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October 11, 2018

IN THE MATTER OF THE PETITION OF PUBLIC
SERVICE ELECTRIC AND GAS COMPANY
FOR APPROVAL OF ITS CLEAN ENERGY FUTURE-ELECTRIC VEHICLE
AND ENERGY STORAGE (“CEF-EVES”) PROGRAM ON A REGULATED BASIS

BPU Docket No. _____

VIA BPU E-FILING SYSTEM & HARD COPY

Aida Camacho-Welch, Secretary of the Board
Board of Public Utilities
44 South Clinton Avenue, 9th Floor
Trenton, New Jersey 08625

Dear Secretary Camacho-Welch:

Enclosed for filing are the original and two copies of the Verified Petition of Public Service Electric and Gas Company (“PSE&G” or the “Company”) in the above-entitled matter, along with the attachments thereto. PSE&G originally filed this matter with the Board of Public Utilities (“BPU” or the “Board”) on September 26, 2018, along with its Clean Energy Future – Energy Efficiency (“CEF-EE”) and Clean Energy Future – Energy Cloud (“CEF-EC”) Programs. However, per the BPU’s request, PSE&G is now filing these three Clean Energy Future Programs separately, with their own petitions and docket numbers.

In support of PSE&G’s CEF-EVES Petition, attached and filed herewith are the Direct Testimonies and Schedules of the following witnesses.

<u>Attachment</u>	<u>Witness</u>	<u>Area of Responsibility</u>
1	Karen Reif, Vice President, Renewables and Energy Solutions, PSE&G	Electric Vehicles
2	Jorge L. Cardenas, Vice President, Asset Management and Centralized Services, PSE&G	Energy Storage

3	Stephen Swetz, Senior Director, Corporate Rates and Revenue Requirements, PSEG Services Corporation	Revenue requirements, cost recovery methodology, and rate design
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PSE&G respectfully requests that the Board retain jurisdiction over this CEF-EVES filing. Copies of the Petition and supporting documentation will be served upon all entities legally required to be noticed.

We look forward to the opportunity to actively participate in these upcoming proceedings and putting New Jersey on a path to a Clean Energy Future.

Respectfully submitted,



Matthew M. Weissman

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C Attached Service List (E-Mail Only)

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STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE PETITION OF)
PUBLIC SERVICE ELECTRIC AND GAS)
COMPANY FOR APPROVAL OF ITS)
CLEAN ENERGY FUTURE-ELECTRIC VEHICLE)
AND ENERGY STORAGE PROGRAMS)
ON A REGULATED BASIS)

PETITION

BPU Docket No. _____

I. INTRODUCTION

Public Service Electric and Gas Company (“PSE&G” or the “Company”), a corporation of the State of New Jersey, having its principal offices at 80 Park Plaza, Newark, New Jersey, respectfully petitions the New Jersey Board of Public Utilities (“Board” or “BPU”) pursuant to N.J.S.A. 48:2-21 and N.J.S.A. 48:2-21.1, and any other statute or regulation the Board deems applicable, as follows:

1. Petitioner is a public utility engaged in the distribution of electricity and the provision of electric Basic Generation Service (“BGS”), and the distribution of gas and the provision of Basic Gas Supply Service (“BGSS”), for residential, commercial, and industrial purposes within New Jersey. PSE&G provides service to approximately 2.2 million electric and 1.8 million gas customers in an area having a population of approximately six million people, which extends from the Hudson River opposite New York City, southwest to the Delaware River at Trenton and south to Camden, New Jersey.

2. PSE&G is subject to regulation by the Board for the purposes of setting its retail distribution rates and to assure safe, adequate, and reliable electric distribution and natural gas distribution service pursuant to N.J.S.A. 48:2-21 et seq.

3. Through this Petition and the accompanying schedules and testimonies, PSE&G seeks BPU approval for the Clean Energy Future – Electric Vehicle and Energy Storage Program

(“CEF-EVES Program”) which, along with two other programs PSE&G is filing at this time under separate petitions and docket numbers, form the basis for a clean and resilient energy future. The CEF-EVES Program will jumpstart the electric vehicle industry and energy storage technology in New Jersey, in order for the State to meet its clean transportation and clean energy objectives.

4. This Program, along with those other programs, will form a Clean Energy Future for New Jersey. This CEF-EVES Program, in particular, will further the State’s goals by, among other benefits: (a) reducing greenhouse gas emissions; (b) creating “green jobs;” (c) launching the electric vehicle industry and energy storage technology in New Jersey; and (d) making the electric grid more reliable, resilient, and safe. Taken together, these programs will allow New Jersey to take the first steps toward becoming a leader in the development of a Clean Energy Future.

II. THE CEF – EVES PROGRAM

A. CEF-EVES Program Background

5. The CEF-EVES Program will help establish New Jersey as a national leader in clean energy, advanced technology development, and environmental excellence. The CEF-EVES Program is supported by the testimonies of Ms. Reif (electric vehicles or “EV”) and Mr. Cardenas (energy storage or “ES”).

6. Recent legislative and executive action in New Jersey has demonstrated a general State policy in support of electric vehicles and energy storage projects. The State recently codified its energy goals in the Clean Energy Law, which reflects an objective of achieving 600 MW of energy storage by 2021 and 2,000 MW by 2030.¹ The Clean Energy Law further directs that the Board conduct an analysis that, *inter alia*, considers “whether implementation of

¹ P.L. 2018, c. 17, § 1(d).

renewable electric energy storage systems would promote the use of electric vehicles in the State[.]”² In addition, Governor Murphy’s Executive Order No. 28 calls for the development of a revised NJEMP by June 1, 2019 to provide a blueprint for the conversion of New Jersey’s energy production profile to 100% clean energy sources by January 1, 2050. The new NJEMP must also explore methods “to incentivize the use of clean, efficient energy and electric technology alternatives in New Jersey’s transportation sector and at New Jersey’s ports.”

7. New Jersey also is a partner in California’s zero-emission vehicle program (“ZEV Program”), which stipulates that large volume automobile manufacturers achieve a certain percentage of new vehicle sales from zero emission vehicles.

8. It is reasonable and prudent for the Company to advance investment in regulated programs that will help New Jersey achieve its energy storage and electric vehicle goals. The CEF-EVES Program will provide significant benefits, including environmentally beneficial economic development and job growth in the state consistent with New Jersey’s goals. Accordingly, in accordance with N.J.S.A. 48:2-21 and 48:2.21.1, PSE&G requests that the Board approve on an expedited basis the CEF-EVES Program through a new Technology Innovation Charge (“TIC”) component of its electric tariff outlined below.

B. Electric Vehicle Overview

9. PSE&G proposes to commit up to \$261 million of investment over a period of approximately six years and projects approximately \$103 million in expenses for the four EV subprograms described below, to commence upon Board approval. A breakdown of the types of costs reflected in the investment and expense categories are discussed further by Ms. Reif in

² *Id.* at § 1(a)(2).

Attachment 1 to this Petition. The proposed six-year commitment period will provide funding and stability that will be important to jumpstart the EV market in New Jersey.

10. A summary of the four EV subprograms is as follows, with more detailed descriptions contained in Ms. Reif’s testimony:

Subprogram	Description	Benefits	Target Number of Charging Stations	Investment Costs (millions)*
Residential Smart Charging	Incentives towards Level 2 networked EV Chargers at residences	Environmental improvement	37,000	\$93
Level 2 Mixed-Use Charging	Deployment of electrical infrastructure and incentives for Level 2 chargers	Job creation	2,200	\$39
Public DC Fast Charging	Deployment of electrical infrastructure and incentives towards or ownership of DC Fast Chargers	Mitigation of EV market barriers	450	\$62
Vehicle Innovation	Incentives for electric school buses and charging equipment; Open solicitation for customized electrification projects	Increased knowledge of the electric distribution system and energy usage	60	\$45
Cross-Subprogram Investment	Investment that is common to all subprograms and includes investment in IT, and education and outreach.			\$22
Total Investment				\$261

11. As reflected in the testimony of Ms. Reif, compared to other states in the ZEV Program, New Jersey lags in both EV penetration per capita and EV charging infrastructure density. The EV subprograms will help to combat these trends by accelerating the development of EV charging infrastructure in New Jersey.

12. The EV subprograms will support the widespread adoption of EVs in all sectors of the economy, including multi-family and low-income customers, as well as customers residing in communities most impacted by air pollutants and GHGs. The subprograms will utilize

multiple approaches to engage customers and encourage customer participation. These approaches include collaboration with advocacy and community groups, online advertising, e-mail marketing, and direct mailings, amongst other methods.

13. The EV subprograms will have wide-reaching customer and societal benefits, while putting New Jersey on track to become a frontrunner in transportation electrification.

These benefits include:

- **Environmental benefits** – EVs offer tremendous promise to help improve the environment by reducing GHGs and other air pollutants. The ChargeEVC³ roadmap, released in September 2017, estimated that every electrically-fueled mile driven in New Jersey is at least 70% cleaner than an average mile that is fueled by gasoline.⁴ Accordingly, the increased EV adoption resulting from PSE&G’s four EV subprograms would remove approximately 16 million net tons of CO₂ through 2035;
- **Job creation** - The EV subprograms will support the clean energy economy and create approximately 3,900 direct, indirect and induced job-years;⁵
- **Supporting schools, including in low income areas** – by providing grants to public school districts to cover the cost of purchasing electric school buses, thereby freeing up resources that can be devoted to educating students;

³ ChargeEVC is a not-for-profit trade and research organization that brings together various groups, including PSE&G, which are impacted by EV penetration, leading to a coalition of diverse interests that strives to help guide sustainable EV growth.

