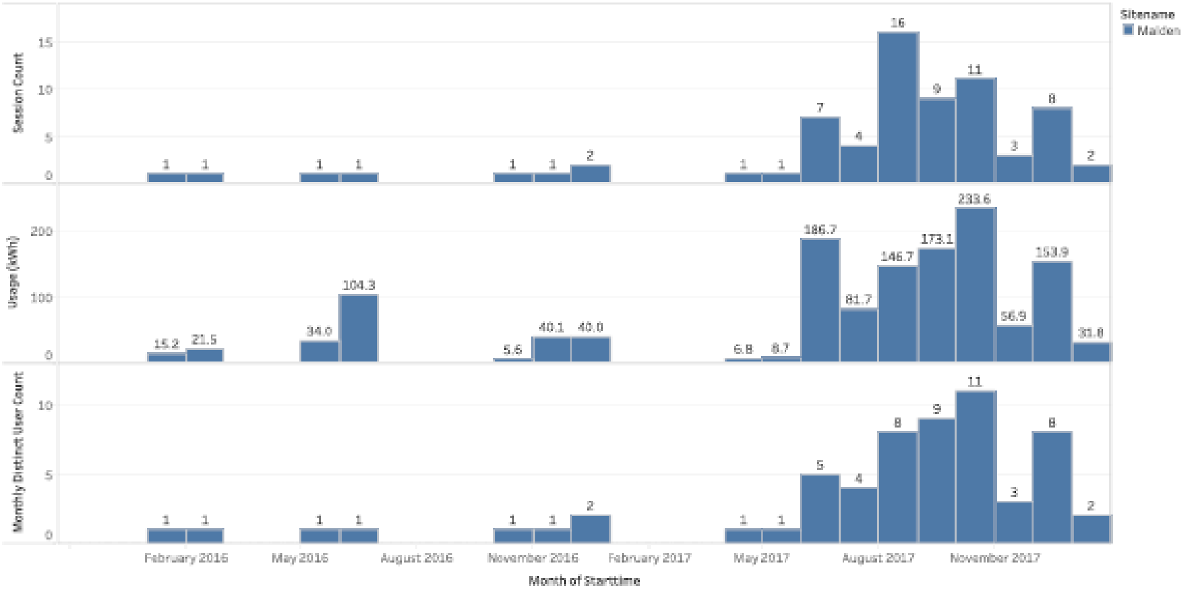
Ulster Sunoco

Dec 2015 - Jan 2018



The plots of count of Sessionid, sum of Energyusage and distinct count of Userid for Starttime Month. Color shows details about Sitename. The data is filtered on Energyusage, Deviceevseid and Starttime. The Energyusage filter ranges from 0.5 to 150. The Deviceevseid filter keeps 63149. The Starttime filter ranges from 12/23/2015 3:36:16 PM to 1/31/2018 11:59:59 PM.

NY Thruway Sessions, kWh, Users per Month
Malden
Dec 2015 - Jan 2018



The plots of count of Sessionid, sum of Energyusage and distinct count of Userid for Starttime Month. Color shows details about Sitename. The data is filtered on Energyusage, Deviceevseid and Starttime. The Energyusage filter ranges from 0.5 to 150. The Deviceevseid filter keeps 63152. The Starttime filter ranges from 12/23/2015 3:36:16 PM to 1/31/2018 11:59:59 PM.

APPENDIX B

Estimated Benefits and Costs of Electric Vehicles and Shift to Non-Demand-Metered Rate

The tables below, entitled "New York State ZEV Benefits" (Benefits) and "Projected Uncollected Utility Delivery Charges" (Delivery Charges) both use nominal values for DCFC impacts. The data in the Benefits table is supplied by M.J. Bradley and Associates, and rests on the same assumptions found in their study, cited throughout the Petition. M.J. Bradley and Associates provided the Petitioners projections for the year 2025, while their public study's projections begin in the year 2030.[93] The projected benefits assume that New York achieves the ZEV mandate targets in year 2025, and are in nominal values as opposed to the NPVs used in the study. These projections show the potentially significant utility net revenue and emission benefits that could result if New York is able to achieve that level of EV deployment. As shown in the MJ Bradley and Associates study, these values can be increased if EVs increase charging during off-peak hours due to the introduction of effective time-of-use rates or other mechanisms. While it is technically true that utility revenue from charges for DCFC would be higher under a scenario in which the shift to a non-demand-metered rate is not granted, utility revenue from increased energy sales driven by the installation of DCFC, and attendant EV adoption, would also be lower.

