December 17, 2019

VIA HAND DELIVERY and
ELECTRONIC MAIL
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board.secretary@bpu.nj.gov

Aida Camacho-Welch
Secretary of the Board
Board of Public Utilities
44 South Clinton Avenue, 9th Floor
P.O. Box 350
Trenton, New Jersey 08625-0350

RE: In the Matter of the Petition of Atlantic City Electric Company for Approval of a Voluntary Program for Plug-In Vehicle Charging
Amended Petition
BPU Docket No. EO18020190

Dear Secretary Camacho-Welch:

On behalf of Atlantic City Electric Company (“ACE”), enclosed herewith for filing are an original and 10 conformed copies of a Verified Amended Petition, along with supporting testimony¹ and accompanying schedules, pertaining to ACE’s proposed Plug-In Vehicle Program. ACE respectfully requests that the Board retain jurisdiction of this matter.

Please return a “filed” and date stamped copy of this submission (including the cover letter) to the delivery agent.

Thank you for your consideration and courtesies. Feel free to contact me with any questions or if I can be of further assistance.

Respectfully submitted,

Andrew J. McNally

Enclosures
cc: Service List

¹ Specifically, this Amended Petition is supported by the Direct Testimony of: (1) Kevin M. McGowan; (2) Jennifer M. Grisham; (3) Michael Normand; and (4) Mark Warner.
ATLANTIC CITY ELECTRIC COMPANY ("ACE" or the “Company”), through its undersigned counsel, hereby submits this Verified Amended Petition (the “Amended Petition”) pursuant to N.J.S.A. 48:2-21 and N.J.A.C. 14:1-5.11 for approval by the New Jersey Board of Public Utilities (“BPU” or the “Board”) of the Company’s Voluntary Program for Plug-In Vehicle ("PIV") Charging. ACE’s Amended Petition substantially alters and expands upon the PIV Petition filed by the Company on February 22, 2018 in the above-captioned docket (the “Original PIV Petition” or “Original Petition”). In support of this Amended Petition, ACE states as follows:

I. Executive Summary

1. By this Amended Petition, ACE proposes a comprehensive, multi-year, $42.107 million program for PIV charging initiatives in New Jersey (the “PIV Program”) designed to be responsive to its customers’ needs and to address critical adoption barriers for PIV transportation by providing infrastructure solutions to reduce range anxiety; to encourage environmentally-friendly mobility options in public spaces, along transit corridors, and at workplaces; and to incentivize at-home and off-peak charging and energy use management through PIV-friendly rate

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1 For purposes of this Amended Petition, a PIV is defined as a vehicle registered in the State of New Jersey (except where otherwise noted) that can be plugged into an electric source to charge the vehicle’s battery.
designs and incentives for smart charger installations. More specifically, the proposed PIV Program seeks to:

- provide qualified residential customers with opportunities to save on their energy costs by shifting usage, including but not limited to PIV charging, to off-peak times through time-of-use (“TOU”) rates (Offering 1);

- provide off-bill incentives to residential customers for off-peak PIV charging (Offering 2);

- provide qualified residential customers with rebates for the purchase and installation of smart Level 2 chargers, plus incentives for off-peak PIV charging (Offering 3);

- provide qualified customers who own or operate multi-family residential buildings with rebates for the purchase and installation of Level 2 chargers, plus a demand charge incentive (Offering 4);

- provide qualified customers who own or operate office buildings or garages with a rebate for the purchase of Level 2 chargers, plus a demand charge incentive (Offering 5);

- provide qualified customers who maintain vehicle fleets with a rebate for the purchase of Level 2 chargers, plus a demand charge incentive (Offering 6);

- expand the availability of public PIV charging infrastructure through the Company’s installation and operation of up to 45 public Direct Current Fast Chargers (“DCFCs”) (Offering 7), and up to 200 Level 2 chargers (Offering 8);

- further promote the deployment of public PIV infrastructure by providing a rate incentive to private owners/operators of public DCFCs at up to 30 locations (up to a maximum of 120 chargers), plus a “make ready” work incentive (Offering 9);

- provide grants (of up to $2 million in total) to encourage innovative projects to further facilitate the electrification of the transportation sector, particularly in low-to-moderate (“LMI”) and environmental justice (“EJ”) communities (Offering 10);

- provide funding to encourage the deployment of electric school buses in the Company’s service territory, with a focus on LMI and EJ communities (Offering 11);

- provide incentives to make electric charging infrastructure available for New Jersey Transit buses operating in the Company’s service territory (Offering 12); and
• offer a voluntary “Green Adder” to customers participating in Offering 1, and a built-in Green Adder for Offerings 7 and 8, where the electricity provided will come from renewable sources (Offering 13).

II. Introduction

2. Over the last several years, electric vehicle ownership and a desire for electric transportation options has significantly increased across the country, including in New Jersey. Many factors have contributed to the growth in electric vehicle ownership, including the increased availability of competitively-priced PIVs, increased consumer interest in reducing emissions from mobile sources, and the introduction of extended range options for PIVs using all-electric power. As the demand for electric transportation continues to rise, the demand for publicly available charging infrastructure increases.

3. The PIV market in New Jersey has grown substantially in recent years, with PIV registrations in the State rising to nearly 27,000 as of June 2019. In ACE’s service territory, which comprises much of Southern New Jersey, the number of registered PIVs has also grown, but PIV registrations in the Company’s service territory are below levels in other parts of New Jersey, and there is a dearth public charging stations available for PIV drivers in the ACE region.

4. At present, range anxiety—concern that an electric vehicle would have insufficient battery charge to reach its intended destination—is among the most significant barriers to large-scale PIV adoption. The strategic placement of charging infrastructure stands to reduce range anxiety, leading to the greater adoption of PIVs in the State, which in turn, will help New Jersey

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3 See id. at 13-14.

meet its ambitious goals to electrify the transportation sector and to dramatically reduce greenhouse gas (“GHG”) emissions.

5. As the State has recognized in the Draft 2019 New Jersey Energy Master Plan (“Draft EMP”), the development of charging infrastructure has been stymied due to “a classic chicken-and-egg problem.” Specifically, the absence of large numbers of PIVs on the road undermines the private sector’s willingness to develop charging infrastructure, while the absence of charging infrastructure reduces consumers’ willingness to purchase PIVs.6

6. To address this problem, and to spur increased adoption of PIVs in New Jersey, ACE proposes in this Amended Petition to implement a voluntary PIV Program, consisting of thirteen (13) Offerings for PIV charging in New Jersey, with a focus on providing ACE’s customers with new charging infrastructure and innovative electric rate options and incentives.

7. Since ACE filed its Original PIV Petition in February 2018, several pivotal events have occurred that have caused the Company to conduct further study of the proposed Offerings contained in the Company’s Original Petition, to engage in additional discussions with Board Staff and key stakeholders, and ultimately, to file the instant Amended Petition containing expanded and additional Offerings.

8. In particular, the State has taken a number of steps to foster PIV growth in New Jersey since the Company’s February 2018 filing. In April 2018, Governor Murphy signed the State Zero-Emission Vehicle Programs Memorandum of Understanding, committing New Jersey to work collaboratively with nine other states to support the deployment of electric vehicles. In May 2018, New Jersey enacted the Clean Energy Act, P.L.2018, c.17, landmark legislation

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5 Draft EMP, at 30.

6 Id.
designed to advance the State’s clean energy and climate goals. In June 2019, the Murphy Administration announced the “New Jersey Partnership to Plug-In,” a Statewide partnership of State government agencies to support the deployment of electric vehicles in various ways, including by seeking $16 million from the Volkswagen Environmental Mitigation Trustee for the deployment of electric heavy-duty garbage trucks, school buses, and port-related vehicles.7

9. Perhaps most prominently, the State issued the Draft EMP in June 2019, which embodies the State’s vision for achieving its clean energy and climate goals. As it relates to PIVs, the Draft EMP emphasizes that New Jersey will “electrify the transportation sector,” and provides that the State “must take further concrete steps to start to phase out motor gasoline and conventional diesel consumption as quickly as possible” through electrification of vehicles.8

10. The Draft EMP’s call for rapid electrification of the transportation sector stems from its recognition that, in New Jersey, “the transportation sector accounts for 46% of the state’s net greenhouse gas emissions, the largest of the state’s sources of emissions and nearly double the national average (28%).”9 Accordingly, the Draft EMP recognizes that electrification of transportation sector is critical to reducing emissions within New Jersey.

11. Among other things, the Draft EMP sets forth ambitious goals and strategies for electrifying the transportation sector, including: supporting the deployment of 330,000 light duty electric vehicles by 2025; deploying smart electric vehicle supply equipment (“EVSE”)10 throughout the State; utilizing incentives for both the installation of EVSE and purchase of electric

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7 Id. at 30.
8 Id. at 27 (emphases added).
9 Id.
10 EVSEs are the chargers and related equipment used PIVs and connected to the distribution system.
vehicles; electrifying the State’s passenger fleet of vehicles; improving New Jersey Transit’s environmental performance; increasing clean transportation options in LMI and EJ communities; and partnering with industry to incentivize the electrification of medium and heavy-duty vehicle fleet or in research and development.

12. To achieve the State’s goal of 330,000 light duty electric vehicles on New Jersey roads by 2025, the State must increase its PIV registrations by several orders of magnitude. Indeed, New Jersey must dramatically and quickly increase the number of PIVs on New Jersey roads in order to meet this goal.

13. As the Draft EMP recognizes, range anxiety is a key impediment to greater PIV adoption, and therefore, increasing the availability of charging locations for PIVs in the State is critical. The Draft EMP acknowledges that New Jersey lags behind other states in the deployment of electric vehicle infrastructure, “rank[ing] 45th in the nation in electric charging outlets per registered vehicle in 2018.” As such, there is a scarcity of PIV charging stations in many areas of the State, including in underserved LMI and EJ communities.

14. In keeping with the ambitious goal of the Draft EMP to electrify the transportation sector in New Jersey, as well as the State’s overall goal of reducing GHG emissions by 80% below 2006 levels by 2050, ACE has reexamined its Original Petition, and by this Amended Petition, has expanded its PIV Program Offerings, and has substantially increased its proposed deployment of electric charging infrastructure and incentives, as set forth in more detail herein. The Offerings within this Amended Petition comport with the State’s ambitious goals for electrifying the transportation sector and will provide for a cleaner environment for the State’s residents.

15. Notably, other jurisdictions have approved applications by utilities to implement programs to accommodate PIV charging. In particular, ACE’s affiliates within Pepco Holdings LLC (“PHI”)—Pepco and Delmarva Power—have received approvals to deploy PIV infrastructure in Maryland, the District of Columbia, and Delaware. Actions in these other jurisdictions include approvals for rebates for residential chargers, deployment of utility-owned public chargers, “make-ready” work for non-utility owned chargers, and rebates for commercial charging stations. New Jersey, however, has not yet approved a utility petition in this regard, ACE’s Original PIV Petition has been pending with the Board since February 2018.

16. Consistent with the findings and conclusions contained in the Draft EMP, and to meet the State’s goals to dramatically reduce carbon emissions and to deploy 330,000 light duty electric vehicles on New Jersey roads by 2025, it is incumbent upon the State to act now to enhance PIV charging infrastructure and accelerate PIV adoption in the State. The Offerings contained within this Amended Petition will support the growth of PIVs and the development of PIV infrastructure, as set forth below.

III. Procedural History

17. On February 22, 2018, ACE filed its Original Petition with the Board in the above-captioned docket, proposing a $14.9 million PIV Program with eight offerings designed to foster the growth and deployment of PIVs in New Jersey. By Board Order dated March 26, 2018, the Board retained jurisdiction over this matter, and designated Commissioner Upendra Chivukula as the presiding officer.

18. On or about April 6, 2018, the Division of Rate Counsel (“Rate Counsel”) filed a motion requesting a stay in this matter. ACE filed its response to Rate Counsel’s motion on or about April 16, 2018. On or about April 26, 2018, ChargePoint, Inc. joined Rate Counsel’s motion to stay. Several other parties sought intervenor and/or participant status in the case.
19. The Board neither granted nor denied Rate Counsel’s motion to stay. No other relevant procedural events have occurred in this docket since full briefing on Rate Counsel’s motion to stay was completed. However, as stated above, the State has taken several steps to set aggressive goals for the increased use of PIVs, prompting ACE to file this Amended Petition, which proposes thirteen (13) Offerings designed to accelerate PIV adoption in New Jersey.

IV. A Comprehensive Approach

20. ACE and its parent company, Exelon, believe that reliable, clean, and affordable energy is essential to a more sustainable future. Accordingly, ACE is committed to fostering innovation, exceptional performance, and thought leadership to help drive progress for its customers and communities, including through electrifying the transportation sector and fostering the growth of PIV adoption in New Jersey.

21. As a utility, ACE has the ability to fashion PIV offerings and tariffs under a portfolio approach that can allocate costs and benefits across various rate classes in a manner that equitably serves the public interest. Accordingly, ACE is uniquely positioned to help the State achieve its goals for electrifying the transportation sector, by, among other things, offering innovative electric rate options to its customers and developing new charging infrastructure in southern New Jersey.

22. By this Amended Petition, ACE is proposing a multi-year, $42.107 million PIV Program to incentivize off-peak charging of PIVs, develop PIV infrastructure, provide grants program to foster innovation in electrifying the transportation sector, and support for electrifying school buses. Rather than targeting a single market segment, the proposed Offerings in ACE’s PIV Program are holistic in nature, and will serve a variety of residential and commercial customers, as well as the public sector.
23. ACE’s proposed Offerings to induce off-peak PIV charging through discounted TOU rates and other rebates and incentives will allow the Company to accommodate the increased electric load resulting from the anticipated widespread adoption of PIVs. Thoughtful demand management can help avoid more expensive investments in the distribution system that would otherwise be required to maintain reliability. By managing PIV charging, collecting specific data pertaining to charging, designing and applying specific rates for PIV charging, and educating customers about PIV charging and methods for achieving cost savings, the Company can effectively implement demand management measures for PIV charging to reduce the impact of the electric load associated with such usage. Relatedly, this approach will help the Company maintain the reliability of the electric distribution system.

24. Properly-sited PIV charging infrastructure, with a focus on access, visibility, and safety will alleviate “range anxiety” and, consequently, will be critical to achieving increased PIV adoption in the State. Greater PIV adoption will reduce GHGs, improve public health, and assist the State in achieving its ambitious, but achievable, clean energy, climate, and PIV-specific goals. ACE’s desire to take on a leading role in this effort conforms with the Company’s commitment to environmental responsibility and technological innovation. More specifically, through ACE’s proposed Offerings that incentivize customers to install EVSE, provide for the development of ACE-owned EVSE, and support development of EVSE by third-parties, the Company seeks to lead the effort to make PIVs cost-effective and convenient for customers in its service territory.

25. Importantly, ACE is particularly well-suited to make PIVs and related charging infrastructure accessible to customers living in multi-family dwellings units (“MDUs”) as well as LMI and EJ communities. LMI and EJ communities are often the most affected by the negative environmental impacts of pollution and emissions, but are less likely to be serviced by third-party
developers of PIV charging infrastructure. Accordingly, ACE’s comprehensive approach to its PIV Program seeks to ensure that underserved communities reap the benefits associated with electrification of the transportation sector.

26. In keeping with the Company’s effort to foster the growth of PIVs in a holistic manner, ACE, by this Amended Petition, further proposes an Innovation Fund (to provide grants for innovative PIV-related projects), an Offering to provide funding for the electrification of school buses, and an Offering that would provide charging infrastructure for New Jersey Transit in the Company’s service territory. Finally, ACE proposes a “Green Adder,” allowing customers participating in Offering 1 to obtain electricity from 100% renewable sources, and which would be embedded in the Offerings pertaining to the public chargers that ACE proposes to operate.

27. As part of its comprehensive approach to PIVs, the Company has worked with stakeholders to devise a Program that is responsive to the needs of its customers. The Company met with the Board Staff, Rate Counsel, the New Jersey School Board Association, New Jersey Transit, the New Jersey Department of Environmental Protection, as well as other stakeholders, to discuss the Company’s proposed PIV Program. The Company was also an active participant in the Board’s New Jersey Electric Vehicle Infrastructure Stakeholder Group, and provided oral and written comments concerning electric vehicle deployment following the release the Draft EMP.12

V. The Company’s Proposed PIV Program Offerings

28. By this Amended Petition, ACE proposes to implement a voluntary PIV Program, consisting of thirteen (13) Offerings. ACE’s proposed Offerings under this Amended Petition, along with projected budgets, are set forth in Table 1, below:

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Table 1: ACE’s Proposed PIV Program Estimated Costs

<table>
<thead>
<tr>
<th>Program Category</th>
<th>#</th>
<th>Offering Name and Description</th>
<th>Maximum Enrollment</th>
<th>Est. Budget ($000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1</td>
<td>Whole House TOU Rate - off-peak charging rate</td>
<td>Unlimited, 300 for budgeting purposes</td>
<td>$120</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Off-Peak Charging Incentive - off-peak incentive based on vehicle data</td>
<td>300 customers</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Residential Rebate/Managed Charging Program - 50% rebate L2; 50% rebate installation, off-peak incentive EVSE data</td>
<td>1,500 customers</td>
<td>3,396</td>
</tr>
<tr>
<td>Commercial</td>
<td>4</td>
<td>Multi-Family - 50% rebate L2; installation rebate (up to $10K); demand charge offset</td>
<td>200 chargers; ~65 locations</td>
<td>1,804</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Workplace - 50% rebate L2; demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td>Public Chargers</td>
<td>6</td>
<td>Fleet L2 - 50% rebate L2, demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Utility-Owned Public DCFC</td>
<td>45 chargers; ~15 locations</td>
<td>4,576</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Utility-Owned Public L2</td>
<td>200 chargers; ~65 locations</td>
<td>7,336</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Non-Utility-Owned Make-ready and Demand Charge Solution</td>
<td>30 locations; up to 4 chargers max/location</td>
<td>4,071</td>
</tr>
<tr>
<td>Community Planning</td>
<td>10</td>
<td>Innovation Fund</td>
<td>TBD</td>
<td>2,000</td>
</tr>
<tr>
<td>and Transit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Electric School Bus Fund</td>
<td>20 buses and chargers</td>
<td>5,500</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>New Jersey Transit Electrification</td>
<td>est. 1 bus depot</td>
<td>2,500</td>
</tr>
<tr>
<td>Green Adder</td>
<td>13</td>
<td>Green Adder for 100% renewable energy Optional Offering 1, mandatory Offerings 7 and 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Total Offering Costs: $33,107

Implementation, Admin, and IT Costs: $6,999

Education and Outreach Plan: $2,000

Total Estimate PIV Program Budget: $42,107

29. The proposed Offerings summarized in Table 1, and detailed in this Amended Petition and accompanying testimony, refer to different types of EVSE. Unlike traditional gasoline-powered vehicles that typically only refuel at gas stations, PIVs charge by connecting to
the electric distribution system using EVSE while parked at homes, at workplaces, or in public locations. EVSEs include a charging station or a charge port, and come in several types and configurations, but are generally categorized by power level, as follows:

(i) **Level 1**: 120-volt, alternating current (“AC”) power.

Level 1 charging refers to charging stations, as well as typical electric outlets that a driver plugs into via a cord set included with the vehicle. A PIV connected to a Level 1 charger takes about 12 hours to charge a fully depleted 50-mile battery.

(ii) **Level 2**: 240-volt, AC power.

Level 2 chargers typically are mounted on a wall or on a pedestal. A PIV connected to a Level 2 charger takes between 3 to 5 hours to charge a fully depleted 50-mile battery.

(iii) **Direct Current Fast Charger (“DCFC”)**:

Converts AC electricity to direct current (“DC”) and delivers a charge to the vehicle at higher power, typically 50 kilowatts. A PIV connected to a DCFC takes about 30 minutes to charge a fully depleted battery to about 80%, depending on battery size.

Typically, single-family homes, MDUs, and workplace charging facilities use Level 1 or Level 2 chargers. Retail operations that provide charging infrastructure usually offer Level 2 chargers. Metro-based and long-distance charging infrastructure typically uses DCFC.

30. All of ACE’s proposed Offerings will allow the Company to collect charging data, and based on analysis of this data, will permit the Company to better understand the impact of PIV charging on the electric distribution system, and to make appropriate adjustments to maintain system reliability.

31. **Offering 1: “Whole House” Time-of-Use Residential Rates – Rate Schedule “RS-PIV”**. Offering 1 would permit an unlimited number of qualified Basic Generation Service (“BGS”) residential customers that own PIVs to be billed under Rate Schedule “RS-PIV,” instead

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13 While ACE’s proposal puts no limit on the number of eligible customers who could avail themselves of this Offering, ACE proposal, for budgeting purposes, assumes that 300 customers would participate in this Offering.
of the standard residential service classification “RS”. The Rate Schedule in Offering 1 provides for a “whole house” TOU rate that incentivizes participating residential customers to shift their electric load, including but not limited to load associated with the charging of PIVs, to off-peak hours. The applicable rate applied under Offering 1 would be lower than standard BGS rates during off-peak hours, allowing customers to save money by shifting their usage to lower-priced, off-peak times. No second meter would be necessary under this Offering, and the customer’s current meter would be replaced with an interval meter to track off-peak use. All customers that enroll in Offering 1 would have the ability to subsequently opt out of the Offering without penalty. Notably, customers participating in Offering 1 would be eligible, but not required, to receive 100% of their electricity through the “Green Adder,” described more fully herein as Offering 13. The estimated cost for this Offering is $120,000.

32. **Offering 2: Off-Peak, Off-Bill Incentive for Residential Customers with Existing, Installed EVSE – Rider “REVCP”**. Under Offering 2, the Company proposes to provide up to 300 residential customers that have existing, installed PIV chargers, or who acquire a PIV charger on their own, with an off-bill incentive of 5 cents per kWh for PIV charging conducted during off-peak hours, netted against any PIV charging conducted during on-peak hours. Participating customers would be enrolled in Rider “REVCP”. To measure off-peak charging without the need for a second meter, a participating customer would install a mobile device (provided by the Company) into their PIV, which would allow ACE to measure off-peak

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14 Off-peak hours are all times other than the hours of 12 pm to 8 pm, Monday through Friday.

15 See infra ¶ 43.

16 Note that consistent with Table 1, the cost of Offering 1, as expressed above, and the costs of the individual Offerings expressed in the paragraphs that follow do not include implementation and administration costs.

17 Off-peak hours under Offering 2 (and Offering 3) are the same as those for Offering 1 (i.e., all hours other than 12 pm to 8 pm, Monday through Friday).
charging. ACE intends to collect customers’ charging data to evaluate usage patterns and their attendant impact on infrastructure needs. As with Offering 1, Offering 2 presents participating customers with the opportunity to save money by shifting usage to off-peak hours. The off-peak usage that this Offering seeks to incentivize inures to the benefit of the grid and will reduce associated costs. The estimated cost of this Offering is $192,000.

33. **Offering 3: Level 2 EVSE and Installation Rebates for Residential Customers without Existing Chargers, Plus Off-Peak Incentive – Rider “REVCP”**. Offering 3 would be available to up to 1,500 residential customers, on a first-come, first-served basis, who do not have a Level 2 charger or do not otherwise acquire one on their own. Under this Offering, ACE would provide a rebate equivalent to 50% of the cost of Smart Level 2 charger, plus a rebate for 50% of the cost of installation. Participants in this Offering would be enrolled in Rider “REVCP” and accordingly, would also receive the off-bill, off-peak charging incentive described in Offering 2 (five cents per each kWh of net off-peak PIV charging).

   To manage this Offering without a second meter, data about all charging transactions will be collected by the utility directly from the Smart L2 charger itself. ACE intends to collect customers’ charging data to evaluate usage patterns and their attendant impact on infrastructure needs. The estimated cost of this Offering is $3.396 million.

34. **Offering 4: Rebates for Level 2 EVSE and Installation, and Demand Charge Offset Incentive for MDUs with dedicated on-site parking, currently without existing EVSE – Rider “CEVCP”**. Offering 4 targets customers who own or operate condominiums and apartment complexes, *i.e.*, MDUs, where dedicated parking can be made available for PIV charging infrastructure. The purpose of this Offering is to bring charging capability MDU residents who might otherwise have no access to PIV charging infrastructure. Under Offering 4,
the Company would provide a rebate equivalent to 50% of the cost of a Smart Level 2 EVSE, plus a rebate for up to $10,000 towards installation costs (less any other applicable rebates). Customers participating in Offering 4 would also receive a demand charge offset incentive, calculated as 50% of the EVSE nameplate capacity, multiplied by the customer’s demand charge from the customer’s applicable rate schedule. The Company seeks to extend this Offering to cover up to 200 EVSEs that would be sited at MDUs.

For purposes of this Offering, the “customer” would be the account holder of the premise with whom ACE has the account contract. The customer would remain on their existing service, meter, and tariff, and no second meter would be required. The estimated cost of this Offering is $1,804,000.

35. **Offering 5: Rebates for Level 2 EVSE for Workplaces, Plus Demand Charge Offset Incentive – Rider “CEVCP”**. Offering 5 would be available to customers that own or operate office buildings or garages where dedicated parking can be made available for PIV charging infrastructure. Offering 5 has two components. First, the Company would provide a rebate equivalent to 50% of the cost of Smart Level 2 EVSEs to qualifying customers. Second, the Company would provide the customer with a demand charge offset incentive, calculated in the same manner as the demand charge incentive under Offering 4.

The Company seeks to extend this Offering to cover up to 150 EVSEs sited at workplaces and garages. Notably, customers participating in Offering 5 would be permitted to obtain rebates for up to six EVSEs, and the subject EVSEs could be located at up to three different sites. The

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18 For example, if a qualifying customer’s Level 2 EVSE had a nameplate capacity of 7.2 kW, and the customer’s demand charge in a given month was $80, the customer would receive a rebate of $40 for the subject month. The calculation for this Offering is more fully described in the accompanying testimony, particularly that of Company Witness Normand.

19 Installations in office buildings and garages can carry more significant costs than residential installations. To control costs and promote efficiency, ACE proposes that customer be responsible for installation costs under Offering 5.
“customer” under this Offering would be the account holder of the premise with whom ACE has the account contract. The customer would remain on their existing service, meter, and tariff, and no second meter would be required. The estimated cost of Offering 5 is $806,000.

36. **Offering 6: Rebates for Level 2 EVSE for Electric Vehicle Fleets, Plus Demand Charge Offset Incentive – Rider “CEVCP”**. Offering 6 would be available to owners of light duty commercial vehicle fleets that are interested in converting their fleets from internal combustion vehicles to PIVs (either BEVs or PIHVs). Under this Offering, ACE will seek to target commercial vehicle fleet managers and government agencies with vehicle fleets. Similar to Offering 5, Offering 6 features of two parts. First, ACE would provide a rebate to qualifying customers equivalent to 50% of the cost of a Level 2 EVSE. Second, the Company would provide qualifying customers with a demand charge offset incentive, calculated in the same manner as the demand charge incentive under Offerings 4 and 5, above.

The Company seeks to extend this Offering to cover up to 150 EVSEs for vehicle fleet charging. Customers participating in Offering 6 would be permitted to obtain rebates for up to six EVSEs, and the subject EVSEs could be located at up to three different sites. The customer would remain on their existing service, meter, and tariff, and no second meter would be required. Under Offering 6, the customer would be the account holder of the premise with whom ACE has the account contract. The estimated cost of Offering 6 is $806,000.

37. **Offering 7: Public Charging – Utility-Owned and Operated DCFCs – Rate Schedule “PC-PIV”**. Offering 7 consists of the installation of up to 45 DCFCs, for public use, at an estimated 15 locations along main transportation corridors in ACE’s service territory. Under this Offering, ACE would target locations that serve local and long-distance travelers in the State, reducing range anxiety, and would provide additional charging solutions for PIV drivers that lack
To identify appropriate locations, the Company will examine the density of PIV ownership in ACE’s service territory, and consider the locations of the major roadways and other pertinent characteristics, to provide the maximum opportunity for use and convenience of PIV drivers. The Company also intends to target underserved areas in ACE’s service territory under this Offering, such as LMI and EJ communities. Regarding specific sites, ACE intends to target government-owned properties for DCFC installation, but the Company will also consider commercially-owned properties where the subject chargers would be available at all times to PIV drivers. Deployment of DCFC under Offering 7 will also provide ACE with insight into the impact of DCFCs on the grid, as well as usage pattern data, and further enable ACE to evaluate the benefits of distribution storage while reducing the impact of demand charges.

The DCFCs to be deployed under Offering 7 would be owned and maintained by ACE, and importantly, the electricity provided would be from 100% renewable sources (through the embedded Green Adder, described more fully herein as Offering 13). The estimated cost of this Offering is $4.576 million.

38. **Offering 8: Public Charging – Utility-Owned Level 2 EVSEs – Rate Schedule “PC-PIV”**. Similar to Offering 7, and also through Schedule “PC-PIV,” Offering 8 consists of the installation of up to 200 Level 2 EVSEs, for use by the public, at an estimated 65 neighborhood locations within ACE’s service territory. Like Offering 7, Offering 8 will provide PIV owners with additional charging options away from home, thereby helping to reduce range anxiety. To

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20 Public charging services under this Offering would be available to all PIV drivers, regardless of whether they reside in New Jersey.

21 See infra ¶ 43.

22 Public charging services under this Offering would be available to all PIV drivers, regardless of whether they reside in New Jersey.
identify appropriate locations for siting these Level 2 chargers, the Company will examine the density of PIV ownership, the locations of the various major roadways, and other pertinent characteristics to maximize opportunities for the use and convenience of PIV drivers. In particular, the siting methodology would factor in convenience, retail proximity, safety, and other elements to ensure that the investment is complementary to community needs. Notably, the Company intends to target underserved areas of the State for the Level 2 chargers under Offering 8, such as LMI and EJ communities.

The Level 2 chargers to be deployed under Offering 8 will be owned and maintained by ACE, and will provide electricity from 100% renewable energy sources through the embedded Green Adder.\(^{23}\) The development of the Level 2 chargers under Offering 8 will also provide ACE with insight into the impact on the grid of Level 2 chargers, as well as additional usage pattern data. The estimated cost of this Offering is $7.336 million.

39. **Offering 9: Demand Charge Incentive and “Make Ready” Work Incentives for Non-Utility Owned Public DCFCs – Rider “NOUPDCFC”**. Offering 9 consists of two parts: (1) an off-bill demand charge incentive for private, competitive, non-utility owner/operators of publicly available DCFCs; and (2) a “make-ready” work incentive, where the Company would perform the electrical upgrades and work up to the point of the charger connection, at no direct cost to the non-utility owner/operator of the DCFC. ACE seeks to extend Offering 9 to up to 30 locations within ACE’s service territory, where each location could support up to 4 chargers (such that the Offering would cover up to a maximum of 120 chargers, in aggregate).

Offering 9 is intended to stimulate the commercial side of the DCFC market, helping to reduce range anxiety concerns, thereby leading to increased adoption of PIVs. During the early

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\(^{23}\) See infra ¶ 43.
adoption phase of PIVs, utilization rates can be low for public DCFCs. A single usage can cause a significantly high demand charge for the commercial owner, disincentivizing them to install a DCFC in locations that are not heavily utilized. To address this problem, Offering 9 would first provide the non-utility owner/operator of DCFC(s) with an off-bill incentive to reduce the effective cost of electricity to a known “set point.” The set point would be 20 cents per kWh under this Offering, until the Offering expires.

Under the second part of Offering 9, ACE would provide “make-ready” work to the non-utility owner of DCFC, where the Company would develop the electric infrastructure required to install a DCFC, up to the point of the charger connection, all at no direct cost to the participating non-utility owner/operator DCFC.

The proposed demand charge incentive, combined with the proposed “make-ready” solution, can help to offset high startup costs that a commercial owner of DCFCs may face until the PIV market expands. Eligible locations for the DCFCs under this Offering will be limited to commercially-owned property where the owner commits to making the charger(s) available for public use at all times. ACE will give priority to non-utility applicants installing DCFC in underserved areas of the Company’s service territory. Existing DCFCs would not be eligible to participate under Offering 9, because the Offering is intended to induce the construction of new, non-utility DCFCs. The estimated cost of this Offering is $4.071 million.

40. **Offering 10: The Innovation Fund – Rider “CTCP”**. With Offering 10, ACE proposes an “Innovation Fund,” by which interested persons or groups could seek funding from the Company to support innovative projects designed to further PIV charging in the State and support electrification of the transportation sector. Eligible projects could include PIV car share hubs, urban residential charging hubs, Vehicle to Grid (“V2G”) charging demonstrations, port
electrification, battery/resiliency pilots, and other similar uses. Projects designed to serve underserved and/or LMI and EJ communities would be desired and encouraged.

Under this Offering, funding would be awarded based on an application and review process conducted by the Company, with assistance and input from key internal and external stakeholders. Funding provided under Offering 10 would take the form of a grant issued by ACE in an amount up to 50% of the cost of the project. The project costs to which the grant would apply would be the net project cost after applying all other applicable incentives, grants, awards, and discounts. Through Offering 10, ACE proposes an Innovation Fund of $2 million, such that the estimated cost of this Offering is $2 million.

41. **Offering 11: Electric School Bus Fund – Rider “CTCP”**. With Offering 11, ACE proposes providing funding to school districts to cover the incremental cost of up to 20 electric school buses over traditional diesel-fueled school buses. The incremental cost of an electric school bus over a diesel-fueled school bus is estimated at $250,000. In addition, ACE proposes that its funding will cover charging infrastructure, up to $25,000 per EVSE. To be eligible for this Offering, a school district would be required to commit to purchase a new electric school bus (and pay the costs not covered by the Offering), keep it in service at least five years, and to provide ACE with access to the charging data. The Company would give preference to electric school buses to be owned and operated directly by the school district, with a limit of two buses per district. Through this Offering, the Company intends to focus on districts in LMI and/or EJ communities.

Funding the incremental cost of electric school buses would benefit the participating school districts by allowing them to save money through replacing higher cost diesel fuel with lower cost of electricity, as well as lower maintenance costs. Furthermore, this Offering would help eliminate
the health and environmental externalities to which school-aged children are exposed through the use of diesel fuels, and would reduce emissions in the communities in which the buses operate. Under Offering 11, ACE would partner with the New Jersey School Board Association to formalize the criteria, identify potential districts, and establish the procurement process for dispersing funds and obtaining electric school buses. The estimated cost of this Offering is $5.5 million.

42. **Offering 12: New Jersey Transit Bus Electrification – Rider “CTCP”.** Consistent with the Draft EMP’s goal of improving New Jersey Transit’s environmental performance, Offering 12 proposes funding to provide charging infrastructure for a New Jersey Transit bus depot in ACE’s service territory.\(^{24}\) Offering 12 would include the Company providing up to $250,000 in distribution engineering and upgrades as needed by the selected bus depot, and $2.25 million for high-powered charging station equipment. The Offering will be contingent on New Jersey Transit’s ability to fund the elements of the project not covered by ACE’s Offering (planning, electric buses, feasibility studies, etc.). ACE will work in close collaboration with New Jersey Transit to develop the specific project details, scheduling, and deployment of funds.

The majority of New Jersey Transit buses are currently powered by diesel engines, exposing riders and neighborhoods to air pollution. Replacing these diesel buses with electric buses will support the State’s efforts to reduce GHG emissions from the transportation sector, and will support bus-dependent residents in LMI and EJ communities. The estimated cost of this Offering is $2.5 million.

43. **Offering 13: The Green Adder – Rider “PIV-Green”.** Offering 13 (the Green Adder) will allow customers participating in Offering 1, at their election, to receive electricity from

\(^{24}\) There are two depots in ACE’s service territory, one in Egg Harbor Township and another in Washington Township).
100% renewable sources (through the proposed “PIV-Green” Rider). To effectuate this Offering, the Company will procure renewable energy credits (“RECs”) consistent with the amount of electricity delivered to customers that voluntarily participate in the Green Adder. At present, ACE estimates that the Green Adder would increase a participating customer’s rate by $0.0543 per kWh, but this will be dependent on REC procurement costs. Notably, these additional costs associated with the Green Adder will be borne exclusively by the customers participating in Offering 1 who elect to participate in the Green Adder.

Additionally, with respect to Offerings 7 and 8 (pertaining to utility-owned public chargers), the Company intends to embed the Green Adder into these Offerings by default, such that all electricity supplied though ACE-owned and operated public chargers would derive from 100% renewable sources. The additional costs associated with the Green Adder under Offerings 7 and 8 will be borne exclusively by the users of the utility-owned chargers.

Because the costs associated with the Green Adder, as applied to any of Offerings to which it could or would apply, is dependent REC procurement costs, the total cost will be determined upon implementation. That said, because these costs will be borne by participating customers, the Company will not seek to socialize the costs of the Green Adder among ratepayers generally.

VI. Education and Outreach Plan

44. Developing broad customer awareness about the benefits of PIVs an integral element of the Company’s proposal. ACE proposes an Education and Outreach Plan to achieve projected program participation levels, and that seeks to inform different customer segments (including potential car buyers) about the benefits of transportation electrification.

45. To reach New Jersey consumers, stimulate participation, and generate excitement around the PIV Program, the Company plans to develop trusted, sustainable, and efficient channels for interacting with customers and providing them with information targeted at allowing them to
make informed decisions regarding PIV purchases and charging options. The information provided through the proposed Education and Outreach Plan will: build awareness of PIV benefits and incentives; alleviate point-of-sale concerns for those looking to purchase a new PIV, encourage commercial customers to see the value in updating their fleet vehicles to include PIVs; inspire business customers to install workplace PIV charging stations; support the State’s efforts to meet its PIV goals; and leverage regional coordination among utilities and auto manufacturers to support PIV-related objectives.

46. The Company anticipates its campaign channels would include web content creation, social media advertising, radio advertising, printed material for car dealerships, outdoor advertising campaigns, ACE customer bill inserts and/or other direct mail outreach, “Ride and Drives” or similar events with area employers, and outreach at community events. The Company will also work with dealers to pass through discounts to incentivize PIV purchases.

47. The estimated cost for the proposed Education and Outreach Plan is $2 million.

VII. **Rate Design**

48. Offering 1 (the Whole House TOU Rate for residential customers) would be effectuated through a new rate schedule, specifically Rate Schedule “RS-PIV.” As mentioned, Rate Schedule “RS-PIV” would be applicable to an unlimited number of ACE BGS customers that own PIVs. The new proposed rate schedule for Offering 1 will be identical to ACE’s standard residential BGS rate schedule (*i.e.*, Rate Schedule “RS”), including Delivery Service Charges and all other applicable charges, except for the TOU-based BGS rate applicable to all electricity consumption (including but not limited to PIV charging) during off-peak hours (as defined above). Rate Schedule “RS-PIV” provides for a BGS rate of 4.9:1 for on-peak versus off-peak hours during the summer months (June through September), and a 3.7:1 ratio for on-peak versus off-peak hours during
during the winter months (October through May). At the customer’s election, the Green Adder could be applied to Offering 1, through Rider “PIV-Green”.

49. Offerings 2 and 3 will be effectuated through Rider “REVCP”, and enrollment in this Rider would be mutually exclusive with enrollment in Offering 1. Residential customers participating in Offerings 2 or 3 would remain on their existing rate schedule, but would receive a rebate of 5 cents per kWh for all PIV charging performed during off-peak hours (with off-peak hours defined as in Offering 1), net of any PIV charging conducted on-peak. Participants in Offering 3 would also receive rebates for the cost of the Level 2 charger (50%) and installation costs (50%). The proposed five-cent incentive for net PIV off-peak charging was selected by examining a number of factors, including an analysis of different charging scenarios and approved off-peak incentives in other jurisdictions (as more fully described within the accompanying testimony of Company Witness Normand).

50. Offerings 4, 5, and 6, which are applicable to the Offerings directed at MDUs, workplaces, and fleets, will be effectuated through participating customers’ enrollment in Rider “CEVCP”. Customers participating in these Offerings would remain on their existing rate schedules. Each of these Offerings provide participating customers with a rebate to cover 50% of the cost of the installed Level 2 EVSE, plus an off-bill demand charge incentive (calculated as 50% of the nameplate capacity of the Level 2 EVSE, multiplied by the demand charge in the customers’ applicable rate schedule. In the case of Offering 4 (MDUs), enrolled customers would also be eligible to receive a rebate for up to $10,000 to cover EVSE installation costs.

51. Offerings 7 and 8 (pertaining to utility-owned DCFCs and Level 2 chargers, respectively) would be effectuated through Rate Schedule “PC-PIV.” Rate Schedule “PC-PIV” will set forth the rates applicable to customers who use the ACE-owned chargers, and include the
Green Adder, effectuated through Rider “PIV-Green”. ACE calculated the Distribution Service Charges for Rate Schedule “PC-PIV” based on estimated public charger usage and the revenue requirement necessary to recover costs associated with the distribution infrastructure and the chargers themselves. The rates to be charged to PIV drivers who use the utility-owned chargers under Offerings 7 and 8 be influenced by prevailing market rates (as regularly updated), plus the cost of the Green Adder (since these chargers will feature electricity derived from renewable sources).

52. Offering 9—providing a set point incentive for Non-Utility DCFCs plus the “make ready” incentive—would be effectuated through Rider “NUOPDCFC”. Offering 9 will consist of a new service on a standard commercial tariff, with a new meter dedicated to the non-utility owned DCFC. This Offering would not be applicable to existing non-utility DCFCs, because the proposed incentive is intended to induce the construction of new non-utility DCFCs. Specifically, the off-bill set point incentive is provided to offset the customer’s demand charge, lowering the overall cost of electricity to a non-utility owner/operator of DCFC to known “set point.” The set point will be set at 20 cents per kWh for the duration of the Offering.

53. Offerings 10, 11, and 12 (pertaining to the Innovation Fund, the Electric School Bus Fund, and New Jersey Transit Electrification) will be effectuated through Rider “CTCP.” As set forth in more detail below, and in the accompanying testimony of Company Witness Normand, ACE proposes recovering its costs under these Offerings (among others) through a new regulatory asset (known as the “PIV Program Regulatory Asset”).

54. Offering 13 (the Green Adder), will be effectuated via Rider “PIV-Green,” and shall be applicable to Offering 1 (but only at the customer’s election), and Offerings 7 and 8 (by default, for utility-owned public chargers). At the end of each year, ACE will purchase an
appropriate number of RECs to provide 100% renewable energy under the Green Adder. Based on current REC prices, the Company estimates that the Green Adder would increase the cost of electricity by $0.0543 per kWh under the circumstances where the Green Adder would be applied. Due to timing issues associated with REC purchases and receipt of revenues paid by participating customers for the additional cost of the Green Adder, a separate regulatory asset, to serve as true-up mechanism, would be required to ensure a matching of revenue and expense.

55. The Draft Tariff Sheets, Rate Schedules and Riders associated with the proposed Offerings are set forth in Schedule (MTN)-2, appended to the accompanying testimony of Company Witness Normand.

VIII. Cost Recovery

56. As proposed, the total cost of the proposed PIV Program for which the Company would seek cost recovery is $42.107 million (see Table 1, supra). This figure excludes the costs to be borne by Offering participants, such as the share of the cost of EVSEs and EVSE installation that will not be covered by Company-provided incentives.

57. For purposes of cost recovery, ACE first proposes that all capital related to its PIV Program be added to rate base as it is placed into service, for the Company to recover in a future base rate proceeding.

58. Second, the Company seeks to establish the PIV Program Regulatory Asset, which would seek to capture the Company’s non-capital costs associated with the Program Offerings (e.g., rebates on EVSE equipment/installation, rate-related incentives, disbursements under Offerings 10 through 12 (Community/Transit), implementation and administrative costs, the costs of the Education and Outreach Plan, and incremental operations and maintenance, including incremental depreciation, associated with new capital placed in service under the program). Notably, the PIV Program Regulatory Asset would also capture the incremental revenues ACE
would receive from use of its public chargers under Offerings 7 and 8, offsetting costs to ratepayers.

59. The PIV Program Regulatory Asset and the undepreciated book value of the new capital placed in service would accrue at the Company’s full authorized return from inception, and would be recoded into the regulatory asset. ACE proposes that the regulatory asset would be amortized over a five-year period. The Company would seek recovery of this PIV Program Regulatory Asset amortization expense in a future base rate case, and that the regulatory asset would be afforded rate base treatment. In the future base rate case where ACE seeks to recover its PIV Program costs, the Company would provide a detailed explanation of how these costs are to be allocated across rate classes.

60. The accompanying testimony of Company Witness Normand, and the schedules attached thereto, set forth in greater detail the Company’s proposal for cost recovery, including the costs ACE proposes putting into rate base as capital, and which costs the Company proposes placing into the proposed PIV Regulatory Asset.

61. ACE estimates that a typical residential customer using 679 kWh per month will pay an additional 54 cents per month for the recovery of the PIV Program costs. This estimated impact is expected to be at least partially mitigated by other beneficial impacts on electricity rates induced by the Program and increased distribution system utilization. The projected bill impact of ACE’s proposed PIV Program is set forth within the accompanying testimony of Company Witness Normand, and the schedules appended thereto.

IX. Benefits to ACE’s Customers

62. ACE’s proposed PIV will be beneficial to ACE’s customers, both those who directly participate in the PIV Program and those who do not. The accompanying testimony of Company Witness Warner contains a thorough benefit cost analysis of the ACE PIV Program,
subjecting the Program to both a market-wide, Societal Cost Test (“SCT”) and Offering-by-Offering merit tests. Company Witness Warner concludes that the proposed PIV Program is projected to be cost-effective and will provide quantified net benefits to ACE customers.

63. More specifically, the accompanying benefit/cost analysis provides that the market-wide SCT and the Offer-specific merit tests deliver positive benefit/cost ratios, indicating that the increases in electricity costs resulting from the proposed Program would be more than offset by benefits to ACE customers.

X. **Stakeholder Support of ACE’s PIV Program**

64. ACE’s Amended Petition reflects the input and has the support of a number of stakeholders, several of whom have provided letters supporting the Company’s PIV Program. *Appendix A*, annexed hereto, contains the letters of support received to date.

XI. **Reporting to the Board**

65. The Company proposes to file a report with the Board as to the results of the PIV Program within two (2) years after it has been implemented. In addition, ACE will provide periodic updates to the Board on the Company’s Education and Outreach Plan.

XII. **Supporting Testimony**

66. This Amended Petition is supported by the Direct Testimony and supporting schedules of the following witnesses for the Company, each of which is attached hereto and made part hereof:

- Kevin M. McGowan............Policy Overview, PIV Program’s Support for State Policies and Acceleration of PIV Adoption
- Jennifer M. Grisham.........PIV Market Overview, Description of PIV Program Offerings, Data Collection
- Michael Normand.............Proposed Rate Design, Cost Recovery
Mark Warner…………………..Methodology and Results of Benefit-Cost Analysis

Performed for ACE’s Proposed PIV Program

XIII. Communications

67. Communications and correspondence regarding this matter should be sent to the following representatives of the Company:

Andrew J. McNally, Esquire
Assistant General Counsel
Atlantic City Electric Company
92DC42
500 N. Wakefield Drive
P.O. Box 6066
Newark, Delaware 19714-6066
Telephone: (609) 909-7033
andrew.mcnelly@exeloncorp.com

and

Clark M. Stalker, Esquire
Associate General Counsel
Atlantic City Electric Company
92DC42
500 N. Wakefield Drive
P.O. Box 6066
Newark, Delaware 19714-6066
Telephone: (302) 429-3260
clark.stalker@exeloncorp.com

and

Heather Hall, Manager
New Jersey Regulatory Affairs
92DC42
500 N. Wakefield Drive
P.O. Box 6066
Newark, Delaware 19714-6066
Telephone: (302) 451-5323
heather.hall@pepcoholdings.com
XIV. Request for Approval

68. ACE respectfully requests that the Board:

(i) approve the Company’s Amended Petition, and specifically, Offerings 1 through 13 as outlined herein, along with the associated tariff pages;

(ii) establish the PIV Program Regulatory Asset, in order to defer costs associated with implementing the PIV Program, and the regulatory asset applicable to the Green Adder; and

(iii) grant such other and further relief that the Board shall, in its discretion, deem just and reasonable.

WHEREFORE, for the foregoing reasons, the Petitioner, Atlantic City Electric Company, respectfully requests that the New Jersey Board of Public Utilities approve the Company’s Amended Petition to offer its PIV Program, and the associated rate recovery therewith.

Respectfully submitted,

ATLANTIC CITY ELECTRIC COMPANY

Dated: December 17, 2019

Andrew J. McNally
Assistant General Counsel
Atlantic City Electric Company – 92DC42
500 N. Wakefield Drive
P.O. Box 6066
Newark, Delaware 19714-6066
(609) 909-7033 – Telephone
andrew.mcnally@exeloncorp.com
IN THE MATTER OF THE PETITION 
OF ATLANTIC CITY ELECTRIC 
COMPANY FOR APPROVAL OF A 
VOLUNTARY PROGRAM FOR PLUG-IN VEHICLE CHARGING

STATE OF NEW JERSEY 
BOARD OF PUBLIC UTILITIES

AFFIDAVIT OF VERIFICATION

KEVIN M. McGOWAN, being duly sworn, upon his oath, deposes and says:

1. I am the Vice President of Regulatory Policy and Strategy of and for Atlantic City Electric Company ("ACE"), the Petitioner named in the foregoing Verified Petition. I am duly authorized to make this Affidavit of Verification on ACE's behalf.

2. I have read the contents of the foregoing Verified Petition for Approval of a Voluntary Program for Plug-In Vehicle Charging. I verify that the statement of facts and other information contained therein are true and correct to the best of my knowledge, information, and belief.

KEVIN M. McGOWAN

WASHINGTON, D.C. ) SS:

SWORN TO AND SUBSCRIBED before me this 9th day of December, 2019.

JAMIELA LANE, NOTARY PUBLIC

My Commission Expires: 05/14/2021

District of Columbia: SS
Subscribed and sworn to before me, in my presence, this 9th day of December 2019

JAMIELA LANE, Notary Public, D.C.
My commission expires May 14, 2021.
Appendix A

Letters of Support

African American Chamber of Commerce of New Jersey
ChargEvC
Edison Electric Institute
Environment New Jersey
Isles Self-Reliant Communities
November 15, 2019

Gary Stockbridge
President, Atlantic City Electric Company
5100 Harding Highway
Mays Landing, NJ 08330

Dear Gary:

On behalf of the Board of Directors, of the African American Chamber of Commerce of New Jersey (AACCNJ), I welcome the opportunity to submit this letter in support of Atlantic City Electric’s “Electric Vehicle” (EV) program, and we roundly endorse initiatives such as these across New Jersey as the state moves toward reducing emissions in the transportation sector.

The African American Chamber of Commerce of New Jersey (AACCNJ) performs an essential role in New Jersey’s Economy. As affirmed in its mission statement, the Chamber seeks to economically empower and sustain African American communities, facilitating entrepreneurship and free enterprise activity within the state, with direct outreach programs. Different from acting as simply an association of allied businesses, the Chamber serves as a proactive advocacy group. While providing a collective voice for New Jersey’s African American business leaders, the AACCNJ advocates and promotes economic diversity while fostering a climate of growth through major initiatives on the educational and public policy levels.

Access to the growing market of electric vehicles in New Jersey is of great interest to AACCNJ. While underserved communities are often lagging in the adoption of new technologies and innovation opportunities, we believe initiatives as proposed by Atlantic City Electric will help close this gap. We urge ACE to focus on strengthening access to the EV market with programs which reduce the cost of ownership in both the primary and secondary markets. Additionally, locating charging stations in underserved communities with high density multi-unit dwellings will offset the lack of private EV investment in communities like Atlantic City, Trenton and Camden County.

We are looking forward to partnering with Atlantic City Electric to help educate minority small businesses in New Jersey regarding the economic opportunities in the Electric Vehicle market.

Thank you for the opportunity to offer the Chamber’s thoughts on Atlantic City Electric’s filing and we support the Board of Public Utilities positive consideration in the upcoming preceding.

Sincerely,

John E. Harmon, Sr., IOM
Founder, President & CEO

Cc: Secretary of the Board
    NJ Board of Public Utilities
November 19, 2019

Secretary of the Board of Public Utilities
State of New Jersey Board of Public Utilities
44 South Clinton Avenue
Trenton, NJ 08625

CC: Joseph Fiordaliso, President
   Commissioner Mary-Anna Holden
   Commissioner Dianne Solomon
   Commissioner Upendra Chivukula
   Commissioner Bob Gordon

RE: ACE EV Petition

SENT VIA EMAIL

Dear Board Secretary:

The purpose of this letter is to provide support and comment on Atlantic City Electric’s (ACE) amended filing which proposes certain initiatives related to the development of the electric vehicle (EV) market in New Jersey.

ChargEVC is a coalition comprised of members representing interests from the utility and power generation sector, consumers, automotive retail dealers, technology and charging companies, environmental and equity advocates, and equipment manufacturers. ChargEVC membership is diverse, representing the convergence of a wide array of divergent interests on programs and policies that accelerate EV market development in New Jersey.