⁴ ChargeEVC, [A Roadmap for Vehicle Electrification in New Jersey: Market Development Strategy and High Impact Initiatives 5](http://www.chargevc.org/documents/chargevc-roadmap/) (Sept. 13, 2017) (“2017 ChargeEVC Roadmap”), available at <http://www.chargevc.org/documents/chargevc-roadmap/>. ChargeEVC’s estimate is based on the current electricity supply mix in NJ, and average gasoline vehicle efficiencies.

⁵ The value of job-years is based on the Rutgers report “Analysis for the 2011 Draft New Jersey Energy Master Plan Update” using the factor 7.91 direct jobs per one million dollars in program spend. (https://nj.gov/emp/docs/pdf/emp_creeep_report20110412.pdf) and the National Renewable Energy Laboratory Jobs and Economic Development Impact Model (<https://www.nrel.gov/analysis/jedi/>).

- **Mitigation of EV market barriers** – The EV subprograms will address critical barriers in the EV market such as lack of consumer awareness, higher upfront cost of electric vehicles, gaps in public charging coverage, and range anxiety (*i.e.*, fear of running out of charge);
- **Increased knowledge** – Collectively, the four EV subprograms will facilitate the implementation of approximately 40,000 chargers with two-way communication “smart chargers,” which will transmit data to a platform that is accessible to PSE&G. This technology investment will provide data to help optimize electric distribution system planning and operation, and support improvements to rate design to better align rates with cost causation; and
- **Advancement of New Jersey’s clean energy goals** – as reflected in the NJGWRA’s GHG reduction targets, New Jersey’s participation in the ZEV program, and Executive Order No. 28.

14. PSE&G requests the flexibility to transfer funds between EV subprograms and across years to respond to market conditions and participant demands to further maximize energy savings and EV subprogram resources.

15. The EV subprograms will be subject to evaluation and reporting requirements as described in Ms. Reif’s testimony.

C. Energy Storage Overview

16. PSE&G proposes to commit up to \$109 million of investment in five energy storage subprograms over a period of approximately six years, and projects approximately \$70 million in expenses. A breakdown of the types of costs reflected in the investment and expense

categories are discussed further by Mr. Cardenas in Attachment 2 to this Petition. ES subprogram investments will occur over the course of a six-year period subject to the ultimate authorized budget for investment and expenses. The implementation schedule for the energy storage systems (“ESSs”) is discussed further in Mr. Cardenas’s testimony.

17. A summary of the five ES subprograms is below, with more detailed descriptions contained in Mr. Cardenas’s testimony:

Use	Description	Customer Benefit	# of Installations	Storage MW	Program Cost (\$ millions)
1. Solar Smoothing	ESS used to smooth short-term changes in voltage due to intermittent generation	Relieves rapid power fluctuations on distribution circuits, extends life of impacted infrastructure, and mitigates voltage disturbances at customer locations	5	10	\$13.1
2. Distribution Deferral	ESSs that resolve forecasted overloads on the system	Utilizes non-wires alternatives to defer or eliminate the need for traditional utility upgrades	7	13	\$38.6
3. Outage Management	Deploy fleet of mobile ESSs for contingency resources during substation construction	ESSs to help reduce the cost of substation construction by reducing the need for mobile transformers	6	6	\$20.0
4. Microgrids for Critical Facilities*	Provide capital to support the development of microgrids	Enables critical facilities to operate independent of the electric grid during extended grid outages	1 to 4	2	\$25.7
5. Peak Reduction for Public Sector Facilities	ESSs sited at public sector facilities and deployed to reduce peak demand	ESSs to help resolve potential overloads, address power quality issues at host sites, and reduce bills for public sector customers	4	4	\$11.9
Total			23 to 26	35	\$109.4

*Program Cost includes funding for 2 MW of storage and 4 MW of solar, or additional generation, to supplement storage

18. The ES subprograms are designed to incorporate utility-scale energy storage into the Company’s distribution system to optimize electricity costs for PSE&G’s customers, support grid operations, and facilitate the integration of renewables on the PSE&G grid.

19. Overall, the ES subprograms will install 35 MW of energy storage capacity across the PSE&G distribution system over six years. Zero carbon and low carbon generation resources are vital to maintaining a clean energy future, and energy storage is expected to be an important resource that New Jersey and its utilities can use to support clean energy goals. While the 35 MW of pilot energy storage deployments proposed by the ES subprograms is only 6% of the 2020 State goal and less than 2% of the 2030 State goal, they represent an important start to achieving the energy storage targets set forth in the Clean Energy Law.

20. The ES subprograms are also expected to help create clean energy jobs in New Jersey. PSE&G estimates that the ES subprograms will create approximately 1,930 direct, indirect and induced job-years. Beyond that, they are expected to create an ecosystem around which the maturing national energy storage market can grow.

21. PSE&G requests the flexibility to transfer funds between ES subprograms and across subprogram years to respond to market conditions and participant demands.

22. The Company will undertake certain evaluation and reporting obligations concerning the ES subprograms. These assumed evaluation and reporting requirements are described in Mr. Cardenas's direct testimony.

D. CEF-EVES Cost Recovery

23. PSE&G proposes to implement a cost recovery mechanism, described more fully below and in Mr. Swetz's testimony, to enable it to timely recover the costs associated with the CEF-EVES Program. The Company's proposed cost recovery mechanism is a fair and efficient means of enabling PSE&G to timely recover the considerable investments that are required by the CEF-EVES Program.

24. PSE&G is proposing rate treatment for the CEF-EVES Program that is consistent with the rate treatment applied to the Company's green programs via its GPRC, with modifications as described herein. The Company requests that the Board grant approval of recovery of the revenue requirements associated with all CEF-EVES Program costs. These costs would be partially offset by the revenues derived from the CEF-EVES Program, including, but not limited to, EV charging revenue associated with Company-owned chargers, and any PJM revenues derived from the ES subprograms or from the assets installed in the CEF-EVES Program, such as through the PJM frequency regulation market. In addition, if the Company can derive any additional revenue in the future from these programs, all net proceeds will be credited to ratepayers as a reduction to revenue requirements.

25. The CEF-EVES Program is proposed to be recovered as separate components of the TIC, a new charge to the Company's Tariff for Electric Service. The two TIC components are the CEF-EV component ("CEF-EVC") and the CEF-ES component ("CEF-ESC"). The TIC would be filed annually after the proposed initial period. Mr. Swetz's testimony (Attachment 3 to this Petition) contains the revenue requirement methodology, cost recovery mechanism, and bill impact analysis associated with the CEF-EVC and CEF-ESC.

26. With respect to the CEF-EVES Program, PSE&G proposes to earn a return on its net investment based upon an authorized ROE and capital structure including income tax effects. The Company is proposing to utilize the latest cost of capital authorized by the Board in a base rate case proceeding. Since the CEF-EVES Program is anticipated to commence after Board approval of the Company's 2018 Rate Case, the Company is utilizing for forecasting purposes the WACC submitted in the 2018 Rate Case. See Schedule SS-CEF-TIC-1 for the calculation of the current After-Tax WACC utilized in the revenue requirement calculation. Any change in the

WACC authorized by the Board in the pending or any subsequent electric, gas or combined base rate case would be reflected in the subsequent monthly revenue requirement calculations. Any changes to current tax rates would also be reflected in an adjustment to the After-Tax WACC.

27. As set forth in more detail in Mr. Swetz’s testimony, the depreciation or amortization of the EV subprogram assets will vary depending on asset class. The table below summarizes the proposed book recovery and associated tax depreciation applied to the corresponding EV asset classes. The tax depreciation is calculated on the total tax cost of the asset.

Asset Class	Book Recovery	Base Tax Depreciation
Utility Plant Investment	40 years dep.	20 years MACRS
Chargers Utility Owned	10 years dep.	20 years MACRS
Battery Storage	15 years dep.	7 years MACRS
Chargers Regulatory Asset (Non-Loan)	10 years dep.	One Month
Chargers Regulatory Asset (Loan)	10 years dep.	Loan
IT Software Investment	4 years dep.	3 yrs. (Straight Line)

28. The depreciation or amortization of the ES subprogram assets will vary depending on asset class. The table below summarizes the proposed book recovery and associated tax depreciation applied to the corresponding ES asset classes. The tax depreciation is calculated on the total tax cost of the asset, less 50% of the investment tax credit for assets associated with solar systems.

Asset Class	Book Recovery	Tax Depreciation
Batteries	15 year dep.	7 year MACRS
Solar Panels, acquisition and installation costs	20 year dep.	5 year MACRS
Inverters	10 year dep.	
Communications Equipment		
Meters/Interconnection	20 year dep.	20 year MACRS

29. The expected increase from the CEF-EVC of the TIC for the initial recovery period for a residential customer would be \$0.000152 per kWh without SUT (\$0.000162 per kWh including SUT) with an expected maximum increase to the RS typical annual bill occurring in the period October 1, 2024 through September 30, 2025 with a rate of \$0.001009 per kWh without SUT (\$0.001076 per kWh including SUT).

30. The expected increase from the CEF-ESC of the TIC for the initial recovery period for a residential customer would be \$0.000011 per kWh without SUT (\$0.000012 per kWh including SUT) with an expected maximum increase to the RS typical annual bill occurring in the period October 1, 2025 through September 30, 2026 with a rate of \$0.000386 per kWh without SUT (\$0.000412 per kWh including SUT).