In order to estimate the magnitude of the requested relief, Petitioners estimated the number of DCFC plugs that are required to support the EV fleet in New York upon meeting the goals of the ZEV mandate in the year 2025. Petitioners used two data sources to complete these estimates:

1. The spreadsheet tool developed by the California Air Resources Board to estimate ZEV deployment.[94]
2. Ratios of DCFC per BEV obtained from the NREL report cited in this petition.[95]

Multiplying ZEV deployment by DCFC ratios yields estimates of DCFC deployment expected under the ZEV mandate. A description of assumptions and values is included below for each data source:

> To obtain an upper bound on the number of DCFC expected under the ZEV mandate by 2025, Petitioners assumed that all vehicles were fully battery electric (plug-in hybrid electric vehicles do not use DCFC), and that the range of each vehicle in 2018 was 100 miles (the shorter the range, the greater number of vehicles required under the ZEV mandate, as short-range vehicles receive fewer ZEV credits than longer range vehicles). The calculator yields a value of roughly 550,000 EVs deployed from 2018 through 2025 for California. Petitioners then multiplied this value by 50 percent to adjust for the ratio of car sales in California relative to New York (2:1). Based on this upper bound of vehicle deployment, Petitioners multiplied this number of vehicles by a ratio of 5.5 DCFC per 1,000 BEVs, as obtained from the NREL analysis. This yields a value of 1,500 DCFC deployed from 2018-2025.

Sensitivity analysis:

- A plausible lower bound from the NREL analysis is roughly 800 DCFC to accommodate the expected number of EVs required under the ZEV mandate.

[93] Dana Lowell et al., M.J. Bradley & Associates LLC, *Electric Vehicle Cost-Benefit Analysis – Plug-In Electric Vehicle Cost-Benefit Analysis: New York* (Dec. 2016).
[94] California Air Resources Board, ZEV Regulatory Calculator, 2017 ZEV Calculator Tool, available at https://www.arb.ca.gov/msprog/zevprog/zevcalculator/zevcalculator.htm.
[95] U.S. Dep't of Energy, Office of Energy Efficiency & Renewable Energy, *National Plug-In Electric Vehicle Infrastructure Analysis* (September 2017).

- If ZEV trajectories are exceeded in New York (as may be required to meet the state's 40 percent GHG reduction goals by 2030), then a plausible upper bound of DCFC is 2,400, assuming double the deployment of BEVs (consistent with 40 percent GHG reduction goals), and a 25 percent penetration of 250-mile range BEVs.

As a proxy for upstate, mid-state, and downstate utilities,[96] the Delivery Charges tables use the applicable demand charges for National Grid, Central Hudson Gas & Electric, and Consolidated Edison Company of New York, Inc., respectively. These tables assume that there will be four plugs per DCFC site and that the average DCFC would be 150kW. Further, they also assume that there are currently 50 DCFC plugs installed, which steadily increases each year until the beginning of 2025, when the stated number of DCFC for each scenario would be installed. The Delivery Charges model uses a probabilistic approach to calculate average kWh consumption and 150kW demand per site, which increases to the maximum demand of 600kW as daily utilization increases. The Delivery Charges model offsets the estimated avoided demand charges with the estimated delivery costs collected through the applicable non-demand-metered rates to approximate the potential impacts.