The coalition has been working over the last four years to develop programs and policies that will accelerate the adoption of EVs in New Jersey. Our recommendations are outlined in *A Roadmap for Vehicle Electrification in New Jersey: Market Development Strategy and High Impact Initiatives* (attached), and are supported by the findings of our landmark study: *Electric Vehicles in New Jersey: Costs and Benefits* (attached). These recommendations and net benefit findings have remained consistent as the market has continued to grow and evolve. See our updated report, *Projections of Electric Vehicle Adoption in New Jersey*, published this past September (attached).

In support of the ACE proposal, we want to highlight the importance of the emerging EV market to help New Jersey meet its clean energy goals. The draft version of the Energy Master Plan, and the results of the Integrated Energy Plan, have focused on the central and crucial role that vehicle electrification will play in achieving the State’s 80X50 goals.
Displacing petroleum use with electricity in vehicles reduces greenhouse gases dramatically, and improves air quality with a direct positive impact on public health. Expanding and accelerating the growth of the EV market is one of the most achievable and impactful strategies for reaching these goals. We consider the amended filing by ACE an essential element of these market development efforts.

The amended filing is consistent in approach, and appropriate in scale, with the recommendations in the ChargEVC Roadmap. It properly reflects important changes in the industry over the last eighteen months and has benefited from discussions with ChargEVC members. Importantly, it will help the state meet its EV goals.

The amended filing provides charging infrastructure solutions across a wide range of customer segments and is “right sized” to meet the EV market goals established for the state. In particular, the proposed programs are targeted to address the most crucial market needs that have been identified by ChargEVC:

- Ensuring that residential vehicle charging takes place at off-peak times, helping to mitigate potentially harmful impacts on the grid;
- Support for commercial sectors that are known to strongly influence EV adoption (such as workplace and fleet chargers);
- Support for the multi-family segment, which is under-served today;
- A variety of solutions to encourage the development of the public charging infrastructure necessary to change consumer perceptions about the lack of fast, convenient public charging and associated concerns about range anxiety;
- Rate-design incentive that addresses known economic barriers in the privately-owned public charging segments;
- Utility-owned public chargers for only the most challenging segments that are not well served by the market today.

ChargEVC is particularly pleased with the focus on underserved communities, the electric school bus proposal, and the electrification of NJ Transit. A central organizing principle for ChargEVC is that the benefits of this transition should be shared as widely as possible, with attention paid to urban and rural underserved communities. Getting essential products and services including getting to and from the workplace in a safe, reliable and affordable manner has been a long-time challenge for New Jersey’s underserved and disadvantaged populations. New Jersey will be well served by putting resources into projects that electrify public transit and encourage the development and operation of electric mobility fleet applications, including school buses. This innovation has the potential to greatly improve the movement of people throughout urban, exurban and rural areas.
In summary, ChargEVC strongly supports the program proposals in the amended filing, a significant advancement since the first filing was submitted in February of 2018. The program proposals will help New Jersey attain a leadership role in EV market development, consistent with Governor Murphy’s policy.

We look forward to a timely process and discussion of this exciting initiative over the next few months and are available to provide any information the Board may need.

Best regards,

Pamela G. Frank, CEO
December 4, 2019

Secretary of the Board
Board of Public Utilities
44 South Clinton Avenue, 3rd Floor, Suite 314
P.O. Box 350
Trenton, NJ 08625-0350

Dear Secretary,

The Edison Electric Institute (EEI) respectfully submits this letter to support active investment and engagement by electric companies in electric transportation infrastructure. EEI closely monitors the electric vehicle (EV) market across the country, including regulatory filings like the one before the New Jersey Board of Public Utilities in this docket. EEI appreciates the opportunity to provide a national perspective on the importance of the electric company role in EV charging infrastructure, how it can support the broader growth of the EV industry, and the opportunity for it to meet customer needs.

EEI is the association that represents all U.S. investor-owned electric companies. Our members, which include Atlantic City Electric, provide electricity for 220 million Americans, and operate in all 50 states and the District of Columbia. EEI’s member companies deliver safe, reliable, affordable and clean energy that powers our nation’s economy and enhances the lives of all Americans.

Electric companies are well-positioned to make targeted and strategic investments in EV charging infrastructure that benefit the broader community and accelerate EV adoption. The lack of EV charging infrastructure is one of the primary barriers to widespread EV adoption.1 EEI and the Institute for Electric Innovation (IEI) released a report in 2018 forecasting 18.7 million electric vehicles on the road by 2030; the report finds that 9.6 million charging ports would be needed to support that many vehicles.2 Similarly, a concurrent increase in deployment of charging infrastructure in New Jersey will be needed to meet the state’s own Zero Emission Vehicle (ZEV) regulation, which requires approximately 15 percent of new vehicle sales to be ZEVs by 2025 - compared to a market share of about 1.23 percent in the state today.3

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3 Zero Emission Vehicles (ZEVs) sales represent 1.23 percent of all new vehicle sales in New Jersey from January 2019 through June 2019, according to the ZEV Sales Dashboard, https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/
Electric companies can expand customer access to EVs, integrate EVs into the energy grid in an efficient and cost-effective manner, and accelerate the transition to widespread EV adoption—in a way that is beneficial to all customers.

- **Customer value:** Electric companies are well-suited to expand electrification across multiple transportation modes and to expand access to EVs for the benefit of customers and communities. Electric companies can help provide a foundational system of charging infrastructure that supports the needs of customers, while also supporting a reliable, consistent, and positive customer experience.

- **Grid integration:** Electric companies are responsible for integrating electric transportation in a manner that benefits the energy grid and the customers who rely upon it. Electric companies are able to help manage the transition to electric transportation in an efficient and cost-effective manner.

- **Accelerating the transition:** Electric companies can help accelerate the transition to electric transportation and the resulting benefits for customers and society. Electric companies have existing relationships with customers and can deploy capital to spur the growth of charging infrastructure that is critical to enabling widespread transportation electrification.

Today, electric companies are investing more than $1.3 billion in electric vehicle programs in more than 23 states.⁴ Programs vary by state and electric company, but usually include at least one of the following elements: investments in “make-ready” infrastructure and charging stations; rebates and incentives to customers for the deployment of charging stations; customer education and outreach; and EV-specific rates. Increasingly, electric company investments have focused on supporting the electrification of commercial fleets, as well as, school and transit buses.

Atlantic City Electric’s amended EV program proposal will enable more choices for customers and make electric transportation more accessible to all communities, as it includes engaging with local school districts and New Jersey Transit to assist in the deployment of electric buses and charging infrastructure. The amended proposal directly benefits customers by lowering the barrier to entry for EV adoption by providing incentives through its residential managed charging program and the workplace and fleet charging offerings. Furthermore, through its proposed public charging offerings, Atlantic City Electric can leverage its system-planning capabilities to locate public charging infrastructure in a way that is cost-effective for the energy grid and geographically useful for the charging needs of its customers. This system-level planning can help fill gaps that the private market may not.

As states and regions develop policies to support the deployment of EVs and grow the market for all participants, electric companies should be permitted, and encouraged, to participate in this space. They are well positioned to play a critical role through targeted and strategic investments in EV charging infrastructure that benefit the broader community. Additionally, these investments can complement and accelerate other efforts underway to grow the EV market by third-parties and state governments, including the New Jersey Energy Master Plan. A healthy electric transportation market will only help to

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spur new entrants into the market that may offer innovative new products and business models. For the reasons mentioned above, New Jersey should allow electric company investments in electric transportation charging programs.

Respectfully submitted,

Philip D. Moeller
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Business Operations Group and Regulatory Affairs
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November 18, 2019

Secretary of the Board of Public Utilities
State of the Board of Public Utilities
44 South Clinton Ave.
Trenton, NJ 08625

Re: ACE EV Petition

Dear Board Secretary:

We write to provide support and comment on ACE’s filing to proposed EV initiatives related to the development of electric vehicles across New Jersey.

Environment New Jersey, a statewide environmental advocacy organization representing more than 20,000 dues-paying citizen member and more than 60,000 citizen activists, wishes to express our strong support for the filing made on behalf of Atlantic City Electric (ACE) concerning the development of electric vehicle market. We are pleased to join a wide set of allies in supporting this filing, including ChargEVC, an electric vehicle business coalition, who we coordinated with on the submission of this letter of support. We have a long history of working to develop programs and policies that will accelerate the adoption of electric vehicles in New Jersey, including campaigning for the initial legislation in 2004 that initiated the Clean Cars program in New Jersey.

The filings submitted by ACE is consistent with the recommendations of our allies and will help New Jersey attain a leadership role in EV market development, consistent with Governor Murphy’s policy goals. Pending further details on benefits and costs that we believe to be favorable for all ACE ratepayers, we would anticipate the final program approved could be even larger than what is in the current filing. We are clearly supportive of aggressive action immediately, to ensure the benefits are spread equitably for all ratepayers.

In supporting the ACE proposal, we want to highlight the importance of the emerging electric vehicle market to helping New Jersey meet its clean energy goals. Both the draft version of the Energy Master Plan, and the recent preliminary results of the Integrated Energy Plan modeling have focused on the crucial role that vehicle electrification will play in achieving the state’s 2050 carbon goals. Displacing petroleum use with electricity in vehicles reduces greenhouse gases dramatically and improves air quality with a direct positive impact on public health. Expanding and accelerating the growth of the electric vehicle market is one of the most achievable, but also one of the most impactful, strategies for achieving these goals. We strongly believe that the amended filing by ACE is an essential element of these market development efforts.
The amended filing submitted by ACE is consistent in approach, and appropriate in scale, with the recommendations made by a broad set of EV advocates across the state. It also reflects important changes in the evolving industry over the last 18 months and is a stronger proposal than the initial filing.

We support the program proposals in the amended filing and welcome the significant advancements in the ACE proposal since the first filing was submitted in February 2018. As is clear from the amended filing, ACE is looking to help New Jersey attain a leadership role in EV market development, consistent with Governor Murphy’s policies.

We believe this filing is crucial to meeting the state’s electric vehicle goals, and appropriate in the approach taken to meet our Clean Car mandates for electric vehicles. The proposal is comprehensive in that it provides charging infrastructure solutions across a wide range of customer segments. We are especially supportive of the increased enrollment scale proposed in the amended filing, which we believe has been appropriately sized to meet the EV market goals established for New Jersey.

The programs proposed are squarely targeted as the most important market needs. Strategic focus has been placed on ensuring that residential vehicle charging takes place at off-peak times, which should help mitigate potentially harmful impacts on the grid. Support has been provided for commercial sectors that are known to strongly influence adoption (such as workplace and fleet chargers), and ACE is proposing especially strong support for the multi-family segment that is under-served today. The proposal also includes a variety of solutions to encourage the development of the public charging infrastructure that is necessary to consumer perceptions about the lack of fast, convenient public charging and associated concerns about range anxiety.

In area of public charging, the utility is proposing utility-owned public chargers for the most challenging segments that are not well served by the market today, combined with a rate-design incentive that addresses known economic barriers in the privately-owned public charging segments. The utility is proposing to support twice as many privately-owned public installations as utility owned facilities, which we believe is an appropriate balance between utility support to address market gaps and stimulation of the competitive charging industry. Only the utility can address rate design issues that currently limit public charging infrastructure development and ACE is proposing strong support for the competitive market is highly significant and will put New Jersey into a leadership position for this part of the market.

We believe the amended filing realizes a proper role for the electric utility in the emerging EV market – mitigating harmful impacts on the grid due to vehicle charging, supporting underserved segments, and addressing the gaps in public charging through a market structure that leverages both utility-based and private investment. We believe that without the kinds of programs proposed by ACE in the amended filing, the charging infrastructure necessary to support an increased number of electric vehicles on the road simply won’t materialize, and we applaud the utility for taking such a comprehensive and careful approach to the program design. Most importantly, we believe that the costs of the program are appropriate, given the large net benefit that is expected to result – including reductions in utility rates associated with the increased use of electricity due to vehicle charging. If the state wants to reduce electricity costs to all ratepayers, promoting increased electric vehicle use through utility programs as proposed by ACE is one of the most effective ways to achieve that goal.

We are particularly supportive of the ACE proposals to support innovative community-scale solutions, including new offerings to spur additional innovation across the ACE service territory, a focus on underserved communities, and the electrification of NJ Transit buses & retrofitting bus depots.
Environment New Jersey believes firmly that a full electrification of the state should occur as equitably as possible and as quickly as possible, which is why we can’t leave electrification to the private market. Specifically, we need to prioritize urban centers across the state that historically have faced undue environmental burdens, especially through the impacts of air pollution, exacerbated by car and light truck traffic, as well as an influx of medium and heavy-duty diesel vehicles. One of the economic challenges of urban residents has been to find adequate transportation to workplaces that are often far from city centers that is safe, reliable and affordable. New Jersey would clearly benefit from moving forward with pilot projects that would electrify public transit and encourage the development and operation of mobility fleet applications. This innovation has the opportunity to greatly improve the movement of people through urban and exurban communities.

Most importantly, the electric school bus program is exactly what is needed to begin the electrification of that segment, directly improving air quality for the school children of New Jersey and the communities in which they live. ACE is proposing to partner with the New Jersey School Board Association to ensure that these programs are designed and targeted in a way that maximizes their impact, and to ensure learning from these pilots is shared across the state.

It should be noted that nothing in this letter precludes the engagement of Environment New Jersey as a potential intervenor in the proceeding of this filing before the Board of Public Utilities, nor from advocating for additional alterations that would strengthen ACE’s current proposal to accelerate an electrification agenda for transportation across its service area.

We encourage a timely process and discussion of this initiative over the coming months of early 2020 and as we enter a new decade, we firmly believe that we are on the cusp of truly initiating a transportation revolution across the state. We understand the need for the BPU to spend the adequate time to ensure the right decisions are made on critical actions like this filing, and while this is the second time ACE has conducted this filing, we are optimistic this second filing can move forward. We believe this filing can be part of the evolution of how we move ourselves around the state and we are happy to provide additional information the Board may request.

Yours,

Doug O’Malley
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Trenton, NJ
domalley@environmentnewjersey.org
Cell: 917-449-6812

Cc: Joseph Fiordaliso, President
    Commissioner Mary-Anne Holden
    Commissioner Diane Solomon
    Commissioner Upendra Chivukula
    Commissioner Richard Mroz
    Michael Winka, Office of Policy & Planning
    Michael Hornsby, Office of Policy & Planning
November 21, 2019

Secretary of the Board
Board of Public Utilities
44 South Clinton Avenue, 3rd Floor, Suite 314
P.O. Box 350
Trenton, NJ 08625-0350

Dear Secretary,

These are exciting times in New Jersey as the state moves toward decarbonizing transport, and I’m pleased to submit this support letter for the ACE BPU filing.

Founded in 1981, Isles, Inc. is a community development and environmental organization based in Trenton, New Jersey. With a mission to foster self-reliant families and healthy, sustainable communities, we design and develop effective services that support this mission and share what we learn with others who can make a difference.

In Trenton, less than 65% of students graduate from high school; over 20% of homes are vacant; and residents need job training, and transportation options that will help them compete in an ever-changing economy. Isles meets these challenges through services like our Isles Youth Institute which has provided education, training and life skills support to drop-outs for 25 years. Isles’ Center for Energy and Environmental Training (CEET) has helped over a thousand underemployed workers access energy efficiency and green job careers while our planning and development work identifies and implements solutions that help activate and revitalize neighborhoods. Because our approaches work, Isles will continue to advocate for investing in youth, adult training and urban neighborhoods.

Left to market forces, EV stimulus programs will likely result in a flow of funds from all ratepayers to middle and upper-income families, who have the capacity to take advantage of them. This “Reverse Robin Hood” outcome can be mitigated by targeting investments in underserved communities in Trenton, the greater Atlantic City region and Salem County. These communities suffer from high levels of asthma primarily due to particulate matter from vehicles on the street, while they are excluded from entry-level jobs outside of cities, such as the over 10,000 Mercer County warehouse jobs that are inaccessible to thousands of talented Trenton young people due to a lack of transportation.

We particularly appreciate Atlantic City Electric’s investment in innovation. The $2M Innovation Fund should be expanded however, in order to create world-class efforts by partnering with community-based organizations such as Isles that can help leverage these dollars to develop emissions-free transportation solutions in inner cities of New Jersey. What a powerful message that would send to graduates of the Isles Youth Build Institute and CEET and active urban residents; to consider the
impact on environment when making transportation decisions of their own in a few years.

We strongly support your EV initiative and look forward to further conversations on how to advantage underserved communities and improve their quality of life.

Sincerely,

[Signature]

Martin Johnson
President and CEO
Isles, Inc.
Q1. Please state your name and position.

A1. My name is Kevin M. McGowan, and I am Vice President, Regulatory Policy and Strategy of Pepco Holdings LLC (“PHI”). I am testifying on behalf of Atlantic City Electric (“ACE”).

Q2. What are your responsibilities in your role as Vice President, Regulatory Policy and Strategy?

A2. I am responsible for regulatory, utility of the future, and energy acquisition matters for PHI and its three regulated utility subsidiaries: ACE, Potomac Electric Power Company (“Pepco”), and Delmarva Power & Light Company (“Delmarva Power”). In this capacity, I am responsible for regulatory affairs related to PHI’s utility business before the New Jersey Board of Public Utilities (“the Board”), the Public Service Commission of the District of Columbia, the Delaware Public Service Commission, the Maryland Public Service Commission, and the Federal Energy Regulatory Commission. I also participate in PHI’s analyses of regulatory issues and the development of positions on those issues.

Q3. Please state your educational background and professional experience.

A3. I hold a Bachelor of Business Administration degree in both Accounting and Business Data Systems from the University of Texas at San Antonio and a Master of Business Administration in Finance from the University of Chicago Booth School of Business. I am also a Certified Public Accountant.
In 1998, I joined Potomac Capital Investments, a subsidiary of Pepco, as the Vice President and Treasurer. In 2004, I transferred to the PHI Power Delivery group and eventually to PHI, where I managed various financial positions, including Strategic Planning, Financial Planning, Treasury, and Corporate Risk. In March 2009, I was promoted to Vice President and Treasurer of PHI. In November 2012, I became Vice President, Regulatory Affairs and, upon the closing of the merger between Exelon Corporation and PHI on March 23, 2016, I was named Vice President, Regulatory Policy and Strategy. Prior to joining Potomac Capital Investments, I worked for Duty Free International, an international retail company, and prior to that I worked for Ernst & Young.

Q4. **What is the purpose of your Direct Testimony?**

A4. The purpose of my Direct Testimony is to support ACE’s revised Plug-In Vehicle Program ("PIV Program") for New Jersey that, as described further, will amend and replace in full, the Company’s previous PIV application. I will provide an overview of the policies supporting the Company’s PIV Program. In addition, my Direct Testimony summarizes how ACE’s proposed PIV Program and offerings will help to support New Jersey’s clean energy policies and remove barriers to the accelerated adoption of PIVs in all communities in ACE’s service territory.

Q5. **How is your testimony organized?**

A5. My testimony is organized as follows. I will:

(a) Provide a background and overview of the Transportation and Electrification industry in New Jersey and ACE’s service territory;

(b) Discuss ACE’s role in supporting the wide spread adoption of PIVs;

(c) Discuss benefits of ACE’s proposed PIV Program;
(d) Summarize the PIV Program Offerings;
(e) Discuss the Data Collection, Customer Education, and Cost Recovery elements of the PIV Program; and
(f) Provide a brief introduction of the Company’s witnesses.

This testimony and accompanying exhibits were prepared by me or under my direct supervision and control. The sources for my testimony and exhibits are Company records, public documents, and analysis in support of the Company’s application. I also rely upon my personal knowledge and experience.

Q6. Did the Company file a previous PIV application?
A6. Yes, on February 22, 2018, the Company filed a Petition seeking approval of a $14.9 million PIV Program (the “Original Petition”). At this time, the Board has not taken action on the Company’s Original Petition.

Q7. Why is ACE amending its Original Petition?
A7. The PIV market in New Jersey has evolved since ACE’s Original Petition was filed over twenty months ago and is expected to grow exponentially in the future. In addition, through initiatives including the Draft 2019 New Jersey Energy Master Plan (“Draft EMP”) and the Partnership to Plug-in, the State has provided additional direction and vision concerning the role that transportation electrification will play in meeting New Jersey’s greenhouse gas (“GHG”) reduction and clean energy goals and how the State’s Electric Distribution Companies are to support this transformation. Over the past two years, ACE has continued to engage in discussions and forums with stakeholders throughout New Jersey in support of electrifying the transportation sector, as well as applying learnings from PIV
programs in our other territories and the experience of other evolving utility PIV programs. Based on this continued engagement and the various actions taken by the Murphy Administration, the Company has modified its Original Petition to expand many of its original Offerings, and to include additional Offerings that will provide more robust opportunities to help the State achieve its transportation electrification and GHG goals.

**Transportation Electrification in New Jersey**

**Q8. Is the State of New Jersey prioritizing the electrification of transportation?**

**A8.** Yes. New Jersey is taking steps to prioritize transportation electrification as a key strategy to reduce fossil fuel dependence, energy costs, air pollution, and GHG emissions and place the State at the forefront of innovation and the clean energy economy.

**Q9. Why is the electrification of the transportation sector in New Jersey a key strategy in achieving the State’s energy goals?**

**A9.** As noted in the Draft EMP, New Jersey’s GHG emissions from the transportation sector “accounts for 46% of New Jersey’s net greenhouse gas emissions.”\(^1\) GHG emissions in the New Jersey electricity generation sector are relatively lower than other states primarily because the State’s customers obtain their electricity from low-carbon sources, in particular natural gas and nuclear energy, as well as a growing share of renewable energy.\(^2\) By incentivizing residents to switch from gas-fueled vehicles to PIVs, New Jersey would realize significant gains in lowering the State’s GHG emissions, and reductions in other air pollutants that directly degrade public health conditions. Further, the reductions would be

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\(^1\) DRAFT EMP, at 102.

\(^2\) Id.
even more pronounced given New Jersey’s long commuting times. According to the 2018 American Community Survey, New Jersey has one of the longest average commute times, at 29.2 minutes, and 11.4% of New Jersey commuters face particularly long commutes of over 60 minutes.

Q10. **What are some of the measures New Jersey is taking to promote transportation electrification?**

A10. New Jersey has taken multiple steps to demonstrate its commitment to electrifying transportation in the State. In April 2018, Governor Murphy signed the State Zero-Emission Vehicle (“ZEV”) Programs Memorandum of Understanding. New Jersey is now one of 11 states that has committed to work collaboratively together as part of a Multi-State ZEV Task force to support the deployment of electric vehicles. This action reinforces New Jersey’s formal opt-in to the California Zero Emission Vehicle compliance program, which positions the State on the forefront of PIV adoption.

Additionally, in June 2019, New Jersey issued its Draft EMP featuring the State’s goals and initiatives to achieve 100% clean energy and reduce GHG emissions by 80% below 2006 levels by the year 2050. The Draft EMP included a comprehensive strategy to reduce energy consumption and emissions from the transportation sector. The strategy included aggressive goals indicating the State’s commitment to electric transportation. These goals and strategies include:

- Supporting the deployment of 330,000 light duty Electric Vehicles (“EV”) by

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2025;

- Deploying Smart electric vehicle supply equipment ("EVSE") throughout the State;
- Utilizing incentives for both the installation of EVSE and purchase of PIVs;
- Electrifying the State’s passenger fleet of vehicles;
- Improving the New Jersey Transit’s environmental performance;
- Increasing clean transportation options in low-and-moderate income ("LMI") and environmental justice ("EJ") communities; and
- Partnering with industry to incentivize the electrification of medium and heavy-duty vehicle fleet and Research & Development that will enable such electrification.

The State is also an active participant in the regional Transportation Climate Initiative ("TCI"), which is a regional collaboration of 12 Northeast and Mid-Atlantic states and the District of Columbia that seeks to improve transportation, develop the clean energy economy, and reduce carbon emissions from the transportation sector. Recognizing that more than one third of all GHG emissions in the region come from the transportation sector, participating states, including New Jersey, are taking action through working groups focused on regional priorities, such as clean vehicles and fuels.4

Finally, in June 2019, Governor Murphy’s Administration announced the “New Jersey Partnership to Plug-In”, a Statewide partnership, led by the Board, the New Jersey

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4 See https://www.transportationandclimate.org/content/about-us.
Department of Environmental Protection (“NJDEP”), and the New Jersey Economic Development Authority. The partnership has requested $16 million from the Volkswagen Environmental Mitigation Trustee for the deployment of electric heavy-duty garbage trucks, school buses, and port-related vehicles. Previously, the State issued $11.2 million of settlement funding to purchase electric buses for the City of Camden and additional charging infrastructure.

Q11. What measures is New Jersey taking to support PIV charging infrastructure?

A11. The New Jersey Partnership to Plug-In will be dedicating $7 million of the Volkswagen Environmental Mitigation settlement funds for fast-charging infrastructure technology. This initiative will promote collaboration with utilities, private transportation network companies, investors, and other energy providers “to establish an implementation roadmap for installing charging infrastructure in strategic and critical locations. This initiative includes assessing the distribution of Level 2 and DC Fast Charging (“DCFC”) stations and identifying a clear role for regulated utilities in building out the infrastructure.”

The New Jersey Department of Community Affairs will also support EV infrastructure development efforts by producing model municipal zoning ordinances to require charging infrastructure on new or redeveloped parking areas, encouraging

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5 Draft EMP, at 30.
6 Id.
7 Id.
8 Id.
9 Id. at 30-31.
municipalities to update zoning ordinances and redevelopment plans to include EV infrastructure, and updating building codes to require supporting electric infrastructure for EV infrastructure in new construction or major renovations.\textsuperscript{10}

Q12. \textbf{Does New Jersey offer incentives for the purchase of PIV charging infrastructure?}

A12. Yes. NJDEP will reimburse each applicant for a percentage of eligible costs, up to a maximum of $750 per Level 1 charging station; $5,000 per single-port Level 2 charging station; and $6,000 per dual-port Level 2 charging station.\textsuperscript{11} The grants covers purchase, installation, and a three-year maintenance agreement for the charging stations.\textsuperscript{12} Infrastructure built in publicly-designated areas will be reimbursed for 80 percent of charging infrastructure up to the associated maximum dollar value, and PIV infrastructure installed at workplaces and multi-dwelling units ("MDUs") qualify for 60 percent reimbursement up to the associated maximum dollar value.\textsuperscript{13} DCFC infrastructure is not eligible for the incentives at this time.\textsuperscript{14}

Q13. \textbf{Does the existence of the NJDEP program eliminate the need for other utility programs such as the PIV Program proposed by ACE?}

A13. No. First, the NJDEP program does not provide any incentives for residential customers, and therefore ACE’s PIV Program targets a segment of the market that is not

\textsuperscript{10} Id. at 30.


\textsuperscript{12} Id.

\textsuperscript{13} Id.

\textsuperscript{14} Id.
being addressed. Second, based on the estimated number of Level 2 and DCFC chargers needed to support 330,000 PIVs in New Jersey by 2025, the NJDEP program is significantly less than the total funds needed to meet overall demand. ACE’s PIV Program complements the NJDEP program and helps address a portion of this shortfall. In addition, the ACE PIV Program offers customers rate design options and benefits that are not available in the NJDEP program. As discussed later, these rate design benefits include demand charge credits and residential off-peak charging incentives that encourage PIV drivers to shift their load and charging to off-peak hours, allowing the Company to avoid infrastructure upgrades to meet the increased load.

In order to achieve the State’s goal of 330,000 electric vehicles on New Jersey roads by 2025, all parties will need to participate in the development of the charging system, and limiting any one party will increase the difficulty of achieving the State’s goal on PIV deployments.

Q14. Has the Company identified barriers to widespread adoption of transportation electrification in New Jersey?

A14. Yes. Barriers include the lack of PIV charging infrastructure in New Jersey, the inability of customers to afford higher upfront costs for advance technologies, the lack of education focused on PIV options and their benefits, and limitations on funding options for customers. In 2018, New Jersey ranked 45th in the nation in electric charging outlets per registered vehicle. The Company’s proposed Offerings within its PIV Program are meant

to address these barriers to a widespread adoption of transportation electrification in New
Jersey.

Q15. **Describe the current PIV market in New Jersey.**

A15. The number of PIVs registered in New Jersey has grown to approximately 26,840 at
June 2019\(^\text{16}\) which represents only about 8\% of the State’s goal of having 330,000 light-
duty electric vehicles by 2025. While Plug-In Hybrid Vehicles (“PIHVs”)—cars powered
by batteries coupled with an onboard gas engine or generator—drove the market initially,
the number of all battery electric vehicles (“BEVs”) has outnumbered PIHVs since 2018.
That said, although the PIV market in New Jersey has experienced exponential growth this
decade, the growth in sales for 2019 is expected to slow down as compared with the growth
in the prior three years, primarily due to fewer PIHV models being available, and the
growing market bias to focus BEV sales in attractive states that provide programs and
incentives for both vehicle purchase and infrastructure development. Therefore, a
comprehensive portfolio of solutions will be required to continue to accelerate this market
and support the State in meeting its goal of 330,000 light-duty electric vehicles by 2025.

Q16. **Describe the current PIV market in ACE’s service territory as compared to the rest of
New Jersey.**

A16. While the number of PIVs registered in ACE’s service territory has grown over the
past decade, the market in ACE’s service territory lags behind the rest of the State. For the
five counties in the Company’s service territory where all or nearly all of the county is

\(^{16}\) *Projections of Electric Vehicle Adoption in New Jersey*, Gabel Associates, Inc. September 2019, at 7, available at:
served by ACE (Atlantic, Cape May, Cumberland, Gloucester, and Salem) each has fewer
than 500 PIVs. Table 1 compares the number of registered PIVs in these five counties,
against the 2018 population compared to the State of New Jersey:

Table 1: Current PIV Registrations as compared Population

<table>
<thead>
<tr>
<th>Location</th>
<th>June 2019 PIV Registrations&lt;sup&gt;17&lt;/sup&gt;</th>
<th>2018 Population Estimate&lt;sup&gt;18&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic County</td>
<td>413</td>
<td>265,429</td>
</tr>
<tr>
<td>Cape May County</td>
<td>193</td>
<td>92,560</td>
</tr>
<tr>
<td>Cumberland County</td>
<td>121</td>
<td>150,972</td>
</tr>
<tr>
<td>Gloucester County</td>
<td>458</td>
<td>291,408</td>
</tr>
<tr>
<td>Salem County</td>
<td>79</td>
<td>62,607</td>
</tr>
<tr>
<td>Total New Jersey</td>
<td>26,840</td>
<td>8,908,520</td>
</tr>
</tbody>
</table>

Across ACE’s entire service territory, it is estimated there were approximately 1,533
PIVs registered at December 2018<sup>19</sup>. A targeted effort to expand Southern New Jersey’s
PIV market will allow these residents the opportunity to reap the benefits provided by
electric vehicles.

Q17. Describe the public EVSE market in New Jersey and ACE’s service territory.

A17. Although New Jersey has joined the ranks of Zero-Emission Vehicle states (states
that have opted into the higher California Clean Air standards), the State ranks low with
respect to publicly available charging facilities. Based on 2018 data, New Jersey has only
4.97 DCFC outlets per 1,000 PIVs, ranking ninth out of the 11 designated ZEV states and

<sup>17</sup>Id. at 13.

<sup>18</sup>https://www.newjersey-demographics.com/counties_by_population

<sup>19</sup>See Schedule (MW) -1. Projections of Electric Vehicle Adoption in New Jersey, Gabel Associates, Inc. September
2019, at 14. Estimate is based on registered electric vehicles by zip code.
15th when other market-leading non-ZEV states are included. Non-ZEV states represent states that have made significant progress toward advancing clean air policies but have not yet opted into the higher California Clean Air standards. In order to reduce range anxiety and develop a supporting PIV infrastructure, ChargEVC, a coalition of stakeholders that support vehicle electrification in New Jersey, estimated that “for an essential level of public charging, the State should have at least 300 locations supporting a minimum of 600 standards-based plugs . . . .” Based on this metric, “New Jersey has attained only 18 percent of the physical locations or plugs needed to provide an essential level of public fast charging.” This ChargEVC study is supported by a recent U.S. Department of Energy report addressing how many plug-in EVSEs are needed in the United States to support both PHIVs and BEVs, and suggests that New Jersey should have at least 480 public DCFCs to support just the State’s highway system.

The publicly available EVSEs that do exist in Southern New Jersey are located along the coastline and near the Delaware and Pennsylvania borders, outside of much of ACE’s service territory. A recent snapshot (as of December 10, 2019) of the Alternative Fuels Data Center’s website (reproduced below as Figure 1) reveals a dearth of publicly

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20 Id. at 16.

21 Id.


23 See https://afdc.energy.gov/stations/#/analyze?region=USNJ&show_map=true&country=US&access=public&access=private&fuel=ELEC&lpg_secondary=true&hy_nonretail=true&ev_levels=all. Each green dot in figure one represents available Level 2 and DCFC chargers.
available PIV charging options in much of ACE’s service territory, as well as inconsistent
geographic coverage that contributes to consumer range anxiety concerns. ACE’s PIV
Program is designed to address both of these deficiencies.

Figure 1: Charging Stations in ACE’s Service Territory

Q18. Please recap Transportation Electrification in New Jersey and why ACE’s
participation is important to achieve the State’s PIV goals.

A18. Although the PIV market in New Jersey has increased over the years, the growth in
new PIV purchases is slowing and the State lags behind other states in the number of registered PIVs and the availability of electric vehicle chargers. Barriers to widespread PIV adoption exist in the State today, and these barriers need to be addressed in order to meet the State’s goal of 330,000 electric vehicles by 2025. ACE is uniquely-positioned as the local utility to address many of these barriers and to support and accelerate the widespread adoption of PIVs in its service territory.

In addition to the direct benefits that ACE’s proposed PIV Program will confer on PIV drivers (e.g., reduced charging costs through off-peak incentives, discounts for charging equipment and installation, and greater availability of EVSE), the State and its residents more generally will benefit from reduced air pollution and GHG emissions generated by gasoline vehicles, resulting in improved air quality.

By deploying PIV charging infrastructure in appropriate locations, ACE can help remove barriers to residents accessing the PIV market. As a regulated entity, ACE can build chargers in a way that promotes PIV adoption among all market sectors, and not just those areas that would likely be served by competitive entities.

**ACE’s Role in Supporting Widespread adoption of PIVs**

**Q19. Please explain the role ACE is playing and can play in changing the landscape of electric transportation and PIV charging in New Jersey.**

**A19.** First, ACE’s role is to provide safe and reliable electricity that powers electric transportation through its distribution network. ACE can remove barriers to electric transportation adoption and deployment by installing charging infrastructure, creating off-peak charging incentives, managing and optimizing vehicle charging, and educating customers and other stakeholders. ACE’s proposed PIV Program addresses the top
reasons why customers have been slow to adopt PIVs, including range anxiety and concerns about how to charge at home.24

As the incumbent utility, ACE has the unique ability to add value to the grid by exercising some control over PIV chargers to efficiently manage power flows, provide open access without membership restrictions, and procure and own chargers in appropriate situations to spur electrification that will quickly yield environmental and economic benefits for all customers. One of the primary focuses of ACE’s PIV Program is to assist New Jersey in meeting and exceeding its progressive policy goals related to carbon reduction and the expansion of clean energy. Several of the Offerings proposed by ACE directly impact these mandates, while others will indirectly cause reductions in emissions by spurring the adoption of PIVs in the State. Moreover, as a utility and non-competitive actor in this space, ACE is positioned to expand the use of PIVs to areas currently underserved by the competitive market.

Q20. How else can the Company assist in promoting transportation electrification in New Jersey?

A20. Electric utilities such as ACE also can provide a foundational system of charging infrastructure that supports the needs of its customers, while also supporting a reliable, consistent, and positive customer experience. A utility’s obligation to serve all customers in its service areas makes it particularly well-suited to expand electrification across transportation modes and increase access to electric transportation for the benefit of all customers, including those in LMI and EJ communities. In this manner, ACE can further

improve and ensure fair access to charging infrastructure and afford all customers the opportunity to benefit from electric transportation.

Q21. **What challenges could an increase in PIV ownership cause for the Company’s distribution system?**

A21. A major challenge utilities face in integrating PIV loads lies in operating a reliable grid given the variability in PIV charging needs. While PIV loads are not currently large enough to meaningfully affect the grid, with widespread adoption of PIVs on the horizon, the future impact on peak loads could be material, particularly at the distribution and circuit levels. A majority of PIV charging is expected to take place at residential locations with off-street parking.25 With the size of a residential Level 2 charger of up to 7 kilowatts (“kWs”), just two of these chargers would equal or exceed the load of an average residence. As a result, even a small number of PIVs, charging simultaneously on a distribution feeder (for example, in the same housing development) could significantly increase peak loads. Utilities must be prepared for the expected increase in the number of PIVs on the road and must understand the charging patterns of PIV owners so they can make necessary adjustments and enhancements to the grid. Importantly, utilities must learn how to influence the charging practices of those owners to direct as much charging as possible to off-peak hours and thereby spread fixed system costs for the benefit of all customers. If utilities can effectively incentivize customers to charge off-peak, overloads to transformers can be managed to extend the life of the existing assets while allowing customers’ PIVs to be fully charged by the morning.

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Q22. Why is ACE best positioned to address these challenges?

A22. The Company’s action and involvement is needed to ensure that widespread transportation electrification occurs in a manner that benefits all customers and is integrated cost-effectively into the grid. Customers view ACE as an energy expert and expect the Company to provide information on energy-related technologies, including electric transportation. As customers seek guidance and options from ACE, the Company must be able to provide them solutions, which include affordable, reliable, and easy-to-use charging infrastructure options.

One key approach needed to advance PIVs in the State is rate design-based solutions. ACE and other utilities are uniquely-positioned to provide these solutions to customers. ACE’s investment in PIV charging infrastructure will also allow the Company to partner proactively with automakers, charging service providers, transportation planners, State and local governments, and other stakeholders to gain better visibility into PIV charging behavior, customer needs, and long-term technology trends that will inform system planning.

As the operator of the local electric grid, ACE alone has the system-level knowledge to integrate all transportation modes efficiently and safely with the existing power system in the Company’s service territory. As the Company plans for the future, it should be allowed to leverage the tools at its disposal to plan for and shape the transition proactively. Therefore, coupled with the fact that ACE has already shown the ability to support PIV charging infrastructure options, the Company should be afforded the opportunity to invest in transportation electrification, including options for full ownership and operation of charging equipment. Indeed, when asked to select who was best suited to
deploy and operate charging infrastructure, three times as many of the industry experts felt that electric utilities were better suited for this task than for-profit companies or other entities.\(^{26}\)

Q23. **Please discuss the benefits of ACE owning the charging infrastructure proposed for public space.**

A23. Utility investment in PIV charging infrastructure will help shape the development of the market with an eye toward long-term grid planning and customer benefits. If easy and affordable access to charging infrastructure at home and at work is unavailable, PIV owners will rely more on short-duration, high-power charging that provides a narrower opportunity to shape charging loads and provide grid benefits. Similarly, if owners of car-sharing fleets and eventual automated vehicle fleets are unable to adopt PIVs because the costs of charging infrastructure are too high, they may rely instead on conventional fuels that have greater environmental impacts. Utility investment in charging infrastructure allows utilities to be prepared to address these issues and to support market development to meet the outcomes desired by customers, policymakers, and other stakeholders. In doing so, further benefits may be reaped through reductions in wholesale energy costs. These benefits are described in further detail in the Direct Testimony of Company Witness Warner.

Q24. **Are there additional benefits to the Company owning charging infrastructure?**

A24. Yes, ACE’s involvement can support goals to facilitate the equitable distribution of charging infrastructure throughout Southern New Jersey. Competitive providers of EVSE, left to themselves, will develop infrastructure only where it is easy and profitable,\(^{26}\) _Id._ at 6.
but not necessarily where it is needed, and not in an equitable way. Some markets in ACE’s service territory are clearly underserved, such as charging stations for MDU residents, at workplaces, and for vehicle fleets. ACE’s involvement can ensure equitable access to public charging infrastructure and maximize benefits for all customers, because ACE, as a utility with a Board-approved PIV Program, would be able to deploy public chargers in places where the competitive market would not. In addition, the Company’s involvement will facilitate reliable and well-maintained charging stations that are online and able to deliver vehicle charging for customers, and that those stations will remain operational for the long term.

Q25. Please discuss the effects of increased PIV use on ACE’s distribution system.

A25. PIVs present a unique opportunity to utilize the power grid in a way that is more efficient and effective to the benefit of all grid customers. Because the power grid is built to serve peak loads, there is an opportunity to make use of unused capacity during hours other than the system’s peak, without need for costly system upgrades. PIVs are well-suited to utilize unused capacity for a few reasons. First, PIVs represent a significant potential new load. A car with a 30 kWh battery stores as much electricity as the average U.S. residence consumes in a day. Second, PIVs represent an inherently flexible load. Passenger cars are driven for an average of only about one hour per day, making the rest of the day an opportunity for the vehicle to be plugged in and provide a wide window within which charging behavior can be “shaped” to occur at optimal times. As such, ACE’s Residential Offerings (Offerings 1, 2 and 3) aim to encourage customers to charge

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at off-peak hours. In doing so, distribution planning can more effectively be accomplished. In addition, cost reductions associated with successfully shifting the demand to off-peak hours will reduce the need for capital equipment upgrades. Please see further details on distribution system impacts in the testimony of Company Witness Warner.

**Benefits of ACE’s PIV Program**

*Q26. Please explain the purpose of ACE’s PIV Program.*

*A26.* ACE’s proposed PIV Program serves several purposes and will provide numerous benefits to residents in Southern New Jersey. Not only does ACE’s PIV Program support PIV adoption for residential and commercial customers, the Program will expand PIV ownership and use in areas underdeveloped by the competitive market, such as electrification of New Jersey Transit bus depots, electric school buses, MDU complexes, workplaces, and vehicle fleets. ACE’s PIV Program is also focused on providing opportunities to underserved LMI and EJ communities. ACE’s PIV Program supports higher adoption of PIVs in ACE’s service territory, supports the removal of barriers to PIV adoption, and enhances education for customers about the benefits of using electric power as a fuel source for vehicles.

*Q27. Please discuss other benefits of the PIV Program.*

*A27.* Increases in PIV use over time will have progressively meaningful impacts on the Company’s distribution system. With recent increases in PIV adoption across the country and within ACE’s service territory, the Company is focused on the impact that PIVs and charging infrastructure will have on the electric distribution system. To that end, the
Company is seeking to mitigate reliability impacts and proactively test methodologies to incentivize customers to shift PIV charging to off-peak periods. The Company is also seeking to better understand whether and to what extent customers will change behavior associated with potential PIV charging through off-peak rates. The objective is to leverage the distribution system to deliver more kWhs to support the new increasing demand for PIV charging, but during the off-peak hours when the distribution system has the additional load capacity. This approach allows the kWh delivery rate to be lower as more kWhs are delivered on the system, while avoiding additional system upgrades to support the higher load.

Q28. Will the PIV Program and expansion of PIV ownership only benefit PIV owners at the expense of other non-PIV owners?

A28. No. Under existing rate structures, investments in other forms of behind-the-meter distributed generation, for example, generally results in customers who do not or cannot adopt these technologies subsidizing customers that do adopt these technologies. However, both PIV and non-PIV customers will benefit from ACE’s PIV Program and the expansion of PIV ownership in the State. It is estimated that the average PIV uses approximately 500 kWh per month to charge, about one-half of the historical residential customer’s monthly usage. As more kWhs are delivered by the system to charge PIVs, the lower the kWh distribution rate will become, benefitting all customers.28

28 To illustrate, if service for 15,000 new residential homes added electric service in ACE’s service territory, the kWh distribution rate for all residential customers would fall because the Company would be able to spread its cost of service over more kWhs. Based on average residential consumption and the kWhs used monthly to charge a PIV, the addition of 30,000 new PIVs in ACE’s service territory would be roughly equivalent to adding new service for 15,000 new residential homes, and likewise, would result in lower distribution rates for individual customers.
Q29. Please comment on the recent report by the Rocky Mountain Institute (“RMI”) on the New Jersey Integrated Energy Plan, particularly with regard to PIVs.

A29. RMI was retained by the Board to model and analyze the least-cost pathways to meet the energy needs of the State, and to achieve the State’s goals to reduce GHG and other clean energy objectives, as part of the State’s Integrated Energy Plan (“IEP”). RMI held a public webinar on November 1, 2019 to present and discuss the results of its analysis. RMI’s least cost scenario depended heavily on achieving a very high level of vehicle electrification very quickly, with an assumption that 100% of new vehicle sales will be electric by 2035. According to RMI, electrification of the transportation sector is critical to achieving the State's goals, since doing so will dramatically reduce GHG emissions and fossil fuel use.

Q30. Is ACE’s PIV Program supportive of the conclusions reached in the analysis by RMI?

A30. Yes, and the Company believes that programs like those included in its filing are essential to meeting the State’s electrification goals. Achieving the high level of vehicle electrification assumed in RMI’s least cost scenario requires development of a large amount of new vehicle charging equipment and infrastructure, which enables displacing the use of petroleum with efficient and diversified sources of electricity supplied through the grid. ACE’s proposed PIV Program directly supports these needs across a comprehensive set of segments, including Offerings to directly encourage deployment of charging equipment by reducing known barriers, and by introducing critical managed charging Offerings to mitigate the impacts of PIV charging on the grid. The Amended Petition addresses top priority barriers directly, especially through Offerings that enable the
development of public charging facilities sufficient to address consumer concerns about range anxiety. The Amended Petition also addresses key equity goals in diesel displacement segments, with programs to enable use of electrified school buses, and the provision of the charging infrastructure needed for New Jersey Transit to begin the transition to all electric buses. Without charging equipment and infrastructure Offerings like those ACE is proposing, the rate of electrification assumed in the IEP will continue to be constrained by existing market barriers, and the rate of electrification will most likely be slower and smaller than needed to achieve the State’s goals.

Q31. Does ACE or its affiliates have experience in other jurisdictions?

A31. Yes. As noted earlier, Pepco and Delmarva Power are affiliates of ACE and have filed for PIV programs in Maryland, the District of Columbia, and Delaware, and has received approval to move forward and deploy PIV infrastructure in all three jurisdictions. Throughout these service territories, PHI, ACE’s parent company, has to date received approval for:

- 1,000 Residential L2 Charger rebates;
- 354 Utility-Owned L2 and DCFC public charging stations;
- “Make-Ready” work for 55 third-party owned charging stations; and
- 250 Commercial charging stations

The learnings from these real-world programs have helped inform the design of this amended filing and provides the experience necessary for ACE to be successful implementing the advanced PIV Program being proposed in New Jersey. In addition, in support of PIV deployment in each of PHI’s jurisdictions, the respective PHI utilities have
conducted extensive customer education and outreach campaigns that include participation at local PIV events, distribution of PIV education material, and the development of a dedicated PIV website,\(^{29}\) where customers can learn about PIVs, understand the PIV programs offered by PHI utilities, and research and compare various PIV cars available to customers in each service territory.

**PIV Program Description**

Q32. **Provide an overview of ACE’s PIV Program.**

A32. ACE’s PIV Program includes Offerings that facilitate widespread and accessible PIV charging infrastructure, ensure responsible integration of vehicle charging loads, promote rate-based solutions that address market barriers, partner with entities and institutions seeking to deploy charging infrastructure, coordinate with State and local governments for deployment of public chargers, and leverage and provide new opportunities for competitive equipment and service providers. In particular, the investments made through the ACE Program will stimulate market development by other market participants, grow the competitive solution providers that supply equipment and services for vehicle charging, and leverage significant private investment. In addition, the Company proposes an Innovation Fund, support for the deployment of electric school buses, and an Offering to support the electrification of a New Jersey Transit bus depot. While the proposed PIV Program is intended to serve all segments of ACE’s customer base, several of ACE’s Offerings will provide direct benefits to underrepresented and underserved LMI and EJ communities. ACE also proposes an Education and Outreach

Plan, and data collection and reporting requirements to understand system impact and customer charging behavior, and to measure the overall effectiveness of the program. Table 2 lists the proposed thirteen (13) Offerings and the targeted market segments included in the Company’s Amended Petition.
### Table 2: Program Components and Targeted Market Segments

<table>
<thead>
<tr>
<th>Program Category</th>
<th>#</th>
<th>Offering Name and Description</th>
<th>Maximum Enrollment</th>
<th>Est. Budget ($000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1</td>
<td>Whole House TOU Rate - off-peak charging rate</td>
<td>Unlimited, 300 for budgeting purposes</td>
<td>$ 120</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Off-Peak Charging Incentive - off-peak incentive based on vehicle data</td>
<td>300 customers</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Residential Rebate/Managed Charging Program - 50% rebate L2; 50% rebate installation, off-peak incentive EVSE data</td>
<td>1,500 customers</td>
<td>3,396</td>
</tr>
<tr>
<td>Commercial</td>
<td>4</td>
<td>Multi-Family - 50% rebate L2; installation rebate (up to $10K); demand charge offset</td>
<td>200 chargers; ~65 locations</td>
<td>1,804</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Workplace - 50% rebate L2; demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Fleet L2 - 50% rebate L2, demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td>Public Chargers</td>
<td>7</td>
<td>Utility-Owned Public DCFC</td>
<td>45 chargers; ~15 locations</td>
<td>4,576</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Utility-Owned Public L2</td>
<td>200 chargers; ~65 locations</td>
<td>7,336</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Non-Utility-Owned Make-ready and Demand Charge Solution</td>
<td>30 locations; up to 4 chargers max/location</td>
<td>4,071</td>
</tr>
<tr>
<td>Community Planning and Transit</td>
<td>10</td>
<td>Innovation Fund</td>
<td>TBD</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Electric School Bus Fund</td>
<td>20 buses and chargers</td>
<td>5,500</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>New Jersey Transit Electrification</td>
<td>est. 1 bus depot</td>
<td>2,500</td>
</tr>
<tr>
<td>Green Adder</td>
<td>13</td>
<td>Green Adder for 100% renewable energy Optional Offering 1, mandatory Offerings 7 and 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

|                                |                                | Total Offering Costs:    | $ 33,107               |
|                                |                                | Implementation and Admin Costs: | 6,999 |
|                                |                                | Education and Outreach Plan: | 2,000 |
|                                |                                | Total Estimate PIV Program Budget: | $ 42,107 |

26
Q33. Please provide the number of units per offering the Company is proposing.

A33. Consistent with the data contained in Table 2, above, ACE’s Offerings provide incentives, rebates, and proposed deployments for the following number of charging units, broken down by Program Category:

- 1,500 Residential L2 chargers and 300 C2 devices (Offerings 1, 2, and 3);
- 500 Commercial L2 chargers (Offerings 4, 5, and 6);
- 45 Public DCFC chargers at an estimated 15 locations (Offering 7);
- 200 Public L2 chargers at an estimated 65 locations (Offering 8); and
- “Make Ready” work for up to 120 chargers at up to 30 locations to facilitate non-utility (privately owned and operated) charger installations (Offering 9).

These offers have been sized to prepare the PIV market in the ACE territory to meet the State’s 330,000 PIV goal by 2025. The specific number of units for the Innovation Fund, New Jersey Transit, and Electric School Bus Offerings will be determined at a later time, but will be within the budgets provided for each respective Offering.

Q34. Please describe the design of the PIV Program.

A34. The PIV Program is both comprehensive and holistic in nature. This means that the Company proposes to provide customers and the community with multiple Offerings designed to serve a range of customer types and target multiple segments of the market. As such, the Company proposes to implement a PIV Program consisting of 13 Offerings, plus a Customer Education and Outreach Plan, to benefit the residential, commercial, and public sectors, as well as Offerings to support communities and mass transit. These
Offerings focus on providing ACE’s customers with new charging infrastructure and innovative electric rate options and incentives. The Offerings cover residential use of PIVs through discounted rates, credits, and/or discounted equipment, support PIV charging at MDUs, workplaces, and for vehicle fleets, and provide for public-space installation of Smart EVSEs. In addition, there are Offerings that address infrastructure support for the electric school bus and mass transit. Please see the Direct Testimony of Company Witness Grisham for a more detailed description of each program Offering summarized below.

Q35. Please provide a brief description of the “Residential” Offerings (1-3).

A35. ACE’s PIV Program consists of three Offerings to accommodate residential charging:

- Offering 1 – Residential Whole-House Time of Use (“TOU”) rate
- Offering 2 – Off-Peak Charging Incentive
- Offering 3 – Managed Charging with Off-Peak Incentive

The TOU rate in Offering 1 is a rate that is structured according to peak and off-peak times of day, in which customers’ bills will be determined by how much energy they use and when they use it. The TOU rate (Offering 1) and off-peak charging incentive (under Offerings 2 and 3) will encourage PIV drivers to shift their load and charging to off-peak hours, which provides benefits to the distribution grid, and will help the Company meet customer demand without, in most cases, adding infrastructure to serve increased load. Offerings 1 and 2, which focus solely on off-peak charging, are generally attractive
for existing PIV owners, while Offering 3 targets future PIV owners through an off-peak incentive plus a rebate for the costs and installation of EVSE.