31. With respect to rate impacts associated with the EV subprograms, PSE&G's typical residential customer using 750 kWh in a summer month and 7,200 kWh annually would experience an initial increase in their annual bill from \$1,233.72 to \$1,234.92 or \$1.20, or approximately 0.10%, or an average of about \$0.10 per month (based upon Delivery Rates and BGS-RSCP charges in effect September 8, 2018, assuming the customer receives BGS-RSCP service from PSE&G), with the expected maximum increase in the period from October 1, 2024 through September 30, 2025 of approximately \$7.72 (0.63%), or about \$0.64 per month from rates in effect September 8, 2018.

32. With respect to rate impacts associated with the CEF-ES subprograms, PSE&G's typical electric residential customer using 750 kWh in a summer month and 7,200 kWh annually would experience an initial increase in their annual bill from \$1,233.72 to \$1,233.84 or \$0.12, or approximately 0.01%, or an average of about \$0.01 per month (based upon Delivery Rates and BGS-RSCP charges in effect September 8, 2018, assuming that the customer receives BGS-

RSCP service from PSE&G), with the expected maximum increase in the period from October 1, 2025 through September 30, 2026 of approximately \$3.00 (0.24%), or about \$0.25 per month from rates in effect September 8, 2018.

33. With respect to the combined rate impacts from the CEF-EVES components of the TIC: PSE&G's typical residential customer using 750 kWh in a summer month and 7,200 kWh annually would experience an initial increase in their annual bill from \$1,233.72 to \$1,234.96 or \$1.24, or approximately 0.10%, or an average of about \$0.12 per month (based upon Delivery Rates and BGS-RSCP charges in effect September 8, 2018, assuming that the customer receives BGS-RSCP service from PSE&G), with the expected maximum increase in the period from October 1, 2025 through September 30, 2026 of approximately \$10.60 (0.86%), or about \$0.88 per month from rates in effect September 8, 2018.

34. PSE&G has submitted proposed tariff sheets as Attachment 5 (redlined and clean), effective upon issuance of a written BPU order, designed to recover the CEF-EVES Program costs, which includes carrying charges on the Company's expenditures.

35. The residential customer bill impacts comparing the current and proposed delivery charges are stated in the CEF-EVES Typical Residential Bill Impacts and draft Form of Notice of Filing and of Public Hearings set forth in Attachments 6 and 7, respectively.

36. In calculating the monthly interest on net over and under recoveries, the interest rate shall be based upon the Company's interest rate obtained on its commercial paper and/or bank credit lines utilized in the preceding month. If both commercial paper and bank credit lines have been utilized, the weighted average of both sources of capital shall be used. In the event that neither commercial paper nor bank credit lines were utilized in the preceding month, the last calculated rate will be used. The interest rate shall not exceed PSE&G's overall rate of return as

authorized by the Board as utilized in calculating revenue requirements for the corresponding period. The calculation of monthly interest shall be based on the net of tax average monthly balance, consistent with the methodology set forth in Attachment 3, Schedules SS-CEF-EV-4 for the EV subprograms and Schedule SS-CEF-ES-4 for the ES subprograms. Simple interest shall accrue on any under and over recovered balances, and shall be included in the deferred balances at the end of each reconciliation period. Near the end of the initial and each subsequent recovery period, the corresponding deferred balances would be included with forecasted revenue requirements for the succeeding period for purpose of setting the revised CEF-EVC and CEF-ESC.

37. Both the CEF-EVC and CEF-ESC are proposed to be applicable to all electric rate schedules on an equal cents per kilowatt-hour basis in the same manner as currently utilized for all electric components of the GPRC. The initial CEF-EVC and CEF-ESC will be based on estimated CEF-EVES Program revenue requirements from April 1, 2019 through September 30, 2020. Thereafter, the CEF-EVC and CEF-ESC of the TIC will be changed as part of an annual cost recovery review as currently conducted for the GPRC. The annual filing will incorporate a true-up for actuals and an estimate of the revenue requirements for the upcoming year.

38. PSE&G requests that the rates to be charged to recover all of the CEF-EVES Program costs be approved by the Board along with the cost recovery mechanism proposed in this Petition. PSE&G also requests that the Board authorize the Company to implement the rates proposed herein, upon issuance of a written BPU order.

39. PSE&G further requests that the Board retain this filing for review on an expedited basis to help achieve the objectives of the proposed CEF-EVES Program as soon as possible. To that end, the Company respectfully requests that the proposed CEF-EVES Program,

which was discussed at the 30-day meeting for the CEF-EE Program, be reviewed on the same schedule as that Program.

V. SUPPORTING TESTIMONY AND PUBLIC NOTICE

40. Below is a table listing the supporting testimony for this Petition and other attachments:

Attachment No.	Document Description
1	Testimony of Karen Reif in support of the EV subprograms
2	Testimony of Jorge L. Cardenas in support of the ES subprograms
3	Testimony of Stephen Swetz describing revenue requirement methodologies, cost recovery mechanisms, and bill impact analysis for the CEF-EVES Program
4	Accounting Schedules
5	Clean and Redlined Tariff Sheets – TIC
6	Typical Residential Customer Bill Impacts – CEF-EVES Program
7	Form of Notice of Filing and of Public Hearings – CEF-EVES Program

41. The Form of Notice sets forth the requested changes to electric rates, and will be placed in newspapers having a circulation within the Company’s service territory upon receipt, scheduling, and publication of public hearing dates. Public hearings will be held in each geographic area within the Company’s service territory, i.e., Northern, Central, and Southern. The Form of Notice will be served on the County Executives and Clerks of all municipalities within the Company’s electric service territories upon receipt, scheduling, and publication of public hearing dates.

42. Notice of this filing and two copies of the Petition will be served upon the Department of Law and Public Safety, 124 Halsey Street, P.O. Box 45029, Newark, New Jersey 07101 and upon the Director, Division of Rate Counsel, 140 East Front Street, 4th Floor, Trenton, New Jersey 08625. The Petition and supporting testimony and attachments will also be e-mailed to the persons identified on the service list provided with this filing.

VI. COMMUNICATIONS

Communications and correspondence related to the Petition should be sent as follows:

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VII. CONCLUSION AND REQUESTS FOR APPROVAL

For all the foregoing reasons, PSE&G respectfully requests that the Board retain jurisdiction of this matter and review and expeditiously issue an order approving the CEF-EVES Program, specifically finding that:

1. The CEF-EVES Program is in the public interest;
2. The CEF-EVES Program, as described herein, is reasonable and prudent;
3. PSE&G is authorized to implement and administer the CEF-EVES Program under the terms set forth in this Petition and accompanying Attachments;
4. The cost recovery proposals and mechanisms for the CEF-EVES Program set forth in this Petition will provide for implementation of just and reasonable rates, and are approved;
and
5. PSE&G may recover all prudently-incurred costs associated with the CEF-EVES Program, on a full and timely basis, under the cost recovery mechanisms set forth herein.

Respectfully submitted,

PUBLIC SERVICE ELECTRIC AND GAS COMPANY



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General State Regulatory Counsel
PSEG Services Corporation
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Phone: (973) 430-7052
Fax: (973) 430-5983

DATED: October 11, 2018
Newark, New Jersey

VERIFICATION

STATE OF NEW JERSEY)
 :
COUNTY OF ESSEX)

Karen Reif, of full age, being duly sworn according to law, on her oath deposes and says:

1. I am Vice President, Renewables and Energy Solutions of Public Service Electric and Gas Company, the petitioner in the foregoing Petition.

2. I have read the annexed Petition, and the matters and things contained therein are true to the best of my knowledge and belief with respect to the electric vehicles subprograms.

3. Copies of the Petition have been provided to the NJBPU, the Department of Law & Public Safety, and the Division of Rate Counsel.

Karen Reif

Karen Reif

Sworn and subscribed to)
before me this 10th day)
of October, 2018)

Michele D. Falcao

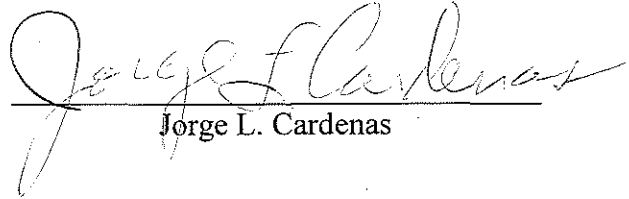


VERIFICATION

STATE OF NEW JERSEY)
:)
COUNTY OF ESSEX)

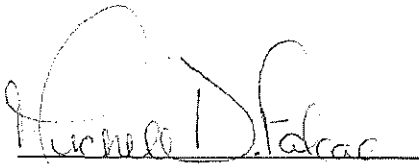
Jorge L. Cardenas, of full age, being duly sworn according to law, on his oath deposes and says:

- 1. I am Vice President, Asset Management and Centralized Services of Public Service Electric and Gas Company, the petitioner in the foregoing Petition.
- 2. I have read the annexed Petition, and the matters and things contained therein are true to the best of my knowledge and belief with respect to the energy storage subprograms.
- 3. Copies of the Petition have been provided to the NJBPU, the Department of Law & Public Safety, and the Division of Rate Counsel.



Jorge L. Cardenas

Sworn and subscribed to)
before me this 10th day)
of October, 2018)



MICHELE D. FALCAO Notary Public, State of New Jersey My Commission Expires November 14, 2021

**STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES**

**IN THE MATTER OF THE PETITION OF PUBLIC
SERVICE ELECTRIC AND GAS COMPANY
FOR APPROVAL OF ITS CLEAN ENERGY FUTURE-
ELECTRIC VEHICLE AND ENERGY STORAGE
PROGRAMS ON A REGULATED BASIS**

BPU Docket No. _____

**PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
KAREN REIF
VICE PRESIDENT RENEWABLES & ENERGY
SOLUTIONS**

October 11, 2018

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1 **PUBLIC SERVICE ELECTRIC AND GAS COMPANY**
2 **DIRECT TESTIMONY**
3 **OF**
4 **KAREN REIF**
5 **VICE PRESIDENT OF RENEWABLES & ENERGY SOLUTIONS**
6

7 **Q. Please state your name and professional title.**

8 A. My name is Karen Reif. I am the Vice President of Renewables & Energy Solutions
9 at Public Service Electric and Gas Company (“PSE&G” or “the Company”). My
10 professional credentials are set forth in the attached Schedule KR-CEF-EV-1.