Under the three potential DCFC deployment scenarios, the potential cumulative avoided delivery charges across all New York utilities ranges from $58.8 million to $124.6 million. In contrast the Benefits table shows that *in the year 2025 alone*, utility net revenue arising from EV use if the ZEV mandate is achieved will be roughly $234 million. **In essence, increased EV adoption, made possible by increased penetration of DCFC, should yield net positive value to utility ratepayers at approximately $175 million to $109 million due to the increased demand and throughput from EV charging in year 2025 alone**. Additionally, the utility benefit is complemented by CO_2 reductions stemming from EV adoption, which is valued by M.J. Bradley and Associates at $64 million for the year 2025 alone. *These net-benefit numbers would all increase if the benefits from the ramp-up in EV adoption to 2025 are considered, increased off-peak charging is achieved, or if ZEV deployments exceed the mandate*. One way to look at this result is that the ultimate end users benefiting from the bypassing of demand charges, EV drivers, would pay for the bypass through the additional system throughput from home and workplace charging.

New York State ZEV Annual Benefits					
		2025	**2030**	**2040**	**2050**
Utility Customer Benefits	$ million	$234	$332	$530	$865
Social Value of CO_2 Reductions	$ million	$64	$162	$358	$708
Total Annual Net Benefits	**$ million**	**$298**	**$494**	**$888**	**$1,573**

[96] This includes Consolidated Edison Company of New York, Inc. and Long Island Power Authority

Projected Uncollected Utility Delivery Charges (Delivery Charges) 800 DCFC		
Utility Territory	**Number of Sites (assumed)**	**Projected Uncollected Utility Delivery Charges to 2025 ($ million)**
Upstate	100	$ 15.6
Mid-state	50	$ 13.2
Downstate	50	$ 30.0
		Total: $ 58.8
Projected Uncollected Utility Delivery Charges 1500 DCFC		
Utility Territory	**Number of Sites (assumed)**	**Projected Uncollected Utility Delivery Charges to 2025 ($ million)**
Upstate	188	$ 24.1
Mid-state	93	$ 20.0
Downstate	94	$ 44.2
		Total: $ 88.3
Projected Uncollected Utility Delivery Charges 2400 DCFC		
Utility Territory	**Number of Sites (assumed)**	**Projected Uncollected Utility Delivery Charges to 2025 ($ million)**
Upstate	300	$ 35.9
Mid-state	150	$ 28.4
Downstate	150	$ 60.3
		Total: $ 124.6

APPENDIX C

Business Incentive Rate Justification for Consolidated Edison Service Territory

In order to spur investment in DCFC and EV adoption in the Con Edison service territory Petitioners believe that additional action is needed beyond shifting to a non-demand-metered rate. Due to the higher SC-2 kWh rate in Con Edison's service territory the full retail electric costs of operating a DCFC under Con Edison SC-2 rate is estimated to be equal to the gas equivalency rate for operating an EV (the price per kWh at which the costs per mile of operating an EV is equal to the cost per mile of operating a vehicle powered by gasoline). Having DCFC priced at or near this price point for the EV driver is particularly important in Con Edison's service territory where potential EV drivers may live in multi-family housing and not have access to traditional home charging, and as such ready access to economic DCFC is important to encourage EV adoption. As shown below the total costs per kWh under the SC-2 rate in Con Edison's service territory are estimated to leave DCFC operators with little to no operating margin if they were to charge end-users a charging rate equivalent to operating a gasoline vehicle. Petitioners believe that a wider spread between the gas equivalency rate and retail electric costs is needed to spur DCFC investment and EV adoption in the Con Edison service territory, which can be accomplished through the application of the Business Incentive Rate discount to the Con Edison SC-2 rate.

(cents per kWh)	**2018 No BIR**	**2018 BIR**
Delivery & Supply Charges	13.75	9.62
Wholesale Electricity Charges	10.83	10.83
Other Charges	3.92	3.45
Electricity Retail Rate	28.50	23.89
Gas Equivalent Price at Pump	28.50	28.50