Q36. Please provide a brief description of the “Commercial” Offerings (4-6).

A36. ACE’s PIV Program consists of three Offerings to promote commercial charging:

- Offering 4 – Multi-Family Dwelling Unit (MDU) Charging
- Offering 5 – Workplace Charging
- Offering 6 – Fleet Charging

MDUs are apartments and condominiums where dedicated parking can be made available for EVSE infrastructure. Many MDU residents face challenges when considering owning or leasing a PIV, due to an absence of charging equipment at many MDUs. Offering 4 seeks to address these challenges by incentivizing MDU owners/operators to build PIV charging infrastructure.

Offering 5 seeks to incentivize the deployment of charging infrastructure in workplaces, to offer PIV drivers around-the-clock opportunities for grid-integrated charging who may not otherwise have convenient and consistent access to charging facilities. Offering 6 provides infrastructure to support the move toward electrifying State and private fleet vehicles, and aligns with one of the Draft EMP’s strategies for carbon reduction by electrifying State vehicle fleets.

Q37. Please provide a brief description of the “Public” charging Offerings (7-9).

A37. ACE’s proposed PIV Program includes three Offerings to support the installation of EVSEs to be available to the public for their charging needs:
• Offering 7 – ACE owned/operated DCFCs

• Offering 8 – ACE owned/operated Level 2 chargers

• Offering 9 – Make-ready work and demand charge incentives for non-utility EVSE operators

The siting for Company-owned chargers will consist of a coordinated effort between ACE, local governments, the New Jersey Department of Transportation, and other State agencies as appropriate. In siting its chargers, the Company will target easily-accessible and well-traveled areas within ACE’s service territory that are currently underserved by the private EVSE market. The “make-ready” work proposed as part of Offering 9 will incentivize third-party, non-utility providers of public chargers to build in areas that might not otherwise be served. Additionally, Offering 9 contains an off-bill demand charge incentive, intended to lower the non-utility owner/operator’s overall cost of electricity to a known “set point” during the term of the program and will further induce construction of new DCFCs by the private market.

Q38. Please provide a brief description of the Community Planning and Transit Offerings (10-12).

A38. ACE’s PIV Program consists of three Offerings to support community planning and transit:

• Offering 10 – Innovation Fund

• Offering 11 – Electric School Bus Fund

• Offering 12 – New Jersey Transit Bus Electrification
ACE will seek to provide priority to LMI and EJ communities while implementing these Offerings. Through Offerings 10, 11, and 12, ACE intends to provide additional support, in the form of financial incentives, to New Jersey residents or New Jersey organizations for innovative projects designed to further PIV charging in ACE’s service territory, and to support electrification of school and New Jersey Transit buses, which will help to curb local air pollution and emissions.

Q39. Please provide a brief description of the Green Adder (Offering 13).

A39. The Green Adder (effectuated through the proposed “PIV-Green” Rider) will ensure that customers participating in Offerings 1, 7 and 8 will receive 100% renewable energy if they so elect. This will be accomplished through the Company’s purchase of an appropriate amount of renewable energy credits (“RECs”) at the end of each year. The Green Adder will add to the customer’s electric costs, but will be voluntary for customers participating in Offering 1. With regard to Offerings 7 and 8 (pertaining to utility-owned EVSE), the Company proposes to include the Green Adder by default, ensuring that users of utility-owned public chargers will receive 100% of their electricity for PIV charging from renewable sources. The Company anticipates the revenue from the Green Rider will equal the cost of the REC purchases such that this option will not increase the cost of the PIV Program. For additional details, see the Direct Testimony of Company Witness Normand.
**Data Collection and Reporting**

**Q40. Please discuss the importance of ACE collecting data as part of its PIV program.**

A40. As discussed further by Company Witness Grisham, ACE proposes to collect data from customers via the EVSE. The data collected, such as transformer loading information, will allow the Company to make proactive rather than reactive decisions as it pertains to transformer replacements or other necessary infrastructure. Specifically, if an overloaded condition exists due to PIV clustering, ACE will be able to perform transformer replacements during the normal course of business, as opposed to conducting costly emergency replacements. It is also important for ACE to analyze the number of PIVs on the road and the charging habits of the owners of those PIVs, so that the Company can make necessary adjustments to the grid. Finally, ACE will quantify the effectiveness of its education and outreach plan and well as savings and overall satisfaction that participating customers enjoyed as a result of the PIV Program.

**Customer Education and Outreach Plan**

**Q41. Please explain the importance of including the Customer Education and Outreach Plan in the PIV Program.**

A41. Among the barriers to widespread PIV adoption is the lack of consumer awareness, particularly in LMI communities. To address this issue, ACE will provide customers with understandable and relevant information on PIV options and benefits. Similarly, robust education and outreach plans are critical to customer participation in utility PIV programs. ACE will leverage its existing relationships with customers and PIV dealers to increase
customer education and awareness, and to support customers in their evaluation of PIVs, rate plans, and charging infrastructure.\(^{30}\)

**Q42.** Will ACE’s proposed PIV Program hinder competition or pose an unfair business advantage?

**A42.** No, the Company’s proposal will not limit competition in any significant way and will not harm customers. In fact, ACE’s proposed PIV Program will stimulate commercial activity in the PIV market and create opportunities for competitive businesses, primarily through Offering 9, which provides incentives for non-utility, third-party competitive EVSE companies. In aggregate, the Company’s proposal is limited in scope and is intended to remove barriers to PIV adoption in ACE’s service territory while addressing gaps in the market, such as charging options for bus fleets, workplaces, multi-unit dwellings, and underserved communities.

The procurement and installation of the PIV Program’s charging equipment will be competitively bid to qualified contractors and vendors, which will enable more competition in these PIV-supporting market segments. Further, the rates offered by the Company would be regulated by the Board, which has extensive utility oversight through rate case regulation, audit authority, and investigative powers. Moreover, in an attempt to create more transparency and accountability, ACE proposes broad reporting requirements. In sum, the net public benefits of ACE’s proposed PIV Program will outweigh its costs.

In order to achieve the State’s goal of 330,000 electric vehicles on New Jersey roads by 2025, all parties will need to participate in the development of the charging system, and

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limiting any one party will increase the difficulty of achieving the State’s goal on PIV deployments.

Cost Recovery

Q43. Please summarize the cost of the PIV Program.

A43. As previously summarized in Table 2, the total estimated cost of the PIV Program is $42.1 million. In addition, revenues received from users of the Company-owned public chargers pursuant to Offerings 7 and 8 will help to offset the initial costs of the Program and its ongoing operating costs. Company Witness Normand further discusses the cost of the Program in his Direct Testimony.

Q44. What is the Company’s cost recovery proposal?

A44. As further discussed in Company Witness Normand’s testimony, the Company proposes that all capital related to the PIV Program be added to rate base as it is placed in service, to be recovered in a future rate case. In addition, the Company seeks a regulatory asset to capture incremental revenues from the public chargers (which will be credited to the asset) and incremental O&M costs associated with the PIV program, including rebates, incentives, and depreciation expense associated with new capital placed in service. The regulatory asset and the undepreciated book value of the new capital placed in service will accrue a return from inception, and will be recorded into the regulatory asset. The balance of the regulatory asset will be recovered in a future rate case and will be afforded rate base treatment.
Q45. Please discuss the impact of the PIV Program on residential customer rates.

A45. The Company estimates that a typical residential customer on BGS service using 679 kWh per month will pay an additional $0.54 per month for the recovery of the PIV Program costs. Company Witness Normand provides support for this estimate in his Direct Testimony. It is important to note the projected impact on the customer bill does not take into account all the other benefits that PIVs will bring to the State and customers. As further discussed by Company Witness Warner, when considering all costs and benefits across all impacted populations, the proposed PIV Program is estimated to provide a positive Benefit/Cost Ratio of 2.05 based on the Societal Cost Test. When considering the portfolio of Offerings 1 through 9 in the narrow context of how electricity costs are impacted for all rate payers (not just those that drive PIVs), benefits exceed ACE Program costs by a factor of 1.28.

Testimony in Support of the PIV Program

Q46. Please describe the structure of the Company’s Amended Petition.

A46. ACE’s present filing consists of the Amended Petition seeking approval of proposed rate schedules and riders, together with my testimony and that of three other witnesses:

- Mrs. Jennifer Grisham, Principal Business Program Manager, provides testimony in support of the proposed Program Offerings and implementation.
- Michael Normand, Manager of Rate Administration, provides testimony in support of the Company’s proposed rate design for this proposal, and addresses proposed cost recovery.
- Mark Warner, Vice President, Advanced Energy Solutions (Gabel Associates),
Witness McGowan

provides testimony in support of the net benefits of deploying the utility’s proposed PIV Program, including a variety of tests that demonstrate strong public benefit from a variety of perspectives.

Q47. Does this complete your Direct Testimony?

A47. Yes, it does.
Q1. Please state your name and position.

A1. My name is Jennifer M. Grisham, and I am the Principal Business Program Manager for the Electric Vehicle Program at Pepco Holdings LLC (“PHI”). I am testifying on behalf of ACE.

Q2. What are your responsibilities in your role as Principal Business Program Manager?

A2. I am responsible for developing, implementing and evaluating the Plug-In Vehicle (“PIV”) programs within PHI’s three regulated utility subsidiaries: Atlantic City Electric Company (“ACE” or “the Company”), Potomac Electric Power Company (“Pepco”), and Delmarva Power & Light Company (“Delmarva Power”). In this role, I am also responsible for stakeholder outreach, ensuring education plans are developed and implemented, as well as a positive customer experience for this new market.

Q3. Please state your educational background and professional experience.

A3. I have a Bachelor of Science degree in Business from the University of Maryland, College Park, MD and a Master of Business Administration from George Washington University in Washington, DC. Prior to joining PHI, I worked as a research analyst and consultant at Navigant Consulting. My focus was on evaluating and quantifying financial damages resulting from disputes in addition to supporting valuation analyses for energy companies. In 2008, I came to PHI as a Senior Analyst in the Regulatory Department, supporting the reporting of quarterly rate of returns and the development of Pepco’s revenue requirement during base rate cases. In 2012, I joined PHI’s Strategic Initiatives
department as a Strategic Policy Lead, then as Manager. In this role, I focused on the regulatory and business case development for asset management and grid modernization projects in Pepco, Delmarva, and ACE. In August 2019, I took on the role of managing PHI’s PIV programs.

**Q4. What is the purpose of your Direct Testimony?**

A4. The purpose of my Direct Testimony is to provide an overview of the PIV Program Offerings set forth in the Company’s Amended Petition, describe the customer enrollment process as well as education, and discuss the data the Company will collect during the Program’s operation, and why these data are important. This testimony and the accompanying schedule were prepared by me or under my supervision and control. The sources for my testimony are Company records, public documents, and my personal knowledge and experience.

**Q5. How is your testimony organized?**

A5. My testimony is organized as follows. I will: (a) describe the proposed New Jersey PIV Program offerings; (b) discuss the customer enrollment process as well as customer education efforts; and (c) explain what type of data the Company will collect during the Program’s operation and why.

**ACE Plug-In Vehicle Application**

**Q6. Please summarize the Company’s PIV application.**

A6. ACE is proposing to implement a multi-year PIV Program consisting of thirteen (13) separate Offerings for PIV charging in ACE’s service territory in Southern New Jersey. ACE’s proposed Offerings seek to facilitate the availability of widespread and accessible electric transportation charging infrastructure, implement grid-integrated rates,
partner with entities and institutions seeking to deploy charging infrastructure, coordinate
with State and local agencies and other stakeholders, leverage and provide new
opportunities for competitive equipment and service providers, and provide an option for
customers to receive 100% renewable energy under select Offerings through a “Green
Adder.” In addition, the Company proposes three community and transit Offerings that
that will provide direct benefits to underrepresented and underserved communities.
Finally, as part of its PIV program, ACE includes an Education and Outreach Plan as well
as data collection and proposed reporting requirements.

Table 1 provides a listing of the proposed Offerings, the targeted market
segments and the estimated costs. In addition to estimated costs for each Offering, Table
1 presents estimated costs for implementation, administrative and information
technology as well as education and outreach. After the PIV Program is approved, ACE
would present its implementation plan containing more refined and updated costs based
on confirmed Program components. A more detailed schedule for the estimated
Program budget is appended to my testimony as Schedule (JMG)-1.
Table 1: ACE’s Proposed PIV Program Estimated Costs

<table>
<thead>
<tr>
<th>Program Category</th>
<th>#</th>
<th>Offering Name and Description</th>
<th>Maximum Enrollment</th>
<th>Est. Budget ($000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1</td>
<td>Whole House TOU Rate - off-peak charging rate</td>
<td>Unlimited, 300 for budgeting purposes</td>
<td>$120</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Off-Peak Charging Incentive - off-peak incentive based on vehicle data</td>
<td>300 customers</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Residential Rebate/Managed Charging Program - 50% rebate L2; 50% rebate installation, off-peak incentive EVSE data</td>
<td>1,500 customers</td>
<td>3,396</td>
</tr>
<tr>
<td>Commercial</td>
<td>4</td>
<td>Multi-Family - 50% rebate L2; installation rebate (up to $10K); demand charge offset</td>
<td>200 chargers; ~65 locations</td>
<td>1,804</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Workplace - 50% rebate L2; demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Fleet L2 - 50% rebate L2, demand charge offset</td>
<td>150 chargers; ~30 locations</td>
<td>806</td>
</tr>
<tr>
<td>Public Chargers</td>
<td>7</td>
<td>Utility-Owned Public DCFC</td>
<td>45 chargers; ~15 locations</td>
<td>4,576</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Utility-Owned Public L2</td>
<td>200 chargers; ~65 locations</td>
<td>7,336</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Non-Utility-Owned Make-ready and Demand Charge Solution</td>
<td>30 locations; up to 4 chargers max/location</td>
<td>4,071</td>
</tr>
<tr>
<td>Community Planning</td>
<td>10</td>
<td>Innovation Fund</td>
<td>TBD</td>
<td>2,000</td>
</tr>
<tr>
<td>and Transit</td>
<td>11</td>
<td>Electric School Bus Fund</td>
<td>20 buses and chargers</td>
<td>5,500</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>New Jersey Transit Electrification</td>
<td>est. 1 bus depot</td>
<td>2,500</td>
</tr>
<tr>
<td>Green Adder</td>
<td>13</td>
<td>Green Adder for 100% renewable energy Optional Offering 1, mandatory Offerings 7 and 8</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Offering Costs:</td>
<td></td>
<td>$33,107</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implementation, Admin and IT Costs:</td>
<td></td>
<td>6,999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Education and Outreach Plan:</td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Estimate PIV Program Budget:</td>
<td></td>
<td>$42,107</td>
</tr>
</tbody>
</table>
Residential Offerings

Q7. Please summarize Offering 1 (Residential Whole House TOU).

A7. Offering 1 permits an unlimited number of Basic Generation Service ("BGS") Residential customers who own PIVs to choose a discounted “whole house” rate that will offer customers easy entry into a new and discounted rate for energy usage and charging during off-peak hours (8 PM – 11:59 AM, Monday through Friday, and all hours on weekends). Under this Offering, customers stay on their existing service, but move to a new Time of Use ("TOU") tariff with a utility interval meter for the whole house. A meter upgrade would typically be necessary, requiring ACE to swap the customer’s current meter to an interval meter, but at no cost to the participating customer. This Offering will benefit those customers who may or may not already own and charge a PIV, and whose lifestyle warrants a TOU rate such that they can benefit from charging at a lower rate.

Q8. What benefits does Offering 1 provide?

A8. Whole House TOU programs have proven to be beneficial in many states and are used by utilities to incentivize PIV customers to shift their load and charge during off-peak hours, which will help the Company meet customer demand without, in most cases, needing to add infrastructure to serve increased load.

Q9. Please summarize Offering 2 (Off-peak charging incentive for residential customers with existing EVSE).

A9. With Offering 2, up to 300 residential customers with existing PIVs and installed EVSEs will have the option to take advantage of off-peak rates for charging through the
use of a connected car ("C2") device. This device, such as those offered by FleetCarma©, will be provided by ACE, and plugged into the customer’s PIV. With its secure platform, the C2 device will provide the customer and the Company with useful data on charging usage location, time, and the amount of the charge. By enrolling in Offering 2, the customer would stay on their existing service, meter, and tariff, and agree to participate for a period of at least one year. As an incentive, the customer would receive a monthly off-bill rebate of 5 cents per kilowatt hour ("kWh") for all hours charged at home during off-peak hours, net of any on-peak charging kWhrs, calculated based on data directly from the vehicle. The kWhrs for any charging done during on-peak hours (noon to 8pm) would be subtracted from the incentive earned for off-peak charging for purposes of the 5 cent rebate to determine the final monthly rebate amount.

Q10. What benefits does Offering 2 provide?

A10. This Offering provides an incentive for customers to charge their PIVs during off-peak hours. The C2 device will verify the vehicle is at the premise and when it is charging off-peak. The participant data collected by ACE would also be used by the Company to better understand infrastructure impacts based on customer usage patterns as well as customers’ responses to off-peak incentives. In addition, customers will receive specific data on their vehicle charging behavior and value. Offering 2 benefits households that already own EVSE by allowing them to shift more of their charging load to off-peak hours, allowing them to save money through lower rates via the off-bill rebate. By encouraging charging during off-peak hours, Offering 2 also benefits the grid and all of ACE’s customers because it reduces the need for capacity upgrades in the short-term due to PIV
Witness Grisham

charging. This Offering will also test whether the off-bill, off-peak incentive alone is
enough to encourage off-peak charging behavior.

Q11. Please summarize Offering 3 (Smart Level 2 EVSE for residential customers).

A11. Offering 3 extends up to 1,500 smart Level 2 EVSE for qualified residential
customers on a first-come, first-served basis. For this Offering, ACE will provide a rebate
to cover a smart Level 2 in-home charger for the first 1,500 eligible customers at 50%
of the cost of the EVSE, plus 50% of the associated cost for installation by a licensed
electrician. As designed for this Offering, the customer will stay on their existing
residential service, meter, and tariff. Customers enrolled in Offering 3 will also be
automatically enrolled in the off-peak charging program (as described in Offering 2), which
will provide an off-bill incentive for kWhs charged during the off-peak window. The off-
peak incentive of 5 cents per kWh will be calculated based on data from the Smart Charger
and will be paid monthly as an off-bill incentive. Similar to Offering 2, the kWhrs for any
charging done during on-peak hours will be subtracted from the incentive for the final
rebate. The program will be limited to one EVSE per residential customer. Notably, the
customers participating in Offering 3 and receiving the off-peak incentive (up to 1,500)
would be in addition to the customers receiving the off-peak incentive under Offering 2
(up to 300 customers).

Q12. What benefits does Offering 3 provide?

A12. Offerings 3 will help address cost barriers by offsetting the upfront costs of
charging equipment, incentivize PIV adoption in New Jersey, encourage off-peak
charging to minimize grid impacts, and provide an advanced charging solution for
customers that want a fully charged vehicle at the beginning of each day. Unlike
traditional chargers, the smart-chargers which will be required for this Offering have the
ability to measure vehicle charging through embedded metrology. Smart chargers also
remotely operate and offer two-way communication with the utility and longer term can
be used to provide more advanced managed charging functions such as start-time
scheduling, power throttling, load curtailment and other beneficial load management
programs.

Similar to Offering 2, managed charging will benefit the grid and all customers
by encouraging off-peak charging. The financial incentive for off-peak charging is
intended to influence customer charging behavior, thereby reducing peak-time system
load and lessening the need for distribution system upgrades. The charging data gathered
from Offering 3 will help prepare for future planning of ACE’s electric system as PIVs
reach widespread use and the Company incorporates PIV charging as a fully integrated
distributed energy resource. That data will also be instrumental in improving the
benefit/cost analysis used to support policy decisions.

Q13. Why did ACE include a Whole House TOU rate and off-peak incentive in the PIV
Program?

A13. Most customers who enroll in Offerings 1, 2 or 3 will park and charge their PIVs
at home overnight, and many customers will find the TOU and off-peak charging rates
advantageous for their monthly electricity costs. The financial incentive can also be
correlated to encourage off-peak charging of PIV. A 2016 study conducted by the U.S.
Department of Energy’s Idaho National Laboratory (“INL”) found that TOU rates and
special EV rates that offer off-peak electric costs were an effective tool to mitigate
potentially negative impacts from increased load on the electric grid. The study found in a case involving an electric utility that the greater the differential between the price of electricity during desirable and undesirable times, the more of an increase there would be PIV drivers charging during desirable times. Please see Company Witness Normand’s testimony for additional details on the off-peak incentive.

Q14. Why is ACE proposing to offer its incentives off-bill as opposed to providing the incentive on the customers’ monthly bills?

A14. The Company’s PIV Program include several Offerings with varying financial incentive levels and criteria. These incentives are described throughout my testimony. Offering the financial incentives off-bill reduces bill complexity and the need for expensive billing system upgrades to calculate the incentive, which can also be time-consuming. Off-bill incentives allows the Company to quickly install a process to provide the off-peak charging incentive to customers. If the Program is successful and expanded, ACE will pursue an on-bill solution through the Company’s billing system.

Q15. Can customers enroll in more than one of the residential Offerings (Offerings 1, 2 and 3) simultaneously?

A15. No. ACE’s intends to maximize residential charging opportunities for its customers, so customers will only be permitted to enroll in one of the residential Offerings at a time.

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Q16. Can Net Energy Metering (“NEM”) Customers participate in any of the residential Offerings?

A16. Yes, NEM customers may participate in Offerings 2 and 3. For Offering 1, the Company is also proposing to allow NEM customers to participate; however, the amount credited for solar generation will be set at the same BGS value as all other NEM customers.

Q17. Why is there a distinction for Offerings 1, 2, and 3 for NEM customers?

A17. For Offerings 2 and 3, the metering for the NEM is separate from the metering for the PIV charging incentives. Since Offering 1 would use a single meter to implement both NEM and PIV TOU, the opportunity exists to credit NEM/PIV customers for generating solar during on-peak times at a value significantly higher than NEM customers that do not participate in the PIV Program. For this reason, the Company is seeking to set the credit at the BGS rate to keep the benefits equal for all NEM customers.

Commercial Offerings

Q18. Please summarize Offering 4 (Multi-Dwelling Unit Charging).

A18. Offering 4 is a three-part offer to support PIV charging at condominiums/apartment complexes, i.e., multi-dwelling units (“MDUs”) where dedicated parking can be made available for EVSE infrastructure. The customer in this case would be the account holder of the premise with whom ACE has the account contract. For the first two parts of this Offering the Company will provide qualified MDU owners/operators a rebate to cover 50% of the cost of qualified Smart Level 2 charger and up to $10,000 per location of the cost of installation from the point of service connection to the charger
location2. For the third part of this Offering, the customer would receive a demand charge offset paid monthly as an off-bill incentive based on half of the aggregate EVSE nameplate capacity of chargers installed, multiplied by the commercial tariff kw-demand charge. The demand charge incentive would be offered only for the 5 years following the PIV Program’s commencement.

This Offering serves EVSE that are installed behind the meter of an existing commercial meter. By enrolling in Offering 4, the customer would stay on their existing service, meter, and tariff. Charging transaction data will be collected by ACE directly from the EVSE. Under Offering 4, ACE seeks to incentivize up to 200 EVSEs in total.

Q19. Why does ACE’s PIV Vehicle Program include an Offering for charging installations for MDUs?

A19. MDUs represent an underserved segment of the PIV market. As part of its proposed PIV Program, ACE seeks to address the challenges that MDU residents face in adopting PIVs. Unlike PIV drivers living in single-family homes, residents of MDUs often lack the ability to install charging infrastructure in these locations because these drivers often do not have ownership or control of the space where the charging station would be installed. Even if an MDU could accommodate an on-site charger, many landlords or other owners/operators of MDUs may be unwilling to make the required investment, or the price of the installation may be cost-prohibitive. Therefore, the incentives under Offering 4 seek to address these barriers to siting chargers in MDUs.

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2 ACE expects $10,000 will cover the cost of EVSE installations at MDUs in most cases.
Q20. What benefits does Offering 4 provide?

A20. In addition to addressing the market barriers described above, Offering 4 helps to address equity issues and open PIV charging opportunities to New Jersey residents who live in dwelling units other than single-family homes.

Q21. Please summarize Offering 5 (Workplace Charging).

A21. Offering 5 is a two-part Offering allowing for the deployment of up to 150 EVSE for workplace charging. For qualified customers who own or operate office buildings or garages where dedicated parking can be made available for PIV charging infrastructure, ACE proposes to offer a rebate for 50% of the cost of a Level 2 EVSE installed behind the meter of an existing account. The customer will be the account holder of the premise with whom ACE has the account contract. While ACE will provide customers enrolled in Offering 5 a 50% rebate following their purchase of a Smart Level 2 EVSE, the customer would be responsible for costs associated with installation of the EVSE.

For the second part of this Offering, the customer would receive a demand charge offset rebate paid monthly as an off-bill incentive based on half of the aggregate EVSE nameplate capacity of chargers installed, multiplied by the commercial tariff kW-demand charge (as in Offering 4). This incentive would be available for five years following the PIV Program’s commencement.

By enrolling in Offering 5, the customer would stay on their existing service, meter, and tariff. Charging transaction data will be collected by ACE directly from the EVSE. Offering 5 would be limited to a maximum of 6 EVSE per customer, but they may be located at multiple service addresses owned or operated by the customer (up to 3 sites maximum). Under Offering 5, ACE seeks to incentivize up to 150 EVSE in total.
Q22. **What benefits does Offering 5 provide?**

A22. Offering 5 will target charging infrastructure for workplaces, which offer around-the-clock opportunities for grid-integrated charging for PIV customers who currently may not have convenient and consistent access to charging facilities. Workplaces represent another significant market segment where additional charging stations can drive increased PIV adoption in New Jersey. That is because when residential charging at home is not available, workplaces become the primary locations for vehicle charging. However, these locations face obstacles to infrastructure investment that are similar to the obstacles faced by MDUs, such as the fact that the building owner or manager may be reluctant to invest. Adding charging stations in these locations can extend the daily range of PIVs and increase PIV visibility and expand PIV awareness. Experience gained with this offering will help to meet this market’s demand for charging solutions and provide useful information for adding future value to this segment.

Q23. **Please summarize Offering 6 (Fleet Charging).**

A23. ACE proposes to provide electric fleet/light duty charging infrastructure for owners of vehicle fleets that are interested in converting from internal combustion vehicles to PIVs. ACE will target commercial fleet managers and government agencies. Qualifying participants must possess the real estate necessary to site the chargers.

Similar to Offering 5, Offering 6 is also a two-part offer featuring a rebate to reduce costs of a smart EVSE charger and a demand charge offset incentive. For qualifying customers, ACE proposes to offer customers a rebate for 50% of the cost of a Level 2 EVSE. While ACE will provide customers enrolled in Offering 6 a rebate following their purchase of a Smart Level 2 EVSE, the customer would be responsible
for costs associated with installation of the EVSE. The customer will be the account holder of the premise with whom ACE has the account contract.

For the second part of this Offering, the customer would receive a demand charge offset paid monthly as an off-bill incentive based on half of the aggregate EVSE nameplate capacity of chargers installed, multiplied by the commercial tariff kw-demand charge. Charging transaction data would be collected from EVSE, but is not used directly in the demand charge incentive calculation.

By enrolling in Offering 6, the customer will stay on their existing service, meter, and tariff. Offering 6 would be limited to a maximum of 6 EVSEs per customer, but the EVSEs may be located at multiple service addresses (up to 3 sites maximum). Under Offering 6, ACE seeks to incentivize up to 150 EVSE in total.

**Q24. What benefits does Offering 6 provide?**

A24. ACE’s Offering 6 directly aligns with one of the strategies set forth in the 2019 New Jersey Draft Energy Master Plan (“Draft EMP”) for carbon reduction by electrifying fleet vehicles. It provides an opportunity for the State to reach the goal for 330,000 PIVs by 2025 more quickly, and serves as a complement to entities seeking to transition the vehicle fleets to cleaner PIVs. Because residential charging is not an option for charging fleet vehicles, workplaces are the only locations for fleet vehicle charging. Adding charging stations in these locations can extend the daily range of PIVs and increase PIV visibility. Experience gained through Offering will help the Company to meet the fleet market’s demand for charging solutions and provide useful information for adding future value to this segment.
Public Charging Offerings

Q25. Please summarize Offering 7 (Utility-Owned Public DCFCs).

A25. ACE proposes to install up to 45 Utility-Owned DCFCs at an estimated 15 locations in the Company’s service territory. ACE will target locations that serve local and long-distance travelers across the State and will also be an additional resource for customers residing in MDUs or homes with no dedicated driveway or garage. ACE intends to give installation priority for the DCFC chargers on government-owned property, but the Company will consider commercially-owned properties that will make charging available at all times to PIV customers. In addition, the Company will target locations along the main transportation corridor sites in New Jersey. The Company will examine the density of PIV ownership, the locations of the various major roadways and other pertinent characteristics that will provide the maximum opportunity for use and convenience of PIV users, as well as attainment of policy goals, especially filling existing geographical deficiencies in public DCFC. The equipment will be owned and maintained by ACE and will provide electricity through 100% renewable sources through the embedded Rider PIV-Green described later in my testimony. ACE proposes to set the rate for these chargers based on a market pricing study as described in the testimony of Company Witness Normand.

Q26. What benefits does Offering 7 provide?

A26. Public DCFCs are a primary strategy for addressing consumer range anxiety concerns through increased availability of convenient fast charging. In addition, they can eliminate the need for customers to maintain a gasoline vehicle for longer trips by facilitating longer-distance PIV travel that would not be practical or convenient using
Level 1 or Level 2 charging stations only. As described in Witness McGowan’s testimony, ACE’s service territory is severely lacking in public charging options and this Offering seeks to alleviate that issue. Moreover, DCFCs are becoming more powerful and more popular. If multiple chargers are grouped together, the point source load for this solution could be significant.

The Company plans to use this Offering to better understand the interconnection requirements and to collect operating information in order to be in a better position to proactively plan for wider deployments.

Q27. Please summarize Offering 8 (Utility-Owned Level 2 Public Charging).

A27. ACE proposes to install up to 200 smart Level 2 chargers at an estimated 65 locations in the Company’s service territory. Similar to Offering 7, the Company intends to give installation priority for the Level 2 chargers at government-owned property, but the Company will consider commercially-owned properties that will be available for charging at all times to PIV customers. In consultation with the New Jersey Department of Transportation, the Company will examine the location density of PIV ownership, the locations of the various major roadways, and other pertinent factors to determine locations that will provide the maximum opportunity for use and convenience of PIV users within a neighborhood. The siting methodology would consider convenience, retail proximity, safety, and other elements to ensure that the investment is complementary to the community’s needs, particularly in communities with little or no charging infrastructure. The equipment will be owned and maintained by ACE and will provide electricity through 100% renewable electricity through the embedded Green Adder described later in my testimony. ACE proposes to set the rate for these chargers based on a market pricing
study as described in the testimony of Company Witness Normand.

Q28. What benefits does Offering 8 provide?

A28. As described by Witness McGowan’s testimony, ACE’s service territory is severely lacking in public charging options and this Offering seeks to alleviate that issue. Accordingly, Offering 8 will allow for broader access to public charging. An increased number of public charging options will address consumer range anxiety as a barrier to PIV adoption and support the expansion of PIVs to wider populations in New Jersey, especially those customers who are unable to charge at home.

Q29. Please summarize Offering 9 (Non-Utility-Owned Public Chargers).

A29. Offering 9 will consist of a new service on a standard commercial tariff and a new meter dedicated to non-utility-owned DCFC, which will be owned and operated by third parties for use by the public. ACE will give priority to applicants installing DCFC in underserved areas of the Company’s service territory, including installations that address current gaps in geographic coverage.

Offering 9 will support the deployment of up to 120 DCFCs at 30 locations, and has two primary components. First, for this new service, ACE proposes to offer “make-ready” work where the Company will provide new service and deploy and own the infrastructure required to install a DCFC up to the point of the charger connection, at no cost to the customer. A depiction of make-ready infrastructure is illustrated in the figure below:
The locations of the DCFCs will be limited to commercial owned properties, where each property owner commits to the charger’s availability for public use at all times.

As the second part of this Offering, ACE will provide a rate incentive to offset the customer’s demand charges for a limited period of time. This incentive provides the customer with a monthly rebate to reduce the effective cost of electricity to a known set point, with a true-up based on a monthly off-bill incentive. This incentive not only addresses economic barriers to private investment in public fast charging, but provides electricity cost certainty for owner/operators during the incentive period. The amount of the customer’s monthly incentive would be the customer’s effective cost per kWh for their monthly usage associated with their DCFC subtracted by the proposed set point of 20 cents per kWh (for additional detail on the set point mechanism, please see Company Witness Normand’s testimony). This structure effectively reduces the customer’s cost of

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1 Fig 1
Fig 13

electricity to the set-point. For example, if a DCFC’s usage for the month was 600 kWhrs with an effective cost of electricity calculated to $.75 per kWh, the customer’s bill would include $450 related to demand charges. If enrolled in Offering 9, the customer would be offered a rebate check that month for $.55 per kWh multiplied by 600 kWhrs or $330. This calculation is illustrated in Table 2.

<table>
<thead>
<tr>
<th>Demand charge factors</th>
<th>Actual Demand Charge</th>
<th>Offering 9 Guaranteed Rate</th>
<th>Incentive Amount Issued to Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly kWhrs</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Effective cost of electricity</td>
<td>0.75</td>
<td>0.20</td>
<td>0.55</td>
</tr>
<tr>
<td>Demand charge portion of DCFC bill</td>
<td>$450</td>
<td>$120</td>
<td>$330</td>
</tr>
</tbody>
</table>

The amount of the incentive paid will naturally decline as the DCFC utilization increases and the customer’s monthly demand charge decreases.

**Q30. What benefit does Offering 9 provide?**

Offering 9 presents an opportunity for ACE to stimulate the commercial side of the EVSE market. During the early adoption phase of PIVs, utilization can be low for public DCFCs. This fact, coupled with the cost of electricity, serves as a deterrent to installing DCFC, which in turn suppresses the overall PIV market as there are no visible public charging solutions for customers.

Put simply, a single usage on a DCFC can cause a significantly high demand charge for the commercial owner, disincentivizing them to install a DCFC in locations that might not be heavily utilized initially. The demand charge and make-ready solution
proposed under Offering 9 can help to offset the high initial associated costs with providing the public charging solutions by giving the DCFC owner an assurance that for five years, their overall bill will never exceed the set point of 20 cents per/kWh. ACE expects that its PIV Program, coupled with the state’s policy goals described by Witness McGowan, will lead to an increased adoption of PIVs by consumers in the Company’s service territory. An increase in PIVs would lead to an increase in public charging and DCFC owners would reach a break-event point for the charger by the conclusion of this Offering, thereby no longer needing the financial incentive.

**Q31. Will the demand charge incentive be available for existing DCFCs?**

**A31.** No. The purpose of Offering 9 is to spur the deployment of new DCFCs by the non-utility competitive market. Extending this incentive retroactively to existing DCFC could over-incentivize existing chargers, which could, in turn, place an unnecessary burden on ratepayers.

**Q32. Describe ACE’s rationale for the increase in DCFC deployments compared to the Company’s original filing.**

**A32.** Since 2017, ACE has been a member of ChargEVC, a coalition of diverse stakeholders including utilities, EVSE companies and environmental organizations, which are concerned with PIV policy. As part of its mission, ChargEVC conducts research and advocates to expand the PIV market in New Jersey. According to ChargEVC’s 2019 report featuring projections for PIV adoption in the state of New Jersey⁴, 300 new high-powered fast charging station locations will be required in New Jersey to reach the critical mass

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necessary to reduce consumer range anxiety and help the state meet its PIV goals by 2025. Approximately 20 percent of these locations (i.e., 60 locations) will be in ACE’s service territory, along major transit corridors and local driving routes in community settings. For the Offerings pertaining to utility-owned DCFCs, ACE proposes proposing up to 45 DCFC installations (at approximately 15 locations). The proposed increase from 30 DCFC installations to 45 allows potential for additional DCFC sites, as well as room for “future proofing” to replace equipment as DCFC technology evolves and for future expansion to add additional EVSE at charging stations.

For Offering 9, ACE proposes to allow up to 30 non-utility owned DCFC locations (with up to 4 DCFCs per location). ACE believes the total number of DCFC installation locations in Offering 9 would provide substantial coverage for new locations in the upcoming years and would meet the strategic goals to achieve geographic coverage thresholds to reduce consumer range anxiety. This Offering would incentivize the non-utility market at a faster pace than if no action were taken and will induce development of DCFCs at commercial locations that might not otherwise be served.

Q33. Does utility involvement in publicly available EVSE undermine the private market’s deployment of EVSE?

A33. No. Utility programs help stimulate private investment in public EVSE and encourage the private market. Utilities are only part of the solution to deploy public EVSE and their involvement can be both supplementary and complementary to the private market. The Company believes multiple models exist for utilities to support the deployment of public EVSE chargers including:
1. Utility owned and operated EVSE: Under this model, the utility is responsible for all grid upgrades and modifications, in addition to the build-out, operation, and ownership of PIV charging infrastructure at locations available to the public. In this model, the utility ownership of PIV charging infrastructure is in addition to, and not in place of, other entities that own and operate PIV charging infrastructure.

2. Utility “Make-Ready” support for EVSE: Under this model, the utility is responsible for all grid upgrades and modifications related to the PIV charging equipment; however, the PIV charging equipment will be installed, owned, and operated by a non-utility third-party provider.

3. Rebates and incentives for third-parties: Under this model, the utility provides incentives for a third-party to perform all make-ready work and install, own, and operate EV charging equipment, thereby stimulating the competitive market.

The foregoing models are not mutually exclusive, and can be used in combination with each other in order to facilitate the development of a robust PIV environment consistent with the goals of the Draft EMP. ACE’s PIV Program proposes elements of each model.

Q34. Will ACE’s involvement in deploying EVSE cause an oversaturation of chargers?

A34. No. Of the 60 DCFC locations recommended for ACE’s service territory by the ChargEVC roadmap, ACE’s proposed utility-owned DCFCs (under Offering 7) would cover only 15 locations, addressing only 25 percent of the recommended number of chargers. As displayed in Figure 1, supra much of ACE’s service territory presently lacks

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charging stations. ACE’s participation in this market would only serve as a supplement to
stimulate the deployment of installations in Southern New Jersey. Offering 9—the make-
ready and demand charge incentive for DCFC covering 30 locations—represents another
50 percent of the recommended chargers. This leaves another 25 percent of necessary
charging locations to be deployed by the private market without ACE’s involvement.
Additionally, ACE intends to prioritize government-owned locations for its installations
for DCFCs and Level 2 EVSEs, thus serving a different segment of the market than third
parties who are likely to target commercial locations.

**Green Adder**

Q35. Please summarize Offering 13 (PIV-Green).

A35. Offering 13 provides customers enrolled in Offering 1 with the option to select a
PIV-specific rate allowing them to electricity consisting of clean energy in the form of an
“Adder” to the PIV-specific rate (applied through proposed Rider “PIV-Green”). Based
on current procurement costs, the Adder would increase the rate by $0.0543 per kWh. The
Adder will allow customers to have their energy supplied from 100% renewable energy,
plus have zero tailpipe emissions from their PIV. This would also yield valuable insight
into whether customers would be willing to pay extra for their PIVs to be supplied with
100% renewable energy. The Green Adder will be mandatory for the EVSE installed by
the Company under Offerings 7 and 8. The Adder would be set based on the estimated cost
to buy RECS in the market, and there no cost to the PIV Program is expected. The Green
Adder is designed as pass-through Offering in which non-participating ratepayers are not
subsidizing participating ratepayers. For additional details on the development of the Green Rider, please see the testimony of Company Witness Normand.

**Community Programs and Transit**

**Q36. Please summarize Offering 10 (Innovation Fund).**

A36. ACE proposes an Innovation Fund that would provide up to $2,000,000 in grants for innovative projects that support additional transportation electrification area needs, such as PIV Car Share, Vehicle to Grid (“V2G”) charging demonstrations, port electrification, battery/resiliency pilots, and other similar uses. The grants provided through the Innovation Fund would encourage innovative ideas that are designed to serve multiple users and/or multiple tenant applications, such as electric car share hubs, residential charging hubs, DCFC applications for multi-family and multi-tenant applications, and mobility fleet applications.

**Q37. What benefits does Offering 10 provide?**

A37. Under Offering 10, interested persons or groups could seek funding from the Company for innovative projects designed to further PIV charging in New Jersey and support electrification of the transportation sector.

Projects designed to serve underserved LMI, and/or EJ communities for such applications are desired and encouraged. One example for this Offering could involve the purchase of PIVs and installation of charging stations to extend the availability of car-sharing programs in LMI communities. Such a project would only reduce carbon emissions in these communities, but would also increase access to safe transportation options.
Another project could be to develop a resiliency pilot including a PIV charging station. In this instance, a public charging station could include a battery unit with solar capability, providing a clean energy source to charge vehicles during a system outage. Such a resiliency hub would provide an extended charging option for PIVs, including emergency vehicles critical to ensuring public safety.

Q38. How would the funds be awarded under Offering 10?

A38. Under Offering 10, funding would be awarded based on an application and review process conducted by the Company, with assistance and input from key internal and external stakeholders. The proposed awards would take the form of a monetary grant issued by ACE in an amount up to 50% of the cost of the project. The project cost amounts to which the grant would apply would be the net project cost after applying all other applicable incentives, grants, awards, and discounts. Innovative projects provide the potential benefits of transportation electrification and grid support can be further studied and validated.


A39. Under Offering 11, ACE proposes to provide funding to make 20 electric school buses accessible for public K-12 school districts in the Company’s service territory, with a primary focus on LMI and/or EJ communities. The proposed funding would cover the estimated $250,000 incremental cost of an electric school bus compared with an equivalent traditional diesel-based bus vehicle. In addition, ACE will cover the required charging infrastructure for the electric school buses to a maximum of $25,000 per EVSE. School districts who are in the process of retiring a diesel bus and seeking this funding would be required to commit to purchase a new electric school bus, to cover non-funded
Witness Grisham

cost thereof, and keep the bus in service at least five years, while providing ACE with access to the charging data. A preference would be given for electric school buses owned and operated directly by the school district, with a limit of two buses per district, for a total of 20 buses and chargers. If this Offering is approved, ACE will partner with the New Jersey School Board Association (“NJSBA”) to formalize the criteria for the funding, identify potential districts, and establish the procurement process for dispersing the funds and obtaining the electric school buses. The involvement of NJSBA will help ensure optimal participant selection, and ensure that any learnings from this program are deployed to other school district across ACE’s service territory and the state.

Q40. What benefits does Offering 11 provide?

A40. Electric school buses offer numerous health and societal benefits, particularly for some of the State’s youngest and most vulnerable residents—school-aged children. By riding an electric school bus, children can avoid the consistent exposure to diesel fumes resulting from their twice daily rides on traditional school buses. Additionally, the communities in which these buses travel will benefit from reduced emissions. Because ACE will spread the allocated number of buses across multiple school districts, there will be an opportunity for the districts to learn from one another and share best operational practices which will benefit all of them once electric school buses become the norm. Finally, the daily presence of electric school buses, and as featured at community events, will be an excellent source of advertisement for PIVs, and will spur increased PIV adoptions from the parents of children who ride in electric vehicles to school.
Q41. How did ACE determine the appropriate costs for Offering 11 to deploy 20 electric school buses in the Company’s service territory?

A41. ACE’s cost estimates were based on consultations with manufacturers of electric school buses. The actual costs will be confirmed once the Offering has been approved, the school districts have been selected, and the procurement process has begun.

Q42. Please summarize Offering 12 (New Jersey Transit Bus Electrification).

A42. New Jersey Transit averages more than 450,000 rides each weekday for bus, rail, and light rail transit services. The Draft EMP explicitly calls for improving New Jersey Transit’s environmental performance.6 One of the suggested strategies is to electrify New Jersey Transit’s buses. Earlier in 2019, New Jersey Transit announced plans to use funds from two federal grants to support the limited deployment of eight electric buses in its Camden service territory by 2021.7 This effort will require significant capital investments in Camden’s bus depots to allow the use of electric buses, and New Jersey Transit staff have indicated the infrastructure requirements are a one of the primary barriers electrification of the agency’s buses. Notwithstanding these recent efforts, the Draft EMP calls upon NJ Transit to continue and expand similar programs across the State as quickly as possible.

New Jersey Transit has two bus depots in ACE’s service territory—one in Egg Harbor Township and another in Washington Township. Offering 12 provides $2.5 million

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6 See Draft EMP, at 1.1.6.

in funding for New Jersey Transit to accelerate electrification of one of these bus depots in ACE’s service territory, complementing the State’s similar efforts in Camden.

ACE will work in close collaboration with New Jersey Transit to develop the specific project details, scheduling, and deployment of funds. The Offering will build on the initial electric deployment currently being planned for Camden, and will include critical elements, including up to $250,000 in distribution engineering and upgrades as needed by each site, and $2.25 million for high-powered charging station equipment to be potentially owned and operated by the Company for lease to New Jersey Transit. The Offering will be contingent on New Jersey Transit’s ability to fund the elements of the project not covered by ACE’s Offering (planning, procurement of electric buses, feasibility studies, etc.).

Q43. **What benefits does Offering 12 provide?**

A43. Approximately 58% of New Jersey Transit’s customer base is comprised of bus riders who use the agency’s extensive bus network that connects communities across the State. While providing critical transportation services to the State’s residents, the majority of New Jersey Transit’s buses are powered by diesel engines, exposing riders and neighborhoods to air pollution. Replacing these diesel buses with electric buses will support the State’s efforts to reduce greenhouse gas (“GHG”) emissions from the transportation sector. This Offering also provides an opportunity to support bus-dependent residents in LMI and EJ communities by improving air quality and increasing awareness of PIVs.
Offering 12 will support the State’s efforts to electrify its bus fleet, as well as encourage other bus fleets located in New Jersey, such as those of colleges and commercial businesses, to switch to electric bus fleets.

Q44. How did ACE determine the appropriate project to provide transportation electrification support for New Jersey Transit?

A44. The project and cost estimate for Offering 12 was determined in consultation with New Jersey Transit to determine the agency’s goals and plans for converting to electric vehicles.

Q45. Why do ACE’s Community Planning and Transit offers specifically target Low to Moderate Income (“LMI”) and Environmental Justice communities?

A45. ACE supports the State in its efforts to ensure that all citizens, especially the most vulnerable, benefit from transportation electrification and efforts to reduce GHG emissions and improve air quality. LMI/EJ communities are often the most affected by the negative environmental and air quality impacts of pollution and carbon emissions. A 2016 study found lower income populations had higher mortality rates associated with long-term fine particle matter exposure. It is critical that disadvantaged communities have access to the clean energy options, but at the same time, they are often the least financially able to self-fund the upfront costs associated with converting to electric technologies to help address these negative impacts.

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Customer Education and Outreach Plan

Q46. What forms of outreach will the Company utilize to socialize its PIV program?

A46. Developing broad awareness about the benefits of fueling vehicles from the grid is an integral element of the Company’s proposal. As Southern New Jersey’s electric distribution company, ACE has an established relationship with customers to support their evaluations of PIVs, rate plans and programs, and charging infrastructure. To leverage this relationship, the Company is proposing an Education and Outreach Plan that will inform different customer segments about the benefits of transportation electrification, including potential car buyers in the State. ACE will also incorporate dealer outreach in its Education and Outreach Plan to better inform dealers of the benefits of PIVs and reach PIV consumers during their car purchase process.

The effort is intended to expand awareness about PIVs and the benefits of transportation electrification, reduced GHG emissions, and lower electric rates for off-peak charging. The Company will use both traditional and digital media, with channels selected to most effectively deliver both general transportation electrification messaging and targeted messages to potential Program participants. Outreach may be conducted via social media advertising, printed materials for local automobile dealerships that sell or lease new and used PIVs, ACE customer bill inserts, and outreach at community events.

The Company will offer a formal and detailed customer education and outreach within six months of the PIV Program’s approval as part of implementation.

Q47. What other assistance will the Company provide customers?

A47. In addition to education and outreach activities specific to the PIV Program, ACE proposes to provide technical assistance to commercial customers, specialized trainings for
key industry stakeholders (i.e., fleet managers and developers), focused and targeted outreach to underrepresented communities, partner rewards, ride and drive events, and education about TOU rates for residential customers that drive PIVs. These efforts will increase awareness of the benefits of electric transportation, as well as promote smart charging that benefits the environment, the grid, and all customers.

**Program Implementation**

Q48. Please explain ACE’s plan for implementing the PIV Program and the various residential and commercial Offerings.

A48. All customers interested in participating in Offerings 1-6 will submit an application to be provided by ACE. Where applicable, residential and commercial customers will be required to verify the purchase and installation of a qualified Smart EVSE prior to receiving approval from ACE for their rebate and enrollment in the incentive offers. For Offerings 2 through 6, customers will also be required to agree to provide ACE with their charging data over the duration of their participation in the PIV Program.

ACE proposes the enrollment window for residential and commercial Offerings will occur between three and five years, depending on the Offering. However, the timing and extent of the implementation is dependent on the type of Offering and, of course, the number of customers that choose to participate in each Offering. For the residential customer Offerings (Offerings 1-3), participation levels will drive the duration of the Offerings. For Offering 1, ACE anticipates a five-year enrollment period, but an enrolled customer would be permitted to stay on the Whole House TOU rate indefinitely. For Offerings 2 and 3, ACE anticipates a three-year enrollment window with a five-year duration for the program for customers. Commercial customers would also be offered a
three-year enrollment window with their incentive lasting a maximum of five years from the PIV program’s commencement. A summary of the enrollment windows, duration and data requirements is provided in Table 3 below:

Table 3: Residential and Commercial Offering Enrollment Window and Program Duration

<table>
<thead>
<tr>
<th>Offerings</th>
<th>Enrollment Window</th>
<th>Duration of Program/Incentive</th>
<th>Customer To Provide Charging Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 years</td>
<td>Unlimited</td>
<td>No</td>
</tr>
<tr>
<td>2-3</td>
<td>3 years or until maximum capacity is reached</td>
<td>5-year incentive from program enrollment</td>
<td>Yes</td>
</tr>
<tr>
<td>4-6</td>
<td>3 years or until maximum capacity is reached</td>
<td>5-year incentive from program commencement</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Q49. Please explain ACE’s plan for implementing the public utility-owned charging offerings.

A49. Before installing the public utility-owned DCFC and smart Level 2 charging stations contemplated by Offerings 7 and 8, the Company will consult with State and local officials and other stakeholders to discuss siting and other relevant issues. The Company will also seek guidance from the New Jersey Department of Transportation and New Jersey Department of the Environment.

ACE will seek to provide geographic and demographic diversity in terms of the location and populations to be served by the deployment of its Company-owned chargers. In siting its chargers, the Company will target easily-accessible and well-traveled areas that are currently underserved by the EVSE market. Priority will be given to potential locations that are located on government-owned property, but the Company will consider commercial locations as well.
Q50. Will ACE monitor its public charging stations to ensure customers are appropriately using the EVSE and parking spaces?

A50. In order to reduce costs for ratepayers, ACE will not provide in-person monitoring of the PIV-assigned parking spaces to ensure that PIV drivers vacate the spaces after charging. However, EVSEs can charge higher fees once a vehicle has reached a full charge, which can serve to disincentivize customers from leaving their vehicles plugged into the EVSE station once their charging session has completed. Additionally, ACE will not oppose a property owner who chooses to ticket and/or enforce parking restrictions to ensure appropriate use of the parking space.

Q51. Describe the site selection for non-utility owned DCFC and enrollment process under Offering 9.

A51. The DCFC deployed through Offering 9 will be in locations identified by third-party entities. ACE will provide interested parties with an application, followed by a thorough and transparent review process to approve charging stations to be installed under Offering 9. This application would be submitted by the entity responsible for installing, owning and maintaining the DCFC at the selected site, whether that be the property a third-party charging company or the actual site host that owns the property, and will be the official customer of record for the new service. Should a third-party charging company choose to apply for this Offering, it would be responsible for securing any required agreements with the property owner. Similarly, if a site-host chooses to enroll in this program, it would be responsible for securing the DCFC to install on their property.
inspections required to connect to ACE facilities. To be eligible for this Offering, applicants would be required to commit to providing the public with access to the DCFC at all times. Finally, the applicant would also determine the pricing structure or rate charged to PIV customers for using the DCFC. The enrollment window for both the “make-ready” and availability of the demand charge incentive is five years from the PIV Program’s commencement (or until the maximum number of EVSE to be covered by Offering is reached).

ACE intends to support up to 120 DCFCs in aggregate under Offering 9, but seeks to limit each selected location to no more than 4 DCFCs to avoid excessive demand charges and associated offset costs. The Company will consider multiple criteria in determining which requested DCFCs are appropriate for the PIV Program including but not limited to cost, proximity to other existing EVSE, compliance with American Disabilities Act standards, and projects that require minimal to no upgrades to the electric system. Additionally, ACE would not consider EVSE applications that would negatively impact the reliability of the distribution system.