11 **I. SCOPE OF TESTIMONY**

12 **Q. What is the purpose of your testimony?**

13 A. I am testifying in support of the Company’s filing in this proceeding for authority to
14 implement a Clean Energy Future Electric Vehicle and Energy Storage Program (“CEF-
15 EVES Program”). The intent of the CEF-EVES Program is to help establish New Jersey as a
16 national leader in clean energy, advanced technology development, and environmental
17 excellence. The CEF-EVES Program supports the Company’s broader clean energy future
18 vision and is consistent with the State’s energy and environmental goals, including the clean
19 energy goals articulated in the Clean Energy Law enacted on May 23, 2018 (P.L. 2018, c. 17)
20 (“Clean Energy Law”) and described in more detail in the accompanying Petition. The
21 electric vehicle (“CEF-EV” or “EV”) component of the CEF-EVES filing includes four
22 subprograms to support the widespread adoption of EVs across a broad range of customers
23 and sectors. The energy storage component of the CEF-EVES Program is described in the
24 testimony of Mr. Jorge Cardenas.

1 **Q. How is your testimony organized?**

2 A. My testimony provides an overview of the proposed EV subprograms, associated
3 benefits, subprogram details and costs, customer outreach, and monitoring.

4 **Q. Do you sponsor any schedules as part of your direct testimony?**

5 A. Yes. I sponsor the following schedule that was prepared by me and/or under my
6 supervision and direction:

7 Schedule KR-CEF-EV-1 describes my professional credentials;
8

9 **Q. Is PSE&G submitting any other testimony in support of the CEF-EVES**
10 **Programs?**

11 A. Yes, Mr. Stephen Swetz is filing testimony in this matter addressing revenue
12 requirements, cost recovery, and rate impacts for CEF-EVES Programs. In addition, Mr.
13 Jorge Cardenas has filed testimony addressing the potential benefits and detailed descriptions
14 of the five proposed energy storage subprograms for the CEF-EVES Program.

15 **II. CEF-EVES PROGRAM**

16 **A. *Program Overview***

17 **Q. Please provide a summary of the EV subprograms proposed in this filing.**

18 A. PSE&G is proposing to commit up to \$261 million of investment to implement four
19 EV subprograms that will support the deployment of EV charging infrastructure and
20 accelerate electrification of light, medium and heavy-duty vehicles across a wide range of
21 customers and sectors:

- 1 • **Residential Smart Charging** – PSE&G will provide rebates for networked EV
2 chargers at residences in the PSE&G territory and provide customer incentives to
3 encourage charging during off-peak periods.
- 4 • **Level 2 Mixed-Use Charging** - PSE&G will deploy electrical infrastructure and
5 provide rebates, tiered by customer type, towards the upfront cost of Level 2 charging
6 equipment and installation. The Level 2 Mixed-Use Charging subprogram is
7 designed to target a diverse set of customers (e.g., multifamily residences,
8 workplaces, fleets, municipalities, overnight lodging) and serve a variety of end-use
9 EV charging needs.
- 10 • **Public DC Fast Charging** – PSE&G will deploy electrical infrastructure and either
11 own or provide financial incentives towards the upfront cost of direct current (“DC”)
12 Fast Charging equipment and installation. PSE&G will also provide financial
13 incentives to offset electricity costs.
- 14 • **Vehicle Innovation** – PSE&G will provide incentives towards electric school buses
15 and EV charging infrastructure that will service school districts in the PSE&G
16 territory, as well as hold an open bidding process to fund high-impact, customized
17 electrification projects for customers with non-standard medium and heavy-duty
18 vehicle electrification needs.

1 Figure 1 below provides a further overview of the EV subprograms:

2 **Figure 1: EV Subprogram Descriptions, Targets and Investment**

Subprogram	Description	Benefits	Target Number of Charging Stations	Investment Costs (millions)*
Residential Smart Charging	Incentives towards Level 2 networked EV Chargers at residences	Environmental improvement	37,000	\$93
Level 2 Mixed-Use Charging	Deployment of electrical infrastructure and incentives for Level 2 chargers	Job creation Mitigation of EV market barriers	2,200	\$39
Public DC Fast Charging	Deployment of electrical infrastructure and incentives towards or ownership of DC Fast Chargers	Increased knowledge of the electric distribution system and energy usage	450	\$62
Vehicle Innovation	Incentives for electric school buses and charging equipment Open solicitation for customized electrification projects	Advancement of state energy and environmental goals	60	\$45
Cross-Subprogram Investment	Investment that is common to all subprograms and includes investment in IT and education and outreach.			\$22
Total Investment				\$261

3 **Q. What conclusions regarding the CEF-EVES Program are supported by your**
 4 **testimony?**

5 A. The proposed EV subprograms will provide considerable benefits not just to EV
 6 owners, but to all PSE&G customers, local communities, those traveling through the state,
 7 and especially those residing in neighborhoods most impacted by air pollutants and
 8 greenhouse gas emissions. These benefits include:

- 9 • **Environmental benefits** – EVs offer tremendous promise to help improve the
 10 environment by reducing greenhouse gas emissions and other air pollutants. The

1 ChargEVC¹ roadmap estimated that every electrically fueled mile driven in New
 2 Jersey is at least 70% cleaner than an average mile that is fueled by gasoline.² The
 3 increased EV adoption resulting from PSE&G’s four EV subprograms would remove
 4 approximately 16 million net tons of CO₂ emissions through the period 2035. The
 5 emissions savings are equivalent to removing up to 65,000 cars from New Jersey
 6 roads for one year;³

7 • **Advancement of New Jersey clean energy goals** – The EV subprograms will
 8 facilitate achievement of state goals set forth in the Global Warming Response Act
 9 (“GWRA”), the Energy Master Plan, California’s Zero Emission Vehicle Program
 10 (“ZEV”), in which New Jersey participates, and the Clean Energy Law.

11 • **Job creation** - The EV subprograms will support the clean energy economy and
 12 create approximately 3,900 direct, indirect and induced job-years;⁴

13 • **Mitigation of EV market barriers** – The EV subprograms will address critical
 14 barriers in the EV market such as lack of consumer awareness, higher upfront cost of

¹ ChargEVC is a not-for-profit trade and research organization that brings together various groups, including PSE&G, that are impacted by EV penetration, leading to a coalition of diverse interests that strives to help guide sustainable EV growth.

² ChargEVC, [A Roadmap for Vehicle Electrification in New Jersey: Market Development Strategy and High Impact Initiatives](http://www.chargevc.org/documents/chargevc-roadmap/), 5 (Sept. 13, 2017) (“2017 ChargEVC Roadmap”), available at <http://www.chargevc.org/documents/chargevc-roadmap/>.

³ Based upon the Greenhouse Gas Equivalencies Calculator developed by the U.S. Environmental Protection Agency (<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>), using program year 2025 emissions data

⁴ The value of job-years is based on the Rutgers report “Analysis for the 2011 Draft New Jersey Energy Master Plan Update” using the factor 7.91 direct jobs per one million dollars in program spend. (https://nj.gov/emp/docs/pdf/emp_creeep_report20110412.pdf) and the National Renewable Energy Laboratory Jobs and Economic Development Impact Model (<https://www.nrel.gov/analysis/jedi/>).

1 EVs (including charging equipment), gaps in public charging coverage, and range
2 anxiety (fear of running out of charge);

3 • **Increased knowledge** – Collectively, the four subprograms will facilitate the
4 implementation of approximately 40,000 “smart chargers” with two-way
5 communication, which will transmit data to a platform that is accessible to PSE&G.
6 This technology will provide data to help optimize electric distribution system
7 planning and operation, and support improvements to rate design to better align rates
8 with cost causation.

9 The proposed EV subprograms will help to position New Jersey as a national leader
10 in vehicle electrification and should be approved by the Board.

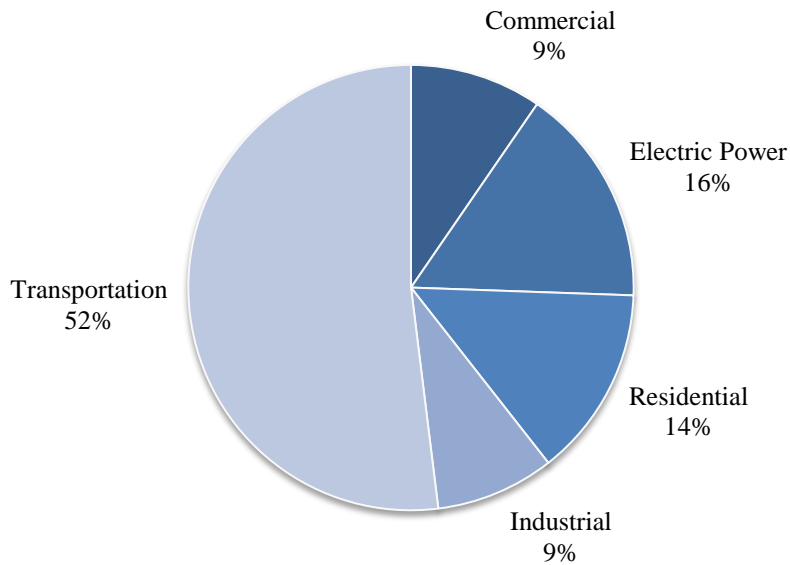
11 **Q. Please further describe the benefits of the EV subprograms and how they will**
12 **advance the State’s energy, environmental and economic goals.**

13 A. The EV subprograms will have wide-reaching customer and societal benefits, while
14 launching New Jersey on a track to become a frontrunner in transportation electrification.
15 These benefits include environmental improvement, job creation, mitigation of EV market
16 barriers, increased knowledge of the electric distribution system and energy usage, and
17 advancement of state energy and environmental goals.