Q52. Please explain ACE’s plan for implementing the Community Planning and Transit Offerings

A52. The deployment of the Innovation Fund (Offering 10) will be dependent on the number of proposed submitted and approved. The Electric School Bus Fund (Offering 11) and New Jersey Transit Electrification (Offering 12) will be implemented in coordination with the New Jersey School Board Association and New Jersey Transit respectively.
Q53. **When can customers begin enrolling in the PIV Program?**

A53. ACE anticipates that it will begin enrollments in its Offerings within six months after the Program is approved.

Q54. **Please discuss the Request for Proposals process.**

A54. As part of the PIV Program, ACE expects that customers will be able to choose from a variety of vendors for hardware options to meet their preferences and needs. To facilitate this process, the Company will competitively bid to third party providers the installation, procurement, operations, and maintenance of the PIV Program’s charging equipment, encouraging broad market competition and participation. ACE will also issue a request for proposals (“RFP”) to select a single vendor to manage and issue the off-bill incentives available under Offerings 2-6 and 9.

The Company anticipates that it will issue all RFPs within four months after the Program is approved by the Board.

Q55. **Describe the Company’s rationale for selecting a software and network provider for the PIV program.**

A55. Successful implementation of ACE’s charging Offerings will require the Company to manage customer transactions and obtain data from a wide range of smart chargers provided by a variety of competitive solution providers. Obtaining this data and providing customers with the offered incentives will require a back-end transaction management and metering software platform. ACE will seek to implement this software in an efficient and cost-effective manner by selecting a single platform supporting open standards. An open platform will allow the Company to seamlessly retrieve charging data from the various vendor hardware expected to be approved for use in the program, allowing multiple EVSE
vendors to supply equipment. It will also avoid the cost and time that would be associated with integrating multiple operating systems to retrieve the data, and allow for interoperability with other existing EVSE providers. Providing a range of EVSE equipment choices to consumers can best be accomplished by leveraging open industry standards to allow an integrated software back-end that supports a diverse fleet of smart chargers. ACE is adopting this strategy to maximize efficiency and ensure consistency of the consumer experience, and to minimize ratepayer costs.

Q56. **In the future, will the Company seek to modify the PIV Program, assuming the Board approves it?**

A56. Potentially. Although ACE is targeting full deployment of all PIV program Offerings, the Company will regularly evaluate the PIV charging market and may seek additional Board approvals in the future, after consultation with stakeholders, to modify the Program if market conditions or other factors indicate that it is prudent to not build out the entire Program, or when new PIV technologies develop. Alternatively, if market demand exceeds the maximum capacity of the final Program’s enrollment ceilings and budget, the Company will also seek approval from the Board to expand the current Offerings.

**Data Collection and Reporting**

Q57. **What type of information does ACE propose to collect from program participants?**

A57. ACE will collect data from customers enrolled in its Offerings regarding the locations of registered PIVs in its service territory, and whether customers are actually shifting the times for charging their vehicles to off-peak hours in response to the incentives provided through the PIV Program. In addition, the Company expects to gain operational
experience in communicating with smart EVSEs to identify demand response events, and the number of customers who react accordingly to the demand response events can be determined.

Q58. **Why does ACE want to collect this information?**

A58. The data that ACE seeks to collect will, among other things, allow the Company to make proactive decisions regarding system enhancements to accommodate PIVs and maintain reliability of the grid. The Company will use this data to determine the potential for long- and short-term impacts on the grid, and the need to either invest or defer infrastructure improvements. In addition, the Company will determine to what extent the PIV charging load may offset the costs of the program. In addition, the Company will use this data to evaluate and refine the marketing and education strategies deployed. Finally, ACE will quantify the savings that participating customers enjoyed because of the PIV Program, as well as their overall satisfaction with the Program.

Q59. **Please describe the type of data and frequency the Company proposes to report to the Board.**

A59. During the term of the PIV Program, ACE proposes to provide periodic reports to the Board, on both a quarterly basis and an annual basis. Within these reports, the Company will provide status updates to the Board regarding progress of the Program. To evaluate the Company’s progress towards meeting these objectives, the Company will collect and provide the Board with data regarding:

- Program costs;
- Customer enrollment;
- Customer education/outreach;
Customer satisfaction;

Supplier diversity;

Load patterns; and

Customer behavior.

Q60. How will ACE handle and maintain customer information during the program?

A60. ACE understands its responsibility to safeguard customer data. Each customer’s personally identifiable information (“PII”) obtained through the application process will only be collected to evaluate a customer’s eligibility for the selected Offering. At no time will PII be shared with entities outside of the Company without customer consent. All data provided in public reports, filings, or to stakeholders will be stripped of PII and submitted in aggregated form.

Q61. Does this conclude your Direct Testimony?

A61. Yes, it does.
Schedule (JMG)-1
<table>
<thead>
<tr>
<th>Program Category</th>
<th>#</th>
<th>Offering Specific Costs</th>
<th>Unit Cost</th>
<th>Unit Basis</th>
<th>Number Of Units</th>
<th>Total Costs</th>
<th>Costs For EVSE &amp; Other PIV Hardware</th>
<th>Budget For Rate Incentives: Paid</th>
<th>Est. Costs: Metering &amp; Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>1</td>
<td>Whole House TOU Rate - off peak charging rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Upgraded Interval Meter</td>
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<td>Per Customer</td>
<td>300</td>
<td>$30,000</td>
<td>$30,000</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Meter Upgrade (labor and other installation costs by utility)</td>
<td>$300</td>
<td>Per Customer</td>
<td>300</td>
<td>$90,000</td>
<td>$90,000</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Off-peak Incentive Delivered</td>
<td>TOU Tariff Expected To Be Revenue Neutral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                  |   | Offering 1 Total | | | | | | | $120,000
| Residential       | 2 | OFF-Peak Charging incentive - off-peak incentive based on vehicle data | | | | | | | |
|                  |   | C2 Device | $99 | Per Customer | 300 | $29,700 | $29,700 | | |
|                  |   | Off bill / Off Peak Incentive Delivered | | | | | | | | | | |
|                  |   | Offering 2 Total | | | | | | | $192,023
| Residential       | 3 | Residential Rebate/Managed Charging Program - 50% rebate L2; 50% rebate installation, off-peak incentive EVSE data | | | | | | | |
|                  |   | Facility Assessment/Visit for Prequalification | $500 | Per Possible Site | 1,875 | $937,500 | $937,500 | | |
|                  |   | Rebate: New Smart Level 2 EVSE (50% of allowed costs) | $500 | Per EVSE | 1,500 | $750,000 | $750,000 | | |
|                  |   | Rebate: Installation (50% of allowed costs) | $500 | Per EVSE | 1,500 | $750,000 | $750,000 | | |
|                  |   | Off bill / Off Peak At Home Incentive Delivered | | | | | | | $958,249
|                  |   | Offering 3 Total | | | | | | | $3,355,749
| Commercial       | 4 | Multi-Family - 50% rebate L2; up to 10K for installation; demand charge offset | | | | | | | |
|                  |   | Facility Assessment/Visit for Prequalification | $800 | Per Possible Site | 83 | $66,400 | $66,400 | | |
|                  |   | Rebate: New Smart Level 2 EVSE (50% of allowed costs, w/ payment module & cell) | $2,500 | Per EVSE | 200 | $500,000 | $500,000 | | |
|                  |   | Rebate: Installation - (100% of allowed costs, up to $10,000 max per site) | $10,000 | Per Site | 67 | $670,000 | $670,000 | | |
|                  |   | Demand Charge Credit Incentive Delivered | | | | | | | $568,569
|                  |   | Offering 4 Total | | | | | | | $1,804,969
| Commercial       | 5 | Workplace - 50% rebate L2; demand charge offset | | | | | | | |
|                  |   | Facility Assessment/Visit for Prequalification | $800 | Per Possible Site | 38 | $30,400 | $30,400 | | |
|                  |   | Rebate: New Smart Level 2 EVSE (50% of allowed costs, w/ payment module & cell) | $2,500 | Per EVSE | 150 | $375,000 | $375,000 | | |
|                  |   | Rebate: Installation - (no incentive for "make ready" or EVSE installation) | | - | Per Site | 30 | $ - | $ - | |
|                  |   | Demand Charge Credit Incentive Delivered | | | | | | | $400,995
|                  |   | Offering 5 Total | | | | | | | $806,395
| Commercial       | 6 | Fleet L2 - 50% rebate L2; demand charge offset | | | | | | | |
|                  |   | Facility Assessment/Visit for Prequalification | $800 | Per Possible Site | 38 | $30,400 | $30,400 | | |
|                  |   | Rebate: New Smart Level 2 EVSE (50% of allowed costs, w/ payment module & cell) | $2,500 | Per EVSE | 150 | $375,000 | $375,000 | | |
|                  |   | Rebate: Installation - (no incentive for "make ready" or EVSE installation) | | - | Per Site | 30 | $ - | $ - | |
|                  |   | Demand Charge Credit Incentive Delivered | | | | | | | $400,995
|                  |   | Offering 6 Total | | | | | | | $806,395
| Public Charging  | 7 | Utility Owned DFC For Public Use | | | | | | | |
|                  |   | Site Engineering and Development (assessment, contracting, design, permits) | $15,000 | Per Site | 15 | $225,000 | $225,000 | | |
|                  |   | New Service & Infrastructure -> EVSE (service drop, new meter, transformer, etc) | $40,000 | Per Site | 15 | $600,000 | $600,000 | | |
|                  |   | DFC EVSE (assumes at least 50KW units, ChaDEMO/CICS) | $50,000 | Per EVSE | 45 | $2,250,000 | $2,250,000 | | |
|                  |   | Installation (EVSE installation, testing, commissioning, network activation) | $50,000 | Per Site | 15 | $750,000 | $750,000 | | |
|                  |   | All Other Development Costs (signage, lighting, bollards, landscaping, etc) | $8,000 | Per Site | 15 | $120,000 | $120,000 | | |
|                  |   | Project Management | $15,780 | Per Site | 15 | $236,700 | $236,700 | | |
|                  |   | Construction Contingency | $26,300 | Per Site | 15 | $394,500 | $394,500 | | |
|                  |   | Offering 7 Total | | | | | | | $4,576,200
| Public Charging  | 8 | Utility Owned L2 For Public Use | | | | | | | |
|                  |   | Site Engineering and Development (assessment, contracting, design, permits) | $15,000 | Per Site | 65 | $975,000 | $975,000 | | |
|                  |   | New Service & Infrastructure -> EVSE (service drop, new meter, transformer, etc) | $40,000 | Per Site | 65 | $2,600,000 | $2,600,000 | | |
|                  |   | L2 EVSE | | | | | | | |
|                  |   | Installation (EVSE installation, testing, commissioning, inspection, activation) | $20,000 | Per Site | 65 | $1,300,000 | $1,300,000 | | |
|                  |   | All Other Development Costs (signage, lighting, bollards, landscaping, etc) | $8,000 | Per Site | 65 | $520,000 | $520,000 | | |
|                  |   | Project Management | $6,180 | Per Site | 65 | $401,700 | $401,700 | | |
|                  |   | Construction Contingency | $8,300 | Per Site | 65 | $539,500 | $539,500 | | |
|                  |   | Offering 8 Total | | | | | | | $7,336,200
| Public Charging  | 9 | Non-Utility-Owned Make-ready and Demand Charge Solution | | | | | | | |
|                  |   | Site Engineering and Development (assessment, contracting, design, permits) | $15,000 | Per Site | 30 | $450,000 | $450,000 | | |
|                  |   | New Service & Make-Ready -> EVSE (service drop, new meter, transformer, etc) | $40,000 | Per Site | 30 | $1,200,000 | $1,200,000 | | |
|                  |   | Demand Charge Credit (via "set-point" design: 20 cents/kwhr) | | | | | | | $2,420,779
|                  |   | Offering 9 Total | | | | | | | $4,070,779
# ACE's Proposed PIV Program
## Estimated Costs

<table>
<thead>
<tr>
<th>Program Category</th>
<th>#</th>
<th>Offering Specific Costs</th>
<th>Unit Cost</th>
<th>Unit Basis</th>
<th>Number Of Units</th>
<th>Total Costs</th>
<th>Budget For Rate Incentives: Paid</th>
<th>Est. Costs: Metering &amp; Infrastructure</th>
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<tr>
<td>Community Planning &amp; Transit</td>
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<td>Innovation Fund</td>
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<td></td>
<td>11</td>
<td>Electric School Bus - Bus Inentive and Charging Infrastructure</td>
<td>20 Buses</td>
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<td>NJ Transit - Charging Infrastructure</td>
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**Offerings 10, 11 and 12 Total**

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<tr>
<th>Residential Offer Totals:</th>
<th>Residential Offer Totals:</th>
<th>Non-Residential Offer Totals:</th>
<th>Public Offer Totals:</th>
<th>Special Segment Offers:</th>
<th>All Offering Totals:</th>
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<tr>
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<td>$10,000,000</td>
<td>$2,000,000</td>
<td>$15,983,179</td>
<td>$3,000,000</td>
<td>$33,108,710</td>
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**Total Offering Costs: $33,108,710**

**Additional PIV Program Costs**

**Recurring Network & Data Costs (for communicating with EVSE: licenses, telcom, etc)**
- Data Network Charges (Offering 2 - C2 device: $276 per customer/yr) $417,000
- Data Network Charges (Offerings 3 - 6, EVSE Cell Communication Costs) $1,422,000
- Data Network Charges (Offerings 7, EVSE Cell Communication Costs) 90,000
- Data Network Charges (Offerings 8, EVSE Cell Communication Costs) 300,000

**Sub-Total - Recurring Networking & Data Costs: $2,229,000**

**Back-end Software Costs (for collecting data from EVSE)**
- General Back-end Costs (Offering 2): C2 device (start-up costs) $24,000
- General Back-end Costs (Offerings 3 - 6): EVSE Backend 2,280,000
- General Back-end Costs (Offering 7): EVSE Backend 112,500
- General Back-end Costs (Offering 8): EVSE Backend 500,000

**Sub-Total - Back-end Costs: $2,936,500**

**Program Implementation and Admin (internal and outsourced resources)**
- Program Implementation and Delivery (startup and 5 years) $100,000
- Utility Program Management (internal utility costs and any outsourcing) 1,536,000
- Utility Systems Interfaces & Updates (IT, Billing, EV Analytics, etc) 67,200
- Analysis & Reporting, BCA Analysis, EM&V, Regulatory Filings (for 5-yr program) 150,000

**Sub-Total - Implementation and Admin: $1,853,200**

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<tr>
<th>Implementation, Admin and IT</th>
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<tr>
<td>Education and Outreach Plan</td>
<td>$2,000,000</td>
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**Total Costs (With Education): $42,107,410**
Q1. Please state your name and position.

A1. My name is Michael Normand. I am the Manager of Rate Administration for Atlantic City Electric Company ("ACE" or the "Company") and Delmarva Power & Light Company ("Delmarva Power"), in the Regulatory Affairs Department of Pepco Holdings, LLC ("PHI"). I am providing this Direct Testimony on behalf of ACE.

Q2. What are your responsibilities in your role as Manager of Rate Administration, Regulatory Strategy and Revenue Policy?

A2. I am primarily responsible for the development of electric rates, including tariff surcharges, for ACE. I also participate in the development of PHI’s policies and practices with respect to rate design and assist with regulatory compliance matters in other PHI jurisdictions, including tariff administration and periodic filings.

Q3. Please state your educational background and professional experience.

A3. In 2008, I graduated from West Virginia University, with a Bachelor of Science degree in Business Administration with a major in finance. In 2016, I received a Master of Science degree in finance from Northeastern University. Beginning in 2008, I was employed at Management Applications Consulting Inc. where I was involved in various state regulatory proceedings. My responsibilities included load research, allocation factor development, marginal cost-of-service, embedded cost-of-service, witness support, and various special cost of service analyses.
In 2011, I joined the Regulatory Department of PHI as a Regulatory Analyst. My responsibilities included witness support and cost of service study development. In 2012, I was promoted and was a Class Cost of Service (CCOSS) witness for Delmarva Power Delaware gas operations. Following this promotion, I have developed and testified to several CCOSS’ for the operating utilities of PHI. This includes Delmarva Power’s Maryland electric operations and, Delaware gas operations, as well as Pepco’s Maryland and District of Columbia operations. In early 2017, I transferred to the Revenue Requirements team for Delmarva Power and ACE. In early 2019 I was promoted to my current position.

Q4. What is the purpose of your Direct Testimony?

A4. The purpose of my Direct Testimony is to provide an overview of the proposed rate design and cost recovery mechanisms contained in the Company’s Amended Petition (the “Amended Petition”) for approval of its proposed Voluntary Program for Plug-In Vehicle Charging (the “PIV Program” or “Program”).

Q5. How is your Direct Testimony organized?

A5. My Direct Testimony is organized as follows. With respect to the proposed PIV Program, I will discuss: (a) the rate design of the new Rate Schedules; and (b) the proposed cost recovery mechanism and its estimated corresponding impact on residential rates. My Direct Testimony and accompanying schedules were prepared by me or under my direct supervision and control. The source documents for my Direct Testimony are Company records and public documents. I also rely upon my personal knowledge and experience.
Rate Design

Q6. Please discuss the goals of the proposed rate design.

A6. The Company is proposing to implement a voluntary Plug-In Vehicle (“PIV”) Program, consisting of thirteen (13) Offerings for PIV charging in New Jersey. With exception to Offering 13 – “Green Adder”, any given customer may only participate in a single offering at a time. This avoids “stacking” or “double dipping” of incentives and rebates which is not the intent of the PIV Program. These Offerings focus on providing ACE’s customers with new charging infrastructure and innovative electric rate options, including incentives. It is important to note that many of these rate offerings only the utility can provide. They cover residential, multiple dwelling units (“MDUs”), workplace charging, and fleet charging for use of PIVs through targeted time-of-use (“TOU”) rates and/or rebates on equipment, and rate related incentives. They also support installation of publicly available Smart Electric Vehicle Supply Equipment (“EVSE”) Level 2 (“L2”) chargers and Direct Current Fast Chargers (“DCFC”). Furthermore, ACE’s Offerings contain Community and Transit Programs which include an Innovation Fund to encourage innovative PIV-related projects, and support for the electrification of school buses, and New Jersey Transit buses. Finally, the Company is proposing an Offering that will permit all electricity supplied to customers participating in Offering 1 to derive from renewable sources, at the customer’s election (opt-in), and to embed this renewable feature in its proposed Offerings pertaining to Company owned public charging (Offerings 7 and 8).

The overall goals of the rate design for the various Offerings is to provide a balance between the recovery of costs from the appropriate customer group with
proposed economic incentives intended to promote PIV applications. Consequently, the Company is proposing the following new Tariff Rate Schedules and Riders:

- Rate Schedule “RS-PIV” (for Offering 1 of the PIV Program);
- Residential Electric Vehicle Charging Rebate - Rider “REVCP” (for Offerings 2 and 3 of the PIV Program);
- Commercial Electric Vehicle Charging Program – Rider “CEVCP” (Offering 4, 5, and 6, of the PIV Program);
- Public Charging - Rate Schedule “PC-PIV” (for Offerings 7 and 8 of the PIV Program);
- Non-Utility Owned Public DCFC – Rider “NUOPDCFC” (Offering 9 of the PIV Program); and
- Community and Transit Charging Program – Rider “CTCP” (Offering 10, 11, and 12); and
- The Green Adder – Rider “PIV-Green” (Offering 13 of the PIV Program).

For each of the Offerings above the Company seeks to establish two regulatory assets. The first is the “Program Regulatory Asset.” The PIV Program Regulatory Asset will capture all the costs of the PIV Program for Offerings 1 through 12 that are not capital. The capital costs of the program will close to plant-in-service. Both the PIV Program regulatory asset and the capital cost recovery are discussed in the cost recovery section of this testimony. The second regulatory asset is for the Green Adder, (Rider “PIV-Green”), and is discussed in the Rider “PIV-Green” section in this testimony. A detailed description of the PIV Program offerings is provided in the Direct Testimony of Company Witness Grisham.
Q7. Please provide a description of Offering 1 – Whole House TOU Rate, Rate Schedule “RS-PIV”.

Rate Schedule “RS-PIV” is a new rate schedule applicable to Basic Generation Service (“BGS”) Residential customers with PIVs who enroll in Offering 1. Customers who enroll in Offering 1 will have all the electric usage for their residence served under a single TOU rate schedule, pursuant to RS-PIV. Under RS-PIV, the Delivery Service Charges and all other applicable charges except for the BGS Charge would be the same as those for Rate Schedule “RS.” Rate Schedule “RS-PIV,” however, includes a time-based BGS rate intended to encourage usage, including but not limited to PIV charging, during “off-peak” hours. The Company intends to consider the hours between noon and 8:00 p.m., Monday through Friday (including all holidays that fall on weekdays) to be “on-peak.” All other hours would be off-peak hours.

Rate Schedule “RS-PIV” provides an approximately 4.9:1 ratio between the price at on and off-peak hours during the summer months (June through September), and an approximately 3.7:1 ratio between the price at on and off-peak hours during the winter months (October through May). The on and off-peak summer and winter rates are designed to be revenue neutral. Additionally, a second meter would not be necessary for this Offering, but the customer’s current meter would be replaced with an interval meter to track on and off-peak usage. All participants in Rate Schedule “RS-PIV” through Offering 1 would be permitted to opt-out of this rate classification. The new capital for replacing the meter would be closed to plant in service and would be
recovered in the next base rate case. The incremental depreciation associated with these meters would be deferred to the PIV Program regulatory asset.

**Rider “REVCP”**

**Q8. Please provide a description of Offering 2 – Off Peak Charging Incentive for Residential Customers with EVSE.**

A8. Offering 2 would be extended up to 300 qualified residential customers through Rider “REVCP”. Under Rider REVCP the Delivery Service Charges would be equal to the current Rate Schedule “RS”, and other applicable charges would be the same as those for Rate Schedule “RS.” Rider “REVCP”, however, includes 5 cent per kilowatt-hour ("kWh") off-bill rebate incentive for charging off-peak, with any on-peak charging netted against the off-peak charging kWh in determining the rebate. This services two purposes: (1) to provide an incentive to charge off-peak and (2) to discourage on-peak charging.

The distinction between on-peak and off-peak hours will be the same as in Offering 1. However, unlike Offering 1, the off-bill incentive under Offering 2 would apply only to net off-peak PIV charging, and not “whole house” usage. Offering 2 would only be available to customers who own PIV(s). Additionally, Rider “REVCP” would not be available for customers who enroll in Rate Schedule “RS-PIV”, such that Offering 1 will be mutually exclusive from Offering 2. The 5 cent per kWh incentive and the cost of the vehicle device provided by ACE would be recovered through the PIV Program Regulatory Asset. This device would allow the Company to measure the on and off-peak charging for purposes of determining the net off-peak rebate.
Q9. Please provide a description of Offering 3 – Residential Rebate / Managed Charging Program in proposed Rider “REVCP”.

A9. Offering 3 would be available up to 1,500 qualified residential customers through Rider “REVCP”. Under Rider REVCP the Delivery Service Charge would be equal to the current Rate Schedule “RS”, and other applicable charges would be the same as those for Rate Schedule “RS”. Offering 3 includes a 50% rebate on the cost of Smart L2 EVSE, and a rebate of 50% of the associated installation costs. Additionally, a customer enrolling in Offering 3 would be automatically enrolled in the off-bill and net off-peak incentive of 5 cents per kWh. The on-peak and off-peak periods would be the same under Offering 3 as they are for Offerings 1 and 2.

Additionally, the cap of 1,500 customers in the off-bill off-peak rebate would be in addition to the 300 customers that could participate in Offering 2 (for up to 1,800 total). Additionally, Rider “REVCP” would not be available to customers who enroll in Rate Schedule “RS-PIV”. All three of the rebates (EVSE, installation, and 5 cent off-peak rebate) for Offering 3 would be recovered through the PIV Program Regulatory Asset.

Q10. Please describe how the 5 cent per net off-peak kWh incentive under Offerings 2 and 3 was determined.

A10. As mentioned, the Company envisions the “on-peak” periods as noon to 8:00 p.m., Monday through Friday, including holidays falling on weekdays, with all other hours being off-peak hours. The 5 cent incentive for net off-peak kWhs under Offerings 2 and 3 was determined by an analysis comparing different three different base line usage per month (before PIV charging) and adding four different EV charging
assumptions. This analysis resulted in 12 different scenarios of monthly kWh usage. These different energy consumption scenarios were used to calculate a total bill for Rate Schedules “RS” and “RS TOU BGS”. The difference of the two total bill costs being the value of the TOU BGS price. This differential in price was used to calculate an effective rebate by using the PIV off-peak kWh for each of the four PIV charging scenarios. This provided a range of rebates from as low as $0.029 per kWh up to $0.16 per kWh. The average base line usage and average PIV charging scenario is approximately $0.06 per kWh.

Additionally, the Company considered similar offerings in other markets. For instance, in Maryland and New York an off-peak incentive of 5 cents has been approved by each of the Commissions in those jurisdictions. In addition, the intention of this offer is to motivate a change in consumer behavior, and the incentive level therefore needs to be at a level that is sufficient to stimulate the desired behavior. That coupled with the range in the analysis led the Company to determine the proposed 5 cent rebate for net off-peak PIV charging was reasonable for ACE’s PIV Program. Both Offerings 2 and 3 intend to test how the 5 cent incentive changes customers behavior.

Q11. Are Rate Schedules “RS-PIV” and Rider “REVCP” available to Net Energy Metering (“NEM”) Customers?

A11. As Company Witness Grisham explains in her Direct Testimony on page 10, Rider “REVCP” (Offerings 2 and 3) will be available to NEM customers. For Offering 1 (Rate Schedule “RS-PIV”), NEM is available, however, the rate credited for solar
generation will be set at a the prevailing BGS rate for Rate Schedule “RS” NEM customers.

**Rider “CEVCP”**

**Q12. Please provide a description of the proposed Offering 4 (Multi-Dwelling Unit Charging).**

A12. ACE proposes that Offering 4 would be applicable for up to two-hundred (200) L2 EVSE with a maximum of 6 EVSE per customer, where the customer for this Offering would be owners or operators of apartment complexes, condominiums (i.e., multi-dwelling units (“MDUs”)). Offering 4 is a three-part Offering, consisting of: (1) a rebate of 50% of the L2 EVSE; (2) a rebate of up to $10,000 to cover eligible installation costs per site; and (3) a demand charge offset incentive. The demand charge offset incentive would be calculated as 50% of the EVSE name plate capacity times the applicable rate schedule demand charge. The customer under Offering 4 will be defined as the account holder of the premise with whom ACE has the account contract, and the customer will remain on their pre-existing Rate Schedule. For example, if an apartment complex is currently receiving service from Rate Schedule Annual General Service Secondary (“AGSS”), they would remain on that rate schedule and the demand charge rebate would be calculated as 50% of the EVSE name plate capacity times the prevailing demand charge for Rate Schedule AGSS as an off-bill rebate. Therefore, the AGSS demand charge of $11.09 per kW, and the nameplate capacity of their installed L2 EVSE was 7.2 kW, the customer would receive a demand charge incentive of $39.92 (7.2 x 0.50 x $11.09). It is important to note this does not discount the demand
of the existing premise, and this incentive is only for the incremental demand the
premise is expected to see from the L2 EVSE capacity installed.

   Additionally, to be eligible to enroll under Offering 4 customers who
own/operate condominium/apartment complexes must have dedicated parking
available for PIV charging infrastructure and at least two residing New Jersey
registered PIV owners. For Offering 4, ACE proposes that any incremental O&M and
both the EVSE, installation costs, and demand charge incentives would be recovered
through the proposed PIV Program Regulatory Asset.

Q13. Please provide a description of the Proposed Offering 5 (Workplace Charging).

A13. Offering 5 would be available for up to one hundred fifty (150) L2 EVSE with
a maximum of 6 L2 EVSE per eligible customer (on a first-come first-served basis).
Qualified customers for Offering 5 will be the owners and operators of office buildings
and/or garages, where dedicated parking can be made available for PIV charging
infrastructure. The customer for purposes of Offering 5 will be defined as the account
holder of the premise with whom ACE has the account contract, and the customer will
remain on their pre-existing Rate Schedule.

   Offering 5 will provide participating customers with a rebate of 50% of the cost
L2 EVSE. The Offering does not include a rebate for the installation costs, but it does
include a demand charge offset incentive. The demand charge offset incentive would
be calculated as 50% of the EVSE name plate capacity times the applicable rate
schedule demand charge (as detailed in the example for Offering 4). Similar to Offering
4, ACE proposes that the cost of the EVSE and demand charge incentives will be
recovered through the PIV Program Regulatory Asset.
Q14. Please provide a description of Offering 6 – Fleet Charging.

A14. As discussed by Company Witness Grisham, Offering 6 provides electric fleet/light duty charging infrastructure to non-residential customers that own commercial vehicle fleets. Similar to Offering 5, Offer 6 consists of a rebate for 50% of the cost of the L2 EVSE (but does not extend to installation costs). This Offering will be available for up to the first one hundred fifty (150) EVSE with a maximum of 6 EVSE per customer. The customer for purposes of Offering 6 will be defined as the account holder of the premise with whom ACE has the account contract, and the customer will remain on their pre-existing Rate Schedule.

Additionally, Offering 6 will provide a demand charge incentive paid monthly as an off bill rebate equal to 50% of the EVSE name plate capacity of the L2 EVSEs installed multiplied by the prevailing tariff demand charge (as detailed in Offering 4 example). Similar to Offerings 4 and 5, both the EVSE rebate and demand charge incentive will be recovered through the PIV Program Regulatory Asset.

Rate Schedule PC-PIV

Q15. Please provide a description of the proposed Offering 7 – Utility-Owned Public DCFC Chargers and Offering 8 – Utility-Owned Public L2 Charging (Rate Schedule “PC-PIV”).

A15. Rate Schedule “PC-PIV” would be applicable to customers using the Company’s public charging infrastructure as provided in Offerings 7 (Utility-Owned Public DCFCs) and 8 (Utility-Owned Public L2 Chargers). The Company proposes that rates charged to customers using the utility-owned public chargers under Offerings 7 and 8 will be based on an assessment of the prevailing market rates in New Jersey.
(one rate for L2 and one rate for DCFC) based on a market pricing study of current public charging prices. This study will be updated regularly (and at a minimum annually). In Maryland, for example, the Tariff rates for L2 utility-owned public charging is 18 cents per kWh and for DCFC 34 cents per kWh (excluding the Maryland Green Rider). These Maryland rates do not include the “Green Adder,” however, since all Green Adder costs for utility-owned chargers are to be paid by ratepayers generally. Here, the Company proposes that the utility-owned chargers under Offerings 7 and 8, through proposed Rate Schedule “PC-PIV,” would feature electricity consisting of 100% renewable energy via the inclusion of the Green Adder (through Rider “PIV-Green”, as discussed below). The Company proposes that the Green Adder under Offerings 7 and 8 would be borne by the users of the utility-owned chargers, and not ratepayers generally.

The cost-based revenues requirements associated with Offering 7 and 8 are provided in Schedule (MTN)-1. These assets will be closed to plant in service and the Company will seek recovery of and on these investments in its next base rate case. The associated incremental depreciation would be included in the proposed PIV Program Regulatory Asset. The appropriate market-based revenues received will credited to the Program Regulatory Asset, and thus reduce the Program regulatory asset balance.

Rider “NUOPDCFC”


A16. As more fully described in the Direct Testimony of Company Witness Grisham, Offering 9 would provide an incentive for non-utility owners/operators of publicly available DCFC. The Offering would be available for non-utility owned DCFCS at up
to 30 locations, with up to four non-utility owned DCFCs per location (for a total of 120 DCFCs maximum). This Offering will consist of a new service on a standard commercial tariff and will require a new meter dedicated to the non-utility owned DCFC. This Offering would not be applicable to existing non-utility DCFCs.

Specifically, this Offering provides a kWh off bill rebate incentive to offset the customer’s demand charge for a limited period of time (until the end of the Program). This lowers the overall cost of electricity to a known “set point.” The set point will be set at $0.20/kWh. As DCFC utilization increases the incentive will naturally and automatically decline because the fixed customer charge and demand charge will be spread over an increasing number of kWhs. As an example, the monthly effective cost of electricity (total monthly bill divided by total monthly kWh) less the set point of 20 cents/kWh will be the rebate paid per kWh. Where the effective cost of electricity is calculated by taking the total monthly bill cost divided by total monthly bill kWh. A single DCFC may drive a monthly billing demand of 50 kW, however, as utilization increases the peak demand will still be 50 kW, but the associated kWh will increase. Meaning that the effective cost of electricity per kWh will decrease as utilization increases (as utilization goes up the total monthly bill divided by the monthly kWh will decline, and thus the rebate will also decline). Utilization may vary for each customer / site every month and therefore the rebate for each customer / site will also vary every month which makes this Offering unique to each site. Schedule (MTN)-5 illustrates this example. The set point rebates would be recovered through the PIV Program Regulatory Asset.
**Rider “PIV-Green”**

**Q17. What is the “Green Adder” (Offering 13)?**

A17. The Green Adder (Offering 13) is applicable to Offering 1, but only if the participating customer so elects (opt-in). Through the Green Adder, customers participating in Offering 1 will have the option to receive electricity consisting of 100% renewable energy under the “Green Adder”. Customers who so elect will have Rider “PIV-Green,” applied to their PIV-specific rate schedule (i.e. “RS-PIV” pursuant to Offering 1). Based on current procurement costs, the Company estimates that the Green Adder (effectuated through Rider “PIV-Green”) would increase a participating customer’s bill by $0.0543 per kWh.

The Green Adder would also be applicable to Offerings 7 and 8 (utility-owned public charging), albeit by default, as more fully explained by Company Witness Grisham. The Green Adder would be effectuated through the same “PIV-Green” Rider, as applied to Offerings 7 and 8.

**Q18. Please discuss the requirements for the Green Adder.**

A18. The additional $0.0543 per kWh, based on current estimates, for the “PIV-Green” Rider, would be added to a customer’s bill to ensure that a customer receives 100% renewable energy. This will be accomplished through the Company’s purchase of renewable energy credits (RECs) at the end of each year. Due to the timing of the expense of REC purchases and the revenues paid by the customers based on $0.0543 per kWh a regulatory asset and true-up mechanism are required to ensure a matching of revenue and expense. This separate mechanism is necessary because the “PIV-Green” Rider is not currently a product offered within BGS.
The Company proposes to establish a separate regulatory asset, distinct from the proposed PIV Program Regulatory Asset that would capture other Program costs and revenues, to track the revenues and expenses associated with the proposed Green Adder (effectuated through the “PIV-Green” Rider). Any over or under recovery would accrue short-term interest. The Company proposes that the proposed Green Adder regulatory asset would have an annual true-up compliance filing. The annual true-up filing would include the establishment of a new “PIV-Green” Rider rate that would include (1) The new prevailing market price for RECs, and (2) the previous 12-month period cumulative over or under recovery amortized over 12-months using forecasted sales.

**Rider “CTCP”**


A19. Company Witness Grisham provides the details of how each of these community and transit programs will function. In Brief the Community and Transit Program (Rider “CTCP”) includes the following three Offerings: (1) Offering 10 (the Innovation Fund) would provide rebates and or grants for 50% of awarded project costs; (2) Offering 11 (Electric School Bus Fund) would include up to $250,000 per electric school bus (covering their incremental costs over traditional buses), plus an additional $25,000 per EVSE; (3) Offering 12 (New Jersey Transit Charging) includes up to $2.25 million in distribution system upgrades and engineering costs, and up to $250,000 for high-powered charging station equipment at a selected New Jersey
Transit bus depot in ACE’s service territory. The Company proposes that it would recover the funds it disburses for each of these Offerings through the Program regulatory asset.

**Tariffs**

Q20. Please list the tariffs and workpapers that you are sponsoring.

A20. Illustrative Tariff Sheets showing the updated proposed terms and conditions and rates applicable to the PIV Program, and provided for through the instant Amended Petition, are set forth in Schedule (MTN)-2. Schedule (MTN)-4 compares the Offerings and Tariffs from ACE’s Original Petition to the Offerings and Tariffs for this Amended Petition.

**Cost Recovery**

Q21. Please describe the overall costs of the program.

A21. The total estimated cost of the PIV Program under this Amended Petition, net of costs borne by customers, is approximately $42.107 million. In order to receive EVSE and installation rebates, Program participants are required to make an investment as a part of the cost-sharing included in Offerings 3, 4, 5, and 6 (e.g., the customer’s share of the EVSE and installation costs), and therefore, these contributions are excluded from the total estimated Program cost. This is important because the Program rebates require private investment by customers before a rebate for infrastructure is to be provided. The costs of the program are split between those associated with capital assets and those associated with operating and maintaining the offerings of the program, as well as rate-related incentives. Additional details surrounding the costs of the PIV Program can be found in Schedule (MTN)-3, pages 1-3.
Q22. Please discuss the Company’s proposal for recovery of PIV Program costs.

A22. ACE proposes that all capital related to the PIV Program be added to rate base as it is placed into service and will be recovered in a future base rate case proceeding. These capital costs are detailed in Schedule (MTN)-3, page 3. In addition, the Company seeks a regulatory asset, the PIV Program Regulatory Asset, for each of the offerings above (Offerings 1-12). The PIV Program regulatory asset costs are detailed in Schedule (MTN)-3 page 2. The costs included in the regulatory asset include:

- Rebates on EVSE equipment (Offering 2, 3, 4, 5, and 6);
- Rebates on installation costs (Offering 3, 4 and 5);
- Rate Incentives (Offering 2, 3, 4, 5, 6, and 9);
- Community and Transit Funds/Grants (Offering 10, 11, and 12);
- Recurring Network & Data Costs (Offering 2, 3, 5, 6, 7, and 8);
- Program Implementation and Administrative Costs (all offerings);
- Incremental Depreciation and O&M (Offering 1, 7, 8, and 9)

Additionally, the Utility-owned public charging market-based revenues received by PIV owners charging at utility-owned charging stations (Offering 7 and 8) would be included as a credit reducing the PIV Program Regulatory Asset. The regulatory asset and the undepreciated book value of the new capital placed in service would accrue at the Company’s full authorized return from inception and will be recoded into the regulatory asset. The regulatory asset will be amortized over a 5-year period and the Company will seek recovery of this regulatory asset amortization expense in its next base rate case proceeding and will be afforded rate base treatment. Additionally, in any future rate case in which PIV Program costs are sought to be
recovered, the Company would provide a detailed explanation of how the costs are to be allocated. Schedule (MTN)-3 pages 2 and 3 summarizes each of the Offerings for what the Company proposes placing into rate base versus the Program Regulatory Asset. The Green Adder regulatory asset will capture the revenues and expenses for the Green Adder, and the proposed true-up mechanism is detailed in Question 17.

Q23. Please discuss the impact of the PIV Program on residential customer rates.

A23. The Company estimates that a typical residential customer on BGS service using 679 kWh per month will pay an additional $0.54 per month for the recovery of the PIV Program costs. This includes recovery through both the PIV Program regulatory asset and the investment in capital. This analysis and its underlying assumptions are set forth in Schedule (MTN)-3. This rate impact will be mitigated by the beneficial impacts of vehicle charging on the cost of electricity overall, as quantified in detail by the benefit/cost analysis of Company Witness Warner, and by the revenues from the utility-owned public charging (Offerings 7 and 8).

Q24. Does this conclude your Direct Testimony?

A24. Yes, it does.
Schedule (MTN)-1
## Development of Public Level II EVSE Charger Revenue Requirements

### Rate Basis:

<table>
<thead>
<tr>
<th>Period (years)</th>
<th>Revenue Requirement</th>
<th>Required Oper. Income</th>
<th>Return Required</th>
<th>Total Operating Expenses</th>
<th>FIT-Current</th>
<th>SIT-Current</th>
<th>Depreciation &amp; Amortization</th>
<th>Interest Expense</th>
<th>Net Rate Base</th>
<th>Return on Equity per WACC</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>5,873,140$</td>
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<td>2</td>
<td>6,776,700$</td>
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<td>9</td>
<td>2,710,680$</td>
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<tr>
<td>10</td>
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<td>13</td>
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<tr>
<td>15</td>
<td>598,460$</td>
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</table>

### Income Statement Check

<table>
<thead>
<tr>
<th>Period (years)</th>
<th>Revenue</th>
<th>Depreciation &amp; Amortization</th>
<th>Interest Expense</th>
<th>Net income before Taxes</th>
<th>Earnings</th>
<th>Return on Equity per WACC</th>
<th>MACRS</th>
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</thead>
<tbody>
<tr>
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<td>1,018,047$</td>
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<td>144,014$</td>
<td>421,427$</td>
<td>302,964$</td>
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<td>301,019$</td>
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<td>6</td>
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<td>240,815$</td>
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<td>96,221$</td>
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<tr>
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<td>$451,780$</td>
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</table>

### Revenue Requirement Summary

- **Period (years):** 15
- **NPV of Cost Rev Req.:** $7,040,884
- **Leveled Annual Revenue Requirement:** $776,962
### ACE NJ

#### Development of Public DCFC Revenue Requirements

<table>
<thead>
<tr>
<th>Rate Basis:</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
<th>Year 11</th>
<th>Year 12</th>
<th>Year 13</th>
<th>Year 14</th>
<th>Year 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated Depreciation</td>
<td>$278,280</td>
<td>$556,560</td>
<td>$834,840</td>
<td>$1,113,120</td>
<td>$1,391,400</td>
<td>$1,669,680</td>
<td>$1,947,960</td>
<td>$2,226,240</td>
<td>$2,504,520</td>
<td>$2,782,800</td>
<td>$3,061,080</td>
<td>$3,339,360</td>
<td>$3,617,640</td>
<td>$3,895,920</td>
<td>$4,174,200</td>
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<tr>
<td>Deferred Taxes</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
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<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
<td>$ -</td>
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<tr>
<td>Net Rate Base</td>
<td>$3,895,520</td>
<td>$3,817,640</td>
<td>$3,359,360</td>
<td>$2,051,080</td>
<td>$2,782,800</td>
<td>$2,504,520</td>
<td>$2,226,240</td>
<td>$1,838,279</td>
<td>$1,669,680</td>
<td>$1,391,400</td>
<td>$1,113,120</td>
<td>$834,840</td>
<td>$556,560</td>
<td>$278,280</td>
<td>$ -</td>
</tr>
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</table>

#### Operating Income:

| Depreciation | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 |
| FIT-Current | $(70,229) | $(69,011) | $(67,793) | $(66,575) | $(65,357) | $(64,140) | $(62,922) | $(60,496) | $(59,281) | $(58,051) | $(56,833) | $(55,615) | $(54,397) | $(53,179) |
| Deferred Taxes | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Required Oper. Income | $460,548 | $462,987 | $474,988 | $487,979 | $491,968 | $495,957 | $499,946 | $503,935 | $507,924 | $511,913 | $515,902 | $519,891 | $523,880 | $527,869 | $531,858 |

#### Revenue Requirement:

| 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 | 1.39101 |
| 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 | 1,391,010 |

#### Income Statement Check:

| Depreciation & Amortization | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 |
| Interest Expense | $89,217 | $82,844 | $76,471 | $70,099 | $63,726 | $57,354 | $50,981 | $44,607 | $38,235 | $31,863 | $25,491 | $19,118 | $12,745 | $6,373 |
| Net income before Taxes | $259,583 | $241,042 | $222,502 | $203,998 | $185,417 | $166,875 | $148,333 | $130,168 | $111,250 | $92,708 | $74,167 | $55,625 | $37,083 | $18,542 |
| Income Tax - Current | $72,969 | $67,757 | $62,545 | $57,333 | $52,121 | $46,909 | $41,697 | $30,684 | $31,272 | $26,060 | $15,636 | $10,424 | $5,212 | $ - |
| Income Tax - Deferred | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - | $ - |
| Earnings | $186,615 | $173,285 | $159,955 | $146,626 | $133,296 | $119,967 | $106,637 | $78,474 | $79,978 | $66,468 | $53,989 | $26,659 | $13,330 | $ - |
| Return on Equity per WACC | $186,615 | $173,285 | $159,955 | $146,626 | $133,296 | $119,967 | $106,637 | $78,474 | $79,978 | $66,468 | $53,989 | $26,659 | $13,330 | $ - |
| MACRS | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 | $278,280 |

#### Revenue Requirement Summary:

<p>| Period (years) | 15.00 |
| NIP of Cost Rev Req | $4,369,518 |
| Levelized Annual Revenue Requirement | $462,176 |</p>
<table>
<thead>
<tr>
<th>Capital Structure</th>
<th>Weight</th>
<th>Rate</th>
<th>Weighted Rate</th>
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</thead>
<tbody>
<tr>
<td>Long Term Debt</td>
<td>50.06%</td>
<td>4.58%</td>
<td>2.29%</td>
</tr>
<tr>
<td>Common Stock</td>
<td>49.94%</td>
<td>9.60%</td>
<td>4.79%</td>
</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td></td>
<td>7.08%</td>
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Source: BPU Docket No. ER18080925
### Revenue Conversion Factor

#### Tax Rates

<table>
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<tr>
<th></th>
<th>Description</th>
<th>Source / Notes:</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Federal Income Tax Rate</td>
<td>Current Federal Corporate Income Tax Rate</td>
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<tr>
<td>(2)</td>
<td>New Jersey State Income Tax Rate</td>
<td>Current NJ Corporate Income Tax Rate</td>
<td>0.090000</td>
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<tr>
<td>(3)</td>
<td>New Jersey - BPU Assessment and Ratepayer Advocate</td>
<td>Current NJ BPU Assessment and Ratepayer Advocate</td>
<td>0.00245</td>
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#### Conversion Factor (Income Tax Only)

<table>
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<tr>
<th></th>
<th>Description</th>
<th>Equation</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>(4)</td>
<td>NJ Taxable Income</td>
<td>(4) = 1</td>
<td>1.000000</td>
</tr>
<tr>
<td>(5)</td>
<td>NJ Income Tax</td>
<td>(5) = (2) x (4)</td>
<td>0.090000</td>
</tr>
<tr>
<td>(6)</td>
<td>Federal Taxable Income</td>
<td>(6) = (4) - (5)</td>
<td>0.910000</td>
</tr>
<tr>
<td>(7)</td>
<td>Federal Income Tax</td>
<td>(7) = (1) x (6)</td>
<td>0.191100</td>
</tr>
<tr>
<td>(8)</td>
<td>Total Additional Taxes</td>
<td>(8) = (5) + (7)</td>
<td>0.281100</td>
</tr>
<tr>
<td>(9)</td>
<td>Increase in Earnings (1 - Additional Taxes)</td>
<td>(9) = 1 - (8)</td>
<td>0.718900</td>
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<tr>
<td>(10)</td>
<td>Revenue Conversion Factor (1 / Increase in Earnings)</td>
<td>(10) = 1 / (9)</td>
<td>1.391014</td>
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#### Conversion Factor (Including BPU Assessment / Ratepayer Advocate)

<table>
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<tr>
<th></th>
<th>Description</th>
<th>Equation</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(11)</td>
<td>NJ Assessment</td>
<td>(11) = 1</td>
<td>1.000000</td>
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<tr>
<td>(12)</td>
<td>NJ Assessment Tax Rate</td>
<td>(12) = (3) x (11)</td>
<td>0.002452</td>
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<tr>
<td>(13)</td>
<td>NJ Taxable Income</td>
<td>(13) = (11) - (12)</td>
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<tr>
<td>(14)</td>
<td>NJ Income Tax</td>
<td>(14) = (2) x (13)</td>
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<td>(15)</td>
<td>Federal Taxable Income</td>
<td>(15) = (11) - (12) - (14)</td>
<td>0.907769</td>
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<tr>
<td>(16)</td>
<td>Federal Income Tax</td>
<td>(16) = (15) x (1)</td>
<td>0.190631</td>
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<tr>
<td>(17)</td>
<td>Total Additional Taxes</td>
<td>(17) = (12) + (14) + (16)</td>
<td>0.282863</td>
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<tr>
<td>(18)</td>
<td>Increase in Earnings (1 - Additional Taxes)</td>
<td>(18) = 1 - (17)</td>
<td>0.717137</td>
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<td>(19)</td>
<td>Revenue Conversion Factor (1 / Increase in Earnings)</td>
<td>(19) = 1 / (18)</td>
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Schedule (MTN)-2
## RATE SCHEDULE RS-PIV
(Residential Service – Plug-In Vehicle Charging)

### AVAILABILITY
Available for full domestic service to individually metered residential customers, including rural domestic customers, engaged principally in agricultural pursuits, who own or lease a plug-in vehicle which requires electric service to provide periodic battery charging and who are not participants of Rider “REVCP” and who would otherwise be eligible to take electric service under Rate Schedule “RS”.

The customer agrees to allow the Company to maintain necessary equipment (if applicable) to monitor or manage the PIV load.

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<th></th>
<th>SUMMER</th>
<th>WINTER</th>
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<tr>
<td></td>
<td>June Through September</td>
<td>October Through May</td>
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<tr>
<td><strong>Delivery Service Charges:</strong></td>
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<tr>
<td>Customer Charge ($/Month)</td>
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<td>$5.77</td>
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<tr>
<td><strong>Distribution Rates ($/kWH):</strong></td>
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<tr>
<td>First Block ($/kWh)</td>
<td>$0.065547</td>
<td>$0.059995</td>
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<tr>
<td>(Summer &lt;= 750 kWh; Winter &lt;= 500 kWh)</td>
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<tr>
<td>Excess kWh ($/kWh)</td>
<td>$0.076291</td>
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<td><strong>Non-Utility Generation Charge (NGC) ($/kWH):</strong></td>
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<tr>
<td>See Rider NGC</td>
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<tr>
<td><strong>Green-PIV (Optional) ($/kWH):</strong></td>
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<td>$0.054300</td>
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<tr>
<td><strong>Societal Benefits Charge ($/kWh):</strong></td>
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<tr>
<td>Clean Energy Program</td>
<td>See Rider SBC</td>
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<tr>
<td>Universal Service Fund</td>
<td>See Rider SBC</td>
<td></td>
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<tr>
<td>Lifeline</td>
<td>See Rider SBC</td>
<td></td>
</tr>
<tr>
<td>Uncollectible Accounts</td>
<td>See Rider SBC</td>
<td></td>
</tr>
<tr>
<td><strong>Transition Bond Charge (TBC) ($/kWH):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Rider SEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Market Transition Charge Tax (MTC-Tax) ($/kWH):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Rider SEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transmission Service Charges ($/kWH):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmission Rate</td>
<td>$0.020425</td>
<td>$0.020425</td>
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<tr>
<td>Reliability Must Run Transmission Surcharge</td>
<td>$0.000000</td>
<td>$0.000000</td>
</tr>
<tr>
<td>Transmission Enhancement Charge ($/kWh)</td>
<td>See Rider BGS</td>
<td></td>
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<tr>
<td><strong>Basic Generation Service Charge ($/kWH):</strong></td>
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<td></td>
</tr>
<tr>
<td>On-Peak ($/kWh)</td>
<td>$0.145744</td>
<td>$0.158411</td>
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<tr>
<td>Off-Peak ($/kWh)</td>
<td>$0.029640</td>
<td>$0.042773</td>
</tr>
<tr>
<td><strong>Regional Greenhouse Gas Initiative Recovery Charge ($/kWh):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Rider RGGI</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RATE SCHEDULE RS-PIV (Continued)
(Residential Service – Plug-In Vehicle Charging)

CORPORATE BUSINESS TAX (CBT)
Charges under this rate schedule include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
None, except that reasonable notice of service discontinuance will be required.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

"In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein."

PRICE TO COMPARE
A customer on this Rate Schedule “RS-PIV” may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.

PEAK HOURS
For Rate Schedule “RS-PIV”, On-Peak hours are considered to be 12:00 PM to 8:00 PM, Monday through Friday, including holidays falling on weekdays. All other hours are Off-Peak.

Date of Issue: X Effective Date: X

Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric Company Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket No. XXXXXXXXXX
RESIDENTIAL ELECTRIC VEHICLE CHARGING PROGRAM
RIDER “REVCP”

AVAILABILITY
The Company’s Residential Electric Vehicle (EV) Charging Program Rider (Rider “REVCP”) includes three offerings: (1) rebate program for up to (300) eligible residential customers with existing Plug-in-Vehicles (PIV) and charging equipment for a Company approved connected car telematics device (“C2”); (2) a rebate program for (1500) eligible customers on a first-come-first-served basis to install Smart EV Level 2 (L2) Electric Vehicle Supply Equipment (EVSE). This rebate is for Company approved devices and will cover 50% of EVSE cost as well as 50% of the associated installation costs. The 50% EVSE and 50% installation rebate is not available to Customer’s with existing EVSE equipment; and (3) a 5 cent per kilowatt hour incentive for off-peak charging net of any on-peak charging as defined in Rider “REVCP” in the form of an off-bill rebate. Customer’s receiving either rebate (1) or (2) will be automatically enrolled in the off-peak off-bill rebate (3). Rebates (1) and (2) are mutually exclusive. These offers are only available to Rate Schedule “RS”.

RESIDENTIAL CONNECTED CAR TELEMATICS DEVICE, MANAGED CHARGING PROGRAMS, AND OFF-PEAK CHARGING INCENTIVE PROGRAMS - OPERATION
The Company has three residential program offerings under Rider “REVCP” to eligible customers who install a qualifying a Connected Car Telematics Device or an EV L2 Smart Charger and have at least one plug-in vehicle (“PIV”):

1. Residential Connected Car Telematics Device: The Company will offer 300 C2 devices valued at $99 each to eligible residential customers for the purchase and installation of a qualifying connected car telematics device including telecommunications cost. The C2 device would be located behind-the-meter and would be owned and operated by the customer receiving the rebate. The C2 device must be located on customer-owned property, or in the case of rental property, with approval from the owner of record. This program offers customers a maximum of one $99 C2 device per premise covering the purchase. Applications can be made beginning xxxx and C2 devices will be awarded on a first-come-first-served basis based on the completed application date and the application meeting all of the program requirements. Customers will be notified by mail when an application is complete.

Customers are required to take electric service under Schedule “R” in order to be eligible for this program. Customers taking service under Schedule “R” and also Rider “NEM” (Net Energy Metering) are eligible for this program under Rider “REVCP”. Applicants taking service under Schedule “R” are not required to receive their energy supply through the Company’s Standard Offer Service.

The Customer is required to submit an application with all of the necessary documentation within 30 days. Applicants agree to share the charging data from the C2 device with the Company. A list of qualified C2 device manufacturers and models is available on the Company’s website as of xxxx for use by customers in making decisions about qualifying C2 device purchases. Customers must also sign a customer participation agreement with the Company regarding program terms, conditions, and duration.

Customers may refer to the Company’s website to find information about applying for a C2 device under this program, the complete list of eligibility and documentation requirements, and the online form for submitting applications. The program has a 3-year enrollment window and only applies to applications received on or after xxxx and the program will end on xxxx.

2. Discounted Level 2 Smart Charger Program (Managed Charging): The Company will offer a 50% discounted L2 Smart Charger, 50% discounted installation of the Smart Charger for customers who do not already own EVSE equipment. This Program is limited up to 1500 participating customers on a first-come-first-served basis.

The Smart Charger would be located behind-the-meter and would be owned and operated by the customer receiving the program incentives under this offering. The Smart Charger must be located on
customer-owned property, or in the case of rental property, with approval from the owner of record. Applications will be awarded on a first-come basis based on the completed application date and the application meeting all the program requirements. Customers will be notified by mail when an application is complete.

Customers are required to take electric service under Rate Schedule "RS". Customers taking service under Rider "NEM" (Net Energy Metering) are eligible for this Program under Rider “REVCP”. Program applicants under Schedule “RS” are not required to receive their energy supply through the Company’s Standard Offer Service.

The Customer is required to submit an application with all of the necessary documentation within 30 days. Applicants will be required to provide proof of purchase of an eligible EV charger and agree to share the charging data from the Smart Charger with the Company. A list of qualified Smart Charger manufacturers and models is available on the Company’s website as of xxxx for use by customers in making decisions about qualifying EV charger purchases. Customers must also sign a customer participation agreement with the Company regarding program terms, conditions, and duration.

Customers may refer to the Company’s website to find information about applying for this program, the incentives offered, the complete list of eligibility and documentation requirements, and the online form for submitting applications. The program has a 3-year enrollment window and only applies to Smart Chargers purchased and installed on or after xxxx and the program will end on xxxx.

3. **Off-Peak Off-Bill Rebate**: Customer’s receiving either equipment and/or rebates under offerings (1) and (2) within Rider “REVCP” will be automatically enrolled in the off-peak charging incentive. This incentive will utilize the data from (1) the C2 device and (2) the Smart Charger to determine on and off-peak usage. For purposes of the off-bill rebate, the total monthly measured off-peak PIV charging net of any on-peak charging will receive a $0.05 per kilowatt hour rebate. Where the on and off-peak periods are:
   - **On-Peak**: 12:00 PM (noon) to 8:00 PM., Monday through Friday including holidays falling on Weekdays;
   - **Off-Peak**: 8:01 PM to 11:59 AM, and all Weekends.


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Date of Issue: X Effective Date: X
Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric
Company Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket Nos. XXXXXXXXXX and XXXXXXXXXX
RESIDENTIAL ELECTRIC VEHICLE CHARGING PROGRAM
RIDER “REVCP”

CORPORATE BUSINESS TAX (CBT)
Charges under this rider include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
The customer agrees to pay for plug-in vehicle charging at the point of sale.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

"In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein."

PRICE TO COMPARE
A customer may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.

Date of Issue: X Effective Date: X

Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric Company
Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket No. XXXXXXXXXX
ATLANTIC CITY ELECTRIC COMPANY
COMMERCIAL ELECTRIC VEHICLE CHARGING PROGRAM
RIDER “CEVCP”

AVAILABILITY – Available only for non-residential customers. Each customer is allowed to be on to a single offering under Rider “CEVCP”: (1) Multi-dwelling Unit Charging; (2) Workplace Charging; (3) Fleet Charging, upon application by the customer and approval by the Company, qualifying non-residential customers who have purchased and installed an eligible Electric Vehicle (EV) charging station within the Company’s electric distribution service territory on or after xxxx, may be eligible for two incentives: (1) rebates for installed Electric Vehicle Supply Equipment (EVSE) including telecommunication cost and associated installation costs and (2) receive an off-bill rebate to partially offset their monthly distribution demand charge. The customer agrees to provide the Company with usage data from the charger and the Company will pay the telecommunications cost to access the charging data. Rider “CEVCP” is available for Rate Schedules: “MGS-SECONDARY”, “MGS-PRIMARY”, “AGS-SECONDARY”, “AGS-PRIMARY”, and “TGS”.

Application submission will begin on xxxx and terminate on xxxx. No new applications will be accepted after xxxx, and all project completion documentation must be submitted to the Company by xxxx. The demand rebate will be available beginning xxxx and will be a fixed amount and will be an off-bill rebate for the account with the eligible installed and operational L2 charging station(s). The maximum allowable term for the demand charge credit until the end of the 5-year PIV Program, or xxxx, regardless of the date of application and documentation approval.

COMMERCIAL REBATE AND DEMAND CHARGE REBATE PROGRAMS (Offerings)
1. Multi-dwelling Unit Charging – Intended for customers who own or operate condominiums and apartment complexes where dedicated parking can be made available for EVSE infrastructure. A rebate of 50% of qualified Smart Level 2 (L2) chargers and up to $10,000 per location for the eligible installation costs from point of service connection to the charger location. This offering is limited to 200 EVSE, and 6 EVSE per customer at a maximum of 3 locations per customer. Customers would also be enrolled in the demand charge rebate.

2. Workplace Charging – Intended for qualified customers who own or operate office buildings or garages where dedicated parking can be made available for PIV charging infrastructure. A rebate of 50% of qualified Smart L2 chargers installed behind the meter of an existing account for qualified customers. This offering does not include any rebates for installation costs. This offering is limited to 150 EVSE, and 6 EVSE per customer at a maximum of 3 locations per customer. Customers would also be enrolled in the demand charge rebate.

3. Fleet Charging – Intended for fleet/light duty charging infrastructure for customers who own or operate vehicle fleets. This offering includes a rebate of 50% of qualified Smart L2 chargers installed behind the metered of an existing account for qualified customers. This offering does not include any rebates for installation costs. This offering is limited to 150 EVSE, and 6 EVSE per customer at a maximum of 3 locations per customer. Customers would also be enrolled in the demand charge rebate.
Demand Charge Rebate:
Demand charge credits are an off-bill rebate applied to the Customer’s bill only for a portion of the maximum distribution demand charge resulting from the addition of EV chargers to the Customer’s facility service and metered load. The demand charge credit amount will be calculated as 50% of the maximum nameplate capacity for new or added L2 EV chargers’ times the prevailing Rate Schedule’s demand charge. The demand rebate credit cannot exceed the Customer’s monthly distribution demand charge. The demand charge rebate requires that the charger be put into service and available for use.

Demand Charge Credit Structure

<table>
<thead>
<tr>
<th>EV Charging Station Type</th>
<th>Maximum Credit</th>
<th>Credit Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2 Charging Station</td>
<td>50% Nameplate Capacity</td>
<td>Until the end of the 5-year PIV Program</td>
</tr>
</tbody>
</table>

The customer must submit an application and documentation of the completed EV Charging station installation on the Company’s EVSmart webpage in order to become eligible for the demand credit (including receipts and/or invoices of the EV chargers, as well as proof of the installation from a certified electrician). The Company’s third-party vendor will determine acceptance, calculate the demand charge credit amount and communicate these results to the Customer. Chargers installed outside the utility approved tariff, Rider “CEVCP”, are not available for the demand charge rebate.

CORPORATE BUSINESS TAX (CBT)
Charges under this rate schedule include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
The customer agrees to make parking available for EVSE charging and to keep charging stations available for use.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

"In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein."

PRICE TO COMPARE
A customer may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.
ATLANTIC CITY ELECTRIC COMPANY
BPU NJ No. XX Electric Service - Section IV xxx Revised Sheet Replaces xxx Revised Sheet No. X

RATE SCHEDULE PC-PIV
(Public Charging – Plug-In Vehicle Charging)

AVAILABILITY – Available only for the purpose of Plug-in Vehicle (“PIV”) battery charging from Company-operated Level 2 (L2) and Direct Current Fast Charging (DCFC) public electric vehicle (EV) charging stations. All public EV charging stations will be sited on property either owned by government entities or government-associated organizations or controlled by those entities and other non-governmental entities (such as through easements, right-of-ways, or similar legal or equitable mechanisms). L2 charging stations shall cover applications with demand loads up to 19.2 kW. DCFC charging stations cover applications with demand loads greater than 19.2 kW.

The service provided under Schedule “PC-PIV” allows EV operators to charge their EV at a Company-owned public charging station. EV operators who reside either within the Company’s service territory or outside the Company’s service territory are eligible to charge their EV at a Company-owned station.

CHARGING RATE FOR EV OPERATOR
Charges under Schedule “PC-PIV” will be administered and billed through the Company’s third-party vendor (Network Provider) on behalf of the Company. Information on opening an account with the Company’s Network Provider is available on the Company’s website. EV operators that charge their vehicle at a Company-owned station are subject to the payment terms of the Company’s Network Provider.

Any EV operator using Company-operated public EV charging stations for the purpose of PIV battery charging shall pay for such service at the rates listed below. These rates are subject to change periodically, subject to Commission approval.

L2 Charging Stations: $ x. xx per kwhr
DCFC Charging Stations: $ x. xx per kwhr

Schedule “PC-PIV” is provided in conjunction with the contract for service under the applicable Rate Schedule (the Controlling Rate Schedule), as determined by the availability of each Rate Schedule. Controlling Schedule provisions apply, unless they are specifically altered herein.

APPLICABLE RIDERS
The applicable Riders for Schedule “PC-PIV” are determined by the Controlling Rate Schedule, unless they are specifically altered herein.

Rider “PIV-Green” provides 100% renewable energy on a mandatory basis to the Controlling Rate Schedules associated with Schedule “PC-PIV.” Rider “PIV-Green” will be included in addition to the rates stated on Rate Schedule “PC-PIV.”
ATLANTIC CITY ELECTRIC COMPANY
BPU NJ No. XX Electric Service - Section IV xxx Revised Sheet Replaces xxx Revised Sheet No. X

RATE SCHEDULE PC-PIV
(Public Charging – Plug-In Vehicle Charging)

CORPORATE BUSINESS TAX (CBT)
Charges under this rate schedule include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
The customer agrees to pay for plug-in vehicle charging at the point of sale.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

"In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein."

PRICE TO COMPARE
A customer may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.

Date of Issue: X  Effective Date: X

Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric Company
Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket No. XXXXXXXXXX
NON-UTILITY OWNED PUBLIC DIRECT CURRENT FAST CHARGING (DCFC)
RIDER “NUOPDCFC”

AVAILABILITY – Available only for non-residential customers with commercial owned properties. Where each property owner commits to the charger’s availability for public use at all times. Rider “NUOPDCFC” is limited to 120 Direct Current Fast Chargers (DCFC) and a maximum of 30 locations, with each location limited to a maximum of 4 DCFC. Rider “NUOPDCDC” is not available to existing customers with installed DCFC. The utility will deploy and own the “make ready” work up to the point of charger connection. This includes the service connection and a meter. The DCFC will be owned and operated by the customer. Rider “NUOPDCFC” includes a rate incentive described herein. Rider “NUOPDCFC” is available for Rate Schedules: “MGS-SECONDARY”, “MGS-PRIMARY”, “AGS-SECONDARY”, “AGS-PRIMARY”, and “TGS”. All other tariff surcharges and riders apply to the aforementioned Rate Schedules.

Application submission will begin on xxxx and terminate on xxxx. No new applications will be accepted after xxxx, and all project completion documentation must be submitted to the Company by xxxx. The rate incentive will be available beginning xxxx and will be determined each month as in Rider “NUOPDCFC” and will be an off-bill rebate for the account with the eligible installed and operational DCFC charging station(s). Charging stations must be put into service and available for use before the rate incentive in Rider “NUOPDCFC” will take effect. The maximum allowable term for the rate incentive rebate until the end of the 5-year PIV Program, or xxxx, regardless from the date of application and documentation approval.

Rate Incentive – The rate incentive fixes the cost of electricity for customers under Rider “NUOPDCFC” at a “Set point” of $0.20 cents per kilowatt hour (kWh). In a given billing month an off-bill rebate is provided to the customer if the customer’s monthly cost of electricity (MCE) is greater than $0.20 per kilowatt hour, where the customer’s cost of electricity in a given month is calculated as the total monthly bill costs (in dollars) divided by the total monthly bill kilowatt hours (in $/kWh). The rebate in a given month is:

\[
\text{Monthly Rebate} = (\text{MCE} - 0.20) \times \text{monthly kilowatt hours}
\]

The rebate will vary from month to month and will be zero when the MCE is equal to or less than the set point of $0.20 cents per kilowatt hour.

CORPORATE BUSINESS TAX (CBT)
Charges under this rate schedule include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
The customer agrees to make parking available for EVSE charging and to keep charging stations available for use.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

“In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein.”

PRICE TO COMPARE
A customer may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.

Date of Issue: X Effective Date: X

Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric Company
Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket Nos. XXXXXXXXXX and XXXXXXXXXX
PIV COMMUNITY AND TRANSIT CHARGING PROGRAMS
RIDER “CTCP”

AVAILABILITY – This rider describes the (3) Plug-in-vehicle Community and Transit Programs available to customers. Interested Customers should submit an application with the Company to see if they are eligible to participate in any of the (3) Programs as described herein. The Company at its discretion will determine if and how much funding / grants will be awarded to the applicant.

INNOVATION FUND
The innovation fund is intended to support transportation electrification area needs within the Company’s service territory. Projects include but are not limited to: PIV Car Sharing, Vehicle to Grid charging, port electrification, and battery / resiliency pilots. Each potential project must be related to vehicle electrification. The proposed awards under the Innovation fund would be a grant that would be limited to 50% of the net project amount after applying all other applicable incentives, grants, awards and discounts.

ELECTRIC SCHOOL BUS FUND
The Electric School Bus Fund is for public K-12 school districts within the Company’s service territory. This Fund will be limited to 20 electric school buses and $250,000 for the incremental cost of an electric school bus compared to a traditional diesel-based bus vehicle. There is a limit of two buses per district. In addition, The Electric School Bus Fund will provide the required charging infrastructure for the electric school buses to a maximum of $25,000 per Electric Vehicle Supply Equipment (EVSE) and a maximum of 2 EVSE per district.

NEW JERSEY TRANSIT BUS ELECTRIFICATION
The New Jersey Transit Bus Electrification Program within RIDER “CTCP” is targeted at New Jersey Transit bus depots in the Company’s service territory. The bus depots in the Company’s service territory include depots in the following Townships (1) Egg Harbor Township and (2) Washington Township. This offer is exclusive to one bus depot within the Company’s service territory as selected by New Jersey Transit, and provides up to $2.5 million in funding for electrification of a bus depot.
GREEN ADDER
RIDER “PIV-GREEN”

AVAILABILITY – This rider provides 100% renewable energy on an opt-in basis to Schedules “RS-PIV”, and on a mandatory basis to the Controlling Rate Schedules associated with Schedule “PC-PIV”.

This rider is a dollar per kilowatt-hour rate and is applied to the Customer’s billed kilowatt-hours. This rider will be updated based on the most up-to-date market prices, the New Jersey Renewable Portfolio Standards, and include a true-up from the difference between the previous 12-month period of revenues received from Rider “PIV-GREEN” and expenses (from Renewable Energy Credit purchases) with short-term interest. The true-up portion of the charge (in dollars per kilowatt hour) will be determined by dividing the difference in revenues and expenses by the total annual forecast kilowatt hour sales. The charge reflected within RIDER “PIV-GREEN” will be the sum of (1) the most up-to-date market prices and (2) the true-up charge as described herein. Rider “PIV-Green” will be updated on or about February 1st of each year.

The current applicable Rider “PIV-Green” rate is equal to $0.054300 per kilowatt-hour.

Date of Issue: X
Effective Date: X
Issued by: David M. Velazquez, President and Chief Executive Officer – Atlantic City Electric Company
Filed pursuant to Board of Public Utilities of the State of New Jersey directives associated with the BPU Docket Nos. XXXXXXXXXXX and XXXXXXXXXXX
GREEN ADDER
RIDER “PIV-GREEN”

CORPORATE BUSINESS TAX (CBT)
Charges under this rate schedule include a component for Corporate Business Taxes as set forth in Rider CBT.

NEW JERSEY SALES AND USE TAX (SUT)
Charges under this rate schedule include a component for New Jersey Sales and Use Tax as set forth in Rider SUT.

TERM OF CONTRACT
The customer agrees to pay Rider “PIV-Green” to receive 100% renewable energy. The customer may opt-out of Rider “PIV-Green” at any time, and will take effect in the next billing cycle.

TERMS AND CONDITIONS
See Section II inclusive for Terms and Conditions of Service.

"In accordance with P.L. 1997, c. 162, the charges in this Rate Schedule includes provision for the New Jersey Corporation Business Tax and the New Jersey Sales and Use Tax. When billed to customers exempt from one or more of these taxes, as set forth in Riders CBT and SUT, such charges will be reduced by the relevant amount of such taxes included therein."

PRICE TO COMPARE
A customer may not choose to receive electric supply from a third party supplier as defined in Section 11 of the Standard Terms and Conditions of this Tariff.
Schedule (MTN)-3
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<th>Cost Component</th>
<th>Capital Costs</th>
<th>Regulatory Asset Costs</th>
<th>Estimated Total Cost</th>
<th>Total Cost to Residential Customers ($)</th>
<th>Total Cost to Other Customers ($)</th>
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<tr>
<td>(1) Whole House TOU (Offering 1)</td>
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<td>$428,133.00</td>
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<td>(2) Off Peak Charging Incentive (Offering 2)</td>
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<td>(3) Residential Rebate/ Manage Charging Program (Offering 3)</td>
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<td>(4) Multi-Dwelling Unit Charging (Offering 4)</td>
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<td>(5) Workplace Charging (Offering 5)</td>
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<tr>
<td>(6) Fleet Charging (Offering 6)</td>
<td>$118,750.00</td>
<td>$1,519,529.00</td>
<td>$1,638,279.00</td>
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<td>$1,638,279.00</td>
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<td>(7) Utility-Owned DCFC's (Offering 7)</td>
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<td>$1,032,633.00</td>
<td>$5,206,833.00</td>
<td>$3,088,975.34</td>
<td>$2,117,857.66</td>
</tr>
<tr>
<td>(8) Utility-Owned Public Level 2 Charging (Offering 8)</td>
<td>$6,776,700.00</td>
<td>$1,787,633.00</td>
<td>$8,564,333.00</td>
<td>$5,080,464.37</td>
<td>$3,483,868.63</td>
</tr>
<tr>
<td>(9) Non-Utility-Owned Public Chargers (Offering 9)</td>
<td>$1,650,000.00</td>
<td>$2,848,913.00</td>
<td>$4,498,913.00</td>
<td>-</td>
<td>$4,498,913.00</td>
</tr>
<tr>
<td>(10) Innovation Fund (Offering 10)</td>
<td>-</td>
<td>$2,000,000.00</td>
<td>$2,000,000.00</td>
<td>-</td>
<td>$1,188,118.38</td>
</tr>
<tr>
<td>(11) Electric School Bus Fund (Offering 11)</td>
<td>-</td>
<td>$5,000,000.00</td>
<td>$5,000,000.00</td>
<td>-</td>
<td>$3,267,325.54</td>
</tr>
<tr>
<td>(12) NJ Transit Bus Electrification (Offering 12)</td>
<td>-</td>
<td>$2,500,000.00</td>
<td>$2,500,000.00</td>
<td>-</td>
<td>$1,485,147.97</td>
</tr>
<tr>
<td>(13) Total</td>
<td>$15,024,900.00</td>
<td>$27,082,510.09</td>
<td>$42,107,410.09</td>
<td>21,868,203.68</td>
<td>20,239,206.40</td>
</tr>
</tbody>
</table>

Source: Refer to Lines (1) to (10) & (13) to (25) of “Class Weighting”, Page 4 of 12.
## ACE EV Filing - Reg Asset Cost Breakdown Analysis

**Schedule (MTN3)**

### Offering 1 - Residential Off-Peak Based on Vehicle Data

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 2 - Residential/Manged Charging Based On EVMS Data

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 3 - Commercial - MDU (Multi-Dwelling Units - Condos, Apartments)

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 4 - Commercial - NVS (Non-Vehicle Service-Related)

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 5 - Utility Owned DEVC For Public Use

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Owned Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 6 - Utility Owned EVC For Public Use

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Owned Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 7 - New Utility Public DEVC Incentive

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Utility Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 8 - Innovation Fund

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation Fund</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 9 - Utility School Res - Bus Incentive and Charging Infrastructure

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility School Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

### Offering 10 - PDTC - Charging Infrastructure

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDTC Offering</td>
<td>Program Cost</td>
<td>428,134.00</td>
<td>$</td>
<td>428,134.00</td>
</tr>
</tbody>
</table>

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4. Column (E): Sum of "Estimated Cost ($)" for each individual offering by cost component. Please refer to the note associated with "*".

5. Represents the "Estimated Cost ($)" for each cost component dummy only that individual offering is approved.
## Offering 1 - Whole House TOU

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Replace Interval Meter</td>
<td>Capital Asset</td>
<td>300</td>
<td>$100.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>(2) Meter Upgrade (labor and other installation costs by utility)</td>
<td>Capital Asset</td>
<td>300</td>
<td>$300.00</td>
<td>$90,000.00</td>
</tr>
<tr>
<td>(3) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$120,000.00</td>
</tr>
</tbody>
</table>

## Offering 2 - Residential Off-Peak: Based On Vehicle Data

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$24,000.00</td>
</tr>
<tr>
<td>(5) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$24,000.00</td>
</tr>
</tbody>
</table>

## Offering 3 - Residential Managed Charging: Based On EVSE Data

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$1,875,000.00</td>
</tr>
<tr>
<td>(7) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$1,875,000.00</td>
</tr>
</tbody>
</table>

## Offering 4: Commercial - MDU (Multi-Dwelling Units - Condos, Apartments)

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
<tr>
<td>(9) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
</tbody>
</table>

## Offering 5: Commercial - Workplace (Charging For Employees)

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(10) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
<tr>
<td>(11) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
</tbody>
</table>

## Offering 6: Commercial - Fleet (Charging For Fleet Vehicles)

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
<tr>
<td>(13) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$118,750.00</td>
</tr>
</tbody>
</table>

## Offering 7: Utility Owned DCFC For Public Use

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14) Site Engineering and Development (assessment, contracting, design, permits)</td>
<td>Capital Asset</td>
<td>15</td>
<td>$15,000.00</td>
<td>$225,000.00</td>
</tr>
<tr>
<td>(15) New Service &amp; Infrastructure -&gt; EVSE (service drop, new meter, transformer, etc)</td>
<td>Capital Asset</td>
<td>15</td>
<td>$40,000.00</td>
<td>$600,000.00</td>
</tr>
<tr>
<td>(16) DCFC EVSE (assumes at least 50KW units, CHaDEMO/CCS)</td>
<td>Capital Asset</td>
<td>45</td>
<td>$50,000.00</td>
<td>$2,250,000.00</td>
</tr>
<tr>
<td>(17) Installation (EVSE installation, testing, commissioning, network activation)</td>
<td>Capital Asset</td>
<td>15</td>
<td>$50,000.00</td>
<td>$750,000.00</td>
</tr>
<tr>
<td>(18) Project Management</td>
<td>Program Cost</td>
<td>15</td>
<td>$15,780.00</td>
<td>$236,700.00</td>
</tr>
<tr>
<td>(19) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$112,500.00</td>
</tr>
<tr>
<td>(20) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$4,374,200.00</td>
</tr>
</tbody>
</table>

## Offering 8: Utility Owned L2 For Public Use

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(21) Site Engineering and Development (assessment, contracting, design, permits)</td>
<td>Capital Asset</td>
<td>65</td>
<td>$15,000.00</td>
<td>$975,000.00</td>
</tr>
<tr>
<td>(22) New Service &amp; Infrastructure -&gt; EVSE (service drop, new meter, transformer, etc)</td>
<td>Capital Asset</td>
<td>65</td>
<td>$40,000.00</td>
<td>$2,600,000.00</td>
</tr>
<tr>
<td>(23) L2 EVSE (assumes dual-plugs 7.2KW, J1772)</td>
<td>Capital Asset</td>
<td>200</td>
<td>$5,000.00</td>
<td>$1,000,000.00</td>
</tr>
<tr>
<td>(24) Installation (EVSE installation, testing, commissioning, inspection, activation)</td>
<td>Capital Asset</td>
<td>65</td>
<td>$20,000.00</td>
<td>$1,300,000.00</td>
</tr>
<tr>
<td>(25) Project Management</td>
<td>Capital Asset</td>
<td>65</td>
<td>$6,180.00</td>
<td>$401,700.00</td>
</tr>
<tr>
<td>(26) Software</td>
<td>Capital Asset</td>
<td></td>
<td></td>
<td>$500,000.00</td>
</tr>
<tr>
<td>(27) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$4,374,200.00</td>
</tr>
</tbody>
</table>

## Offering 9: DCFC - Non Utility Public DCFC Incentive

<table>
<thead>
<tr>
<th>Program Components</th>
<th>Type</th>
<th>Units</th>
<th>Cost Per Unit</th>
<th>Estimated Cost*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(28) Site Engineering and Development (assessment, contracting, design, permits)</td>
<td>Capital Asset</td>
<td>10</td>
<td>$15,000.00</td>
<td>$150,000.00</td>
</tr>
<tr>
<td>(29) New Service &amp; Make-Ready -&gt; EVSE (service drop, new meter, transformer, etc)</td>
<td>Capital Asset</td>
<td>10</td>
<td>$40,000.00</td>
<td>$400,000.00</td>
</tr>
<tr>
<td>(30) Individual Offering Total</td>
<td></td>
<td></td>
<td></td>
<td>$1,650,000.00</td>
</tr>
</tbody>
</table>

## Total Capital

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capital</td>
<td>$15,024,900.00</td>
</tr>
</tbody>
</table>

Column (E): Sum of "Estimated Cost ($)" for each individual offering by cost component. Please refer to the note associated with "**".

* Represents the "Estimated Cost ($)" for each cost component assuming only that individual offering is approved.
### Calculation of the Allocation of Capital Asset Costs

#### Offering #

<table>
<thead>
<tr>
<th>Offering #</th>
<th>Total Capital Assets</th>
<th>Residential %</th>
<th>Other Customer %</th>
<th>Residential Contribution</th>
<th>Other Customer Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Whole House TOU (Offering 1)</td>
<td>$120,000.00</td>
<td>100%</td>
<td>0%</td>
<td>$120,000.00</td>
<td>-</td>
</tr>
<tr>
<td>(2) Off Peak Charging Incentive (Offering 2)</td>
<td>$24,000.00</td>
<td>100%</td>
<td>0%</td>
<td>$24,000.00</td>
<td>-</td>
</tr>
<tr>
<td>(3) Residential Rebate/Manage Charging Program (Offering 3)</td>
<td>$1,875,000.00</td>
<td>100%</td>
<td>0%</td>
<td>$1,875,000.00</td>
<td>-</td>
</tr>
<tr>
<td>(4) Multi-Dwelling Unit Charging (Offering 4)</td>
<td>$167,500.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$167,500.00</td>
</tr>
<tr>
<td>(5) Workplace Charging (Offering 5)</td>
<td>$118,750.00</td>
<td>0%</td>
<td>100%</td>
<td>$2,478,711.87</td>
<td>-</td>
</tr>
<tr>
<td>(6) Fleet Charging (Offering 6)</td>
<td>$118,750.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$118,750.00</td>
</tr>
<tr>
<td>(7) Utility-Owned DCFC's (Offering 7)</td>
<td>$4,174,200.00</td>
<td>59%</td>
<td>41%</td>
<td>$4,025,760.90</td>
<td>$2,750,939.10</td>
</tr>
<tr>
<td>(8) Utility-Owned Public Level 2 Charging (Offering 8)</td>
<td>$6,776,700.00</td>
<td>59%</td>
<td>41%</td>
<td>-</td>
<td>$6,500,417.23</td>
</tr>
<tr>
<td>(9) Non-Utility-Owned Public Chargers (Offering 9)</td>
<td>$1,650,000.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$1,650,000.00</td>
</tr>
<tr>
<td>(10) Total</td>
<td>$15,024,900.00</td>
<td>-</td>
<td>-</td>
<td>$8,524,482.77</td>
<td>$6,500,417.23</td>
</tr>
</tbody>
</table>

Column (B): Refer to Column (E) of "Capital Cost Breakdown Analysis", Page 3 of 12, for each respective offering.

Column (C) and (D): For Commercial Offerings, 100% of costs associated with capital assets are allocated to Commercial customers; for Residential Offerings, 100% are allocated to residential customers; for all other offerings, shared costs associated with capital assets are allocated based on the split of Total Delivery Revenues as shown on Lines (11) and (12) of "Total Delivery Revenues", Page 5 of 12.

### Allocation of Regulatory Asset Costs

#### Offering #

<table>
<thead>
<tr>
<th>Offering #</th>
<th>Total Regulatory Asset</th>
<th>Residential %</th>
<th>Other Customer %</th>
<th>Residential Contribution</th>
<th>Other Customer Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>(13) Whole House TOU (Offering 1)</td>
<td>$428,133.00</td>
<td>100%</td>
<td>0%</td>
<td>$428,133.00</td>
<td>-</td>
</tr>
<tr>
<td>(14) Off Peak Charging Incentive (Offering 2)</td>
<td>$1,037,156.00</td>
<td>100%</td>
<td>0%</td>
<td>$1,037,156.00</td>
<td>-</td>
</tr>
<tr>
<td>(15) Residential Rebate/Manage Charging Program (Offering 3)</td>
<td>$4,273,883.09</td>
<td>100%</td>
<td>0%</td>
<td>$4,273,883.09</td>
<td>-</td>
</tr>
<tr>
<td>(16) Multi-Dwelling Unit Charging (Offering 4)</td>
<td>$2,635,102.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$2,635,102.00</td>
</tr>
<tr>
<td>(17) Workplace Charging (Offering 5)</td>
<td>$1,519,528.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$1,519,528.00</td>
</tr>
<tr>
<td>(18) Fleet Charging (Offering 6)</td>
<td>$1,519,528.00</td>
<td>0%</td>
<td>100%</td>
<td>-</td>
<td>$1,519,528.00</td>
</tr>
<tr>
<td>(19) Utility-Owned DCFC's (Offering 7)</td>
<td>$1,032,633.00</td>
<td>59%</td>
<td>41%</td>
<td>$609,253.47</td>
<td>$423,379.53</td>
</tr>
<tr>
<td>(20) Utility-Owned Public Level 2 Charging (Offering 8)</td>
<td>$2,848,913.00</td>
<td>59%</td>
<td>41%</td>
<td>$1,485,147.97</td>
<td>$1,363,765.03</td>
</tr>
<tr>
<td>(21) Non-Utility-Owned Public Chargers (Offering 9)</td>
<td>$2,000,000.00</td>
<td>59%</td>
<td>41%</td>
<td>$1,188,118.38</td>
<td>$811,881.62</td>
</tr>
<tr>
<td>(22) Innovation Fund (Offering 10)</td>
<td>$5,500,000.00</td>
<td>59%</td>
<td>41%</td>
<td>$3,267,325.54</td>
<td>$2,232,674.46</td>
</tr>
<tr>
<td>(23) Electric School Bus Fund (Offering 11)</td>
<td>$2,500,000.00</td>
<td>59%</td>
<td>41%</td>
<td>$1,485,147.97</td>
<td>$1,014,852.03</td>
</tr>
<tr>
<td>(24) NJ Transit Bus Electrification (Offering 12)</td>
<td>$27,082,510.09</td>
<td>-</td>
<td>-</td>
<td>$13,343,720.91</td>
<td>$13,738,789.17</td>
</tr>
</tbody>
</table>

Column (B): Refer to Column (E) of "Reg Asset Cost Breakdown Analysis", Page 2 of 12, for each respective offering.

Column (C) and (D): For Commercial Offerings, 100% of costs associated with capital assets are allocated to Commercial customers; for Residential Offerings, 100% are allocated to residential customers; for all other offerings, shared costs associated with capital assets are allocated based on the split of Total Delivery Revenues as shown on Lines (11) and (12) of "Total Delivery Revenues", Page 5 of 12.

### Program Cost Allocation Percentage

#### Residential

<table>
<thead>
<tr>
<th>(A)</th>
<th>(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>59%</td>
</tr>
</tbody>
</table>

Source: Line (11) of "Total Delivery Revenues", page 5 of 12.

#### Other Customer

<table>
<thead>
<tr>
<th>(A)</th>
<th>(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Customer</td>
<td>41%</td>
</tr>
</tbody>
</table>

Source: Line (12) of "Total Delivery Revenues", page 5 of 12.
### Total Delivery Revenue (Proposed Revenue)

<table>
<thead>
<tr>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D) % Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Residential</td>
<td>RS</td>
<td>$252,856,698</td>
<td>59%</td>
</tr>
<tr>
<td>(2) Other Customer</td>
<td>MGS-SECONDARY</td>
<td>$76,125,408</td>
<td>18%</td>
</tr>
<tr>
<td>(3) Other Customer</td>
<td>MGS-PRIMARY</td>
<td>$1,439,528</td>
<td>0%</td>
</tr>
<tr>
<td>(4) Other Customer</td>
<td>AGS-SECONDARY</td>
<td>$59,322,342</td>
<td>14%</td>
</tr>
<tr>
<td>(5) Other Customer</td>
<td>AGS-PRIMARY</td>
<td>$11,486,945</td>
<td>3%</td>
</tr>
<tr>
<td>(6) Other Customer</td>
<td>TGS-Sub Transmission</td>
<td>$3,525,450</td>
<td>1%</td>
</tr>
<tr>
<td>(7) Other Customer</td>
<td>TGS-Transmission</td>
<td>$2,141,460</td>
<td>1%</td>
</tr>
<tr>
<td>(8) Other Customer</td>
<td>Streetlighting Service</td>
<td>$18,182,872</td>
<td>4%</td>
</tr>
<tr>
<td>(9) Other Customer</td>
<td>Direct Dist. Connection</td>
<td>$561,561</td>
<td>0%</td>
</tr>
<tr>
<td>(10) Total</td>
<td></td>
<td>$425,642,264</td>
<td>100%</td>
</tr>
</tbody>
</table>


Column (D): Calculation: Column (C), Line (1) / Column (C), Line (10) for Column (D), Line 1; and so on.

### Total Delivery Revenue - Residential Vs. Other Customer

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(11) Residential</td>
<td>59%</td>
<td>Source: Column (E), Line (1)</td>
<td></td>
</tr>
<tr>
<td>(12) Other Customer</td>
<td>41%</td>
<td>Calculation: 1 - Line (11)</td>
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### As-Billed Billing Determinants (Exclude Lighting & Direct Distribution Connection)

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate Schedule</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Residential</td>
<td>RS</td>
<td>3,983,153,885</td>
</tr>
<tr>
<td>(2) Other Customer</td>
<td>MGS-SECONDARY</td>
<td>1,262,257,212</td>
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<tr>
<td>(3) Other Customer</td>
<td>MGS-PRIMARY</td>
<td>37,625,999</td>
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<td>(4) Other Customer</td>
<td>AGS-SECONDARY</td>
<td>-</td>
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<tr>
<td>(5) Other Customer</td>
<td>AGS-PRIMARY</td>
<td>-</td>
</tr>
<tr>
<td>(6) Other Customer</td>
<td>TGS-Sub Transmission</td>
<td>-</td>
</tr>
<tr>
<td>(7) Other Customer</td>
<td>TGS-Transmission</td>
<td>-</td>
</tr>
<tr>
<td>(8) Total</td>
<td></td>
<td><strong>5,283,037,096</strong></td>
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</table>

Column (C): Source: "Exhibit A", Pages 2 to 12 of 12, from the 3/13/2019 Decision and Order Adopting Initial Decision and Stipulation of Settlement (BPU Docket No. ER18080925).

### As-Billed Billing Determinants- Residential Vs. Other Customer

<table>
<thead>
<tr>
<th>Type</th>
<th>kWh</th>
<th>Calculation:</th>
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</thead>
<tbody>
<tr>
<td>(9) Residential</td>
<td>3,983,153,885</td>
<td>Line (1)</td>
</tr>
<tr>
<td>(10) Other Customer</td>
<td>1,299,883,211</td>
<td>Line (2) + Line (3) + ... + Line (6) + Line (7)</td>
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</tbody>
</table>
## ACE NJ - Residential Revenue Requirement

### Net Levelized Annual Revenue Requirement - Capital

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$988,307</td>
</tr>
<tr>
<td>2</td>
<td>$988,307</td>
</tr>
<tr>
<td>3</td>
<td>$988,307</td>
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<tr>
<td>4</td>
<td>$988,307</td>
</tr>
<tr>
<td>5</td>
<td>$988,307</td>
</tr>
<tr>
<td>6</td>
<td>$988,307</td>
</tr>
<tr>
<td>7</td>
<td>$988,307</td>
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<tr>
<td>8</td>
<td>$988,307</td>
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<tr>
<td>9</td>
<td>$988,307</td>
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<tr>
<td>10</td>
<td>$988,307</td>
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<tr>
<td>11</td>
<td>$988,307</td>
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<tr>
<td>12</td>
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<td>13</td>
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<td>15</td>
<td>$988,307</td>
</tr>
<tr>
<td>Total</td>
<td>$14,824,610</td>
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</tbody>
</table>

### Levelized Annual Revenue Requirement - RA

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<th>Year</th>
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<tr>
<td>1</td>
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<td>$2,172,469</td>
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<tr>
<td>3</td>
<td>$2,172,469</td>
</tr>
<tr>
<td>4</td>
<td>$2,172,469</td>
</tr>
<tr>
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<td>7</td>
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<tr>
<td>8</td>
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<td>15</td>
<td>$2,172,469</td>
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<tr>
<td>Total</td>
<td>$10,862,343</td>
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</table>

### Total Revenue Requirement - Total

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>$3,160,776</td>
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<tr>
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<td>$3,160,776</td>
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<tr>
<td>3</td>
<td>$3,160,776</td>
</tr>
<tr>
<td>4</td>
<td>$3,160,776</td>
</tr>
<tr>
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<td>15</td>
<td>$3,160,776</td>
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<tr>
<td>Total</td>
<td>$25,686,953</td>
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</tbody>
</table>

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### Cost-Benefit Analysis Input

<table>
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<th>Amount</th>
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<tbody>
<tr>
<td>$18,768,802</td>
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</table>

### ACE NJ - Levelized Monthly Bill Impact

<table>
<thead>
<tr>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>$0.17</td>
</tr>
<tr>
<td>$0.37</td>
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</table>

### Total Levelized Monthly Bill Impact

<table>
<thead>
<tr>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.54</td>
</tr>
</tbody>
</table>
Schedule (MTN)-3

ACE New Jersey

Cap Asset Amortization - Capital - Residential

Page 8 of 12

(1) Rate Base:

(2) Unamortized Balance

(3) Amortized Balance

(4) Net Rate Base

(5) Operating Income:

(6) Depreciation

(7) SIT-Current

(8) FIT-Current

(9) Deferred Taxes

(10) Total Operating Expenses

(11) Return Required

(12) Required Oper. Income

(13) Revenue Conversion Factor

(14) Revenue Requirement

(15) Income Statement Check

(16) Revenue

(17) Depreciation & Amortization

(18) Interest Expense

(19) Net income before Taxes

(20) Income Tax - Current

(21) Income Tax - Deferred

(22) Earnings

(23) Return on Equity per WACC

(24) MACRS

(25) Depreciation

(26) Revenue Requirement Summary

(27) Net Rate Base

(28) Levelized Annual Revenue Requirement - Residential

(29) Annual Residential kWh

(30) L/RW Residential Charge

(31) ACE NJ - Typical Monthly Residential Usage

(32) ACE NJ - Typical Monthly Residential Cost

### Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 | Year 14 | Year 15
---|---|---|---|---|---|---|---|---|---|---|---|---|---|---

-20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000 | -20,000,000

1,001,660 | 2,003,320 | 3,004,980 | 4,006,640 | 5,008,300 | 6,009,960 | 7,011,620 | 8,013,280 | 9,014,940 | 10,016,600 | 11,018,260 | 12,019,920 | 13,021,580 | 14,023,240 | 15,024,900

1,001,660 | 2,003,320 | 3,004,980 | 4,006,640 | 5,008,300 | 6,009,960 | 7,011,620 | 8,013,280 | 9,014,940 | 10,016,600 | 11,018,260 | 12,019,920 | 13,021,580 | 14,023,240 | 15,024,900

4,006,640 | 5,008,300 | 6,009,960 | 7,011,620 | 8,013,280 | 9,014,940 | 10,016,600 | 11,018,260 | 12,019,920 | 13,021,580 | 14,023,240 | 15,024,900 | 15,024,900 | 15,024,900 | 15,024,900

0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $ | 0.168 $

671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713 | 671,713

0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $ | 0.0002 $
<table>
<thead>
<tr>
<th>Year</th>
<th>Rate Base</th>
<th>Unamortized Balance</th>
<th>Amortized Balance</th>
<th>Net Rate Base</th>
<th>Operating Income</th>
<th>SIT-Current</th>
<th>FIT-Current</th>
<th>Deferred Taxes</th>
<th>Total Operating Expenses</th>
<th>Return Required</th>
<th>Required Oper. Income</th>
<th>Revenue Conversion Factor</th>
<th>Revenue Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27,082,510</td>
<td>27,082,510</td>
<td>2,668,744</td>
<td>24,413,766</td>
<td>2,668,744</td>
<td>(290,504)</td>
<td>(616,836)</td>
<td>-</td>
<td>1,761,404</td>
<td>1,728,495</td>
<td>3,489,899</td>
<td>1.39101</td>
<td>4,854,498</td>
</tr>
<tr>
<td>2</td>
<td>27,082,510</td>
<td>27,082,510</td>
<td>2,668,744</td>
<td>21,745,022</td>
<td>2,668,744</td>
<td>(285,003)</td>
<td>(605,157)</td>
<td>-</td>
<td>1,778,548</td>
<td>1,539,548</td>
<td>3,318,131</td>
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<td>4,615,567</td>
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<tr>
<td>3</td>
<td>27,082,510</td>
<td>27,082,510</td>
<td>2,668,744</td>
<td>19,076,278</td>
<td>2,668,744</td>
<td>(279,503)</td>
<td>(593,478)</td>
<td>-</td>
<td>1,795,763</td>
<td>1,350,600</td>
<td>3,146,363</td>
<td>1.39101</td>
<td>4,376,635</td>
</tr>
<tr>
<td>4</td>
<td>27,082,510</td>
<td>27,082,510</td>
<td>2,668,744</td>
<td>16,407,533</td>
<td>2,668,744</td>
<td>(274,003)</td>
<td>(581,799)</td>
<td>-</td>
<td>1,812,942</td>
<td>1,161,653</td>
<td>2,974,595</td>
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<td>4,137,704</td>
</tr>
<tr>
<td>5</td>
<td>27,082,510</td>
<td>27,082,510</td>
<td>2,668,744</td>
<td>13,738,789</td>
<td>2,668,744</td>
<td>(269,503)</td>
<td>(570,121)</td>
<td>-</td>
<td>1,830,121</td>
<td>972,706</td>
<td>2,802,827</td>
<td>1.39101</td>
<td>3,898,772</td>
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</tbody>
</table>

(25) Revenue Requirement Summary
(26) Period (years) 5.00
(27) NPV of Cost Rev Req. $18,040,168
(28) Levelized Annual Revenue Requirement $4,409,258
(29) Less: Public Charging Revenues TBD
(30) % Assigned to Residential Class 49%
(31) Levelized Annual Revenue Requirement - Residential $2,172,469
(32) Annual Residential kWh 3,983,153,885
(33) $/kWh Residential Charge 0.0005
(34) ACE NJ - Typical Monthly Residential Usage 679.00
(35) ACE NJ - Typical Monthly Residential Cost 0.370
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Capital</th>
<th>ACE NJ - Residential</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
<th>Year 11</th>
<th>Year 12</th>
<th>Year 13</th>
<th>Year 14</th>
<th>Year 15</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
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<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
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<td>$15,024,900.00</td>
<td>$15,024,900.00</td>
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</tr>
<tr>
<td></td>
<td>$15,024,900.00</td>
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<td>$15,024,900.00</td>
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<td></td>
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</tr>
<tr>
<td>Long Term Debt</td>
<td>50.06%</td>
<td>4.58%</td>
<td>2.29%</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Common Stock</td>
<td>49.94%</td>
<td>9.60%</td>
<td>4.79%</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Total</td>
<td>100.00%</td>
<td></td>
<td>7.08%</td>
<td></td>
<td></td>
<td></td>
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</table>

Source: BPU Docket No. ER18080925
### Revenue Conversion Factor

<table>
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<tr>
<th>Tax Rates</th>
<th>Source / Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Federal Income Tax Rate</td>
<td>Current Federal Corporate Income Tax Rate</td>
</tr>
<tr>
<td>(2) New Jersey State Income Tax Rate</td>
<td>Current NJ Corporate Income Tax Rate</td>
</tr>
<tr>
<td>(3) New Jersey - BPU Assessment and Ratepayer Advocate</td>
<td>Current NJ BPU Assessment and Ratepayer Advocate</td>
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#### Conversion Factor (Income Tax Only)

<table>
<thead>
<tr>
<th></th>
<th>Source / Notes:</th>
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<tbody>
<tr>
<td>(4) NJ Taxable Income</td>
<td>(4) = 1</td>
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<tr>
<td>(5) NJ Income Tax</td>
<td>(5) = (2) x (4)</td>
</tr>
<tr>
<td>(6) Federal Taxable Income</td>
<td>(6) = (4) - (5)</td>
</tr>
<tr>
<td>(7) Federal Income Tax</td>
<td>(7) = (1) x (6)</td>
</tr>
<tr>
<td>(8) Total Additional Taxes</td>
<td>(8) = (5) + (7)</td>
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<tr>
<td>(9) Increase in Earnings (1 - Additional Taxes)</td>
<td>(9) = 1 - (8)</td>
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</table>

#### Revenue Conversion Factor (1 / Increase in Earnings)

<table>
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<th></th>
<th>Source / Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(10) Revenue Conversion Factor (1 / Increase in Earnings)</td>
<td>(10) = 1 / (9)</td>
</tr>
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### Conversion Factor (Including BPU Assessment / Ratepayer Advocate)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>(11) NJ Assessment</td>
<td>(11) = 1</td>
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<tr>
<td>(12) NJ Assessment Tax Rate</td>
<td>(12) = (3) x (11)</td>
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<tr>
<td>(13) NJ Taxable Income</td>
<td>(13) = (11) - (12)</td>
</tr>
<tr>
<td>(14) NJ Income Tax</td>
<td>(14) = (2) x (13)</td>
</tr>
<tr>
<td>(15) Federal Taxable Income</td>
<td>(15) = (11) - (12) - (14)</td>
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<tr>
<td>(16) Federal Income Tax</td>
<td>(16) = (15) x (1)</td>
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<tr>
<td>(17) Total Additional Taxes</td>
<td>(17) = (12) + (14) + (16)</td>
</tr>
<tr>
<td>(18) Increase in Earnings (1 - Additional Taxes)</td>
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#### Revenue Conversion Factor (1 / Increase in Earnings)

<table>
<thead>
<tr>
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<th>Source / Notes:</th>
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<tbody>
<tr>
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Schedule (MTN)-4
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<thead>
<tr>
<th>(1)</th>
<th>Offering</th>
<th>Original Petition</th>
<th>Amended Petition</th>
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<tr>
<td>(2)</td>
<td>Offering 1</td>
<td>RS-PIV</td>
<td>RS-PIV</td>
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<tr>
<td>(3)</td>
<td>Offering 2</td>
<td>IR-PIV</td>
<td>REVCP</td>
</tr>
<tr>
<td>(4)</td>
<td>Offering 3</td>
<td>IR-PIV</td>
<td>REVCP</td>
</tr>
<tr>
<td>(5)</td>
<td>Offering 4</td>
<td>MFDU-PIV</td>
<td>CEVCP</td>
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<tr>
<td>(12)</td>
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<td>CTCP</td>
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<tr>
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Schedule (MTN)-5
Example Incentive Decline Over Time: two 50KW charger configuration

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<thead>
<tr>
<th></th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
<th>Yr 4</th>
<th>Yr 5</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Charging Sessions Per Day (measured at the location)</td>
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<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
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<tr>
<td>KWHRs Delivered Per Session</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
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<tr>
<td>Effective Cost Of Electricity (AGS Tariff)</td>
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<tr>
<td>Set Point</td>
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<tr>
<td>Annual Customer Cost For Electricity - Without Offer 9</td>
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<tr>
<td>Annual Customer Cost For Electricity - WITH Offer 9</td>
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<td>$0.2691</td>
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Example: Incentive Paid To Customer Over Time ($/kwhr)
(Reflects Utilization Growing From 1 session/day to 12 sessions/day)

Example: Effective Cost Of Electricity Over Time
(Reflects Utilization Growing From 1 session/day to 12 sessions/day)
BOARD OF PUBLIC UTILITIES
STATE OF NEW JERSEY

IN THE MATTER OF THE PETITION OF
ATLANTIC CITY ELECTRIC
FOR APPROVAL OF ITS
NEW JERSEY PLUG-IN ELECTRIC VEHICLE PROGRAM
BPU DOCKET NO. EO18020190

TESTIMONY
OF
MARK WARNER

ON BEHALF OF
Atlantic City Electric Company

December 17, 2019
TABLE OF CONTENTS

I. INTRODUCTION .......................................................................................................................... 1
II. BENEFIT-COST ANALYSIS APPROACH AND METHODOLOGY ........................................... 3
III. BENEFIT-COST ANALYSIS RESULTS .................................................................................. 38
IV. CONCLUSIONS ......................................................................................................................... 63
I. INTRODUCTION

Q1. What is your name and business address?
A1. My name is Mark Warner and my business address is 417 Denison Street, Highland Park, New Jersey, 08904. I am presently employed as a Vice President at Gabel Associates, Inc., an energy, environmental, and public utility consulting firm.

Q2. What is your professional experience and educational background?
A2. At Gabel Associates, Inc, I lead a team of analysts that provides specialized economic, financial, environmental, and policy analysis related to energy markets and a variety of clean energy technology applications. I have been leading technical teams for over 35 years across a variety of utility industries, and I have been specializing in energy market policy and analysis since 2001. I have recognized expertise in economic modeling and policy development for new clean energy technologies, particularly regarding utility implications and market impact. My primary focus areas include renewable energy, energy storage, microgrids, advanced “behind the meter” energy project development, and electric vehicles, particularly Plug-In Electric Vehicles (“PIVs”). I support a wide variety of public and private clients, including energy utilities, and I interact closely with a variety of government agencies and regulatory authorities. I lead our firm’s practice on PIV research and policy development, where we have been active for approximately four years. I am a co-founder of the ChargEVC electric vehicle coalition, which is currently active in New Jersey and growing throughout the region. I am also able to draw on the expertise and resources of Gabel Associates, which is a widely recognized consulting firm specializing in energy markets with expertise in energy procurement, project development, energy policy, environmental analysis, in-depth economic analysis, and overall energy markets including generation, regional operators (especially PJM), and utilities. I received my education from the Georgia Institute of Technology where I received a B.S. and M.S in Mechanical Engineering. I was recognized as Clean Energy Market Innovator of the Year by the New Jersey Board of Public Utilities in 2008, and I served on the board of the Mid-Atlantic Solar Industry Association for four years.
Q3. What experience do you have with the electric vehicle market?