18 With respect to the environmental benefits, electrifying the transportation sector
19 offers the single most significant opportunity in New Jersey to improve air quality, since
20 52% of the state’s greenhouse gas emissions come from the transportation segment. Carbon
21 dioxide emissions by sector for New Jersey are shown in the Figure 2 below. Additionally,
22 compared to other states, New Jersey ranks sixteenth for total carbon dioxide emissions, but

1 it is the eighth largest polluting state in terms of carbon dioxide emissions from
 2 transportation.⁵ Therefore, the EV subprograms will help to facilitate a reduction in carbon
 3 emissions.

4 **Figure 2: New Jersey 2015 Carbon Dioxide Emissions by Sector⁶**



5
 6 The proposed subprograms provide a vital avenue to help New Jersey achieve state
 7 energy and environmental goals. The GWRA requires an 80% reduction in greenhouse gas
 8 emissions by 2050.⁷ In addition, New Jersey’s participation in the California Zero Emission
 9 Vehicle program stipulates that large volume automobile manufacturers achieve a certain
 10 percentage of new vehicle sales from zero emission vehicles. To meet the ZEV goals,
 11 ChargeVC is estimating that 330,000 light-duty plug-in EVs will be needed in New Jersey

⁵ EIA State Carbon Dioxide Emissions Data, as of 2015: <https://www.eia.gov/environment/emissions/state/>.

⁶ United States Energy Information Administration (“EIA”), State Carbon Dioxide Emissions Data: New Jersey, available at <https://www.eia.gov/environment/emissions/state/>. The EIA provides data through 2015.

⁷ GWRA (N.J.S.A. 26:2C-37).

1 by 2025.⁸ The Energy Master Plan also dictates that “the State must continue to expand its
2 efforts to promote the use of alternative fuel vehicles.”⁹ In addition, contemporaneous with
3 the signing of the Clean Energy Law, Governor Murphy signed Executive Order No. 28,
4 requiring the BPU and other executive branch agencies to prepare a new energy master plan
5 by June 1, 2019. That new energy master plan must explore methods “to incentivize the use
6 of clean, efficient energy and electric technology alternatives in New Jersey’s transportation
7 sector and at New Jersey’s ports.” To accomplish these objectives, New Jersey must achieve
8 rapid EV growth in the coming years.

9 Along with the significant environmental benefits, the job creation aspect of the EV
10 subprograms will favorably impact New Jersey’s economy. As noted above, the EV
11 subprograms will create approximately 3,900 direct, indirect and induced clean energy job-
12 years. This workforce will require skilled labor and licensed electricians to build electrical
13 infrastructure and perform EV charging station installations and maintenance.

14 **Q. Please provide background on EVs and the state of the EV market in New**
15 **Jersey.**

16 A. At the end of 2017, there were approximately 15,700 light-duty plug-in electric
17 vehicles (“PEVs”), registered in the state of New Jersey.¹⁰ Compared to other states, New
18 Jersey lags in both EV penetration per capita and EV charging infrastructure density. For
19 example, New Jersey has just one-sixth of the EV penetration per capita of California, and

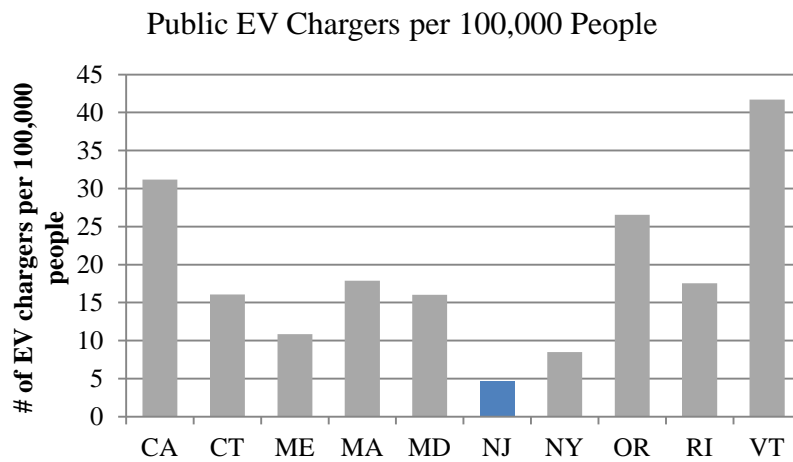
⁸ 2017 ChargeEV Roadmap, at 10.

⁹ New Jersey Energy Master Plan Update, 13 (Dec. 2015).

¹⁰ State of New Jersey Department of Environmental Protection, Bureau of Mobile Sources, Electric Vehicle Basics,
<http://www.drivegreen.nj.gov/electric.html>.

1 less than half of the level achieved by other leading states such as Oregon, Vermont,
 2 Washington and Georgia.¹¹ Additionally, the density of public chargers relative to the
 3 population in New Jersey is by far the lowest of the states that participate in ZEV, as shown
 4 in Figure 3 below.¹²

5 **Figure 3: Public EV Chargers per 100,000 People for each ZEV State**



6
 7 The limited actions taken so far by New Jersey, such as the sales tax exemption for
 8 zero emissions vehicles, have not been enough to address the lag behind the other states. The
 9 proposed EV subprograms will combat these trends and address the EV market barriers
 10 mentioned above by accelerating the development of EV charging infrastructure.

11 The subprograms outlined herein focus exclusively on Level 2 and DC Fast Charging
 12 technology because these charging technologies are better suited to accommodate the

¹¹ ChargeVC, Electric Vehicles in New Jersey: Costs and Benefits, 23 (Jan. 26, 2018), available at <http://www.chargevc.org/documents/electric-vehicles-in-new-jersey-costs-and-benefits/>.

¹² Data obtained February 1, 2018 from United States Department of Energy, Alternative Fuels Data Center, available at https://www.afdc.energy.gov/data_download and United States Census Bureau, National Population Totals and Components of Change: 2010-2017, available at <https://www.census.gov/data/datasets/2017/demo/popest/nation-total.html>.

1 increasingly larger battery sizes found in today’s electric vehicle models. The various
 2 charging technologies are described in Figure 4 below.

3 **Figure 4: Overview of Charging Technologies¹³**

Type	Voltage (V)	Capacity (kW)	Minutes to Supply 80 Miles of Range
Level 1	120	1.4-1.9	630-860
Level 2	240	3.4-20	60-350
DC Fast Charger	480	50-400	3-24

4 **Q. What makes PSE&G uniquely qualified to successfully implement the proposed**
 5 **EV subprograms?**

6 A. There are many factors that make PSE&G uniquely positioned to effectively
 7 implement the proposed EV subprograms, including:

- 8 • **Established Customer Relationship:** As the state’s largest electric and gas delivery
 9 company, PSE&G is in a position to encourage program participation because it has
 10 access to many potential CEF-EV Program participants through its monthly billing
 11 process, social media platforms, internet site, e-mail distribution lists, customer call
 12 centers, walk-in customer service centers across its service territory (located in urban
 13 environments, including the state’s largest cities), and field activities;
- 14 • **Experience:** PSE&G has deep experience and a successful track record with
 15 building electrical infrastructure and operating the distribution system, which can be
 16 extended to the EV subprograms. PSE&G also has experience with EVs through its:
 - 17 • EV employee incentive program, which is the largest in the state and features
 18 over 45 chargers at company locations;

¹³ Rocky Mountain Institute, From Gas to Grid 33, available at <https://www.rmi.org/wp-content/uploads/2017/10/RMI-From-Gas-To-Grid.pdf>.

- 1 • Pilot program that provided 145 chargers to 23 New Jersey hospitals, colleges
2 and businesses;
- 3 • Partnership with third-party to deploy DC Fast Charging stations along
4 corridor locations in New Jersey; and
- 5 • Partnerships with automobile manufacturers to provide PSE&G customers and
6 employees with rebates on EVs.
- 7 • **On-bill Repayments:** The Company can provide customers with on-bill repayments
8 over an extended period of time at zero percent rates in a way that is accessible and
9 easy for all customers, which will reduce the up-front cost burden of EV charging
10 equipment installations;
- 11 • **Usage Data:** PSE&G can use EV charging data to increase knowledge to improve
12 grid planning and operations and develop effective rate designs.

13 ***B. Level of Investment and Subprogram Term***

14 **Q. Please summarize the amount of investment proposed and the time period for**
15 **which this investment will be made.**

16 A. PSE&G anticipates committing up to \$261 million of investment over a period of
17 approximately six years towards the delivery of the four EV subprograms. The proposed six
18 year commitment period will provide funding and stability that will be important to support
19 the emerging EV market.

1 **Q. Does PSE&G’s proposal include the flexibility to move funds within**
2 **subprograms?**

3 A. Yes. The CEF-EV program would be most effective with the flexibility to transfer
4 funds between subprograms and across years to respond to market conditions and participant
5 demands to further maximize CEF-EV program resources.

6 **C. *Subprogram Descriptions***

7 **Q. Please describe the Residential Smart Charging subprogram.**

8 A. In the Residential Smart Charging subprogram, PSE&G will promote installation of
9 Level 2 networked EV Chargers at residences in the PSE&G territory, and provide customer
10 incentives to encourage charging during off-peak periods. The residential customer segment
11 represents a significant opportunity for PSE&G to encourage light-duty EV adoption, reach a
12 substantial number of customers, and favorably influence charging behaviors.

13 **Q. What is the target market for the Residential Smart Charging subprogram?**

14 A. The Residential Smart Charging subprogram will target residential customers in the
15 PSE&G territory that live in single-family residences or multi-unit dwellings of four units or
16 less.

17 **Q. How does the Residential Smart Charging subprogram work?**

18 A. Eligible customers who enroll in the subprogram will choose a Level 2 charger with
19 integrated network capability that meets PSE&G EV subprogram specifications. PSE&G
20 will ensure that qualified EV chargers are sourced from a variety of vendors and are
21 consistent with current market technology.

1 The cost of a residential EV charger installation varies widely depending on a number
2 of factors including the age of the home, location, proximity of the electric panel to the
3 charger location, and the size and load of the existing panel. Certain homes may require an
4 upgrade of their utility service in order to support the charging equipment. In order to ensure
5 the desired seamless and safe customer experience, PSE&G will pay for the cost of the EV
6 charger and the installation thereof. The Company proposes to cap the rebate at \$2,000 per
7 installation but retain the flexibility to adjust the cap in response to market trends on notice to
8 Board Staff and Division of Rate Counsel. PSE&G plans to use a skilled, licensed workforce
9 of PSE&G employees or contractors to perform the EV installations and any associated
10 electrical work required to support the charging equipment. For any installations whose costs
11 exceed the subprogram cap, the customer will pay the amount over the cap. Additionally,
12 PSE&G will upgrade the utility service to the home, at no cost to the customer, if such
13 upgrade is required to support the new load from the EV charger. The residential customer
14 will own the EV Charger, and will also be responsible for operating and maintaining it.

15 PSE&G is proposing a rebate in the amount of two cents per kWh for each kWh of
16 EV charging that occurs during off-peak periods. This rebate will be provided to eligible
17 customers in an off-bill format by utilizing data from the charger. PSE&G proposes to have
18 flexibility to adjust these rebates in response to customer behavior, on notice to Board Staff
19 and Division of Rate Counsel. PSE&G will recover these costs from rate payers.

20 Finally, as part of the Residential Smart Charging subprogram, PSE&G proposes to
21 perform a technical trial to collect data from the vehicles of up to 500 EV customers, either
22 through a device installed in the vehicle or through direct communication with the vehicle.

1 Participation is voluntary, and participating customers will be eligible to earn financial
2 rewards for enrollment and for following certain charging behaviors. This technical trial will
3 provide PSE&G with valuable vehicle data that is not available from home charging stations,
4 such as miles traveled and frequency, duration and location of charging sessions that take
5 place outside of the home vehicle location. Additionally, this solution would allow PSE&G
6 to implement a flexible charging rewards structure to supplement the incentives in the main
7 subprogram offering.

8 **Q. What are the eligibility requirements?**

9 A. This subprogram is open on a first-come, first-served basis to residential customers
10 who meet the following criteria:

- 11 • Have access to a dedicated parking space within PSE&G's service territory, either in
12 a single-family residence or multi-unit dwelling of four units or less;
- 13 • Obtain property owner approval to install the new infrastructure to charge their EV;
- 14 • Provide proof of the purchase or lease of a light-duty EV within the last six months
15 and provide proof of vehicle registration; and
- 16 • The participant will be required to allow PSE&G to access data from the networked
17 charging stations. PSE&G intends to collect data about the number of charging
18 events, times, duration, usage and load profiles;

1 **Q. What is the investment proposed for the Residential Smart Charging**
 2 **subprogram?**

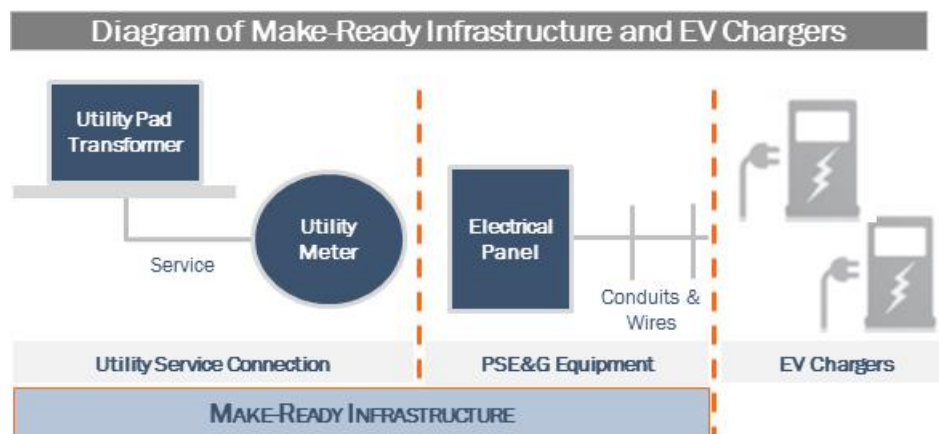
3 A. The subprogram will launch after Board approval and extend over a six year period.
 4 The total proposed investment is \$93 million, with a goal to reach approximately 37,000
 5 installations by the end of the subprogram.

6 **Q. What is the second subprogram that is being proposed?**

7 A. A Level 2 Mixed-Use Charging subprogram is proposed. In the Level 2 Mixed-Use
 8 Charging subprogram, PSE&G will deploy the Make-Ready Infrastructure and will also
 9 provide rebates, tiered by customer type, towards the upfront cost of the Level 2 charging
 10 equipment and installation.

11 PSE&G will own, maintain and operate all electrical infrastructure up to the utility
 12 meter and also the electrical panel, conduits and wires up to the charger stub (“Make-Ready
 13 Infrastructure”), as depicted in Figure 5 below.

14 **Figure 5: Diagram of Make-Ready Infrastructure**



15
 16 The Level 2 charging stations will be installed, owned, operated and maintained by a third
 17 party, which could be the property owner (“Site Host”), an EV service provider (“EVSP”), or

1 other entity responsible for the safe, reliable, and affordable operation of the charging
2 equipment. Participants will be the customers of record and will have the opportunity to
3 select Level 2 charging stations qualified by PSE&G and receive a rebate from PSE&G to
4 cover a portion of the cost of the charging stations deployed through the subprogram,
5 including hardware and installation. Participants with existing capacity at their sites can
6 choose to install charging stations behind their existing meter, and are not required to put in a
7 new utility service connection.

8 Eligible equipment will be Level 2 chargers that have integrated network capability
9 and meet the equipment specifications to be set forth by PSE&G.

10 PSE&G will execute an agreement with each subprogram participant. In the case
11 where the participant is different than the Site Host, PSE&G will also execute an agreement
12 with the Site Host to allow PSE&G access to the property for the purposes of installing,
13 owning, maintaining and operating the Make-Ready Infrastructure, part of which will reside
14 on the property of the Site Host.

15 In the case where the participant is different than the Site Host, the participant will be
16 solely responsible for establishing an agreement with each Site Host that provides for the
17 participant's legal right to own, operate and maintain the charging station(s) on the property
18 of the Site Host for the lifespan of the equipment.

19 **Q. What is the target market for the Level 2 Mixed-Use Charging subprogram?**

20 A. The Level 2 Mixed-Use subprogram is designed to target a diverse set of customers
21 and serve a variety of end-use EV Charging needs. Example customer types include multi-

1 family (greater than four units), workplaces, fleets, municipalities, overnight lodging, and
2 other community locations where EV Level 2 charging is desired.

3 **Q. What are the eligibility requirements?**

4 A. Third parties that wish to participate must meet the following eligibility requirements:

- 5 • The customer of record at sites may be the Site Host, the EVSP, or another third
6 party. The customer of record must be the same as the subprogram participant;
- 7 • The participant will be required to allow PSE&G to access data from the
8 networked charging stations. PSE&G intends to collect data about the number
9 of charging events, times, duration, usage and load profiles;
- 10 • The Site Host and/or EVSP will agree that any transactions with EV charging
11 customers will be in accordance with applicable State and Federal laws and
12 regulations;
- 13 • The Site Host and/or EVSP will agree to operate and maintain the charging
14 equipment in a safe and reliable manner for the lifespan of the equipment.
15 PSE&G will be responsible for the operation and maintenance of Make-Ready
16 Infrastructure during this timeframe; and
- 17 • The Site Host must agree to grant PSE&G access to the property and Make-
18 Ready Infrastructure that is installed, owned and maintained by PSE&G.

19 In addition, eligible locations must support the following:

- 20 • Include an appropriate location within the site to deploy charging stations in a
21 cost-effective manner, as determined by PSE&G in its sole discretion;

- 1 • Be located in a safe and well-lighted area, which is a safe distance from traffic;
- 2 and
- 3 • Be in compliance with all Americans with Disabilities Act requirements.

4 **Q. How does the Level 2 Mixed-Use Charging subprogram work?**

5 A. PSE&G will provide rebates toward the upfront cost of Level 2 charging
6 equipment.¹⁴ The rebates will be tiered based on the classification of the participant, so that
7 PSE&G covers the percentage of the upfront equipment and installation costs noted below.

- 8 • Multi-Family – 80 %
- 9 • Local Government Units – 60%
- 10 • Other Public Entity – 40%
- 11 • Other Private Entity – 20%

12 These percentages reflect suggested levels of rebate, but PSE&G will adjust the incentive
13 amounts if necessary to attract more interest in multi-family locations and chargers
14 designated for public use. Participants will have the option to pay back their share of the
15 costs using interest-free on-bill repayments over a period of two years.