A3. The emerging PIV market has been my primary focus area for the last four years. I routinely monitor industry developments, support a variety of clients with specialized market research, work with utilities that are developing programs as a subject matter expert, and interact with a wide variety of policy makers in multiple states regarding market development initiatives for PIVs. A key focus area has been the development of new tools and methodologies for assessing PIV impacts on energy markets and utility infrastructure, and rigorous methods for analyzing and documenting potential benefits, costs, and the net-benefit resulting from widespread PIV adoption. I have worked with nine different utilities in five different states on development of their PIV programs, including tasks such as forecasting, opportunity assessment, strategic planning, PIV program design, budgeting, regulatory filing support (including preparation of testimony), benefit-cost analysis, and program implementation support. In addition, in support of market development efforts by ChargEVC in New Jersey, I was the lead investigator for a comprehensive benefit-cost study for the State entitled *Electric Vehicles in New Jersey, Costs and Benefits: The Opportunities, Impacts, and Market Barriers to Widespread Vehicle Electrification in New Jersey*. This analysis was unique because it is based on detailed simulation modeling of both impacted energy markets and physical infrastructure loading, tuned specifically for conditions in New Jersey. Those tools and datasets have been refined over the last two years to enable highly specialized assessment of PIV impacts on the electricity markets and infrastructure, and rigorous determination of benefits, costs, and Benefit-Cost Analysis (“BCA”) using net-benefit merit tests specific to proposed utility PIV filings. I am a frequent public speaker in a wide variety of forums regarding the electric vehicle market, policy development for electric vehicles, and utility implications of widespread electric vehicle adoption.

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1 ChargEVC is a not-for-profit coalition of diverse stakeholders that support development of the electric vehicle market in New Jersey. Stakeholders include all four electric utilities, both local and national environmental groups, New Jersey car retailers, vehicle manufacturers, charging companies, consumer advocates, and others.

Q4. **Did you prepare the benefit-cost analysis included in this filing?**

A4. Yes. I developed projections of benefits and potential costs, and I prepared the BCA based on multiple merit tests that examine both the market-wide impact of vehicle electrification, as well as merit tests customized for each of the utility program offers. These Offering-specific merit tests are needed since each proposed utility Offering impacts the market in different ways. To the greatest extent possible, these merit tests were adapted from standardized tests typically used for evaluating utility Energy Efficiency programs.

Q5. **What is the purpose of your testimony?**

A5. The purpose of this testimony is to present the methodology and results of the BCA that was performed regarding the PIV Program proposed by Atlantic City Electric Company (“ACE” or “the Company”). My testimony is being submitted as part of ACE’s Amended Petition for approval of the Company’s PIV Program, which amends the Company’s Original Petition filed on February 22, 2018.

II. **BENEFIT-COST ANALYSIS APPROACH AND METHODOLOGY**

Q6. **Did you evaluate the proposed program for benefits and costs?**

A6. Yes. I evaluated the impacts expected to result from the Program and related PIV use. Based on these impacts, I prepared an inventory of projected benefits and potential costs. This portfolio of benefits and costs was used to calculate a variety of net BCA merit tests. Many of the impacts from PIV use result from vehicle charging impacts on electricity markets and utility infrastructure. These impacts have physical, market, and environmental dimensions that can be quantified on an economic basis, in addition to broader strategic implications. The BCA is therefore based primarily on quantifying the net impact of displacing gasoline consumption with electricity use, and considering the impact of that change on the electricity market, implications for utility infrastructure, changes in environmental emissions, and other relevant factors for impacted populations.
Q7. What assumptions were used regarding PIV adoption?
A7. This BCA analysis is based on a forecast of PIV adoption within the ACE territory from 2020 through 2035. This forecast was taken from previous work to project PIV adoption in the State of New Jersey, with allocations to each utility territory commissioned by ChargEVC. This projection is based on the most recent information available about historical PIV sales in New Jersey, including detailed geo-mapping to particular territories. Please refer directly to the previously published study, *Electric Vehicle Adoption in the State of New Jersey* (September 18, 2019, Mark Warner), which is respectfully submitted as part of this testimony as Schedule (MW)-1. The projection accounts for growth of the PIV fleet through new sales, as well as vehicle retirements, in both Battery Electric Vehicles (“BEVs”) and Plug-in Hybrid Vehicles (“PIHVs”) segments. The overall PIV projection is used for the market-wide tests as described in more detail below, but the number of impacted vehicles is used when considering individual Program Offering.

As summarized in more detail in the ChargEVC report referenced above, the vehicle adoption projection blends an extrapolation of historical sales in the short term with transition to the adoption trajectory needed to meet the State’s goal of 330,000 PIVs on the road by 2025. ChargEVC developed a stakeholder-consensus market development roadmap in 2017, which included projections for sales through 2035 that would allow New Jersey to achieve adoption parity with other states leadership levels of PIV adoption. These “market leadership parity” goals were used to project sales requirements after 2025, including a goal for 2,000,000 PIVs on New Jersey roads by 2035. The forecast is based on the number of PIVs in New Jersey as of the end of 2018, as reported by the New Jersey Department of Environmental Protection (“NJDEP”) based on vehicle registration data, mapped to each utility’s service territory by zip code. Please refer to the previously referenced ChargEVC study (Schedule (MW)-1 for details on methodology and projection assumptions.

Q8: How does the analysis quantify physical impacts from PIV adoption?
A8. The model translates the number of PIVs on the road (from the projection described above) into predominantly physical impacts on miles driven (gasoline vs. electric), changes in
electricity consumption (in megawatt hours ("MWhs")), changes in load profile (time-of-day MW distributions), and the resulting changes in emissions (net between tailpipe and power plant). These impacts are calculated for the baseline case (where there is no growth in PIV use), and the PIV adoption case under both “natural” and “managed” charging scenarios. Natural charging assumes that there are no programs or policies to influence charging behavior, and that residential charging loads begin to ramp up when most drivers return home from work. Managed charging assumes that policies and programs are in place to influence when charging happens, moving vehicle charging load from on-peak times to preferred off-peak periods. These physical impacts, for each of the three cases (baseline, natural, and managed), is calculated for each year from 2020 to 2035. The impact of PIV adoption is calculated as the difference in each impact-parameter between the PIV adoption cases and the baseline case.

Q9: How do these physical impacts translate into costs and benefits?

A9. All of the physical impacts are quantified in terms of their economic cost. Total cost for each of the three cases (baseline with no PIV use growth, with PIVs under natural charging, and with PIVs under managed charging) are computed considering the cost of electricity, operating expenses for vehicles, and the costs associated with emissions. If costs go down in the PIV case compared with the baseline, they are considered a benefit for the BCA calculation. If costs go up in the PIV case compared with the baseline, they are considered a cost for the BCA calculation. Some other direct costs and benefits, such as the tax incentives associated with a PIV purchase (a benefit) or the expense to install vehicle charging infrastructure (a cost), are also calculated to provide a complete view of the cost and benefit portfolios. The model maps these costs and benefits to three impacted populations: utility customers that do not drive PIVs, PIV owner/operators, and society at large, the latter of which collectively bears the consequences of externalities such as air pollution or greenhouse gas emissions. The Net Present Value ("NPV") of all costs and benefits are computed based on a discount rate of 6.44%, which was provided by ACE based on their Weighted Average Cost of Capital. Note that benefit/cost ratio results are not strongly dependent on the discount rate selected, since it typically applies equally to both costs and benefits.
Q10. What methods were used to quantify costs and benefits for utility customers due to changes in electricity costs?

A10. Determining how PIV charging affects electricity costs is a primary focus for the BCA analysis, and is quantified through a comprehensive model that examines wholesale market impacts, implications for capacity and transmission costs, and impacts on the distribution revenues collected by the utility. Both aggregate and unit-cost impacts are quantified to allow for determination of electricity cost changes that affect all ratepayers. If rates are determined to go down in a PIV adoption case, that is considered a ratepayer benefit. The key electricity cost components considered are summarized as follows:

a. Utility Distribution Costs: The utility provided information regarding gross utility revenue requirements, including both the costs for distribution and related sur-charges. Based on this historical information, a baseline utility distribution revenue requirement was established for 2020, and projected forward using a growth rate of 0.8% per year. This rate was synthesized using both utility and Energy Information Administration ("EIA") statistics on distribution revenue growth. These gross costs represent the relatively fixed costs for utility distribution services, not including the proposed PIV programs which are accounted for as a separate cost.

b. Wholesale Costs: PIV charging, especially if done during off-peak times, changes the shape of the aggregate load curve. This modified load curve results in a change in the average wholesale cost of electricity since more electricity is purchased during lower cost, off-peak times. Gabel forecasts these impacts based on a detailed asset dispatch simulation based on AURORAxmp ("AURORA"). AURORA is an industry-leading software and data package that simulates the hourly commitment and dispatch of electric generators to serve load, recognizing utility-level peak demand, transmission constraints, operational characteristics of generators, delivered fuel prices, emissions prices, etc. Gabel completed hour-by-hour market simulations using AURORA, for
every year from 2020 to 2035, for each of the three cases (baseline, with PIVs natural charging, and with PIVs managed charging). Total electricity costs ($ per year) and generation emissions (tons of CO₂, NOₓ, and SO₂) are the primary outputs of the simulation. Many other studies on PIV benefits are based on generalized assumptions about PJM costs or emission profiles. By contrast, this study looks at wholesale electricity costs (and emission) impacts based on detailed dispatch simulations.

c. **Capacity and Transmission Costs:** The physical impact model summarized above can be used to create an aggregate load curve associated with PIV charging. This model accounts for the fact that vehicle charging takes place across a variety of segments (at home, at work, at public chargers, etc.), and computes the aggregate load impact for both the natural and managed charging cases. Separately, an analysis of the historical PJM-wide coincident peaks used for allocation of capacity and transmission costs was conducted. In 2018 and 2019, eight of the ten coincident-peak periods were between 4PM and 5PM on the peak days. The PIV charging load during the 4PM-5PM period, for both the natural and managed charging cases, were used as an indicator for potential PIV charging impacts for peak-related costs. PJM costs for capacity ($/MW·day) and transmission ($/MW for the year) were projected through 2035 based on recent PJM market data. The capacity and transmission costs, multiplied by the PIV charging loads at PJM-wide peak times (during the 4PM-5PM period), allow for an estimate of potential capacity and transmission costs associated with PIV charging. These are generally additional costs compared with the no-PIV baseline case since load (in MW) has increased. A capacity reserve factor of 8.89% was used based on recent PJM guidance, along with a transmission and distribution efficiency factor of 92.851% based on information about losses from ACE.

d. **Total Electricity Costs:** Utility distribution costs, wholesale electricity costs, and capacity and transmission costs are combined to create an overall electricity
cost indicator. This indicator is determined for each of the three cases (no PIV baseline, with PIV’s natural charging, and with PIV managed charging) for each year of the study period. Changes in the indicator between the PIV and baseline cases indicate how electricity costs change for all ratepayers as a result of PIV charging. This model captures several dynamics associated with PIV charging impacts on electricity costs:

- Overall electricity use (total megawatt hours (“MWhs”) goes up due to the increased electricity use associated with vehicle charging;

- Unit costs (dollars per kilowatt hour (“kWh”) go down due to the combination of dilution of distribution costs through increased MWh volume and reductions in average wholesale unit costs due to more optimal loading (i.e., increased capacity factors);

- Capacity and transmission costs go up due to the increasing load, although they increase more for natural charging than managed charging;

- Of these three affects, the dilution effect is the strongest and generally results in net reduction in unit costs, on a per-kWh basis;

- This change in aggregate costs (between the with-PIV and baseline cases) is applied against just the baseline load to determine the impact on utility customers that do not drive a PIV.

Q11. What methods were used to quantify costs and benefits for PIV drivers?

A11 Impacts on vehicle operating expense were computed based on both the difference between fueling with electricity versus gasoline, combined with projected changes in maintenance expense. It costs less to “fuel” a PIV with electricity than it does to fuel a traditional vehicle with gasoline based on differences in vehicle efficiencies and basic energy costs (electricity
versus gasoline). Furthermore, early market evidence suggests that PIVs cost less to maintain due to the simplified drive train. The combination of these two factors generate significant savings in operating expense for PIV owners/operators. The fuel savings are computed based on a projection of electricity and gasoline prices, average vehicle efficiency factors (miles/kWh, or miles/gallon) while maintenance savings are estimated based on results from a vehicle maintenance study by the American Automobile Association (“AAA”) on a per-mile basis. To ensure a fair comparison, an additional expense is assumed for PIV owners based on replenishment of the infrastructure funding lost through avoided State and federal gasoline taxes. Details on these calculations are provided below:

a. Vehicle Charging Electricity Costs: Since most charging (85%-95%) of vehicle charging happens at home, the residential cost of electricity is used for computing the costs of vehicle charging given average miles driven and average vehicle efficiency (in miles/kWh) for each year in the study period. The model computed BEV and PIHV charging costs separately, given unique efficiency parameters for each.

b. Cost of Gasoline: EIA projections on the cost of gasoline through 2035 were used as the basis for the cost of fueling traditional vehicles and the fueled fraction of PIHV travel, as normalized by a comparison of New Jersey versus national gasoline costs from the price tracking website gasbuddy.com. Projections of fuel costs, combined with projections of the average miles driven and average vehicle efficiency (in miles/gallon) of the base of light duty vehicles being displaced by PIVs were used to compute gasoline costs for each year in the study period.

c. Infrastructure Tax Adders: An operating expense for PIV drivers is added that is equivalent to the federal and district gas tax to ensure fair comparison between gasoline-fueled and electrically-powered scenarios. The current gas tax in New

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Jersey, combining both federal and state taxes, is 59.8 cents/gallon. That is translated to a cost-per-mile based on average vehicle efficiency (miles/gallon) for each year in the study period, and is included as an operating expense for PIV drivers.

d. Maintenance Costs: A variety of recent studies have documented early market experience with the costs of maintaining traditional vehicles compared with electric vehicles (both BEVs and PIHVs). I used the 2019 data from AAA for these factors (as cited above), and applied the relevant maintenance costs per mile to each vehicle type to determine changes in maintenance costs. The general trend is that maintenance costs for PIVs are lower than with traditional vehicles, given the simplified drive train, and the elimination of routine maintenance such as oil changes and tune-ups.

e. PIV driver operating expenses are determined based on the combination of the costs of electricity for vehicle charging, the costs of gasoline use, maintenance costs, and the Transportation Trust Fund tax replenishment adder.

f. Vehicle operating expenses in New Jersey are significant, amounting to $10 billion to $15 billion a year in fuel and maintenance expense. The reductions in operating expenses associated with vehicle electrification therefore represent billions of dollars of increased disposable income for New Jersey households as high levels of adoption are achieved. These savings are accessible by any New Jersey household that makes use of an electrified vehicle.
Q12. Are there other costs and benefits that accrue to PIV drivers?

A12. Yes, in addition to impacts from fueling and maintenance costs, PIV drivers experience both a price premium for the initial vehicle purchase (a cost), and a one-time federal tax incentive associated with their new vehicle purchase (a benefit), and a variety of non-economic advantages.

a) PIVs of all types currently command a price premium, measured as the higher average Manufacturers Suggested Retail Price (“MSRP”) for typical PIVs compared with traditional internal combustion engine vehicles. This cost premium is declining over time, based on increasing competition, larger industry scale, and especially the reduced cost of vehicle batteries. An estimate for this price premium over time was used based on projections by the National Renewable Energy Laboratory (“NREL”)\(^5\). This price premium is considered an incremental cost absorbed by PIV drivers. The projections from NREL were corroborated based on New Jersey-specific research I recently completed on base MSRP and likely as-sold prices for both PIVs and traditional vehicles on a detailed market segment-basis.

b) The federal government provides a tax credit for purchase of a qualified PIV. The amount of the credit varies by vehicle type and range, up to a maximum of $7,500. It is generally modeled as a benefit, since that economic incentive flows to New Jersey PIV owners from an external source (i.e., the federal government). That tax credit begins to decline when at least 200,000 PIVs from a particular manufacturer have been sold, and several market leaders (such as Tesla, Nissan, and Chevrolet) have already surpassed that threshold. As part of the BCA analysis, an assessment of cumulative sales rates for different PIV manufacturers was completed to determine the current average incentive level available, and the expected decline rate, based on volume-weighted sales in the U.S. Overall, the average incentive declines as more manufacturers surpass the 200,000 vehicle threshold. This declining incentive is

\(^5\) National Renewable Energy Laboratory, Electrification Futures Study – End Use Technology Costs and End Use Projections through 2050, Published 2017
included as a benefit for all PIVs purchased in the ACE territory through 2026 (for BEVs) and 2028 (for PIHVs).

c) PIV owner/operators (and drivers) enjoy a variety of non-monetary benefits, including the potential for increased safety (due to a lower center of gravity and state of the art safety features), reduced road noise, increased “fueling” convenience (no trips to the gas station), fewer maintenance events, elimination of State vehicle inspections, state of the art design with desired technical features, appreciation for the environmental, societal, and geopolitical benefits associated with reduced petroleum use, and an enjoyable driving experience. While these non-economic considerations are very important to many PIV drivers and consumers, they were not considered as part of the formal BCA.

Q13. What methods were used to quantify the economic impact of changes in emissions realized by society-at-large?

A13. Current levels of vehicle emissions impose significant costs on society through health care expenses, extreme weather damage, lost worker and business productivity, asset devaluation, etc. Although frequently considered an “externality,” there is real economic value that accrues to society due to the avoided emissions enabled by widespread PIV adoption. More generally, greenhouse gases (especially CO₂) are widely considered the primary drivers of climate change, which imposes significant costs as well. The BCA model calculates the value of these avoided emissions based on net change in emissions per year and societal-cost-per-ton factors provided by independent sources as noted below:

a) Emission Changes: The model considers CO₂, NOx, and SO₂, and models emissions in the baseline case (traditional vehicle only, fueled by gasoline) compared with emissions in the PIV adoption case using predominantly electricity instead of gasoline (100% electricity for BEVs, and a combination of electricity and gasoline use for PIHVs). This model considers the net impact of the change in fueling considering both emissions at the vehicle tailpipe and emissions at the electricity generation facility. Emission factors for electricity generation were calculated based on dispatch
simulation by Aurora for the actual vehicle charging loads projected. Emission factors for the mobile sources (pounds of emissions per gallon of fuel consumed) were from estimates of the United States Environmental Protection Agency (“EPA”).

b) Economic Value Of Reduced CO₂ Emissions: To determine the economic value of reduced CO₂ emissions, the BCA model uses the “Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866” produced by the Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, as updated August 2016. Specifically, the analysis used the “3% Average” case that represents a mid-point of the three primary CO₂ cost scenarios. This analysis, when adjusted to nominal dollars/ton in each year of emissions, provides an economic estimate of the value of avoided CO₂ emissions. Since CO₂ is easily and widely dispersed from any source regionally, economic impact factors are the same for both mobile and stationary electricity generation sources.

c) Economic Value of Reduced NOₓ and SO₂ Emissions: To quantify the benefits of SO₂ and NOₓ reductions, the model incorporates results from a recent EPA study that allocates public health costs associated with emissions across a variety of segments on a nominal dollar per ton of emissions basis. That EPA study provides different factors for “on-road” mobile sources and stationary sources at electricity generation plants. The difference between these factors therefore accounts for not just the changes in the amount of emissions, but the fact that vehicle electrification changes where the emissions happen – shifting from typically more developed and populated areas along roadways to more remote power plant locations.

d) The model computes the total emissions from gasoline use in the baseline case, the PIV case, and based on that difference, applies the economic factors to determine total environmental costs. As a general trend, overall economic costs due to emissions

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7 United States Environmental Protection Agency, Technical Support Document, Estimating Benefit Per Ton Benefit of PM2.5 Precursors from 17 Sectors, Published February 2018
decline significantly due to PIV adoption given the lower net emissions rate and the shift in emissions geography. These impacts are recognized by “society at large,” but are also felt by utility customers since air quality affects all residents of the State.

Q14. Are there any other costs or benefits incorporated into the model?

A14. In addition to the benefits and costs realized directly by the three primary sub-populations (PIV drivers, utility customers, and society at large), the model also accounts for a variety of other economic impacts on other market participants as summarized below:

a) Utility Investments in Charging Infrastructure: ACE is proposing a variety of customer Offerings that provide equipment and services that directly support customers driving an PIV, and development of the PIV market overall in support of State goals. These utility costs include the capital and expense associated with delivering those programs, non-revenue neutral rate incentives, and general costs associated with information technology, data and network licenses, and customer acquisition. This portfolio of utility program costs is comprehensive and includes all potential program costs subject to recovery from ratepayers. These costs are recognized when incurred according to the program deployment plan, as summarized in the following figure.
b) **Revenues from Utility-Owned Charging Infrastructure**: ACE is proposing two Offerings under which the Company would own and operate public charging infrastructure. One is focused on lower-power “Level 2” chargers, while the other is focused on the higher-power Direct Current Fast Chargers (“DCFCs”) that address consumer concerns about range anxiety. These Offerings are designed to only address a part of the public charging market need, focused on those applications that are underserved by competitive PIV charging providers. The Company intends to charge PIV
drivers for use of these facilities, the revenues of which will be used to offset ratepayer impacts. These revenues are captured as a benefit since they offset costs.

c) **Utility Investments in Grid Reinforcement:** Beyond the proposed PIV programs noted above, there may be the need for additional utility investment in grid reinforcement. As PIV adoption grows, the Company will be required to deliver more electricity in support of vehicle charging. An *estimate* of these potential grid reinforcement investments, which are longer-term in nature, has been provided to ensure complete characterization of PIV adoption costs. See the section below on potential utility distribution impacts and how those potential costs were determined. Note that these costs have been included in the BCA as a possible longer-term cost, but they are not formally budgeted as part of the current utility Program proposal.

d) **Investments by Non-Utility Entities in Charging Infrastructure:** In addition to actions by utilities, other market participants will be making incremental investments as part of more widespread PIV adoption. Primary examples include customer investments in vehicle chargers (commercial and residential), and investments by private capital in public charging infrastructure. A detailed model to estimate total infrastructure requirements across a variety of segments has been developed, including chargers in residential settings, workplace chargers, fleet chargers, and a variety of public chargers. The investment in a growing base of charging infrastructure is based on the vehicle adoption projection noted above. Unit costs for different types of chargers have been estimated based on market data, while also ensuring consistency with cost assumptions inherent in the utility program filing. In most cases, both equipment costs and installation costs have been considered, which vary considerably by segment. Long-term estimates of those costs have been included (net of utility incentives) as part of the costs associated with market-wide vehicle electrification. Under this methodology, the combination of utility investments and non-utility investments fully capture the charging infrastructure investment requirements over time.
Q15. Will there be impacts on utility distribution infrastructure resulting from PIV charging, and were those costs included?

A15. Yes, it would be prudent to assume distribution system impacts due to increased loading from PIV charging longer term, especially in the residential sector where most charging takes place, and we have included an estimate of those costs in this analysis. We did not assess the physical impacts on the ACE distribution infrastructure at an engineering level as part of this study. However, Gabel has conducted in-depth engineering analysis of PIV implications on utility infrastructure for other territories. Those studies identified several general conclusions that we believe are applicable across a variety of territories, and those guidelines were used to estimate potential costs for grid reinforcement resulting from PIV charging loads in the ACE territory. In particular, utility infrastructure impacts vary over time as the PIV population increases, and it is useful to think about utility response (and associated costs) in three phases. Key guidelines for characterizing these three phases include:

a) When the PIV population is small (as an aggregate percentage of the overall light duty vehicle population in the territory), there is generally sufficient capacity within the distribution system to handle those incremental PIV charging loads, although clustering affects (i.e., multiple PIVs within a single neighborhood) could cause localized distribution system loading issues.

b) During this early market phase, vehicle charging impacts, if they emerge, will be relatively localized and can be dealt with within the boundaries of routine maintenance and upgrade budgets already supported by the utility.

c) Based on consideration of a wide variety of PIV loading scenarios, my analysis suggests that more systemic loading impacts on the distribution system will emerge

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8 Detailed physical infrastructure impact studies were completed for a utility in New Jersey as part of the ChargEVC market opportunity assessment (Electric Vehicles in New Jersey – Costs and Benefits, ChargEVC, principle investigator Mark Warner, Gabel Associates Inc and Energy Initiatives Group LLC, January 26, 2018), and also specifically for the utility infrastructure on Long Island (Electric Vehicles On Long Island – Costs and Benefits, Principal Investigator: Mark Warner, Gabel Associates Inc. and Energy Initiatives Group LLC, July 10, 2018).
first on residential single-phase transformers. Larger impacts on conductor capacity, sub-station elements, and transmission infrastructure would likely emerge in the longer term, if they emerge at all. The timing, and impact scope, of PIV charging depends heavily on residential PIV charging patterns, and managed charging – if fully deployed – can defer (but probably not completely eliminate) these impacts in time. The PIV programs being proposed by the utility are intended to encourage residential managed charging, and managed charging was therefore assumed to be the dominant scenario for this analysis.

d) Once the PIV population exceeds the number of single-phase transformers, distribution loading issues will become more common since that condition begins to guarantee multiple vehicle charging loads on a given residential transformer. Past that point, more proactive grid reinforcement would be prudent to ensure responsible support for increased loading related to PIV charging. However, not all residential PIV charging happens at the same power levels, and loads can range from 1.3 kW (for a typical “Level 1” charger, more typically used by PIHV owners), to a higher powered 7.2 kW charger (for a Level 2 solution favored by BEV owners with larger batteries). The model accounts for this portfolio of diverse loads on the distribution system and estimates that in the case where natural charging is dominant, more systemic impacts will begin to emerge once the number of PIVs exceeds approximately 0.75 times the number of single-phase transformers. By comparison, in the case where managed charging is dominant, more system impacts are estimated to emerge when the number of PIVs exceeds approximately 2.7 times the number of single-phase transformers. For a given number of transformers and PIV adoption rate, this analysis can estimate when system grid reinforcement becomes necessary for both the natural and managed cases.

e) There are approximately 129,000 single phase transformers currently in ACE’s service territory. Based on the current projection for PIV adoption in the ACE territory, more proactive grid reinforcement begins to become important around 2030 if natural charging is the dominant residential charging behavior. In the case of high levels of managed charging, grid reinforcements are deferred beyond 2035. This dynamic
highlight the economic and strategic value of managed charging, and why it is an important element of the proposed ACE PIV Program.

f) The associated grid reinforcement costs are scheduled in the cost model over time in proportion to PIV adoption, beginning in 2030 for the natural charging case, and assumes that the reinforcement takes place over a 15-year period. This high-level analysis assumes complete upgrade replacement of impacted single-phase transformers, at a cost of $15,000 each, although other technical options (such as feeder reorganization) may be determined to be optimal at that time. This analysis is significant, however, in that it assumes that eventually upgrade of most, if not all, of the residential transformer base may be required. The costs for that reinforcement, from 2030 through 2035, are accounted for in this analysis as a market-wide cost. I consider this a highly conservative assumption since it reflects significant reinforcement investments that may ultimately not be required if other alternatives – such as strong managed charging programs or other feeder re-organization strategies – are ultimately used instead. No costs for grid reinforcement are required in the managed charging case, since that strategy defers impacts beyond the scope of this BCA analysis.

g) Distribution impacts will be felt most strongly on residential circuits, where the majority of vehicle charging electricity is delivered. Impact on commercial circuits, for workplace, fleet, public charging, and other specialized infrastructure (i.e., electric buses, etc.) have not been assessed in detail. While those installation are much smaller in number (compared with residential chargers), they may have higher power requirements that need to be assessed on a case-by-case basis.

h) The above guidelines demonstrate the importance of strong deployment of effective managed charging programs, especially for residential customers. While price signals that defer charging start into off-peak hours is a very effective strategy short term, eventually, as PIV penetration increases, these programs will be about to more actively coordinate vehicle charging through staggered starts, power throttling, and curtailment
in extreme cases. If managed charging is not implemented, larger impacts on infrastructure are likely to result as represented in the grid reinforcement costs associated with natural charging. As a rough rule of thumb, effective managed charging programs reduce or mitigate distribution impacts by about a factor of four.

i) Note that these upgrades, although motivated by PIV loads, will also accomplish other reinforcement objectives, potentially including improved instrumentation, better resiliency, improved overall capacity, etc. Many of these transformers would require upgrade over a similar period anyway, even if PIV adoption did not happen. This assumption of full transformer upgrade is therefore extremely conservative, and probably overstates the costs that should be “booked” to PIV adoption, while also understating the associated benefits.

Q16. How did the analysis determine merit for the proposed Program?

A16. Merit tests assess the net impact of benefits after costs are accounted for. A wide variety of merit tests are available, and they differ based on which costs and benefits are included, and which impacted populations are considered. Numerous studies on vehicle electrification have focused primarily on market-wide net benefits considering the full impact of all electric vehicles on the road. This approach is helpful for understanding the overall policy merit of vehicle electrification, but implicitly overstates benefits associated with a particular utility Offering since it considers the impact of all PIVs, beyond the market-impact scope of a particular utility proposal. In addition, other studies have attempted to evaluate proposed utility PIV programs based exclusively on traditional – and relatively standardized – net benefit programs associated with energy efficiency (“EE”) filings. Those protocols, if applied simplistically with narrow boundaries, can be confounded by the fact that vehicle charging increases electricity consumption, which is fundamentally different than the outcome expected from an EE measure. It is therefore

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necessary to apply the principles associated with standard tests to conditions applicable to
the PIV market. Specifically, I consider two different views on net benefit that together
provide a comprehensive perspective on the utility programs being proposed. These two
perspectives are based on a market-wide\(^{10}\) Societal Cost Test ("SCT"), and customized
merit tests for each of the proposed utility Offerings that focus on non-participating utility
customer impacts (\(i.e.,\) impacts on utility customers that do not own a PIV). Details on
those merit tests are summarized below:

a) **Market-Wide Merit:** The SCT measures net costs based on the total costs of the
Program, including both the utility's costs and the costs incurred by all other market
participants. Similarly, all benefits are included, regardless of the impacted population,
including externalities. The SCT used in this analysis is based on the standard EE-
focused SCT as applied to PIVs and is an intentionally broad test that helps determine
if society is better or worse off overall as a result of the tested market change (\(i.e.,\),
increased PIV adoption). My design of this SCT is consistent with other studies that
have attempted to quantify SCT-merit for proposed utility PIV programs.

b) **Merit Per Utility Program Offering:** In addition to the market-wide SCT described
above, I also designed customized merit tests per utility program Offering. This
approach is necessary since particular Offerings impact the market in very different
ways. The impact of a residential off-peak Time-Of-Use ("TOU") rate (ACE’s
Offering 1), for example, impacts the market in a fundamentally different way than
public charging Offerings (ACE’s Offerings 7, 8, and 9). This per-Offering merit
assessment only considers costs and benefits that are directly tied to the particular
Offering. In general, these are very narrow tests that focus on utility customer impacts
from the recovered cost of the proposed Offering, and the benefits that are realized
directly by all utility customers through either change in electricity costs (as evident on
their utility bill) or the value of cleaner air through PIV-induced emission reductions.
Unlike the market-wide SCT, which considers the impacts of all electric vehicles on

\(^{10}\) In the context of the SCT, “market-wide” means the number of PIVs in the ACE territory, but also reflecting pricing
dynamics based on the PJM market of which ACE is a part.
the road in the utility territory, these per-Offering tests capture only benefits induced by the directly impacted PIVs.

c) **Portfolio Merit Test:** The costs and benefits of each of the Offerings (1 through 9) can be combined to provide a view of the net benefit at the overall program level\(^{11}\). Since this test is an aggregation of the Offering-specific tests, it provides a narrow assessment of the net impacts on non-participating ratepayers (i.e., *all* utility customers that don’t own a PIV) for the overall Program.

d) **Multiple Perspectives:** Providing multiple perspectives on merit, including both a market-wide SCT, a customized test per utility program Offering, and a portfolio test provides an appropriate, fair, and comprehensive perspective on both the overall Program and the individual offerings. The SCT provides important context for market-wide impacts from vehicle electrification overall and reflects a broad scope of market development activities that implicitly include the proposed utility Program. In parallel, the per-Offering merit tests are highly customized to reflect the impacts of each Offering, and the impact-scope (i.e., number of vehicles and number of directly impacted customers) associated with the proposed scope and design of each Offering. The portfolio test quantifies the impact on utility customers from the proposed Offerings in aggregate.

**Q17. Why did you use the SCT as the market-wide merit test?**

**A17.** Widespread PIV adoption will introduce profound changes in electricity markets and infrastructure, with a related beneficial impact on energy use, emissions, economics, and numerous other factors. There is therefore impact beyond that experienced by PIV owner/operators, and significant societal benefit associated with PIV adoption externalities. I therefore consider the SCT to be a strong measure of market-wide merit for PIV adoption, and it provides important context for considering strategic and policy

\(^{11}\) BCA was not completed for Offerings 10 – 12, since the exact use of funds, and the associated benefits, are not knowable at this time.
implications of the overall vehicle electrification transition of which the utility programs are an instrumental part.

Q18. How are the benefits and costs described above considered in the SCT?

A18. As noted above, the market-wide SCT incorporates all costs and benefits associated with PIV adoption in ACE’s service territory regardless of the sub-group impacted. The following inventory of benefits and costs were included over the analysis period from 2020 – 2035 (methodologies for quantifying these elements are summarized in the sections above):

a) Avoided Wholesale Electricity Costs: Projected changes in wholesale unit costs due to changes of the aggregate load profile, particularly the increased fraction of overall consumption in lower-cost, off-peak times. In most cases, this is a benefit since average wholesale electricity costs decline as PIV charging increases off-peak consumption (especially with managed charging). These wholesale cost changes are applied to the non-PIV charging loads (i.e., electricity use by utility customers not participating in the utility PIV Program) to determine utility customer impacts.

b) Dilution of Utility Revenues: An estimate of how unit-cost (dollars/kWh) of the relatively fixed utility distribution revenue requirements are diluted as volume increases due to vehicle charging. This effect is the reverse of the dynamic associated with EE programs that decrease overall consumption volume and lead to increased ratepayer unit costs, but in this case is strongly beneficial. These dilution impacts on a per-kWh basis are applied to the non-PIV charging loads (i.e., electricity use by utility customers that do not own a PIV not participating in the utility PIV Program) to determine utility customer impacts.

c) Capacity and Transmission: An estimate of how incremental vehicle charging loads would change capacity and transmission costs. Transmission and Distribution losses and typical PJM capacity reserve factors are taken into consideration. A projection of both capacity and transmission costs, based on recent and projected cost factors, were
used as the basis for estimating these impacts. Specifically, the projected charging load (from all charging segments) during the peak period from 4 pm to 5 pm, compared with the typical ACE baseline at those times, is the basis for these costs. Since PIV charging typically imposes an incremental load, these are typically incremental costs in the BCA. Note that two variations of the SCT are provided, reflecting the natural and managed charging scenarios that introduce variations in the capacity and transmission impacts as well as variations in the wholesale price impacts noted above.

d) **Net Value of Avoided Emissions:** The economic value of changes in physical air emissions induced by PIV charging, including the benefit of reduced CO₂ and NOx, as offset slightly by an increase in SO₂. These economic factors reflect changes in where the emissions take place: as a result of PIV charging emissions are lower in high population density areas along roadways, and higher in less populated areas near power plants. When the economic impact of net emissions go down, these impacts are captured as a benefit, but when the economic impact of net emissions go up, this impact is captured as a cost.

e) **Net Savings on PIV Driver Operating Expenses:** The long-term net savings for PIV owner/operators based on avoided gasoline costs, incurred costs of electricity for charging, and changes in costs for maintenance. This analysis also assumes that PIVs incur an additional expense to replace lost gas tax revenues so that roadway funding is retained. These impacts are all (strongly) beneficial over the period, and are included as a benefit.

f) **Utility PIV Program Investments:** Capital and expenses for the proposed utility PIV Program, to be recovered from utility customers through rates. The majority of these programs are related to providing charging infrastructure, encouraging the adoption of managed charging solutions and related off-peak rate incentives, and other rate-related incentives. The overall PIV Program budget includes all elements of Program cost, including administration, IT integration costs, ongoing data license and network costs, and proposed marketing and outreach programs. It is important to note that these costs
are not really absolute costs to a utility customer – they are a component of cost considered in a net benefit test, which when combined with other costs and benefits, determine whether there is a net impact to the utility customer.

g) **Utility Revenues for Utility-Owned Public Charging:** The utility will be collecting revenues from PIV drivers that use utility-owned and operated public chargers. Those revenues will be used to offset the recovery from ratepayers for those investments, and are therefore are included as a benefit.

h) **Utility Operating Costs for Utility-Owned Public Chargers:** For the utility-owned and operated public chargers, there are operating costs such as the cost of delivered electricity (just the supply component) and other maintenance costs. These costs are included as a cost in the net benefit test.

i) **Utility Investments in Grid Reinforcement:** Estimated costs for utility reinforcement of the distribution system medium term, with costs beginning in 2030. Only costs through 2035, which is the boundary for this analysis period, are included.

j) **Non-Utility Investments in Charging Infrastructure:** Potential costs incurred by non-utility market participants (PIV drivers and other private investors) for charging infrastructure over the analysis period net of any investments made by the utility through the proposed Program.

k) **PIV Driver Vehicle Purchase Premium:** An estimate of the purchase premium paid by purchasers of PIVs, captured as a cost.

l) **Value of Federal Tax Credits for PIV Purchase:** The federal tax incentive provided for PIVs, declining over time, based on distinct eligibility rules for BEVs and PIHVs, captured as a benefit.
The following figure summarizes how each of these elements were included in the SCT:

**Figure 2: Market-Wide Societal Cost Test**

<table>
<thead>
<tr>
<th>Economic Impact</th>
<th>Impacted Population</th>
<th>Cost or Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in average wholesale electricity costs</td>
<td>Ratepayer</td>
<td>Usually A Benefit</td>
</tr>
<tr>
<td>Dilution of utility distribution revenues</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td>Changes in capacity and transmission costs</td>
<td>Ratepayer</td>
<td>Usually A Cost</td>
</tr>
<tr>
<td>NET value of avoided emissions</td>
<td>Society at large</td>
<td>Benefit</td>
</tr>
<tr>
<td>NET value of reduced vehicle operating expense</td>
<td>EV owner/operators</td>
<td>Benefit</td>
</tr>
<tr>
<td>Utility EV program investments</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td>Utility revenues from public charging</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td>Utility operating costs for public charging</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td>Potential utility investments in grid reinforcement</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td>Non-utility investments in charging infrastructure</td>
<td>EV owners and others</td>
<td>Cost</td>
</tr>
<tr>
<td>EV purchase premium</td>
<td>EV drivers</td>
<td>Cost</td>
</tr>
<tr>
<td>Federal tax incentives for EV purchase</td>
<td>EV drivers</td>
<td>Benefit</td>
</tr>
</tbody>
</table>

The SCT result is based on a benefit/cost ratio (NPV of benefits divided by the NPV of costs) and the NPV of benefits minus costs (per year) over the analysis period. A benefit/cost ratio over 1.0 is considered beneficial, and a positive NPV implies that the benefits exceed the costs.

**Q19:** How were the net benefits of the specific utility Offerings assessed?

**A19.** The Offering-specific merit tests quantify the costs and benefits specific to each proposed utility Offering. These are very narrow tests designed to focus on impacts for non-participating utility ratepayers (*i.e.*, all utility customers that do not drive a PIV). This test is based on the costs specific to the Offering under consideration, and the scale of the Offering proposed (*i.e.*, number of participants and/or vehicles impacted). In contrast to the SCT – which compares the market with PIVs to the market without PIVs – these Offering-specific tests focus on the direct change created in the market by the proposed
utility Program. Each utility Offering is targeted at different customer groups, and has a
different market impact, which motivates the need for these customized merit tests. These
tests have been specifically designed to quantify the net benefit of utility Offerings that
impose recovery costs on ratepayers, and the benefit realized by all ratepayers. These
benefits vary by Offering depending on the impact, but generally reflect how electricity
costs for all ratepayers are affected by the Offering, and in some cases the value of induced
environmental benefits as well. As with most typical net benefit tests, the merit test
quantifies a benefit/cost ratio based on the NPV of benefits divided by NPV of costs. What
differs in each merit test is the portfolio of benefits and costs included for each utility
Offering, and the scope of Offering costs and impacts considered for each.

Q20: If these Offering-specific merit tests are intended to quantify ratepayer impact, why
are environmental benefits included?
A20. As noted, in most cases the merit tests focus on the impact that vehicle charging associated
with the specific Offering will have on the cost of electricity for all ratepayers. In some
cases, an Offering also has significant indirect impact through environmental benefits. I
believe it is fair to account the value of environmental benefits for Offerings that are
instrumental in inducing increased PIV adoption, especially since improved air quality
positively impacts all ratepayers. Unlike the SCT, however, only the subset of
environmental benefits that are directly induced by the Offering are considered, and only
those environmental benefits that affect all ratepayers are considered. For example, the
savings from reduced PIV operating costs are not considered in the customized per-
Offering tests because they do not directly impact non-participating ratepayers. The
sections below outline the specific costs and benefits associated with each customized
Offering merit test.

Q21: What were the Offering design parameters assumed as part of the benefit-cost
analysis?
A21. Please refer to the utility filing and other supporting testimony for detailed descriptions of
the Offering. All references to “Offering costs” include direct costs the Offering, and an
allocation (based on share of overall budget) for cross-Offering costs such as
administration, IT integration, and marketing. The following figure summarizes the
customer-visible elements for each of the proposed utility program offers.

Figure 3: Offering Incentive Summary

<table>
<thead>
<tr>
<th>Offer</th>
<th>Residential</th>
<th>Commercial</th>
<th>Public</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer 1: Wholehouse TOU</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 2: Off-Peak (vehicle data)</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 3: Managed Charging</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 4: Multi-Family L2</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 5: Workplace L2</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 6: Fleet L2</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 7: Utility Owned Public DCFC</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Offer 8: Utility Owned Public L2</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Offer 9: Privately Owned Public DCFC</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Offer 10: Electric School Buses</td>
<td></td>
<td>Y</td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Offer 11: NJ Transit Electrification</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offer 12: Innovation Fund</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>Offer 13: Green Adder</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

Note that benefit-cost analysis is not included for the community Offerings, since the exact
details of how those funds will be spent, and the associated benefits are not knowable at
this time.

Q22: What methodology was used for calculating net benefits for Offering 1, the residential
“whole-house” TOU rate?

A22: Offering 1 is targeted to new or existing PIV drivers who want to charge their vehicle at
home, but do not elect to participate in the ACE’s proposed managed charging program
(Offering 3). Offering 1 considers PIV charging as part of overall household load, and
provides an incentive for all electricity consumption during off-peak times as defined by
the applicable tariff. The customer is free to charge their PIV with any charger they desire,
and no incentive related to the charging hardware itself will be provided by ACE. Offering
1 is a rate incentive implemented through a standard revenue-neutral tariff, and the
economic incentive is realized directly by the customer through electricity cost savings on
their electric bill. This merit test is very narrow and reflects only the impact the Offering has on shifting load to off-peak times; dilution is not considered as a benefit, since these customers are assumed to be charging anyway and the only impact of the Offering is to influence when they charge. The only benefit considered is therefore the avoided harm associated with increased capacity and transmission costs. A “success factor” is included to capture the fraction of kWhs that are actually shifted to off-peak times, and this factor was developed based on the success rates exhibited by similar programs in other territories. The costs included are the costs of the utility Offering itself, which is primarily the cost of installation (or upgrade, as appropriate) of a residential interval meter.

Q23: What methodology was used for calculating net benefits for Offering 2, the residential off-peak vehicle charging incentive?

A23. Offering 2 is targeted to new or existing PIV drivers who want to charge their PIV at home, but which do not want to participate in the utility’s managed charging program (Offering 3). The customer is free to charge their vehicle with any charger they desire, but they are required to install a utility provided device in their PIV to track charging transactions (and other data). Offering 2 provides an off-bill incentive, at the rate of 5 cents/kWh, for all PIV charging during designated off-peak times as defined by the applicable tariff, net of any charging during on-peak times. The data for computing the incentive is collected by the utility from the vehicle, which allows the utility to encourage off-peak charging to customers that want to use their own charger, including non-network chargers. This merit test is very narrow, and reflects only the impact the Offering has on shifting load to off-peak times. Dilution is not considered as a benefit, since these customers are assumed to be charging anyway and the only impact of the Offering is to influence when they charge. The only benefit considered is therefore the avoided harm associated with increased capacity and transmission costs. A “success factor” is included to capture the fraction of kWhs that are actually shifted to off-peak times, and this factor was developed based on the success rates exhibited by similar Offerings in other utility service territories. The costs included in merit test are the costs of the utility Offering itself, which is primarily the cost of the vehicle interface device, the associated network and service fees, and the value of the off-peak incentive provided to the PIV customer. Beyond the direct impact on
consumer charge scheduling, Offering 2 will also provide extremely valuable information about PIV use and charging behavior to ACE. This information is critical for future Program design and benefit cost assessment.

Q24: **What methodology was used for calculating net benefits for Offering 3, the residential managed charging program?**

A24. Offering 3 is a highly strategic platform solution that is targeted to new PIV drivers. The Offering allows the customer to select a networkable Level 2 charger from an ACE-approved list, and provides a rebate to cover 50% of the equipment and 50% of the installation costs, plus an off-bill incentive for charging during designated off-peak times as defined by the applicable tariff net of any on-peak charging. The off-peak incentive will be 5 cents/kWh. The transaction information required to compute the off-bill incentive is collected by the Company directly from the networked residential charger. This Offering has two market impacts: (a) it addresses consumer barriers associated with customers that are uncertain about how to charge their vehicles at home; and (b) it enables managed charging programs that encourage residential charging at optimal off-peak times. This merit test is very narrow, however, and reflects only the impact the Offering has on shifting load to off-peak times. Dilution is not considered as a benefit, because these customers are assumed to be charging anyway, and the primary impact of the Offering is to influence when they charge. The only benefit considered is therefore the avoided harm associated with increased capacity and transmission costs. A “success factor” is included to capture the fraction of kWhs that are actually shifted to off-peak times, and this factor was developed based on the success rates exhibited by similar programs in other territories. The costs included are the costs of the utility Offering itself, which is primarily the cost of the networked charger rebate, the associated network and service fees, and the value of the off-peak incentive provided to the PIV customer. Other important strategic benefits, such as increased PIV adoption resulting from addressing consumer adoption barriers related to home charging uncertainty, and the fact that some of these start-up costs associated with this Offering (especially regarding IT integration) could be leveraged through future programs are not explicitly quantified in this analysis.
Q25: What methodology was used for calculating net benefits for Offering 4, the multi-family charger solution?

A25. Offering 4 addresses the fact that residential chargers in multiple dwelling units (“MDUs”) are virtually non-existent in New Jersey. This segment includes all New Jersey residents that live in multi-family housing with parking in shared lots, shared parking decks, or on-street parking. Many consumers that cannot count on a routine charging solution at home will simply choose not to drive a PIV, and the absence of chargers in the multi-family environment is therefore a major barrier for those consumers. Offering 4 specifically addresses a need not being met by the competitive market, and the PIV drivers impacted by this Offering are expected to mostly be new PIV drivers. Offering 4 allows the commercial customer (typically the property owner, or homeowner association) to select a networkable Level 2 charger from a utility-approved list and provides a rebate to cover 50% of the equipment costs and up to $10,000 per site for installation costs, and an additional rate incentive to offset 50% of the demand charges typically induced by vehicle chargers on commercial tariffs. ACE will be able to collect transaction information from all chargers provided through this Offering, which will help improve utility understanding of potential grid impacts from vehicle charging. This merit test is very narrow, and reflects the dilution effect associated with the vehicle charging consumption (kWhs) for directly-impacted PIV drivers (based on the increase in electricity use associated with PIV charging, and the reduced unit cost of utility distribution revenues over that increased volume), and consideration of the environmental value associated with charging of the supported vehicles. These environmental impacts are appropriate to include since the induced emission reduction benefits all ratepayers through cleaner air. The costs included are the costs of the utility Offering itself, which is primarily the cost of the networked charger rebate (including installation), the associated network and service fees, and the value of the demand charge offset incentive provided to the commercial customer.

Q26: What methodology was used for calculating net benefits for Offering 5, the commercial workplace charger solution?

A26. Offering 5 addresses demonstrated benefits of providing PIV charging at the workplace, for use by employees. Chargers at the workplace serve as an important “back-up” or “range
extender” for PIV drivers that have routine charging at home, may serve as the primary routine charging facility for customers in a multi-family home, and strongly impact consumer awareness and adoption. The PIV drivers impacted by this Offering are expected to mostly be new PIV drivers. Offering 5 allows a commercial customer (typically the business owner or commercial landlord) to select a networkable Level 2 charger from a utility-approved list, and provides a rebate to cover a fraction of the equipment (but not installation costs) and an additional rate incentive to offset a fraction of the demand charges typically induced by PIV chargers on commercial tariffs. ACE will be able to collect transaction information from all chargers provided through this Offering, which will help improve utility understanding of potential grid impacts from vehicle charging. This merit test is very narrow, and reflects only the dilution effect associated with the vehicle charging consumption (kWhs) for directly impacted PIV drivers (based on the increase in electricity use associated with vehicle charging, and the reduced unit cost of utility distribution revenues over that increased volume), and consideration of the environmental value associated with the supported vehicles. These environmental impacts are appropriate to include since the induced emission reduction benefits all ratepayers through cleaner air. The costs included are the costs of the Offering itself, which is primarily the cost of the networked charger rebate (not including installation), the associated network and service fees, and the value of the demand charge offset incentive provided to the commercial customer.

Q27: What methodology was used for calculating net benefits for Offering 6, the commercial fleet charger solution?

A27. Offering 6 facilities the installation of routine charging infrastructure for owners of vehicle fleets, including State, local government, commercial or industrial, and not-for-profit entities. Fleet owners can potentially have a large impact on accelerating PIV adoption because: (1) they account for approximately 9% of all registered light-duty vehicles; (2) fleet owners are strongly attracted to the operating cost advantages of PIVs; and (3) a commitment to PIVs by fleet operators can result in bringing many PIVs onto New Jersey roads relatively quickly. The electrification of these fleet vehicles also impacts consumer awareness. Charging infrastructure for fleet vehicles is critical to enabling fleet
The PIV drivers that are impacted by Offering 6 are expected to mostly be new PIV owner/operators, since a fleet operator will typically not choose to electrify a portion of the fleet unless a routine charging solution has been identified. ACE’s proposed Offering 6 will allow the commercial customer (typically the business owner or landlord) to select a networkable Level 2 charger from a utility-approved list, and provides a rebate to cover 50% of the equipment (but not installation) costs and an additional rate incentive to offset 50% of the demand charges typically induced by vehicle chargers on commercial tariffs. ACE will be able to collect transaction information from all chargers provided through this Offering, which will help improve utility understanding of potential grid impacts from vehicle charging. This merit test is very narrow, and reflects only the dilution effect associated with the vehicle charging consumption (kWhs) for directly impacted PIV drivers, and consideration of the environmental value associated with the supported vehicles. These environmental impacts are appropriate to include since the induced emission reduction benefits all ratepayers through cleaner air. The costs included are the costs of the utility program itself, which is primarily the cost of the networked charger rebate (not including installation), the associated network and service fees, and the value of the demand charge offset incentive provided to the commercial customer.

Q28: What methodology was used for calculating net benefits for Offering 7, utility-owned public DCFC?

A28. Offering 7 addresses the market need for public DCFC. The single largest consumer adoption barrier for PIVs is the lack of a sufficient number of DCFC locations for public use. These facilities have distinct and legitimate use cases that address the needs of both long-distance drivers and local drivers that find themselves in a “must charge” situation due to driving beyond their vehicle range. Although the need for these chargers is relatively rare when compared with the number of times the driver of a traditional vehicle visits a gas station to refuel, DCFCs are nonetheless necessary. Consumer attitude surveys have consistently identified the shortage of public fast charging as a consumer barrier, even when the driver has access to charging at home or work or a PIV with a large battery. Improving access to these facilities is therefore a critical market development need that is
only partially being met by the competitive market. The proposed utility-owned public
DCFC will be targeted at those segments that are not well served by private investors today,
and will leverage private investments significantly. Under Offering 7, ACE will charge
PIV drivers for the charging services delivered, and those expected revenues are included
as a benefit that offsets the ratepayer recovery burden. This Offering-specific net benefit
test is very narrow, and captures the dilution effect associated with the electricity volume
delivered by these facilities and the value of the emission reduction associated with the
vehicle charging delivered by these public chargers. The costs include the cost for the
equipment and installation, and ongoing operating costs (including the supply costs of the
delivered electricity).