16 **Q. What is the investment proposed for the Level 2 Mixed-Use Charging**
17 **subprogram?**

18 A. Over a six-year investment period, this subprogram will support the installation of
19 approximately 2,200 charging stations at 600 locations, for a total investment of \$39 million.

¹⁴ Rebate is applied per charging station (not per port).

1 **Q. What is the third subprogram that is being proposed?**

2 A. A Public DC Fast Charging subprogram is proposed. In the Public DC Fast Charging
3 subprogram, PSE&G will deploy Make-Ready electrical infrastructure and either own or
4 provide financial incentives towards the upfront cost of DC Fast Charging equipment.
5 PSE&G will also provide financial incentives to defray electricity costs.

6 PSE&G proposes two different ownership models. In the first model, PSE&G will
7 deploy the Make-Ready Infrastructure, while a third party will install, own, maintain and
8 operate the DC Fast Charging stations (“Third-Party Ownership Model”). In the second
9 model, PSE&G will deploy the Make-Ready Infrastructure and install, own, maintain and
10 operate the DC Fast Charging stations (“Utility Ownership Model”). The second model will
11 only be utilized if the competitive market is unable to support the DC Fast Charging station
12 development using the Third-Party Ownership Model. As the DC Fast Charging market
13 matures, PSE&G anticipates that the Third-Party Ownership Model will be the predominant
14 model.

15 The utility-owned Make-Ready Infrastructure in both models will include all electric
16 infrastructure up to the utility meter and also the electrical panel, conduits and wires up to the
17 charger stub. Each site will include a new utility service connection, separately metered from
18 the existing service.

19 **Q. What is the target market for the Public DC Fast Charging subprogram?**

20 A. The target market for the Public DC Fast Charging subprogram includes Site Hosts,
21 EVSPs or other third parties that are interested in developing public DC Fast Charging

1 stations in the PSE&G territory. Examples include highway rest stops or other locations
2 easily accessible from major thoroughfares.

3 **Q. Why is a DC Fast Charging subprogram necessary?**

4 A. The availability of publicly-accessible Fast Charging stations, where customers can
5 charge their EVs in under thirty minutes, is a critical component to the growth of EVs.
6 Range anxiety, or the fear of running out of charge, is a known barrier to widespread EV
7 adoption, and can be directly alleviated with a robust, public DC Fast Charging network that
8 provides sufficient geographical coverage.

9 The PSE&G territory, consisting of a 2,600 square-mile diagonal corridor across the
10 state of New Jersey from Bergen to Gloucester Counties, is an ideal location for an expanded
11 network of public DC Fast Charging. The transportation infrastructure in the PSE&G
12 territory serves as a major thruway for in-state and out-of-state drivers traveling up and down
13 the Northeast corridor, in and out of New York City, and to the popular beach towns along
14 the New Jersey coastline. Properly sited DC Fast Chargers in New Jersey can reach a wide
15 number of drivers, since the state is geographically compact, and approximately 67% of daily
16 miles driven are supported by only fifty federal and state roads.¹⁵

17 **Q. How does the Public DC Fast Charging subprogram Work?**

18 A. Under the Third-Party Ownership Model, and to promote customer choice and
19 flexibility in business models, PSE&G will accept applications for DC Fast Charger
20 deployments by third parties within its service territory. If site applications meet PSE&G's

¹⁵ 2017 ChargeVC Roadmap at 12.

1 specifications, PSE&G will design, install, own, and operate the Make-Ready charging
2 infrastructure for the DC Fast Charging location, in coordination with the Site Host and/or
3 EVSP. PSE&G will operate and maintain this Make-Ready Infrastructure during the entire
4 operating life of the associated DC Fast Charging equipment at participating sites. The DC
5 Fast Charging stations will be installed, owned, operated and maintained by a third party.

6 Participants will have the opportunity to select DC Fast Charging stations, qualified
7 by PSE&G, and receive a rebate from the Company to cover a portion of the cost of the
8 charging stations deployed through the subprogram, including hardware and installation.

9 PSE&G will provide rebates toward the upfront cost of DC Fast Charging equipment.
10 The rebates will be tiered, so that PSE&G covers the percentage of the upfront DC Fast
11 Charger and installation costs noted below.¹⁶

- 12 • Public Entities – 80 %
- 13 • Non-public Entities – 40%

14 Participants will have the option to pay back their share of the costs using interest-free
15 on-bill repayments over a period of two years.

16 To identify projects, PSE&G will conduct periodic competitive solicitations to gather
17 proposed locations from third parties. Respondents will utilize their industry knowledge and
18 experience, and leverage their relationships with Site Hosts to propose sites for the DC Fast
19 Charging stations. Respondents are encouraged to propose portfolios consisting of multiple
20 sites that prioritize critical traffic corridors with high expected utilization and provide
21 suitable but not duplicative geographic coverage.

¹⁶ Rebates are applied per charging station (not per port).

1 To ensure the desired geographical coverage, PSE&G also proposes the Utility
2 Ownership Model, where it will install, own, maintain and operate the Make-Ready
3 Infrastructure as well as the DC Fast Chargers, but only in the case where third-party interest
4 falls short of subprogram goals. Given that the DC Fast Charging market is still in its early
5 phases, PSE&G anticipates that there could be cases where the competitive market does not
6 propose enough projects to close the gaps in DC Fast Charger coverage. For example, there
7 could be locations where DC Fast Chargers are desired, but expected utilization is below the
8 level that would make them attractive for a competitive provider. As such, the Utility
9 Ownership Model is proposed as a backstop in order to ensure subprogram success.

10 Under the Utility Ownership Model, PSE&G proposes a similar process of site
11 selection where third parties propose individual sites, or baskets of sites through a
12 competitive solicitation process. PSE&G will then review, and determine, at their discretion,
13 which sites make sense for utility ownership. If the location proposals are not adequate to
14 meet desired coverage, PSE&G will choose additional sites to cover the gaps. For utility-
15 owned sites, drivers will be billed for their charging session energy according to a flexible
16 pricing structure that is in line with local market fast charging rates. PSE&G will source the
17 charging equipment under the Utility Ownership Model from a variety of vendors. Revenues
18 collected by PSE&G from the charging stations will be credited back to ratepayers. Utility
19 ownership of the charging infrastructure will help to ensure that the charging facilities are
20 reliably operated and maintained.

21 In addition to the upfront costs, PSE&G recognizes that another barrier to entry in the
22 DC Fast Charging market is the cost of electricity, especially in cases where demand charges

1 apply and station utilization is low. Given the objective of DC Fast Charging stations – to
2 deliver as much charge to drivers as possible in a short time window – they inherently face
3 high levels of maximum demand under the existing PSE&G tariff. When coupled with low
4 utilization overall, this can make the effective cost per kWh very expensive. To address this
5 challenge, particularly while chargers remain under-utilized, PSE&G proposes to use off-bill,
6 ongoing rebates to offset electricity bill expenses. The rebates have the following
7 characteristics.

- 8 • Will be offered to participants in the Third-Party Ownership Model for a period of
9 five years and distributed monthly;
- 10 • Will provide participants with a rebate to cover the difference between the effective
11 cost per kWh of their monthly DC Fast Charging electric usage and the subprogram
12 target rate;
 - 13 ○ The target rate will be determined by PSE&G using a variety of factors
14 including but not limited to market dynamics affecting local customer electric
15 rates and local DC Fast Charging economics.
- 16 • The subprogram target rate will be set when PSE&G engages in an agreement with a
17 participant, and will remain the same for the five years that it is in effect; and
- 18 • The subprogram target rate may be adjusted as market dynamics change, but changes
19 will only affect new participants and not those already under a participation
20 agreement.

1 **Q. What are the eligibility requirements?**

2 A. For third-party owned stations, the third party shall be solely responsible for installing
3 each DC Fast Charging station and shall:

- 4 • Obtain all applicable local, state and federal permits required for the installation and
5 operation of the DC Fast Charging station;
- 6 • Perform all installation work in accordance with local, state and federal zoning and
7 code requirements;
- 8 • Coordinate the installation activities with the Site Host;
- 9 • Ensure that all maintenance is performed for each DC Fast Charging station; and
- 10 • Provide customer service support that is accessible 24 hours per day, seven days per
11 week.

12 Third parties that wish to participate must meet the following eligibility requirements:

- 13 • The customer of record at sites may be the Site Host, the EVSP, or another third
14 party. The customer of record must be the same as the participant;
- 15 • The participant will be required to allow PSE&G to access data from the charging
16 stations. PSE&G intends to collect data about the number of charging events, times,
17 duration, usage and load profiles;
- 18 • The Site Host and/or EVSP will agree to operate and maintain the charging
19 equipment in a safe and reliable manner for the lifespan of the equipment. PSE&G
20 will be responsible for the operation and maintenance of Make-Ready Infrastructure
21 during this timeframe; and

- 1 • The Site Host must agree to grant PSE&G access to the property and Make-Ready
2 Infrastructure that is installed, owned and maintained by PSE&G.

3 In addition, eligible sites must include the following requirements:

- 4 • Be safe and accessible to the public 24 hours per day, seven days of the week;
- 5 • Take into consideration accessibility and charging demand;
- 6 • Include an appropriate location within the site to deploy charging stations in a cost-
7 effective manner, as determined by PSE&G in its sole discretion, but subject to the
8 participant's agreement;
- 9 • Be on a paved parking spot that is clearly designated as DC Fast Charging station
10 parking only;
- 11 • Be located in a safe and well-lighted area, which is a safe distance from traffic; and
- 12 • Be in compliance with all Americans with Disabilities Act requirements.

13 **Q. What type of chargers will be used, and how will they be selected?**

14 A. The chargers that are eligible to participate will be industry standard DC Fast
15 Chargers that have integrated network capability and meet the equipment specifications to be
16 set forth by PSE&G.