Q29: **What methodology was used for calculating net benefits for Offering 8, the utility-owned public Level 2 charging solution?**

A29. Offering 8 addresses the market need for public Level 2 chargers, typically in commercial,
not-for-profit, and municipal settings. Level 2 public chargers are not as directly beneficial
in addressing consumer range anxiety concerns as public DCFCs, but they support
expanded consumer awareness, are easier to install than high-power DCFC, and provide a
more ubiquitous base of “back up” charging for many drivers, and a routine charging
solution for some PIV drivers (such as residents in MDUs). Level 2 chargers are typically
installed in retail or other destination settings where consumers will include vehicle
charging as part of other activities, such as shopping. The utility-owned public Level 2
solution will be targeted at those segments that are not well served by private investors
today. The utility will charge PIV drivers for the charging services delivered, and those
revenues are included as a benefit that offsets the ratepayer recovery burden. This
Offering-specific net benefit test is very narrow, and captures the dilution effect associated
with the electricity volume delivered by these facilities and the value of the emission
reduction associated with the vehicle charging delivered by these public chargers. The costs
include the cost for the equipment and installation, and ongoing operating costs (including
the supply costs of the delivered electricity).
Q30: What methodology was used for calculating net benefits for Offering 9, the privately owned public DCFC rate incentive?

A30. This Offering differs from those discussed above in that it does not deal directly with installing charger hardware or influencing off-peak charging. Instead, it addresses the biggest barrier identified by private investors in public DCFC facilities--the challenging economics associated with low utilization of these facilities while the PIV population is still low, and the related impacts that demand charges have on operating costs. For a privately-owned public DCFC facility, which inherently has high demand charges (associated with the high-power equipment), but potentially a modest number of kWhs dispensed (during the first few years), operating costs are prohibitive. This dynamic limits private investment in public DCFCs, and focuses private development only on locations where there is expected to be exceptionally high usage. This results in insufficient geographic coverage overall, and broad gaps in the coverage map. The ACE territory currently suffers from these “charging deserts.” A utility is uniquely able to address this market barrier since it is a rate-related issue. The proposed “set point” solution in Offering 9 provides only the level of incentive required for each charging location, and the amount of incentive naturally declines as utilization increases. This approach avoids either under- or over-incentivizing a particular DCFC location, and transitions to zero when the incentive is no longer needed. Under Offering 9, commercial DCFC operators will own and operate the public DCFC facilities, based on private investment, will install new service on a standard commercial tariff, and will apply to participate in ACE’s Offering based on defined rules. Importantly, the utility Offering also includes a “make-ready” solution to help offset up-front installation costs, and the off-bill incentive that offsets the economic impacts of low utilization and demand charges for a set period of time. Costs are based on the hard costs associated with the make-ready work, and the value of the set point incentive. Benefits reflect the dilution effect associated with the kWhs delivered by these commercially-owned DCFCs, and a consideration of environmental benefits associated with public chargers similar to that defined for Offering 7. These environmental impacts are appropriate to include since the induced emission reduction benefits all ratepayers through cleaner air. Offering 9 is specifically designed to encourage private investment in public charging, focusing on the component of the economic barrier that can be uniquely
addressed by an electric utility through a rate-related incentive, and is temporary in nature until utilization increases. The utility has sized this Offering to support approximately twice as many privately-owned locations as utility-owned locations.

Q31: **What portfolio of costs and benefits were included in each of the Offering-specific merit tests?**

A31. Please see the figure below.
### Figure 4: Offering-Specific Merit Tests

<table>
<thead>
<tr>
<th>Offering</th>
<th>Merit Test</th>
<th>Impacted Population</th>
<th>Cost or Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offering 1: Residential Whole-house TOU rate</td>
<td>Value of &quot;avoided harm&quot; due to off-peak charging</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (mostly meter replacement)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (none, revenue netural)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Offering 2: Residential Off-Peak Incentive</td>
<td>Value of &quot;avoided harm&quot; due to off-peak charging</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (vehicle device, operating costs)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (off peak, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td>Offering 3: Residential Managed Charging</td>
<td>Value of &quot;avoided harm&quot; due to off-peak charging</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment/installation rebate)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (off peak, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td>Offering 4: Multi-Family Charger Solution</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment/installation rebate)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (demand charge offset, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 5: Workplace Charger Solution</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment rebate)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (demand charge offset, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 6: Workplace Charger Solution</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment rebate)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (demand charge offset, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 7: Utility Owned DCFC For Public Use</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Collected revenues</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment &amp; installation)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Utility operating costs (including electricity)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 8: Utility Owned Level Two For Public Use</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Collected revenues</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (equipment &amp; installation)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Utility operating costs (including electricity)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 9: Privately Owned DCFC For Public Use</td>
<td>Dilution value (for volume delivered)</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Pull-through of environmental benefit</td>
<td>Ratepayer</td>
<td>Benefit</td>
</tr>
<tr>
<td></td>
<td>Program costs (make-ready)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>Rate incentive (demand charge offset, off-bill)</td>
<td>Ratepayer</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>SENSITIVITY: No Pull-through</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q32: Can the results of the Offering merit tests be combined to provide a perspective on net benefit of the overall portfolio of Offerings?

A32. Yes, an additional merit test considers the net benefit of the portfolio of Offerings One through Nine. This test aggregates the total costs, and all benefits, for each of the included offerings to provide a portfolio-level view. As with the Offering-specific merit tests, this analysis considers only the costs and benefits that directly impact ratepayers, i.e. utility customers that do not own an EV. Both electricity cost impacts and emission impacts are considered in the primary case. A sensitivity case considers only electricity cost impacts as realized by ratepayers. This portfolio-level test provides the best perspective on how the overall Program will impact ratepayers.

III. BENEFIT-COST ANALYSIS RESULTS

Q33. How would you summarize your overall conclusions?

A33. This analysis represents an evaluation of both physical and economic impacts from widespread PIV adoption in the ACE territory. Detailed projections of the benefits and costs are summarized in the sections below, as used in a market-wide SCT, and customized net benefit calculations for the Offering-specific merit tests. The SCT demonstrates that increased PIV adoption market-wide (within ACE’s service territory), considering a wide range of costs and benefits by a variety of market participants, delivers substantial positive net benefit for both the natural and managed charging scenarios. Customized tests for each Offering, refined to reflect only the costs, benefits, and market impact associated with each Offering, demonstrate similar net benefit. Based on these results, it is my assessment that expanded market-wide PIV adoption in the ACE service territory delivers significant public benefits, the projected benefits exceed expected costs, and the proposed Program is strongly beneficial on a net basis for all impacted populations. In addition, the individual Offerings proposed by the Company each demonstrate positive net benefit, based on a customized merit test that considers the unique impact and scale of each particular utility Offering. The following figure summarizes those merit test results for the primary case:
A sensitivity was also considered, that looked only at electricity costs directly evident to non-participating utility customers (i.e., ratepayers that do not use a PIV). The following figure summarizes the results of that sensitivity (where applicable).

**Figure 5: Merit Test Summary – Primary Case**

<table>
<thead>
<tr>
<th>Offering</th>
<th>B/C Ratio</th>
<th>Net Benefit NPV</th>
<th>Impacted Group</th>
<th>Impacts Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market-Wide SCT (Natural)</td>
<td>1.49</td>
<td>$613,771,476</td>
<td>All</td>
<td>Electricity $, PIV OpEx, Env.</td>
</tr>
<tr>
<td>Market-Wide SCT (Managed)</td>
<td>2.05</td>
<td>$973,247,471</td>
<td>All</td>
<td>Electricity $, PIV OpEx, Env.</td>
</tr>
<tr>
<td>Offering 1: Residential Wholehouse TOU</td>
<td>3.83</td>
<td>$328,871</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 2: Residential Off-Peak</td>
<td>2.83</td>
<td>$908,439</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 3: Residential Managed Charging</td>
<td>1.10</td>
<td>$488,731</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 4: Commercial Multi-family</td>
<td>1.31</td>
<td>$677,066</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 5: Commercial Workplace</td>
<td>3.03</td>
<td>$2,159,031</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 6: Commercial Fleet</td>
<td>3.03</td>
<td>$2,159,031</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 7: Utility Owned Public DCFC</td>
<td>2.01</td>
<td>$5,721,900</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 8: Utility Owned Public L2</td>
<td>1.49</td>
<td>$4,767,740</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Offering 9: Privately Owned Public DCFC</td>
<td>4.14</td>
<td>$11,846,055</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
<tr>
<td>Portfolio Ratepayer Impact (Offerings 1-9)</td>
<td>2.67</td>
<td>$48,252,824</td>
<td>Ratepayers</td>
<td>Electricity Costs &amp; Emissions</td>
</tr>
</tbody>
</table>

**Figure 6: Merit Test Summary – Sensitivity Cases**

<table>
<thead>
<tr>
<th>Offering</th>
<th>B/C Ratio</th>
<th>Net Benefit NPV</th>
<th>Impacted Group</th>
<th>Impacts Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market-Wide SCT (Natural)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market-Wide SCT (Managed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offering 1: Residential Wholehouse TOU</td>
<td>0.51</td>
<td>-$1,070,546</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Offering 2: Residential Off-Peak</td>
<td>1.16</td>
<td>$169,367</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Offering 3: Residential Managed Charging</td>
<td>1.16</td>
<td>$169,367</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Offering 4: Commercial Multi-family</td>
<td>1.66</td>
<td>$3,756,718</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Offering 5: Commercial Workplace</td>
<td>1.11</td>
<td>$1,015,509</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Offering 6: Commercial Fleet</td>
<td>1.60</td>
<td>$2,255,122</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
<tr>
<td>Portfolio Ratepayer Impact (Offerings 1-9)</td>
<td>1.28</td>
<td>$8,021,579</td>
<td>Ratepayers</td>
<td>Electricity Costs Only</td>
</tr>
</tbody>
</table>

**Q34. In summary, what are physical impacts of increased PIV use in the ACE territory?**

**A34.** Widespread PIV adoption is projected to displace significant gasoline consumption, increase electricity use overall with modest impacts on PJM coincident peak, and reduce transportation-induced air emissions. Key results include:
a) In ACE’s service territory over the period from 2020 through 2035, PIVs will account for 19.3 billion electrically-powered miles, resulting in an estimated displacement of 873 million gallons of gasoline. This displacement of gasoline with electricity will have a profound impact for PIV drivers, resulting in changes in vehicle operating expenses, as quantified in the economic sections below.

b) Electricity use is projected to increase due to PIV charging. PIVs will require an estimated 3,910 kWhs per year for charging for each vehicle (average over the period 2020 to 2035). PIVs will add an estimated 11.2 GWhs of electricity consumption in 2020, increasing in lockstep with PIV adoption to 1,031 GWhs of electricity consumption in 2035. These changes in electricity volume and the aggregate load curve will have a significant, but predominantly beneficial, impact on ratepayer economics as quantified in the merit tests outlined below.

c) Although increased electricity use increases power plant emissions, tailpipe emissions are eliminated through PIV use, and the net impact is highly beneficial. After accounting for both tailpipe and power plant impacts, every electrically-fueled mile in ACE’s service territory is projected to be 60.4% cleaner than a gasoline fueled mile (average over the period), and this “cleanup factor” will increase as the fraction of electricity supplied by renewable sources grows. A total of 10.4 billion pounds of CO2 are projected to be avoided over the period, along with 25.0 million pounds of NOx. SO2 is expected to increase slightly (at the power plants), adding a total of 5.3 million pounds of additional SO2 over the period.

d) Most of the economic benefits quantified below are induced by the physical impact that vehicle charging has on gasoline consumption, changes in electricity consumption, and reductions in emissions.

Q35. **What are your net-benefit conclusions based on the market-wide Societal Cost Test?**

A35. The economic benefits and costs were combined to determine net benefit using the SCT as described in the methodology section above. **The market-wide SCT delivered a net benefit on an NPV basis, with a SCT Benefit/Cost ratio of 1.49 for the natural charging case,**
and a significantly higher ratio of 2.05 for the managed charging case. This difference in outcome reflects the deferred distribution-reinforcement costs resulting from managed charging. These results demonstrate that benefits strongly outweigh costs, and that there is public benefit to vehicle electrification overall, based on market development costs that include ACE’s proposed Offerings. The following chart summarizes how benefits and costs were combined in the SCT and the resulting net benefit ratio for both the natural and managed charging cases. Note that the managed charging case is the most relevant, because ACE’s proposed Program includes a scalable platform for widespread managed charging, especially in the residential sector.

Figure 7: Market-wide SCT: Natural Charging

<table>
<thead>
<tr>
<th>Benefit/Cost</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$293,408,884</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: PEV OpEx</td>
<td>$1,236,799,569</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Emission Reductions</td>
<td>$234,479,376</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Federal Tax Incentives</td>
<td>$93,998,288</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Revenues From Charger Use</td>
<td>$16,292,899</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Private EVSE Investment</td>
<td>0</td>
<td>$302,504,443</td>
</tr>
<tr>
<td>Cost: Utility Incentives</td>
<td>0</td>
<td>$35,036,731</td>
</tr>
<tr>
<td>Cost: Incremental PEV Costs</td>
<td>0</td>
<td>$588,859,675</td>
</tr>
<tr>
<td>Cost: Potential Grid Reinforcement</td>
<td>0</td>
<td>$334,806,690</td>
</tr>
<tr>
<td>Total</td>
<td>$1,874,979,016</td>
<td>$1,261,207,540</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.49</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$613,771,476</td>
<td></td>
</tr>
</tbody>
</table>
**Figure 8: Market-wide SCT: Natural Charging**

Marketwide Societal Cost Test (2020-2035, NPV) - NATURAL CHARGING

- Benefit: Electricity Cost Reductions $318,078,189
- Benefit: Emission Reductions $234,479,376
- Benefit: Federal Tax Incentives $93,998,288
- Benefit: Revenues From Charger Use $45,227
- Cost: Private EVSE Investment $302,504,443
- Cost: Utility Incentives $35,036,731
- Cost: Incremental PEV Costs $588,859,675
- Cost: Potential Grid Reinforcement $0
- Benefit To Cost Ratio: 2.05
- NPV of Net Benefits: $973,247,471

**Figure 9: Market-wide SCT: Managed Charging**

<table>
<thead>
<tr>
<th>Benefit/Misc.</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$318,078,189</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: PEV OpEx</td>
<td>$1,236,799,569</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Emission Reductions</td>
<td>$234,479,376</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Federal Tax Incentives</td>
<td>$93,998,288</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Revenues From Charger Use</td>
<td>$45,227</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Private EVSE Investment</td>
<td>0</td>
<td>$302,504,443</td>
</tr>
<tr>
<td>Cost: Utility Incentives</td>
<td>0</td>
<td>$35,036,731</td>
</tr>
<tr>
<td>Cost: Incremental PEV Costs</td>
<td>0</td>
<td>$588,859,675</td>
</tr>
<tr>
<td>Cost: Potential Grid Reinforcement</td>
<td>0</td>
<td>$0</td>
</tr>
<tr>
<td>Total</td>
<td>$1,883,400,650</td>
<td>$926,400,850</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$973,247,471</td>
<td></td>
</tr>
</tbody>
</table>
Q36. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 1 (Whole-House TOU rate)?

A36. Offering 1 delivered a net benefit on an NPV basis, with a Benefit/Cost ratio of 3.83. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and only the benefits related to shifting charging load to off-peak periods. These results demonstrate that benefits strongly outweigh costs for ACE customers as realized through changes in electricity costs for all ratepayers, and that there is therefore public benefit to implementing ACE’s proposed Offering 1. The following figures summarize benefits and costs for this test.
Q37. **What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 2 (Residential Off-Peak Incentive)?**

A37. Offering 2 delivered a net benefit on an NPV basis, with a **Benefit/Cost ratio of 2.83**. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and only the benefits related to shifting charging load to off-peak periods. These results demonstrate that benefits strongly outweigh costs for ACE customers as realized through changes in electricity costs for all ratepayers, and that there is therefore public benefit to implementing ACE’s proposed Offering 2. This Offering also provides significant value in that it allows existing PIV owners, who will typically already have a charging solution in place,
participate in off-peak charging. In addition, this Offering will allow for the collection of crucial customer behavior and charging transaction data that will be used to optimize future program design and inform BCA. All those benefits are not quantified in the BCA outcome, but should be considered as strategic implications of significant merit. The following figures summarize benefits and costs for this test.

**Figure 13: Factors Included in the Offering 2 Merit Test**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Avoided Peaking Cost Harm</td>
<td>$1,404,935</td>
</tr>
<tr>
<td>Cost: Utility Incentive Program</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$1,404,935</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>2.83</td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$908,439</td>
</tr>
</tbody>
</table>

**Figure 14: Benefits and Costs for the Offering 2 Merit Test**

Q38. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 3 (Residential Managed Charging)?

A38. Offering 3 delivered a net benefit on an NPV basis, with a *Benefit/Cost ratio of 1.10*. As described in the methodology section above, this is a very narrow test that considers only
impacts on utility customers, including the costs of the proposed ACE Offering and only
the benefits related to shifting charging load to off-peak periods. These results demonstrate
that benefits outweigh costs for all ACE customers as realized through changes in
electricity costs for all ratepayers, and that there is therefore public benefit to implementing
ACE’s proposed Offering 3. This Offering is also strategic because it addresses consumer
carens about how they will charge their vehicle at home, and therefore helps encourage
PIV adoption (and market growth) while also shifting charging loads off-peak. This initial
Offering also results in the development of a scalable platform that allows ACE to interact
with the Smart EVSE in the home, creating opportunities for more advanced managed
charging mechanisms in the future as charging loads increase (coordinated start scheduling,
power throttling, demand-response style curtailment, ultimately Vehicle-to-Grid12
(“V2G”) capability). The platform developed with this Offering can be reused for
potential future managed charging programs. Those benefits are not quantified in the BCA
outcome, but should be considered as strategic implications of significant merit. The
following figures summarize benefits and costs for this test.

Figure 15: Factors Included in the Offering 3 Merit Test

<table>
<thead>
<tr>
<th></th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Avoided Peaking Cost Harm</td>
<td>$5,389,533</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility Incentive Program</td>
<td>0</td>
<td>$4,900,802</td>
</tr>
<tr>
<td>Total:</td>
<td>$5,389,533</td>
<td>$4,900,802</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.10</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$488,731</td>
<td></td>
</tr>
</tbody>
</table>

12 “Vehicle-to-Grid” refers to the capability of smart EVSE to control a bi-directional flow of energy either into, or
out of, the vehicle battery. When electricity is flowing from the battery to the grid, it is acting as a storage asset
that can be used to shave peak load or firm local power quality. Managing a large and distributed group of V2G-
capable vehicles can help optimize grid loading and reduce ratepayer costs. This technology can also allow the
vehicle battery to power the home or building, providing resiliency value during extreme grid outage events.
Q39. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 4 (Commercial MDU L2), for the principal case where both electricity cost impacts and environmental impacts are considered?

A39. Offering 4 delivered a net benefit on an NPV basis, with a *Benefit/Cost ratio of 1.31* As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offering 4. The following figures summarize benefits and costs for this test.
Q40. How would the BCA outcome change for Offering 4 (Commercial MDU L2) in the sensitivity case where only impacts on electricity costs are considered?

A40. On that narrow basis, Offering 4 does not deliver a net benefit on an NPV basis, with a Benefit/Cost ratio of 0.51. The fact that the Benefit/Cost ratio is below 1.0 implies that cost exceed benefit. This is a very narrow test, however, and discounts the fact that charging infrastructure is typically not available for consumers that reside in a MDU, and that without access to routine charging they would be unlikely to adopt a PIV. Strategically, this Offering addresses equity concerns in the market, and helps ensure access to charging infrastructure across the socio-economic spectrum. The environmental (and other) benefits enabled by this offer should be considered as demonstrated in the

---

**Figure 17: Factors Included in the Offering 4 Merit Test (Primary Case)**

<table>
<thead>
<tr>
<th></th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,092,875</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Environmental Value</td>
<td>$1,747,612</td>
<td></td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$2,163,420</td>
</tr>
<tr>
<td>Total:</td>
<td>$2,840,487</td>
<td>$2,163,420</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$677,066</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 18: Benefits and Costs for the Offering 4 Merit Test (Primary Case)**

![Benefits Vs Costs: Commercial - MUD L2 Offering (2020 - 2035, NPV) (Cost of Electricity and Environmental Benefits)]
primary cost noted above. This sensitivity, however characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered. The following figures summarize benefits and costs for this test.

**Figure 19: Factors Included in the Offering 4 Merit Test (Sensitivity Case)**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,092,875</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>$2,163,420</td>
</tr>
<tr>
<td>Total:</td>
<td>$1,092,875</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>0.51</td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>-$1,070,546</td>
</tr>
</tbody>
</table>

**Figure 20: Benefits and Costs for the Offering 4 Merit Test (Sensitivity Case)**

Q41. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 5 (Commercial Workplace L2), for the principal case where both electricity cost impacts and environmental impacts are considered?

A41. Offering 5 delivered a net benefit on an NPV basis, with a **Benefit/Cost ratio of 3.03**. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both
the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits strongly outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offering 5. The following figures summarize benefits and costs for this test.

Figure 21: Factors Included in the Offering 5 Merit Test (Primary Case)

| Benefit: Electricity Cost Reductions | Benefit | $1,235,052 |
| Benefit: Environmental Value        | Benefit | $1,989,663 |
| Cost: Utility Investment            | Cost    | 0          |
| Total:                              |         | $3,224,715 |
| Benefit To Cost Ratio               |         | 3.03       |
| NPV of Net Benefits                |         | $2,159,031 |

Figure 22: Benefits and Costs for the Offering 5 Merit Test (Primary Case)

Q42. How would the BCA outcome change for Offering 5 (Commercial Workplace L2) in the sensitivity case where only impacts on electricity costs are considered?

A42. Even on that narrow basis, Offering 5 still delivers a net benefit on an NPV basis, with a Benefit/Cost ratio of 1.16. This sensitivity characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered, discounting the environmental
benefits realized by all ratepayers due to this Offering as represented in the primary BCA case noted above. Despite restricting benefits exclusively to economic impacts visible on customer utility bills, this Offering delivers net benefit. This Offering is also highly strategic since it can be a routine charging solution for PIV drivers living in MDU settings (and therefore has significant equity value), and has a large positive impact on PIV awareness building and PIV adoption rates. The following figures summarize benefits and costs for this test.

Figure 23: Factors Included in The Offering 5 Merit Test (Sensitivity Case)

<table>
<thead>
<tr>
<th>Benefit: Electicity Cost Reductions</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,235,052</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$1,065,684</td>
</tr>
<tr>
<td>Total:</td>
<td>$1,235,052</td>
<td>$1,065,684</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.16</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$169,367</td>
<td></td>
</tr>
</tbody>
</table>

Figure 24: Benefits and Costs for The Offering 5 Merit Test (Sensitivity Case)
Q43. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 6 (Commercial Fleet L2), for the principal case where both electricity cost impacts and environmental impacts are considered?

A43. Offering 6 delivered a net benefit on an NPV basis, with a Benefit/Cost ratio of 3.03. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits strongly outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offering 6. The following figures summarize benefits and costs for this test.

Figure 25: Factors Included in the Offering 6 Merit Test (Primary Case)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,235,052</td>
</tr>
<tr>
<td>Benefit: Environmental Value</td>
<td>$1,989,663</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$3,224,715</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>3.03</td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$2,159,031</td>
</tr>
</tbody>
</table>

Figure 26: Benefits and Costs for the Offering 6 Merit Test (Primary Case)
Q44. How would the BCA outcome change for Offering 6 (Commercial Fleet L2) in the sensitivity case where only impacts on electricity costs are considered?

A44. Even on that narrow basis, Offering 6 still delivers a net benefit on an NPV basis, with a Benefit/Cost ratio of 1.16. This sensitivity characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered, discounting the environmental benefits realized by all ratepayers due to this Offering as represented in the primary BCA case noted above. Despite restricting benefits exclusively to economic impacts visible on customer utility bills, this Offering delivers net benefit. This Offering is also highly strategic since fleet owners are strongly motivated by the operational savings associated with PIVs, and supporting adoption within this segment can result in a large number of PIVs on New Jersey roads in support of State objectives. The following figures summarize benefits and costs for this test.

**Figure 27: Factors Included in the Offering 6 Merit Test (Sensitivity Case)**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,235,052</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$1,235,052</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.16</td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$169,367</td>
</tr>
</tbody>
</table>

**Figure 28: Benefits and Costs for the Offering 6 Merit Test (Sensitivity Case)**

Cost of Electricity Benefits Only
Q45. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 7 (Utility-owned DCFC for public use), for the principal case where both electricity cost impacts and environmental impacts are considered?

A45. Offering 7 delivered a net benefit on an NPV basis, with a Benefit/Cost ratio of 2.01. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits strongly outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offering 7. The following figures summarize benefits and costs for this test.

**Figure 29: Factors Included in the Offering 7 Merit Test (Primary Case)**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,303,883</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Receipts From Charger Use</td>
<td>$8,113,067</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Environmental Value</td>
<td>$1,965,182</td>
<td></td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$4,590,362</td>
</tr>
<tr>
<td>Cost: Utility OpEx</td>
<td>0</td>
<td>$1,069,870</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>$11,382,131</td>
<td>$5,660,232</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>2.01</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$5,721,900</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 30: Benefits and Costs for the Offering 7 Merit Test (Primary Case)**

![Benefits Vs Costs: Utility-Owned Public DCFC (2020 - 2035, NPV) (Cost of Electricity and Environmental Benefits)](chart)
Q46. How would the BCA outcome change for Offering 7 (Utility-owned DCFC for public use) in the sensitivity case where only impacts on electricity costs are considered?

A46. Even on that narrow basis, Offering 7 still delivers a net benefit on an NPV basis, with a

Benefit/Cost ratio of 1.66. This sensitivity characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered, discounting the environmental benefits realized by all ratepayers due to this Offering as represented in the primary BCA case noted above. Despite restricting benefits exclusively to economic impacts visible on customer utility bills, this Offering delivers net benefit. This Offering is also highly strategic since it ensures availability of the fast charging infrastructure needed to address consumer range anxiety concerns, with a focus on serving areas not well supported by the competitive market, and providing for appropriate geographic coverage of fast charging facilities. The equipment and services used by the utility in implementation of this Offering will be provided by the competitive market, and these utility investments therefore help stimulate growth in that industry. The following figures summarize benefits and costs for this test.

---

**Figure 31: Factors Included in the Offering 7 Merit Test (Sensitivity Case)**

<table>
<thead>
<tr>
<th></th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$1,303,883</td>
<td>$0</td>
</tr>
<tr>
<td>Benefit: Receipts From Charger Use</td>
<td>$8,113,067</td>
<td>$0</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$4,590,362</td>
</tr>
<tr>
<td>Cost: Utility OpEx</td>
<td>0</td>
<td>$1,069,870</td>
</tr>
<tr>
<td>Total:</td>
<td>$9,416,950</td>
<td>$5,660,232</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.66</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$3,756,718</td>
<td></td>
</tr>
</tbody>
</table>
Q47. **What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 8 (Utility-owned L2 for public use), for the principal case where both electricity cost impacts and environmental impacts are considered?**

A47. Offering 8 delivered a net benefit on an NPV basis, with a **Benefit/Cost ratio of 1.49**. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offering 8. The following figures summarize benefits and costs for this test.
Q48. **How would the BCA outcome change for Offering 8 (Utility-owned L2 for public use) in the sensitivity case where only impacts on electricity costs are considered?**

A48. Even on that narrow basis, Offering 8 still delivers a net benefit on an NPV basis, with a *Benefit/Cost ratio of 1.11*. This sensitivity characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered, discounting the environmental benefits realized by all ratepayers due to this Offering as represented in the primary BCA case noted above. Despite restricting benefits exclusively to economic impacts visible on customer utility bills, this Offering delivers net benefit. This Offering provides community-level access to routine charging L2 facilities, which could be used by MDU

---

**Figure 33: Factors Included in the Offering 8 Merit Test (Primary Case)**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$2,472,511</td>
</tr>
<tr>
<td>Benefit: Receipts From Charger Use</td>
<td>$8,179,832</td>
</tr>
<tr>
<td>Benefit: Environmental Value</td>
<td>$3,752,232</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility OpEx</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$14,404,574</td>
</tr>
<tr>
<td>Benefit/Cost Ratio:</td>
<td>1.49</td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$4,767,740</td>
</tr>
</tbody>
</table>

---

**Figure 34: Benefits and Costs for the Offering 8 Merit Test (Primary Case)**

---

### Benefits Vs Costs: Utility-Owned Public L2 (2020 - 2035, NPV)

(Cost of Electricity and Environmental Benefits)
residents or any other PIV driver in need of a charge. The equipment and services used by the utility in implementation of this Offering will be provided by the competitive market, and these utility investments therefore help stimulate growth in that industry. The following figures summarize benefits and costs for this test.

Figure 35: Factors Included in the Offering 8 Merit Test (Sensitivity Case)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$2,472,511</td>
</tr>
<tr>
<td>Benefit: Receipts From Charger Use</td>
<td>$8,179,832</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility OpEx</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>$10,652,343</td>
</tr>
</tbody>
</table>

Benefit To Cost Ratio: 1.11
NPV of Net Benefits: $1,015,509

Figure 36: Benefits and Costs for the Offering 8 Merit Test (Sensitivity Case)

Q49. What are the costs, benefits, and net-benefit result associated with the merit-test applied to Offering 9 (privately-owned DCFC for public use), for the principal case where both electricity cost impacts and environmental impacts are considered?
A49. Offering 9 delivered a net benefit on an NPV basis, with a **Benefit/Cost ratio of 4.14**. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits outweigh costs for all ratepayers to an exceptional degree, and that there is public benefit to implementing ACE’s proposed Offering 9. The following figures summarize benefits and costs for this test.

*Figure 37: Factors Included in the Offering 9 Merit Test (Primary Case)*

<table>
<thead>
<tr>
<th></th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$6,024,800</td>
<td>0</td>
</tr>
<tr>
<td>Benefit: Environmental Value</td>
<td>$9,590,932</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$3,769,677</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>$15,615,732</strong></td>
<td><strong>$3,769,677</strong></td>
</tr>
<tr>
<td><strong>Benefit To Cost Ratio:</strong></td>
<td>4.14</td>
<td></td>
</tr>
<tr>
<td><strong>NPV of Net Benefits:</strong></td>
<td><strong>$11,846,055</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 38: Benefits and Costs for the Offering 9 Merit Test (Primary Case)*

*Cost of Electricity and Environmental Benefits*
Q50. How would the BCA outcome change for Offering 9 (privately-owned DCFC for public use) in the sensitivity case where only impacts on electricity costs are considered?

A50. Even on that narrow basis, Offering 9 still delivers a net benefit on an NPV basis, with a 

**Benefit/Cost ratio of 1.60.** This sensitivity characterizes the net benefit in the very narrow 
case where only impacts on electricity costs are considered, discounting the environmental 
benefits realized by all ratepayers due to this Offering as represented in the primary BCA 
case noted above. Despite restricting benefits exclusively to economic impacts visible on 
customer utility bills, this Offering delivers net benefit. This Offering directly supports 
development of DCFC for public use by private investors, and utility investments through 
this Offering leverage significant private investment. The following figures summarize 
benefits and costs for this test.

**Figure 39: Factors Included in the Offering 9 Merit Test (Sensitivity Case)**

<table>
<thead>
<tr>
<th></th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit: Electricity Cost Reductions</td>
<td>$6,024,800</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility Investment</td>
<td>0</td>
<td>$3,769,677</td>
</tr>
<tr>
<td>Total:</td>
<td>$6,024,800</td>
<td>$3,769,677</td>
</tr>
<tr>
<td>Benefit To Cost Ratio:</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits:</td>
<td>$2,255,122</td>
<td></td>
</tr>
</tbody>
</table>
Q51. What would the BCA results be if you considered the Offerings at a portfolio level?

A51. When combining the costs and benefits of Offerings 1 through 9, the portfolio delivered a net benefit on an NPV basis, with a Benefit/Cost ratio of 2.67. As described in the methodology section above, this is a very narrow test that considers only impacts on utility customers, including the costs of the proposed ACE Offering and both the direct economic impacts (through electricity costs) and environmental benefits (which impact all ratepayers). These results demonstrate that benefits strongly outweigh costs for all ratepayers, and that there is public benefit to implementing ACE’s proposed Offerings (1-9) even when considered in aggregate. The following figures summarize benefits and costs for this test.

**Figure 41: Factors Included In Portfolio Merit Test (Primary Case)**

<table>
<thead>
<tr>
<th>Benefit/Cost</th>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits: Electricity &amp; Emission Impacts</td>
<td>$77,127,848</td>
<td>0</td>
</tr>
<tr>
<td>Cost: Utility Incentive Program</td>
<td>0</td>
<td>$28,875,024</td>
</tr>
<tr>
<td>Total</td>
<td>$77,127,848</td>
<td>$28,875,024</td>
</tr>
<tr>
<td>Benefit To Cost Ratio</td>
<td>2.67</td>
<td></td>
</tr>
<tr>
<td>NPV of Net Benefits</td>
<td>$48,252,824</td>
<td></td>
</tr>
</tbody>
</table>
Q52. How would the Portfolio BCA outcome change the sensitivity case where only impacts on electricity costs are considered?

A52. Even on that narrow basis, the aggregate portfolio still delivers a net benefit on an NPV basis, with a Benefit/Cost ratio of 1.28. This sensitivity characterizes the net benefit in the very narrow case where only impacts on electricity costs are considered, ignoring the environmental benefits realized by all ratepayers due to this Offering as represented in the primary BCA case noted above. Despite restricting benefits exclusively to economic impacts visible on customer utility bills, this Offering delivers net benefit. The following figures summarize benefits and costs for this test.

### Figure 43: Benefits and Costs for the Portfolio Merit Test (Primary Case)

![Benefits Vs Costs - Portfolio Ratepayer Impact](image)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits: Electricity Cost Impacts Only:</td>
<td>$36,896,603</td>
</tr>
<tr>
<td>Cost: Utility Incentive Program</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$36,896,603</td>
</tr>
</tbody>
</table>

**Benefit To Cost Ratio:** 1.28  
**NPV of Net Benefits:** $8,021,579
IV. CONCLUSIONS

Q53. In summary, what were the results of your analysis?
A53. The proposed utility PIV program is projected to be cost-effective and is expected to provide quantified net benefits to the customers of ACE. The market-wide SCT, and each of the Offering-specific merit tests deliver positive net benefits after accounting for estimated potential costs, and all deliver benefit/cost ratio greater than 1.0. Several sensitivities were included, reflecting Offering-specific merit tests where environmental value was not included. In all those cases except one (for Offering 4, multi-family charging solution), the electricity-cost-impact-only sensitivity (without environmental value) was still greater than one, indicating that non-participating rate payers will realize a direct economic benefit as realized directly on their electricity bill.

Q54. What conclusions do you draw from these results?
A54. Based on these results, it is our assessment that the projected benefits exceed expected costs, and are strongly beneficial on a net basis across all merit tests considered. For utility
ratepayers in particular, increases in electricity costs (due to PIV program costs and potential grid reinforcement) are more than offset by decreases in utility costs (due to beneficial PIV impacts related to vehicle charging), and these benefits accrue to utility customers that do not own a PIV. The managed charging programs proposed by the utility are critical to achieving these rate payer benefits.

Q55. Based on the results, do you recommend approval of ACE’s PIV Program proposed in its Amended Petition?

A55. Yes. The Board would be justified in approving ACE’s application based on the substantial net benefits to the ratepayers, PIV drivers, and society at large.

Q56. Does this conclude your testimony?

A56. Yes.
Schedule (MW)-1
Projections Of Electric Vehicle Adoption In New Jersey

Prepared For ChargEVC By Gabel Associates, Inc.

September 18, 2019
Acknowledgements

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Acknowledgments: This report benefited greatly from the input, guidance, and active collaboration from many parties, especially subject matter experts at various New Jersey state agencies, colleagues at the New Jersey Climate Change Alliance, and Jeff Foltz in association with NJCAR.
1 Executive Summary

ChargEVC, a coalition of stakeholders that support vehicle electrification in New Jersey, commissioned Gabel Associates to complete an update to the original Plug-In Electric Vehicle (PEV) market study issued in January 2018. This updated study will incorporate new information about recent developments, build on updated data sources, and incorporate a variety of improvements to the model for assessing impacts, costs, and benefits. The foundation for this new study is an updated projection of PEV adoption in New Jersey, incorporating several additional years of market data, and benefiting from a fundamentally new projection methodology. This report summarizes the results of that new PEV adoption study.

The study combined four elements to project PEV adoption levels in New Jersey through the period 2035 and 2050:

- In depth research on recent sales activity in New Jersey, vehicle registration data, national sales statistics, and other relevant market trends;

- A survey of projection methods used for PEV adoption, and development of a methodology that meets the needs of the New Jersey market at the current time; the projection model is based on a blended approach that couples short term sales projections to recent market trends, but transitions to the adoption levels needed to achieve state goals in 2025, 2035, and 2050.

- A projection model that estimates sales of both Battery Electric Vehicles (BEVs) and Plug-In Hybrid Electric Vehicles (PHEVs) and computes the population of registered PEVs each year over the study period;

- An assessment as to the probability that the sales growth assumptions used in the model are achievable based on considerations of PEV coverage of the New Jersey market, measures of consumer interest, benchmark comparisons, and estimates of the likely impact the planned vehicle purchase rebate will have on market growth.

The model incorporates detailed market research about recent sales statistics and trends, and those results indicate that the New Jersey market is in transition. Sales growth for both BEVs and PHEVs have been strong in New Jersey since 2016, with PEVs year-over-year growth exceeding 83% in 2018. Based on market growth since 2011 through June 2019, New Jersey has now attained 8.1% of its 2025 vehicle adoption goal. These results indicate strong natural interest in PEVs by New Jersey consumers.

More recently, however, sales growth appears to be softening. Sales at the national level have begun to weaken in the second half of 2019, and sales for the first half of 2019 in New Jersey are significantly lower than the same period in 2018. Simultaneously, the market (nationally, in New Jersey, and in other leading states) is experiencing a strong shift toward BEVs being a larger fraction of the market. Concurrent with these transition dynamics, however, are indicators for strong future growth, including a large number of new PEV models expected over the next two years, improved prices and longer range, and growing consumer awareness and interest.
Those factors, by themselves, would suggest a slight reduction in sales growth rates short term, with growing strength as the market continues to develop. However, New Jersey is planning a vehicle rebate program with initial funding of $30M, which is expected to become available in 2020. In addition, several utilities are proposing new programs that could stimulate infrastructure development and help address consumer barriers, and new consumer awareness programs are being planned. The study combined these considerations in estimating sales growth over the next few years, and identified the sales growth assumptions necessary to achieve 330K vehicles in 2025 and 2M in 2035. The resulting model provides detailed quantification of BEV and PHEV sales rates, the number of registered vehicles each year, and estimated projections of vehicle adoption within each electric utility territory. The following graphs the number of registered PEVs through 2035, and a detailed sales projection through 2025.
The projection model estimates that PEVs will account for approximately 16% of new Light Duty Vehicle (LDV) sales by 2025, and will represent approximately 5% of the LDV population. BEVs will be dominant by that point in time, accounting for 95% of the PEV population. The necessary sales growth rates peak when the rebate program is introduced, but then maintain strong growth while declining slightly year-over-year consistent with the behavior typical of maturing markets. By 2035, the model projects that PEVs will represent approximately 42% of new LDV sales, and 33% of the LDV population. This is consistent with goals established by global market leaders that are targeting approximately 30% PEV penetration in the 2030-2035 timeframe. The long term projection estimates that PEVs will approach 100% of LDV sales by 2050, at which point approximately 80% of the LDV population will be electrified. Attainment of these benchmarks, at a minimum, are required for the state to achieve its aggressive state greenhouse gas (GHG) reduction goals.

The feasibility assessment considered whether the assumptions used in the model are likely to be achieved (or not) from a variety of perspectives. There is basic coverage of the vehicle market, when assessed at a per segment basis, to deliver the adoption rates assumed — although that coverage is minimal in many segments, and price premiums for PEVs remain significant. Product coverage is therefore considered sufficient to meet the model assumptions short term, but higher levels of adoption, especially in the period from 2025 to 2035, will depend on additional product availability and improved pricing. Consumer awareness is growing, and recent studies (at both the national and state level) confirm that there is already sufficient interest to support the levels of adoption assumed in the short term. The sales growth assumptions for the next few years a) have been achieved (and exceeded) in New Jersey in recent years, and b) are no more optimistic than sales growth evident in other leading PEV adoption states. Most importantly, the market experience in Colorado provides a meaningful example of the potential impact of the new vehicle rebate in New Jersey, and the sales growth rates assumed in the model are within the expected range of impact.

Taken together, these considerations suggest that the sales growth assumptions used in the model are feasible, but strong, sustained, sales growth will be necessary to achieve state goals, and success will depend heavily on the planned vehicle rebate program to address current affordability issues, combined with overcoming barriers related to charging infrastructure, continued introduction of new models in key segments with strong inventory availability, and successful efforts to expand consumer awareness significantly. The projection is therefore considered a “most likely” trajectory of adoption over the next few years given current market conditions, but in the medium term (2023 – 2025), attainment of state goals will depend heavily on the sustained success of market stimulation initiatives under development.

Longer term, attainment of the high levels of electrification expected to be required by 2050 will depend heavily on the EV adoption momentum established over the next few years. As part of the market research associated with this study, the team explored dozens of alternative adoption trajectories. If the next five years are not leveraged to create strong initial momentum, attainment of longer term goals becomes significantly less likely since unrealistically high growth levels become necessary in the out years. The State therefore faces a unique opportunity since early action to build momentum now makes long term electrification success much more likely.
2 Introduction

ChargEVC, a coalition of stakeholders that support vehicle electrification in New Jersey, has commissioned Gabel Associates to complete an update to the original Plug-In Electric Vehicle (PEV) market study issued in January 2018. This updated study will incorporate new information about recent developments, build on updated data sources, and incorporate a variety of improvements to the model for assessing impacts, costs, and benefits. The foundation for this new study is an updated projection of PEV adoption in New Jersey, incorporating several additional years of market data, and benefiting from a fundamentally new projection methodology. This report summarizes the results of the new PEV adoption study.

The study combined four elements to project PEV adoption levels in New Jersey through the periods 2035 and 2050:

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- A survey of projection methods used for PEV adoption, and development of a methodology that meets the needs of the New Jersey market at the current time; the projection model is based on a blended approach that couples short term sales projections to recent market trends, but transitions to the adoption levels needed to achieve state goals in 2025, 2035, and 2050.

- A projection model that estimates sales of both Battery Electric Vehicles (BEVs) and Plug-In Hybrid Electric Vehicles (PHEVs) and computes the population of registered PEVs each year over the study period;

- An assessment as to the probability that the sales growth assumptions used in the model are achievable based on considerations of PEV coverage of the New Jersey market, measures of consumer interest, benchmark comparisons, and estimates of the likely impact the planned vehicle purchase rebate will have on market growth.

This forecast covers Light Duty Vehicles (LDVs) in New Jersey. A separate forecast (and related modeling assumptions) is under development for diesel displacement opportunities (i.e. Medium and Heavy duty vehicles).

Terminology: This projection is focused on LDVs powered by electricity. This vehicle class includes pure Battery Electric Vehicles (BEVs) that do not have a petroleum fueled engine of any kind, and Plug-In Hybrid Electric Vehicles (PHEVs) that make use of both an electric motor and a fueled engine for motive power. Both vehicle types provide for charging of an on-board battery or similar storage device from primary energy sources external to the vehicle, and are collectively called Plug-In Electric Vehicles – i.e. all vehicles with a plug. Throughout this document, the term Plug-In Electric Vehicles (PEVs) and Electric Vehicles (EVs) are used synonymously and interchangeably. This vehicle group purposefully does not include traditional hybrid vehicles (without a plug for charging), or other alternative fuel vehicles such as compressed natural gas (CNG), hydrogen, or liquefied petroleum gas (LPG).
3 Historical Market Statistics

The study team completed detailed research on the PEV market in New Jersey, especially historical trends regarding general market conditions, actual vehicle sales, vehicle registrations, and other considerations that impact key projection assumptions. This section summarizes those results, updated through the end of 2018 and (in selected cases) through the first half of 2019, which provided the baseline for the projection over the study period.

3.1 EV Adoption Scorecard

As summarized in more detail below, New Jersey has established a goal of 330K PEVs on the road in New Jersey by the end of 2025. As of the end of June 2019, an estimated 30,539 new PEVs\(^a\) (including both BEVs and PHEVs) have been sold in New Jersey since 2011. Based on the most recent snapshot of vehicle registration data by the New Jersey Department of Environmental Protection (NJDEP), those sales have resulted in 26,840 PEVs and PHEVs on the road in New Jersey as of the end of June 2019, net of retirements and changes due to used cars entering or leaving the state. **New Jersey has therefore achieved 8.1% of its 2025 goal**, a significant improvement over the 5.4% attainment achieved by the end of June 2018.

For calendar year 2018, PEVs represented an estimated 1.77% of new LDV sales, and approximately 0.35% of the LDV population (i.e. vehicles “on the road”).

As detailed in further detail throughout this report, PEV sales in the state are beginning to slow, and the strong sales needed to meet the 2025 goal will depend on robust and immediate market development initiatives.

3.2 New Jersey Market Conditions

PEVs have been available in New Jersey since the introduction of first generation vehicles in 2010, and those sales have generally increased year-over-year. Compared with other leading states, however, New Jersey has so far implemented few policies, programs, or market development initiatives to achieve the higher level of sales that may be possible. This section outlines New Jersey’s market conditions that could influence projected sales, including several recent changes and details about planned programs:

- **Sales Tax Exemption**: The New Jersey legislature implemented a state sales tax exemption for Zero Emission Vehicles (ZEVs, N.J.S.A. 54:32B-8.55) as defined under the California Zero Emission Vehicle program. The incentive applies to any ZEV that is purchased, leased, or rented after May 1, 2004. This is a significant incentive that eliminates what would otherwise be several thousand dollars in tax for a purchased vehicle. The value of this incentive is captured at the point of sale.

\(^a\) This statistic represents only new vehicle sales, and does not capture used vehicle transactions. At the current time, used EV transactions are not expected to change the EV population in the state significantly, since the vehicle was already in the state, and often remains in the state after the transaction. Any retirement or import/export impacts are captured in the difference between the cumulative sales and total registered vehicles statistics.
if the customer supplies a “sales tax exemption waiver” (ST-4) form. The NJDEP maintains a list of vehicles that are eligible for earning the Sales Tax Exemption.

- **Section 177 Waiver (ZEV Compliance Program):** As allowed under the federal Clean Air Act, New Jersey opted-in to the California Zero Emission Vehicle compliance program. New Jersey is one of ten states that have opted into that framework, and is therefore referred to as a “Section 177” state in reference to the enabling Clean Air Act provision. This framework requires that large volume automobile manufacturers ensure that a certain percentage of new vehicle sales are based on zero emission vehicles (ZEVs, such as fuel cell or pure battery electric cars), or transition zero emission vehicles (TZEVs such as plug-in hybrids) each year. The percentage of ZEVs and TZEVs increases each year, and is managed through a “credit” system. The NJDEP is responsible for tracking credit compliance and banking in the state. New Jersey’s participation in the ZEV program has a real and significant practical implication for the PEV market: automobile manufacturers prioritize the allocation of PEVs in “Section 177 states” like New Jersey, thereby making stronger PEV adoption feasible.

- **The ZEV MOU and State Goals (recent development):** Many of the “Section 177” states developed, and signed on to a regional Memorandum Of Understanding (MOU). This MOU outlined a variety of EV market development policies and programs intended to encourage accelerated adoption of EVs in the participating states. Primary elements of the MOU include a commitment to certain levels of EV penetration (approximately 5% of the LDV population by 2025), and development of the infrastructure necessary to support those vehicles. Governor Murphy committed New Jersey to this multi-state MOU in April of 2018. Like the Section 177 opt-in, participation in this initiative positions New Jersey as a market leader, helps attract EV inventory to the state, and stimulates the programs necessary to achieve the stated goals. Consistent with the MOU, the State has communicated a goal of 330K EVs on New Jersey roads by 2025. This objective is consistent with the short term goals identified in the ChargEVC roadmap.

- **Inter-Agency Partnership (recent development):** To facilitate realization of the MOU goals, and in support of broader vehicle electrification priorities being identified by the State, Governor Murphy announced a new inter-agency partnership in June of 2019. The New Jersey Board of Public Utilities (NJBPU), the NJDEP, and the Economic Development Authority (EDA) have formed the “Partnership to Plug-In” to coordinate agency activities on EV market development, especially as it relates to charging infrastructure.

- **Vehicle Electrification in the EMP (recent development):** As required by law, the State is required to periodically update its Energy Master Plan (EMP), and the Murphy administration is coordinating the development of a comprehensive new plan. Based on the draft version released in June 2019, and for the first time in a New Jersey EMP, vehicle electrification has been identified as a primary strategy for realizing GHG reductions, among other anticipated benefits. The proposed focus on vehicle electrification has received strong support from many stakeholders.

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The EMP is scheduled to be finalized by the end of 2019, and will provide a framework for coordinating state policy and programs to achieve vehicle electrification goals. These activities are expected to significantly enhance the EV market conditions in New Jersey, and to accelerate EV adoption over time as a result.

- **Utility Program Filings (recent development):** Two New Jersey electric utilities, Public Service Electric and Gas (PSE&G) and Atlantic City Electric (ACE), have submitted proposed programs to the NJBPU. These programs, if approved, would provide substantial incentives that could grow EV adoption and use, including (among other efforts) expanded availability of public charging, help for new EV buyers that need a charger at home (including multi-family settings), and incentives to encourage off-peak charging.

- **NJDEP Workplace Charger Incentive:** The NJDEP, in collaboration with the NJBPU, has sponsored an incentive program by providing rebates to employers that install PEV charging infrastructure for use by their employees after June 15, 2016. Current incentive levels are $250 for a Level One charger, and up to $5,000 per Level Two charging station. The program is part of the NJDEP’s overall “Drive Green New Jersey” program\(^d\), and given high levels of interest, the NJDEP currently intends to continue providing this incentive subject to funding availability. This incentive is available state-wide.

- **Proposed Vehicle Purchase Rebate (recent development):** As part of the State budget for the next fiscal year, a $30M fund has been included to launch a new vehicle purchase rebate program. Efforts are underway (primarily at the NJBPU) to design and implement this substantial new program, potentially beginning in 2020. The introduction of this program, especially if augmented with ongoing funding after the initial budget, could have a large positive impact on EV sales growth.

- **Infrastructure Development Activity:** Electric vehicles require new infrastructure for charging, and the competitive markets – funded mostly through private capital – have launched efforts to serve that new market demand. A wide variety of companies now operate in New Jersey that can serve both private and public charging needs in a variety of segments. Some companies focus on hardware and/or services offerings, while others offer financing solutions for certain applications. In some cases, charging infrastructure companies have partnered with automobile manufacturers or other “channel partners” to provide the infrastructure required. See more details on charging infrastructure availability in Section 3.4 below.

- **Market Planning and Development Efforts:** A variety of loosely coupled organizations have been working over the last decade to improve the EV market in New Jersey, including:

  ➢ The NJ Clean Cities Coalition (led by Chuck Feinberg) has been active in the State for approximately a decade, and published an EV infrastructure development plan in October 2011.

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\(^d\)[http://www.drivegreen.nj.gov/programs.html]
Several local environmental groups, especially Sierra Club, Environment NJ, and the Association of New Jersey Environmental Commissions (ANJEC) have been promoting PEVs over the last few years. Environment NJ published its “Driving Cleaner” report in June 2014, and a guide promoting “50 steps to carbon-free transportation” in the Fall of 2016.

The local metropolitan planning authorities, including the North Jersey Transportation Planning Authority (NJTPA) covering north Jersey and the Delaware Valley Regional Planning Commission (DVRPC) covering the New Jersey region around Philadelphia, have become active in PEV matters, and NJTPA recently sponsored an initiative focused on municipal EV readiness.

Sustainable Jersey, a not-for-profit organization focused on supporting schools and municipalities in sustainability advancements statewide, introduced PEV actions in 2014 which have helped socialize the potential for municipal support of PEV market development by local government units.

Most recently, a new coalition called ChargEVC was formed in 2016, which focuses specifically on PEV market development in New Jersey. The ChargEVC coalition, based on consensus building within its diverse stakeholder membership, published a roadmap for New Jersey Plug-In Vehicle Market Development in September of 2017, and a market opportunity and benefit-cost study in January of 2018. ChargEVC commissioned and funded the research project upon which this updated projection report is based.

Commercial PEV Availability (recent development): After an initial ban, New Jersey legislation allows Tesla to sell vehicles through its “factory direct” business model (i.e. not through independent retailers), but with limitations and requirements. Many consumers, however, will look to their traditional car retailer to purchase a PEV. That commercial environment remains relatively immature in New Jersey compared with some other ZEV states, making widespread EV market growth difficult. The national Sierra Club completed a study of EV buying experiences across a variety of states, including New Jersey, and found that in many cases the consumer buying experience was not conducive to EV adoption. New Jersey scored in the lowest category (“Barely Moving”) on factors such as sales staff being knowledgeable about incentives and prominent display of EVs on the lot. The report attributes these conditions to automobile OEM policies as well as the retailers themselves. That situation has started to change in New Jersey, especially under the leadership of the NJ Coalition of Automotive Retailers (NJ CAR), which has been focused on increasing awareness and retailer support for this new class of vehicles. NJ CAR is a ChargEVC member, and is developing a dealer certification program that will help prepare, educate, and motivate traditional dealers to sell EVs. This program could have a large positive impact on the consumer buying experience, with a direct impact on EV sales.

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* Multi-State Study of the Electric Vehicle Shopping Experience by Sierra Club (Mary Lunetta and Gina Coplon-Newfield), 2016
3.3 Historical EV Market Performance

This section summarizes key historical statistics that establish the quantitative baseline for the projection analysis. The following chart summarizes BEV and PHEV sales in New Jersey, from 2011 (the first year data is available) through year-end 2018.  

These results represent year-over-year sales growth for PEVs of 89.9%, 26.5%, and 83.4% (for 2016, 2017, and 2018 respectively). Sales for the first half of 2019 demonstrated 55.4% growth over the same period in 2018, demonstrating strong growth but a slow-down compared with the average of the prior three years. This softening is expected to continue in the second half of 2019 (see Section 4.3 below for further details on this market dynamic).  

These sales, after accounting for retirements and the net impact of vehicles entering or leaving the State, have resulted in substantial growth in the number of registered EVs on the road in New Jersey. That trend is summarized in the chart below, based on snapshots of vehicle registration data developed by the NJDEP (year-end 2016 is the first year for which there is data available under the current methodology). Note that these numbers represent the PEV population, not annual sales.  

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2. All NJDEP statistics in this report are based on an amended version of registration data issued by the NJDEP in August of 2019, reflecting corrections in minor prior-year methodology issues.
The following chart summarizes cumulative sales over the period, compared with the registered PEV population. The difference between the curves represents the impact of vehicle retirement and the net impact of vehicles moving into or out of the state (as of the end of each year).
The following table summarizes the PEV distribution by county (end of June 2019), and related demographic metrics regarding PEV penetration.

<table>
<thead>
<tr>
<th>County</th>
<th>Battery Electric Vehicles (BEVs)</th>
<th>Plug-In Hybrid Electric Vehicles (PHEVs)</th>
<th>Total Plug-In Electric Vehicles (PEVs)</th>
<th>PEVs Per 1000 Residents</th>
<th>PEVs Per 1000 Households</th>
<th>PEV Percentage Of Registered Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic</td>
<td>212</td>
<td>201</td>
<td>413</td>
<td>1.53</td>
<td>4.23</td>
<td>0.20%</td>
</tr>
<tr>
<td>Bergen</td>
<td>2,341</td>
<td>2,097</td>
<td>4,438</td>
<td>4.68</td>
<td>13.09</td>
<td>0.62%</td>
</tr>
<tr>
<td>Burlington</td>
<td>577</td>
<td>571</td>
<td>1,148</td>
<td>2.56</td>
<td>7.00</td>
<td>0.30%</td>
</tr>
<tr>
<td>Camden</td>
<td>864</td>
<td>526</td>
<td>1,390</td>
<td>2.72</td>
<td>7.28</td>
<td>0.36%</td>
</tr>
<tr>
<td>Cape May</td>
<td>84</td>
<td>109</td>
<td>193</td>
<td>2.03</td>
<td>4.84</td>
<td>0.23%</td>
</tr>
<tr>
<td>Cumberland</td>
<td>49</td>
<td>72</td>
<td>121</td>
<td>0.78</td>
<td>2.39</td>
<td>0.11%</td>
</tr>
<tr>
<td>Essex</td>
<td>1,319</td>
<td>948</td>
<td>2,267</td>
<td>2.80</td>
<td>7.95</td>
<td>0.47%</td>
</tr>
<tr>
<td>Gloucester</td>
<td>214</td>
<td>244</td>
<td>458</td>
<td>1.57</td>
<td>4.36</td>
<td>0.20%</td>
</tr>
<tr>
<td>Hudson</td>
<td>626</td>
<td>406</td>
<td>1,032</td>
<td>1.49</td>
<td>4.10</td>
<td>0.34%</td>
</tr>
<tr>
<td>Hunterdon</td>
<td>337</td>
<td>268</td>
<td>605</td>
<td>4.81</td>
<td>12.93</td>
<td>0.47%</td>
</tr>
<tr>
<td>Mercer</td>
<td>1,048</td>
<td>702</td>
<td>1,750</td>
<td>4.67</td>
<td>13.57</td>
<td>0.60%</td>
</tr>
<tr>
<td>Middlesex</td>
<td>1,785</td>
<td>1,138</td>
<td>2,923</td>
<td>3.47</td>
<td>10.26</td>
<td>0.46%</td>
</tr>
<tr>
<td>Monmouth</td>
<td>1,254</td>
<td>948</td>
<td>2,202</td>
<td>3.52</td>
<td>9.33</td>
<td>0.39%</td>
</tr>
<tr>
<td>Morris</td>
<td>1,333</td>
<td>770</td>
<td>2,103</td>
<td>4.21</td>
<td>11.62</td>
<td>0.50%</td>
</tr>
<tr>
<td>Ocean</td>
<td>381</td>
<td>501</td>
<td>882</td>
<td>1.48</td>
<td>3.90</td>
<td>0.18%</td>
</tr>
<tr>
<td>Passaic</td>
<td>361</td>
<td>424</td>
<td>785</td>
<td>1.53</td>
<td>4.67</td>
<td>0.22%</td>
</tr>
<tr>
<td>Salem</td>
<td>40</td>
<td>39</td>
<td>79</td>
<td>1.24</td>
<td>3.29</td>
<td>0.14%</td>
</tr>
<tr>
<td>Somerset</td>
<td>1,261</td>
<td>654</td>
<td>1,915</td>
<td>5.71</td>
<td>16.65</td>
<td>0.74%</td>
</tr>
<tr>
<td>Sussex</td>
<td>123</td>
<td>202</td>
<td>325</td>
<td>2.26</td>
<td>6.06</td>
<td>0.23%</td>
</tr>
<tr>
<td>Union</td>
<td>788</td>
<td>510</td>
<td>1,298</td>
<td>2.30</td>
<td>6.83</td>
<td>0.31%</td>
</tr>
<tr>
<td>Warren</td>
<td>92</td>
<td>123</td>
<td>215</td>
<td>2.01</td>
<td>5.19</td>
<td>0.21%</td>
</tr>
<tr>
<td>Unknown</td>
<td>210</td>
<td>88</td>
<td>298</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>15,299</td>
<td>11,541</td>
<td>26,840</td>
<td>2.98</td>
<td>8.34</td>
<td>0.39%</td>
</tr>
</tbody>
</table>

Private vehicle ownership generally scales with household income, although the automobile market is over a century old in the United States and has had time to develop affordable solutions for most buyer segments. The PEV market is relatively new: vehicles are currently more available in higher-end segments, and typically command a premium compared with equivalent traditional models.

The following chart shows the relationship between PEV ownership (PEVs per 1,000 households as of the end of June 2019) and median household income (on a per-county basis). The fairly strong correlation between these factors suggests that price is still a significant factor in PEV ownership. It is worth noting that a given level of PEV ownership was consistently associated with a ~$30K band of median household income across the market.
PEV ownership varied widely across the four electric utilities as summarized in the following chart (reflecting year-end (YE) 2018 data). Note that the rate of PEV adoption does not scale strongly with the residential population in a given territory, probably reflecting significant differences in demographics across the counties. Key potential factors include degree of private vehicle ownership, building stock variations (single family vs. multi-family), typical travel characteristics, and the differences in median household income noted above. These percentages are expected to converge toward the fraction of LDV ownership in each territory as the PEV market matures.

<table>
<thead>
<tr>
<th></th>
<th>BEV Count (YE 2018)</th>
<th>PHEV Count (YE 2018)</th>
<th>Total Count (YE 2018)</th>
<th>Utility-% Of Total (YE 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSE&amp;G</td>
<td>6,302</td>
<td>6,446</td>
<td>12,748</td>
<td>54.79%</td>
</tr>
<tr>
<td>Rockland Electric</td>
<td>627</td>
<td>414</td>
<td>1,041</td>
<td>4.47%</td>
</tr>
<tr>
<td>ACE</td>
<td>582</td>
<td>951</td>
<td>1,533</td>
<td>6.59%</td>
</tr>
<tr>
<td>JCP&amp;L</td>
<td>3,783</td>
<td>3,533</td>
<td>7,316</td>
<td>31.44%</td>
</tr>
<tr>
<td>Municipal</td>
<td>141</td>
<td>116</td>
<td>257</td>
<td>1.10%</td>
</tr>
<tr>
<td>All Others</td>
<td>235</td>
<td>137</td>
<td>372</td>
<td>1.60%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,670</strong></td>
<td><strong>11,597</strong></td>
<td><strong>23,267</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>
3.4 Public Charging Infrastructure

PEVs require charging infrastructure in a variety of segments, including home, work, and in public places (see further details in the original ChargEVC New Jersey Study). A key metric of PEV market maturity, and related sales growth rates, is the number of public charging assets – both charging devices and the number of charging plugs provided by those devices – on a per capita and per PEV basis \( h \). These metrics are considered especially important because they directly respond to consumer concerns about range anxiety. Within that range anxiety context, however, these two metrics characterize different market needs: stations per capita are, in part, a metric for general coverage and associated perceptions by consumers who are not yet PEV owners, while plugs per PEV suggest the level of public charger availability for current PEV drivers and their need for public charging capacity \( i \). Both factors are important in understanding the current state of public charging capability in New Jersey, and the associated impact on potential EV adoption rates.

Within the public charging segment, both Level Two (240V devices based on the J1772 connection standard) and Direct Current Fast Chargers (DCFC) (higher powered devices with a variety of plug types) are typically considered. For most mainstream consumers, the ability to obtain a fast and convenient charge while “on the road” is a primary consideration in potential PEV adoption. The following characterization therefore focuses on the DCFC assets in the State that are available for public use (to varying degrees).

Based on the federal U.S. Department of Energy (USDOE) national database \( k \), as of September 2019, there are 82 PEV public DCFC locations (sites, or physical address), supporting 324 plugs (or outlets). These assets varied by plug-standard: “Tesla Chargers” use a proprietary plug that can only be used by Tesla vehicles, while “Standardized Plugs” are based on either the SAE Combo Charging Standard (CCS) or CHaDEMO plugs which together can support all vehicles on the road today, including Tesla (with an adaptor). Note that DCFC facilities are only needed, or used by, BEVs. This translates to charging asset density factors as summarized in the following chart. The following statistics are based on a New Jersey population of 8,908,520 (US Census Quickfacts, as of July 1, 2018), and a BEV population of 15,299 as of the end of June 2019 (from the NJDEP registration snapshot).

<table>
<thead>
<tr>
<th>Plug Type</th>
<th>Total Count (location/plug)</th>
<th>Locations/10,000 People</th>
<th>Plugs/BEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Power (Tesla)</td>
<td>22/200</td>
<td>0.0247</td>
<td>0.0131</td>
</tr>
<tr>
<td>High Power (CCS or CHaDEMO)</td>
<td>60/124</td>
<td>0.0674</td>
<td>0.0081</td>
</tr>
</tbody>
</table>

\( h \) Multi-State Study of the Electric Vehicle Shopping Experience by Sierra Club (Mary Lunetta and Gina Coplon-Newfield), 2016

\( i \) An Integrated Perspective on The Future of Mobility by Bloomberg New Energy Finance, McKinsey & Company [October 2016]

\( j \) The ABC’s of EVs; Guide for Policy Makers and Consumer Advocates by Martin R. Cohen of the Citizens Utility Board of Illinois [April 2017]

\( k \) [https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC](https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC)
When considering these statistics, however, it is important to note that there are significant inconsistencies in reporting conventions associated with this data. Not all locations are truly available as public charging assets as desired. For example, chargers located inside a repair bay at a car dealer are only available during business hours and are really intended to be used for charging demonstration vehicles. Just as important, the interpretation of “plugs” varies widely across vendors, with some vendors reporting “two plugs per charger” when in fact only one can be used at a time. Given these factors, and based on a detailed review of individual assets associated with the data noted, these statistics probably over-estimate the useful public charging capacity in New Jersey significantly.

Despite these complications, this USDOE data is useful for comparing infrastructure capability. When compared with other “peer states” New Jersey’s infrastructure levels are relatively low.

<table>
<thead>
<tr>
<th>ZEV States</th>
<th>DCFC Outlets Per 1000 PEVs</th>
<th>DCFC Outlets Per 1000 PEVs (rank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>3.55</td>
<td>16</td>
</tr>
<tr>
<td>Oregon</td>
<td>8.72</td>
<td>4</td>
</tr>
<tr>
<td>New York</td>
<td>3.62</td>
<td>14</td>
</tr>
<tr>
<td>New Jersey</td>
<td>4.97</td>
<td>15</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>5.35</td>
<td>12</td>
</tr>
<tr>
<td>Maryland</td>
<td>12.40</td>
<td>1</td>
</tr>
<tr>
<td>Connecticut</td>
<td>7.42</td>
<td>8</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>8.14</td>
<td>6</td>
</tr>
<tr>
<td>Vermont</td>
<td>10.28</td>
<td>3</td>
</tr>
<tr>
<td>Maine</td>
<td>10.59</td>
<td>2</td>
</tr>
<tr>
<td>Colorado</td>
<td>7.80</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leading Non-ZEV States</th>
<th>DCFC Outlets Per 1000 PEVs</th>
<th>DCFC Outlets Per 1000 PEVs (rank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington State</td>
<td>6.73</td>
<td>9</td>
</tr>
<tr>
<td>Georgia</td>
<td>6.66</td>
<td>10</td>
</tr>
<tr>
<td>Florida</td>
<td>6.14</td>
<td>11</td>
</tr>
<tr>
<td>Texas</td>
<td>8.29</td>
<td>5</td>
</tr>
<tr>
<td>Illinois</td>
<td>5.21</td>
<td>13</td>
</tr>
</tbody>
</table>

For reference, the ChargEVC roadmap calls for an essential level of public charging, based on at least 300 locations supporting a minimum of 600 standards-based plugs (CCS and CHaDEMO), with appropriate equipment reliability and high levels of customer access (i.e. minimal physical site or customer use or payment restrictions). The “essential level of service” corresponds with the public DCFC capacity required to address mainstream consumer concerns about public charging availability (i.e. a significant component of range anxiety). For comparison to the chart above, that roadmap objective represents 27 DCFC plugs per PEV on the road in NJ (as of the end of 2018). By that metric, New Jersey has attained only 18% of the physical locations or plugs needed to provide an essential level of public fast charging, or even less once access and “plug count” reporting inconsistencies are considered.
4 Projection Methodology

The study team developed an updated methodology to meet the needs of the New Jersey PEV market at the current time. The methodology was developed to consider a) recent sales results and market trends, b) PEV adoption goals, and c) general characteristics about how emerging markets mature over time. The model was designed to provide the following information:

- The number of new BEV, PHEV, and PEV sales each year through the study period
- The BEV and PHEV, and total PEV, population at the end of each year, after accounting for net changes due to vehicle retirement, or vehicles leaving and entering the state
- Estimates of overall LDV sales and LDV population to provide context for PEV adoption

The historical market statistics summarized in Section 3 provided the baseline for the forward projection. This section describes how that information, and consideration of other market trends, were combined to generate the projection.

4.1 Projection Methodology

In preparation for developing the updated projection, the study team examined a wide variety of projection methods evident in other planning efforts, consultant studies, and industry analysis. Key strategies identified from that survey include:

- **Hypothetical Planning Scenarios**: Many studies are based on hypothetical “low, medium, and high” adoption cases. The original ChargEVC study took this approach, which was helpful at the time (three years ago) for initial goal setting and opportunity assessment. These scenarios are speculative, and in many cases aspirational, and may not reflect the real sales or vehicle population likely in the short term.

- **Simple Extrapolations**: Many projections simply extrapolate recent sales trends, which is a reasonable method in mature markets. The PEV market is relatively immature, however, and data for even the last three years does not establish a high confidence trend for projection, especially in cases when significant policy initiatives may fundamentally change the market short term. There is diversity about the basis for these extrapolations, with some studies projecting PEV marketshare as a fraction of LDV sales, others estimating year-over-year sales growth rates, while others focus on estimating overall PEV population changes from year to year. Each of these approaches, by themselves, are not well matched to current market conditions in New Jersey at this time, and the granularity required for the resulting projection.

- **Goal Attainment Projections**: Many states, like New Jersey and other Section-177 ZEV states, have set PEV goals (say in 2025, 2035, or 2050). A wide variety of projections are in place that illustrate the adoption needed to achieve those goals. These models really represent a “projection of need”, rather than what is likely to happen.
Despite their prevalence in other studies performed, none of the reviewed methodologies meet the needs of the New Jersey market at this time. Given the rapid advancement of market development policies in New Jersey, and the need for real planning around potential program budgets, utility load impacts, various benefit/cost studies, etc, the projection needs to represent a realistic “most likely” scenario for the sales and population over the next several years. At the same time, the State is setting aspirational goals that are intended to serve as policy drivers. The projection needs to fairly represent what attainment of these goals would require from the market and associated costs.

Given these needs, the study team developed a hybrid projection method that blends a) tight coupling of short term projections with recent sales activity in New Jersey, b) combined consideration of relevant market dynamics and trends that impact key assumptions, and c) transitions to the lowest risk adoption profile possible that still achieves targeted adoption levels in 2025 and 2035. “Lowest Risk” in this case means the minimum sales growth assumptions needed to attain the relevant goals.

The resulting projection therefore represents an adoption trajectory that starts with the known registered EV population at the end of 2018, assumes short term sales activity for the next few years that are tied to current market conditions but sufficient to achieve the 2025 goal of 330K EVs, and then maintains the long term growth needed to achieve two million EVs on the road by 2035 consistent with the ChargEVC roadmap. The assumptions across these different phases of growth have been refined to exhibit year-over-year growth profiles consistent with key market trends and general characteristics of maturing markets, as informed by statistics evident in the EV market in both New Jersey and nationwide. Within this model, the key assumptions are the year-over-year sales growth rates, by year, for both BEVs and PHEVs. Separately, a method for estimating retirements, and the net impact of vehicles entering or leaving the state, has been developed. BEV and PHEV trends are computed separately, with the population at the end of the year being equal to the population at the end of the previous year, plus new sales, minus net retirements/vehicle entering/vehicles exiting.

4.2 General Market Considerations

Beyond the historical baseline summarized in Section 3, the study team considered key trends that should inform model assumptions. The PEV market is small enough that specific industry events, or sales performance of a given vehicle, can change overall results significantly. Strategic consideration of these trends were combined with the historical baseline to establish projection assumptions.

The trends indicates a market that is in transition, at both the national level and in New Jersey. Key trends identified by the study team include:

- 2018 was an exceptional year for PEV sales, internationally, in the United States, and in New Jersey. 2018 was the best sales year in the history of the industry, and was heavily influenced by the production ramp-up of the Tesla Model 3 in the second half of the year. This exceptional deployment rate, which essentially doubled the size of the PEV market over several months, was isolated to a single vehicle from a single supplier. This ramp-up distorted 2018 results as a basis for longer term projection, especially as the Tesla Model 3 achieves more steady state production in the second half of 2019.
• The growth in the market is not homogeneous across different vehicle manufacturers. Taking Tesla Model 3 data out of the results for the last few years, growth in the rest of the market has been relatively soft, and more recently declining. This reality has been “masked” by the Model 3 ramp-up, which essentially compensated for softness across the rest of the market. Now that the Model 3 is approaching steady-state sales, that compensating effect is fading, which suggests weaker year-over-year sales growth in the short term.

• Meanwhile, there are several structural factors that are weighing on PEV growth short term. Of particular importance, several of the most popular vehicles have now passed (or are about to pass) their federal tax credit threshold, and the value of the available credit is quickly declining. For most consumers, this essentially looks like a price increase for PEVs. Simultaneously, global markets (especially in Europe and Asia) are very strong, benefiting from robust consumer interest and policy support. These dynamics are creating drag on the strong growth evident in the United States the last few years.

• In addition to factors that affect overall sales growth, there is a significant shift emerging in the market, with BEVs now becoming a much more dominant fraction of the market. This trend is evident nationally, but is especially striking in New Jersey: PHEVs ranged from 56% to 66% of the PEVs sold in New Jersey from 2014 – 2017, but dropped to a share of 38% in 2018. PHEV share in the first half of 2019 was down to 25%, and the growth rate (over the same period in 2018) was a negative 34%. This outcome results from the growth of the Model 3 (which increased BEV share), combined with the discontinuation of the popular Chevy Volt PHEV. Regardless, this appears to be a long term trend by which consumer preference focuses on BEVs compared with PHEVs. Given the large number of new PHEVs entering the market in the next three years, however, PHEVs are expected to remain an important, but smaller fraction of the market moving forward.

• The combination of the trends noted above have combined to depress 2019 sales rates year-to-date. At the national level, PEV sales for the first half of 2019 grew only 29.3% over the same period in 2018, compared with a growth rate of 39.6% in first half 2018 (over first half 2017). Sales for the first half of 2019 in New Jersey are significantly lower than the same period in 2018. The primary short term drivers of this outcome is the Tesla Model 3 approaching steady state deployment, general weakness in well established models (like the Bolt and Leaf), and most importantly, apparent inventory limitations in New Jersey for new vehicles that have been very well received in other markets (like the Hyundai Kona, Kia Niro, and Audi eTron).

• The trend considerations above are critical for determining appropriate short term sales projections, since various “anomalous events” need to be distilled out of the raw trends. Concurrent with these transition dynamics, however, are indicators for strong growth medium term, including a large number of new models expected over the next two years, improved prices and longer range, improved availability of charging infrastructure, and growing consumer awareness and interest.
Those factors, by themselves, would motivate significant reductions in sales growth in the short term, with growing strength as the market continues to mature. However, New Jersey is planning a vehicle rebate program with initial funding of $30M, which is expected to become available in 2020. Several utilities are proposing new programs that could stimulate infrastructure development and help address consumer barriers, and new consumer awareness programs are being planned. The study combined these considerations in estimating sales growth over the next few years, especially for the critical years 2020 and 2021. The projection therefore assumes a significant positive impact from the rebate program and other programs under development, offsetting the growth rate decline that might have otherwise emerged.

4.3 Key Projection Assumptions

Based on a synthesis on the historical baseline summarized in Section 3, and strategic consideration of the trends outlined in Section 4.2, the following assumptions were developed for use in the projection:

- The number of registered PEVs in New Jersey at the end of 2018 included 11,670 BEVs and 10,566 PHEVs, for a total of 22,236 PEVs “on the road”.

- The following year-over-year sales growth rates were used, which as noted in the methodology of Section 4.1, reflect recent sales activity and consideration of current trends short term, transitioning to the lowest growth rate assumptions necessary to achieve the state goals in 2025 (330K PEVs) and 2035 (2M PEVs). The growth rates in 2020 and 2021 have been adjusted to reflect the expected impact of the new rebate program, combined with significant new vehicle availability. The assumptions reflect a shift to BEV dominance over time, with PHEV growth becoming flat in 2030.
The model accounts for more than just new sales, and estimates vehicle retirements, and the net impact of vehicles coming into, or moving out of, the New Jersey market. There is limited data available in the early years, and simple assumptions were made based on historical evidence: 150 net BEV retirements in 2019, growing linearly to 350 in 2026, and flat 1,000 net PHEV retirements from 2019 through 2030. Once a critical mass of vehicle is established, in 2027 for BEVs and 2030 for PHEVs, the model computes the expected number of vehicles leaving the market every year (based on historical data), and allocates those changes to PEVs in proportion to the PEV fraction of the market 11 years prior. Eleven years was selected as the “retirement lookback window” since on average, the New Jersey LDV population “turns over” (i.e. is replaced by new vehicles) every 11 years.

The study assumes that the proposed New Jersey rebate program is implemented in 2020, and that market stimulation offsets the emerging growth deceleration evident in recent market sales statistics.

4.4 Goal Attainment Implications

As part of assessing the historical baseline and other strategic market trends, the team considered a wide variety of growth assumptions to assess the feasibility of different scenarios. The team considered low growth followed by high growth, high growth followed by low growth, fairly consistent growth over the period, and numerous other permutations. Several dozen growth trend scenarios were evaluated.

As a result of this analysis, a key implication emerged: the feasibility of attaining state goals in 2035, and even more importantly the strategic goals for 2050, depend heavily on the momentum established prior to 2025. If growth remains modest through 2025, exceptionally high (and probably un-attainable) growth levels would then be required to meet the goals in 2035 and 2050. The State therefore faces a unique opportunity since early action to build momentum now makes long term electrification success much more likely.

5 Key Findings: EV Projections

Based on the historical baseline summarized in Section 3, and the projection methodology summarized in Section 4, the study prepared a detailed projection of BEV and PHEV adoption in New Jersey through 2035 and 2050. Annual sales for both BEVs and PHEVs were computed, with aggregation into overall PEV population per year (after accounting for retirement and vehicles entering or leaving the State). These trajectories represent the curve that a) starts with the registered PEV population at the end of 2018, b) strongly reflects recent sales results in the State for the next three years, as calibrated by consideration of relevant market trends, but c) transitioning to the lowest-risk adoption profile necessary to achieve the targets of 330K PEVs by YE-2025, and 2M PEVs by YE-2035.
5.1 Projection Through 2035

The following graph summarizes the projected PEV population through 2035.

This projection estimates that PEVs will represent approximately 16% of LDV sales in 2025, and just over 5% of the LDV population. By 2035, PEVs will account for 41% of LDV sales, and nearly 32% of the LDV population. This benchmark is approximately aligned with global leaders (mostly in Europe) that are targeting 30% PEV penetration within the 2030 – 2035 timeframe.

The following chart provides a more detailed view of the projection through 2025, including the breakout between BEVs and PHEVs. Consistent with recent market trends, BEVs are expected to become a more dominant share of the market, especially given expected BEV price reductions in the medium term.
The following chart provides the detailed break-down of BEV and PHEV populations through 2025.

Based on detailed mapping of the PEV population across utilities (using vehicle registration data by zip-code), and assuming that the utility allocation transitions to alignment with overall LDV ownership by 2035, the PEV adoption projection breaks-out per utility as follows.

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1 Mapping of LDV ownership to utility is underway. For this analysis, utility fraction of residential load, which correlates strongly with vehicle ownership, is used as a proxy.
5.2 Projection Through 2050

Adoption trends were also estimated for the period from 2036 to 2050, which is needed to assess the role of vehicle electrification in the State’s broader clean energy goals. Under this projection, PEVs represent ~100% of LDV sales and ~80% LDV electrification by 2050. The 2050 projection of PEV population is summarized in the following graph.
6 Key Findings: Assessment Of Projection Feasibility

The key assumptions outlined in Section 5 formed the basis for the projection, and were informed by recent sales statistics, consideration of market trends that impact adoption levels, and State goals for 2025 and 2035. The “lowest risk” adoption assumptions were used, which represent the lowest possible sales growth rates that satisfy the multiple criteria that defined the projection. As part of the study, the feasibility of these assumptions were evaluated based on “market analog” comparisons. Consideration of these factors help assess the probability that the growth assumptions upon which the project is based will be realized.

None of the following validation perspectives are conclusive on its own, but each test is based on detailed market analysis that provides a relevant perspective on feasibility. Taken together, these validation points indicate that the projection model assumptions, especially regarding year-over-year sales growth rate assumptions, are within a reasonable range.

6.1 Market Segmentation Analysis

Some key considerations in PEV adoption rates is a) the degree to which PEVs provide a practical alternative to traditional vehicle choices for the consumer, b) the price differential between the PEV alternative and the portfolio of traditional vehicle options, and c) whether PEV availability covers sufficient potential sales volume to achieve the adoption rates projected. For example, if all the PEVs were suitable for market segments that accounted for only 5% of the traditional vehicles sold, a projected sales rate of 15% would be considered unreasonable.

The study team partnered with NJCAR (the trade association for NJ Car Retailers) to complete a detailed market segmentation analysis to assess how well current PEV offerings support the buying behaviors of consumers in relation to the way they purchase LDVs today. The results of that study are summarized in the following infographic. Please see Appendix B for a larger version of the same image.
This infographic contains a large amount of information about both the traditional LDV market in New Jersey (for the 2018 sales year), and how current PEV offerings map onto that landscape (for products available in New Jersey as of May 2019). The LDV market is organized into two large macro-segments: cars and light duty trucks. Cars include traditional passenger vehicles, from small compacts to luxury sports cars. Light trucks include pick-up trucks, small commercial vans, mini-vans, cross-overs, and SUVs. These categories are further parsed into 20 segments reflecting variations in size, cost, and luxury. In general, the segments in the infographic are organized with smaller, basic, less expensive vehicles in the upper left, to larger, more luxurious, more expensive vehicles in the bottom right. Note that four segments represent 60% of the market (on a vehicle count basis). A key trend is that car segments are generally declining in volume, while the small to mid-range cross-over/SUVs are growing.

Within each segment, the yellow box characterizes current consumer preferences and the portfolio of traditional vehicle offerings. The numbers within each box summarize the fraction of the market represented by that segment (based on vehicle count), and the average base Manufacturer Suggested Retail Price (MSRP) for those vehicles.

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The statistics in this analysis are all based on average BASE MSRP. Typical “as sold” configurations are on average $5 - $10K higher in actual selling price (not including taxes, title, registration, or delivery fees).
The three lower boxes represent potential PEV offerings in each segment, covering BEVs with electric range greater than 200 miles, BEVs with less than 200 miles of electric range, and PHEVs. The numbers in each box represent the number of PEVs currently available within each segment, and the average base MSRP of those vehicles.

This information allows segment level evaluation of the number of PEV alternatives available to consumers in each segment, the average price differential (on a base MSRP basis). There are forty PEVs currently available across twelve LDV segments, which together total over 63% of traditional sales. Twenty-seven of the forty vehicles are in six luxury segments representing approximately 20% of current vehicle sales.

While there is at least basic coverage across multiple segments, in many cases only one or two PEV options are available, which implies that there is a very limited consumer selection compared with the existing vehicle portfolio. More importantly, there is a $10-15K difference in price between the average base MSRP of the traditional vehicle portfolio and the PEV models currently available. This difference is a key adoption barrier for most price-sensitive mainstream consumers. Most importantly, however, the key cross-over/SUV segments that represent a large fraction of the market, and where most growth is currently concentrated, has few PEV alternatives. In the critical compact SUV segment (25% of the market and growing), there are only two PHEV options, with a price premium of ~$10K. PEV options are beginning to become available in this segment, and there is some consumer elasticity for consideration of PEV offerings in the sub-compact SUV segment (as indicated by the red arrows). A key threshold for stronger PEV adoption growth medium term is better coverage in these key mid-range light truck segments, combined with overall reductions in MSRP.

Based on this assessment, the study team concludes that there are sufficient PEV offerings to support the projected adoption levels through 2035, far above the 15% market share of LDV sales at that point in time, but a) there are limited PEV options in many key segments, and b) current MSRP premiums will be a limiting factor for many price-sensitive mainstream consumers. Additional PEV offerings, in the more popular light truck segments, along with price reductions of $10-15K, will be necessary to achieve the higher levels of adoption needed after 2025. Current OEM announcements suggest that the necessary vehicle offerings may be available prior to 2025, although the magnitude of PEV pricing premiums remains uncertain. This analysis also suggests that maximum MSRP for the most popular PEVs, after accounting for typical “as sold” configuration prices, is in the range of $45K - $50K.

### 6.2 Consumer Interest

One of the most important factors in the adoption of any new product is consumer awareness and interest. Mainstream awareness of PEVs remains relatively small – but it is growing. Two recent surveys, at both the national and state level, suggest that consumer interest in PEVs is improving. The study team considered two recent consumer attitude studies that directly quantify consumer interest in choosing a PEV for their next new vehicle purchase:
• In a new poll released by the Union of Concern Scientists and Consumer reports (July 2019)\textsuperscript{a}, a sample of national respondents indicates that 5% of prospective car buyers will definitely buy an EV within the next two years, while an additional 31% would consider it. This suggests a potential market of 36% of new car buyers over the next two years willing to at least consider a PEV.

• Looking specifically at the attitudes of New Jersey consumers, a recent survey by Eagleton done for the New Jersey Climate Change Alliance (April 2019)\textsuperscript{o}, indicated that 50% of respondents said they will buy a new car within the next five years, and 38% of that group (19% of the respondents) said they would consider buying an EV for their next purchase. Two percent of this group reported already having an EV.

Together, these studies validate that approximately a third of new car buyers over the next 2-5 years would be willing to at least consider a PEV purchase. The projection model assumed market share of annual LDV sales increasing from 2.2% in 2019 to 15.1% in 2025. Those adoption levels are feasible within the range of consumer interest demonstrated in the surveys noted, although high levels of conversion (of interest to an adoption decision) will be required in the period approaching 2025. Adoption at the levels required between 2025 and 2035 will depend on significantly higher levels of consumer awareness and interest, but that is highly feasible as the market matures, especially if there are investments in marketing, education, and consumer outreach.

6.3 Benchmark Comparisons

As part of the feasibility assessment, the study team compared the sales growth assumptions with benchmarks from other leading states as a real world comparison of feasibility. If the model assumed higher growth rates than other leading states were achieving, that would weaken confidence in the projection. As noted in more detail below, this benchmarking analysis indicated that even the high point of sales growth rate assumptions in the projection are well within the range of results being realized by other leading states. These benchmarks therefore provide a “proof of concept” that the assumed growth rates are achievable.

Benchmarking between states on EV sales is challenging, since the states are all very different. They are different sizes, at different levels of maturity (the west coast states started much earlier), different demographics, and all have very different policy environments. It is therefore difficult to compare absolute sales results between states. Regardless, a comparison of year-over-year growth rates for a sample of leading states provides some sanity check on the assumptions being made in the projection model. We compared the New Jersey projection model assumptions to the ten states that had the highest three year average year-over-year PEV sales growth (2016 – 2018). This sample essentially represents the ten fastest growing states on an aggregate year-over-year percentage basis, and included New Hampshire, New Mexico, California, Connecticut, Minnesota, Washington, Massachusetts, Oregon, Nevada, and New York.

\textsuperscript{a} Electric Vehicle Survey Findings and Methodology, Union of Concerned Scientists and Consumer Reports, July 2019.
\textsuperscript{o} Climate Change Attitudes in New Jersey, a collaboration between Rutgers Eagleton for Public Interest Polling the New Jersey Climate Change Alliance, Ashley Koning, April 2019.
These ten sample states demonstrate a clear trend regarding the difference in growth rates between BEVs and PHEVs. In general, the growth rate is increasing for BEVs, and declining for PHEVs, consistent with an apparent overall shift to increased BEV fraction in the market. The charts below summarize the average year-over-year sales growth rate for the sample states for 2016 – 2018. The red dashed line represents the highest sales growth rate assumed in the projection model relative to the historical experience seen in the sample states (i.e. a 70% growth in BEV sales in 2020, and 20% in PHEV sales, when the rebate program launches in New Jersey).

Consistent with the trends evident in the sample states, the projection model assumes continued strong growth for BEVs, but declining growth for PHEVs. This trend was reinforced in early data for the first half of 2019 across all states considered (including New Jersey). The projection model assumptions are relatively conservative compared with known sales growth factors evident in the sample states.

The following charts provide further detail about the projection model assumptions compared with performance in the sample states. These graphs summarize the AVERAGE year-over-year sales growth rate in each of the sample states, from 2016 – 2018, compared with the assumptions in the projection model. As with the charts above, the red dashed line represents the highest growth assumptions used in the projection.

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\[ \text{Although the western coastal states (California, Oregon, Washington) demonstrate strong PEV sales each year, in absolute vehicle count, their year-over-year sales growth rate is somewhat smaller because the market is more mature. The sample states tended to have higher growth rates since they are earlier in their market development cycle, and many of them are also relevant as peer ZEV states in the mid-Atlantic region.}\]
As with the BEV/PHEV trend noted above, the projection model assumptions are well within the range of actual performance seen in the sample states. Eight of the 10 sample states demonstrated average 3-yr growth rates higher than the maximum assumed in the New Jersey projection. The PHEV assumptions are significantly below historical trends for the sample states, reflecting the emerging decline of PHEV sales growth moving forward. These benchmarks suggest that even the maximum growth rate assumptions during the year of rebate introduction (2020), are reasonable compared with the historical sales results demonstrated in leading states.
Beyond benchmarking with other states, the team also considered the net impact of all the moving parts relative to historical baseline in New Jersey. The net annual change in PEV population size reflect the aggregate impact of all model dynamics in a single metric, and those trends tend to be relatively predictable. The net change in PEV population in New Jersey resulting from this projection is summarized in the chart below.

![Net Change In New Jersey PEV Population](chart.png)

This trend makes sense conceptually, since it reflects a) the actual growth in 2017 and 2018, where New Jersey was in a strong growth mode, b) more modest growth in 2019 due to the current slow-down, c) a rebound in 2020 and 2021 based on the new rebate (and other positive factors, like new vehicle introductions), and c) a reasonable long term trajectory consistent with how maturing markets typically behave.

Finally, the projection assumptions were compared to a variety of recent studies that estimate PEV adoption in the US. That portfolio of studies represents a range of estimates through 2030 (or beyond), and the projection assumptions were within the range of estimates available, especially when focusing on the results expected within leading ZEV (Section-177) states. For example, the recent projection from Bloomberg New Energy Finance estimates that PEVs will represent about 40% of vehicles on the road by 2040q, average across the country, with higher penetration in leading states.

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q [https://about.bnef.com/electric-vehicle-outlook/](https://about.bnef.com/electric-vehicle-outlook/)
6.4 Potential Impact Of NJ Rebate

As noted in Section 4, the sales growth assumptions in the projection model balanced several antagonistic trends in the market. Sales growth in 2019 is weakening overall, as quantified in sales statistics for the first half of the year at both the national and state levels. There are structural reasons for this slow-down, which would motivate modest sales assumptions in 2020, with strengthening over time as those structural issues are addressed by the maturing market. At the same time, however, New Jersey plans to introduce a new vehicle purchase rebate that is expected to significantly stimulate growth. The projection model is based on the assumption that the new rebate program in 2020 will help stimulate sales, allowing for a stronger projection than the “slow down” trend would otherwise suggest. In short, the model assumed that sales growth in 2020 is approximately twice what it would have otherwise been without the rebate.

As a feasibility test, the study team examined all other states that have implemented rebate programs to assess what market impact could be expected from the planned New Jersey rebate. The experience in many states was not considered relevant in many cases, because they were of fundamentally different design, they were in states at very different levels of market maturity (i.e. numerous other factors in place that could simultaneously impact adoption), or the rebate program were so far in the past (when PEV availability was more limited, and prices were higher) as to not be relevant.

However, the recent experience in Colorado was identified as a reasonable market analog for predicting the likely impact on sales growth in New Jersey. First, Colorado is similar to New Jersey in many important ways: residents of each state have a similar affinity for the PEV value proposition (i.e. strong environmental values), similar levels of PEV market maturity\(^1\), and similar levels of median household income (both states were in the top 15 for median income in the United States in 2017\(^2\)). Second, Colorado currently provides a vehicle purchase rebate that is very similar to that proposed by New Jersey: a $5,000 rebate that can be realized by the buyer at the time of purchase. Third, the Colorado experience is relatively recent (introduced in 2017), with similar levels of vehicle availability and pricing to what New Jersey consumers will see in 2020 when the rebate is introduced. Any comparison based on “before and after” perspectives on sales rates is not perfect, since there may be (and probably are) other factors at play in the market that also affect adoption. However, for purposes of anticipating possible vehicle rebate impact on sales, Colorado was identified as the mostly closely matched market analog, providing the most recent perspective on a rebate design that is very similar.

The following chart illustrates the impact on sales in Colorado over a multi-year period, including a “before” and “after” view relative to rebate implementation. The rebate was implemented early in 2017, and the average of annual year-over-year sales growth for PEVs in 2015 and 2016 was 32.9%.

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\(^1\) New Jersey opted-in to the Section 177 ZEV framework early, but delayed signing on the regional ZEV MOU, and has delayed implementing programs or policies that would ensure attainment of those goals. That has changed recently, including New Jersey signing on to the ZEV MOU, and setting a goal of 330K PEVs on the road by 2025. Similarly, Colorado experienced reasonably strong levels of PEV sales, although there were few policies in place to encourage those sales. Colorado just opted into the Section 177 ZEV framework in 2019. Both New Jersey and Colorado were approximately cotemporaneous in their commitment to Section 177 goals and supporting policies.

compared with an average of 61.5% in 2017 and 2018. The year-over-year sales growth numbers were on average almost twice as large after the rebate as the two years prior to rebate introduction.

As noted above, this visual correlation is not perfect – there are numerous other market factors that could be involved in the sales rate changes noted. But the study team considers Colorado the best available market analog for anticipating the potential impact of a $5,000 rebate in New Jersey due to the high degree of similarity between the two states’ market conditions and rebate design. This context provides some confirmation of the rebate program impact assumed in the projection model.

6.5 Feasibility Assessment Conclusions

The study team completed a “sanity check” of the key assumptions in the projection model, looking at feasibility from several different perspectives. Generally, these validations support the range of assumptions made in the model, but also suggest needed advancements in the market to sustain the higher levels of adoption projected longer term. Key conclusions include:
1. PEV models are available in enough segments to provide options for consumers interested in considering a PEV rather than a traditional vehicle. The market share represented by those “covered segments” is more than sufficient to support the adoption levels needed in the short term (through 2025). Longer term, however, additional vehicles will be needed in more segments, especially the popular cross-over and SUV segments, to achieve the higher levels of adoption required to meet state goals. Given announcements already made by the auto industry, that need is expected to be addressed over the next five years.

2. There are still substantial price premiums for PEVs compared with traditional vehicles, typically $10-$15K for the base MSRP. The proposed New Jersey rebate will help close that gap short term, in combination with the federal tax credit (for some vehicles). Longer term, progress on affordability - through reductions in vehicles prices and/or the availability of incentives – will be required to achieve the higher levels of PEV penetration desired. For the most popular PEVs, after accounting for “as sold” configurations, the upper bound on MSRP is $45K - $50K.

3. Even though general awareness of PEVs and their benefits remains relatively low, that is changing. Recent studies indicate that a significant fraction of potential buyers (over the next 2–5 years) would at least consider a PEV rather than a traditional vehicle. Based on the two studies considered, an average 38% of consumers would be interested, compared with the more modest model assumptions that ramp up to about 16% market share of new sales in 2025. There is therefore sufficient consumer interest to support the projected sales short term, but achieving the projected market share longer term will depend on both growing consumer awareness, and a high level of conversion of consumer interest into actual buyers. This research suggests that New Jersey is fertile ground for higher levels of PEV adoption, but that a focus on achieving high levels of “conversion” of that interest into sales will be required to achieve longer term goals.

4. Benchmarks with a sample of the ten highest growth states for PEV sales (2016–2018) suggest that projection model assumptions for a) a transition to a preference for BEVs over PHEVs, and b) the levels of sales growth are supported by actual sales results in the sample states.

5. The projection model assumes that BEV sales in 2020 for New Jersey will be relatively strong due to the planned rebate, approximately twice the growth rate that would have otherwise been expected. This “rebate impact” assumption is consistent with the actual sales result in Colorado, who implemented a rebate program similar to the design being considered for New Jersey. This correlation isn’t perfect given other market dynamics that may be at play, but after an investigation into all rebate programs offered in the country, Colorado appears to be the closest to New Jersey as a market analog, and their experience validates the assumptions made in the projection model.
7 Findings and Conclusions

The projection model is based on a blended approach that starts with known registrations as of the end of 2018, extrapolates sales growth over the next few years consistent with recent trends, and transitions to the sales growth rates needed to achieve key objectives: the State goal of 330K PEVs by 2025 and the ChargEVC roadmap goal of 2M PEVs on the road by 2035. This methodology couples the projected sales strongly with recent market performance short term, but achieves attainment of key goals medium term while reflecting transition characteristics consistent with maturing markets.

The model incorporates detailed market research about recent sales statistics and trends, and those results suggest that the New Jersey market is in transition. While sales growth for both BEVs and PHEVs have been strong in New Jersey since 2016, with PEVs year-over-year growth exceeding 83% in 2018, growth appears to be softening. Sales at the national level have begun to weaken, and sales for the first half of 2019 in New Jersey are significantly lower than the same period in 2018. Simultaneously, the market (nationally, in New Jersey, and in other leading states) is experiencing a strong shift toward BEVs being a larger fraction of the market. Concurrent with these transition dynamics, however, are indicators for strong future growth, including a large number of new PEV models expected over the next two years, improved prices and longer range, and growing consumer awareness and interest.

Those factors, by themselves, would motivate significant reductions in sales growth in the short term, with growing strength as the market continues to mature. However, New Jersey is planning a vehicle rebate program with initial funding of $30M, which is expected to become available in 2020. Several utilities are proposing new programs that could stimulate infrastructure development and help address consumer barriers, and new consumer awareness programs are being planned. The study combined these considerations in estimating sales growth over the next few years, especially for the critical years 2020 and 2021. The projection therefore assumes a significant positive impact from the rebate program and other programs under development, offsetting the growth rate decline that might have otherwise emerged.

The projection model estimates that PEVs will account for approximately 16% of new LDV sales by 2025, and will represent approximately 5% of the LDV population. BEVs will be dominant by that point in time, accounting for 95% of the PEV population. The necessary sales growth rates peak when the rebate program is introduced, but then maintain strong growth while declining slightly year-over-year consistent with the typical behavior of maturing markets. By 2035, the model projects that PEVs will represent approximately 42% of new LDV sales, and 33% of the LDV population. This is consistent with goals established by global market leaders that are targeting approximately 30% PEV penetration in the 2030-2035 timeframe. The long term projection estimates that PEVs will approach 100% of LDV sales by 2050, at which point approximately 80% of the LDV population will be electrified. Attainment of these benchmarks, at a minimum, are required for the State to achieve its aggressive state GHG reduction goals.

The feasibility assessment considered whether the assumptions used in the model are likely to be achieved (or not) from a variety of perspectives. There is basic coverage of the vehicle market, when assessed at a per segment basis, to deliver the adoption rates assumed – although that coverage is minimal in many segments and price premiums for PEVs remain significant. Product coverage is therefore
considered sufficient to meet the model assumptions short term, but higher levels of adoption, especially in the period from 2025 to 2035, will depend on additional product availability and improved pricing. Consumer awareness is growing, and recent studies (at both the national and state level) confirm that there is already sufficient interest to support the modest levels of adoption assumed in the short term. The sales growth assumptions for the next few years, for example, a) have been achieved (and exceeded) in New Jersey in recent years, and b) are no more optimistic than sales growth evident in other leading PEV adoption states. Most importantly, the market experience in Colorado provides a meaningful example of the potential impact of the new vehicle rebate in New Jersey, and the sales growth rates assumed in the model are within the expected range of impact.

Taken together, these considerations suggest that the sales growth assumptions used in the model are feasible, but strong, sustained, sales growth will be necessary to achieve state goals, and success will depend heavily on the planned vehicle rebate program to address current affordability issues, combined with overcoming barriers related to charging infrastructure, continued introduction of new models in key segments with strong inventory availability, and successful efforts to expand consumer awareness significantly. The projection is therefore considered a “most likely” trajectory of adoption over the next few years given current market conditions, but in the medium term (2023–2025), attainment of state goals will depend heavily on the sustained success of market stimulation initiatives under development.

Longer term, attainment of the high levels of electrification expected to be required by 2050 will depend heavily on the EV adoption momentum established over the next few years. As part of the market research associated with this study, the team explored dozens of alternative adoption trajectories. If the next five years are not leveraged to create strong initial momentum, attainment of longer term goals becomes significantly less likely since unrealistically high growth levels become necessary in the out years. The State therefore faces a unique opportunity since early action to build momentum now makes long term electrification success much more likely.
Appendix A: ChargEVC Members

The following list summarizes all ChargEVC members as of the date of this study. Please go to www.chargevc.org for more details.

AAA
Association of NJ Environmental Coalitions
Atlantic City Electric
BYD
Center for Sustainable Energy
Clearview Energy
EN Engineering
Environment New Jersey
Environmental Defense Fund
EVgo
Fuel Force
Greenfaith
Greenlots
Independent Energy Producers of NJ
International Brotherhood of Electrical Workers
International Council of Shopping Centers
Isles, Inc.
Jersey Central Power & Light
JuiceBar
Natural Resources Defense Council
New Jersey Coalition of Automotive Retailers
New Jersey Clean Cities Coalition
New Jersey League of Conservation Voters
NJR Clean Energy Ventures
New Jersey State Electrical Workers Association
Plug-In America
Proterra
PSE&G
Rockland Electric
Sierra Club NJ Chapter
Sussex Rural Electric Cooperative
Tesla
Union of Concerned Scientists
Work Environmental Council

Associate Members
Cherry Hill Township
Cranford Environmental Commission
Princeton
Secaucus
Appendix B: Market Segmentation Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Schedule (MW)-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Size</td>
<td></td>
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<tr>
<td>Sport/Pony Cars</td>
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<tr>
<td>Compact</td>
<td></td>
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<tr>
<td>Subcompact</td>
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<tr>
<td>Compact/Mid-Pick-Up</td>
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<tr>
<td>Large Mid-Size SUV</td>
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<tr>
<td>Large SUV</td>
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<tr>
<td>Large Van</td>
<td></td>
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<tr>
<td>Mini Van</td>
<td></td>
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<tr>
<td>Near Luxury</td>
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<tr>
<td>Full Size Pick-Up</td>
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<tr>
<td>Compacts</td>
<td></td>
</tr>
<tr>
<td>Entry-Luxury</td>
<td></td>
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<tr>
<td>Luxury Mid-Size SUV</td>
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<tr>
<td>Luxury Large SUV</td>
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</tr>
</tbody>
</table>

Note: The table shows the market segmentation results with four segments accounting for 60% of the market. The percentages and monetary values are as follows:

- Mid-Size: 32.4% $28,977
- Sport/Pony Cars: 0.69% $26,657
- Compact: 11.57% $13,385
- Subcompact: 1.18% $11,053
- Compact/Mid-Pick-Up: 1.55% $24,971
- Large: 1.01% $33,450
- Near Luxury: 5.02% $29,497
- Entry-Luxury: 0.66% $33,450
- Full Size Pick-Up: 5.50% $39,565
- Compact SUV: 24.95% $24,966
- Subcompact SUV: 4.00% $23,083
- Large SUV: 1.12% $33,162
- Large Van: 1.27% $27,088
- Mini Van: 2.02% $29,972
- Luxury Mid-Size SUV: 0.81% $79,093
- Luxury Large SUV: 0.81% $79,093
- Luxury SUV: 2.57% $60,000

The table includes BEV and PHEV percentages for each category.
IN THE MATTER OF THE PETITION OF ATLANTIC CITY ELECTRIC COMPANY FOR APPROVAL OF A VOLUNTARY PROGRAM FOR PLUG-IN VEHICLE CHARGING

STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

CERTIFICATION OF SERVICE

ANDREW J. MCNALLY, of full age, certifies as follows:

1. I am an attorney at law of the State of New Jersey and am Assistant General Counsel to Atlantic City Electric Company, the Petitioner in the within matter, with which I am familiar.

2. I hereby certify that, on December 17, 2019, I caused the within Verified Petition and supporting appendixes thereto to be filed with the New Jersey Board of Public Utilities, by hand delivery, one original and ten copies to the Office of the Secretary to the Board, Board of Public Utilities, 44 South Clinton Avenue, 9th Floor, Trenton, New Jersey 08625-0350, Attention: Aida Camacho-Welch. I also caused an electronic copy to be sent to the Board Secretary’s office at board.secretary@bpu.state.nj.us.

3. I further certify that, on December 17, 2019, I caused a complete copy of the Verified Petition and supporting appendixes thereto to be hand delivered and sent by electronic mail to the Division of Rate Counsel at 140 East Front Street, Trenton, New Jersey 08625. I also caused a complete copy to be hand delivered and sent by electronic mail to the Division of Law, Pamela L. Owen, Esquire, Deputy Attorney General, 25 Market Street, Trenton, New Jersey 08625. A copy was delivered by electronic mail and Federal Express to Peter Van Brunt, Esquire, Deputy Attorney General, 124 Halsey Street, Newark, New Jersey 07101.
4. I further certify that, on December 17, 2019, I caused a complete copy of the Verified Petition and supporting appendixes to be sent by electronic mail and Federal Express to all remaining members of the Service List.

5. I further and finally certify that the foregoing statements made by me are true. I am aware that, if any of the foregoing statements made by me are willfully false, I am subject to punishment.

Dated: December 17, 2019

ANDREW J. MCNALLY

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(609) 909-7033 – Telephone
(609) 393-0243 – Facsimile
andrew.mcnally@exeloncorp.com
I/M/O Petition of Atlantic City Electric Company for Approval of a Voluntary Program for Plug-In Vehicle Charging
BPU Docket No. EO18020190

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