17 **Q. What is the investment proposed for the Public DC Fast Charging subprogram?**

18 A. PSE&G proposes to make a \$62 million investment in this subprogram over a period
19 of six years. The proposed investment is based on an initial estimate of 150 charging
20 locations and 450 charging stations within the PSE&G territory. These goals are consistent

1 with the ChargeVC statewide goals of 300 locations and 600 DC Fast Charging stations.¹⁷
2 With quickly changing market conditions and a six-year long investment period, the
3 Company proposes to annually re-evaluate the planned number of charging stations and
4 reduce plans if warranted by factors such as actual EV adoption levels, changes in vehicle
5 and charging technology, and DC Fast Charger installations that are funded by other sources.
6 This practice is intended to prevent unneeded stations.

7 **Q. Are there any pilot projects included as part of this subprogram?**

8 A. Yes, as part of this subprogram, and through the solicitation process used to select DC
9 Fast Charging sites, PSE&G will select five sites at which to deploy integrated energy
10 storage. The primary goal of the integrated energy storage is to enable DC Fast Charging
11 stations in locations where the required level of utility service to support the EV charging
12 infrastructure is not readily available or is cost-prohibitive. A secondary goal is to evaluate
13 how integrated energy storage impacts the economics of DC Fast Charging sites.

14 **Q. What is the fourth subprogram that is being proposed?**

15 A. A Vehicle Innovation subprogram is proposed. In the Vehicle Innovation
16 subprogram, PSE&G proposes to provide incentives towards electric school buses and EV
17 charging infrastructure that will service school districts in the PSE&G territory, as well as
18 hold an open solicitation process to fund high-impact, customized electrification projects for
19 customers with non-standard vehicle electrification needs.

¹⁷ 2017 ChargeVC Roadmap, at 2.

1 **Q. What is the investment proposed for the Vehicle Innovation subprogram?**

2 A. The proposed investment for this subprogram is \$45 million, with \$33 million for
3 electric school buses and \$12 million for open solicitation.

4 **Q. What is the target market for the Vehicle Innovation subprogram?**

5 A. The target market for the Vehicle Innovation subprogram is school districts interested
6 in deploying electric buses, and ports, airports, transit authorities or other entities with
7 specialized medium and heavy-duty electrification needs.

8 **Q. How does the Vehicle Innovation subprogram work?**

9 A. The Vehicle Innovation subprogram is split into two categories: electric school buses
10 and an open solicitation.

11 In the electric school bus portion of the subprogram, PSE&G proposes to provide
12 grants to public school districts to cover the cost of purchasing electric school buses, as well
13 as deployment of the Make-Ready infrastructure and financial incentives towards charging
14 equipment. PSE&G proposes to grant \$300,000 per bus for up to 102 buses, with 100 buses
15 to be assigned permanently to their respective school districts, and the other two available to
16 rotate amongst different districts. In order to promote subprogram and operating
17 efficiencies, PSE&G will encourage participation from school districts with needs for more
18 than one bus. PSE&G will target school districts across the socioeconomic spectrum,
19 including urban districts, to ensure the benefits of the program extend to low-income school
20 children.

21 Second, PSE&G proposes to dedicate \$2 million per year of investment towards
22 innovative, customized projects that will be gathered from respondents during an open

1 solicitation process. Certain prospective candidates for electrification, such as those with
2 fleets of medium and heavy-duty vehicles, may have individualized needs that are not fully
3 addressed through the other subprograms and that can be best served through carefully
4 tailored projects. Examples of customers and segments that would be targeted include ports,
5 airports and transit authorities. Projects will be evaluated based on multiple criteria including
6 estimated costs relative to expected benefits, and ability to leverage other sources of funding
7 in conjunction with PSE&G investment.

8 **Q. How will the Vehicle Innovation subprogram help to improve air quality?**

9 A. By promoting the electrification of medium and heavy duty vehicles, including school
10 buses, the Vehicle Innovation subprogram will help to improve air quality by reducing diesel
11 emissions in New Jersey. Diesel exhaust exposure is linked to numerous serious negative
12 health effects, including asthma, respiratory problems, lung cancer and premature
13 mortality.¹⁸ The United States Environmental Protection Agency (“EPA”) believes that
14 diesel exhaust is among the substances that pose the greatest health risk to humans.¹⁹ In New
15 Jersey, where 96 percent of the diesel particulate matter in outdoor air comes from mobile
16 sources such as passenger vehicles, trucks, buses, and heavy equipment, electrification
17 solutions can help to address the worrisome risks from diesel emissions.²⁰ The below map
18 (Figure 6) of diesel particulate concentrations in New Jersey shows elevated levels in swaths
19 of the state, especially those surrounding heavily industrial areas, trucking corridors and

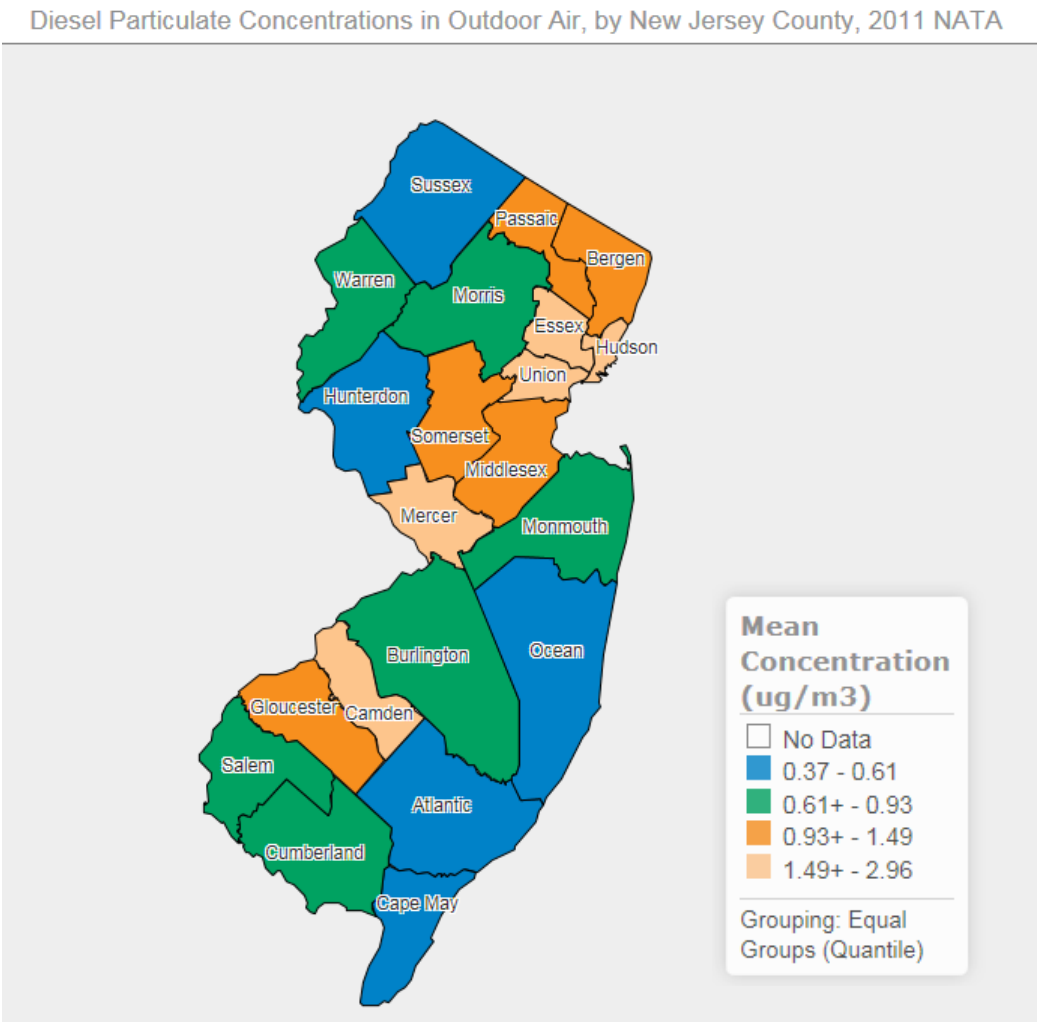
¹⁸ EPA, National Air Toxics Assessment: NATA Frequent Questions, available at <https://www.epa.gov/national-air-toxics-assessment/nata-frequent-questions>.

¹⁹ *Id.*

²⁰ Diesel Particulate Concentrations data retrieved on February 20, 2018 from New Jersey Department of Health, New Jersey State Health Assessment Data, available at <http://nj.gov/health/shad>.

1 ports. Parts of the PSE&G service territory, such as Essex County, Union County and
2 Hudson County, have 500 to 1,000 times the benchmark level of diesel particulate that is
3 considered safe for humans to breathe.²¹

4 **Figure 6: Diesel Particulate Concentrations in New Jersey²²**



²¹ *Id.*

²² *Id.*

1 **Q. How does poor air quality affect public health and low-income communities?**

2 A. Research indicates that people residing near heavily-traveled roads, industrial sites,
3 ports, and other polluting sources have an increased incidence and severity of health
4 problems associated with air pollution.²³ Likewise, less affluent neighborhoods face
5 disproportionately higher risks since they are more likely to be located in close proximity to
6 these high-pollution areas.²⁴ This paradigm exists in New Jersey. For example, low-income
7 communities such as Newark, Bayonne, Jersey City and Elizabeth fall squarely in the
8 counties with the highest diesel emissions in the state.

9 For children, who are among those that have a higher risk of negative health impacts
10 from air pollution,²⁵ the consequences are significant. In Newark, where parts of the massive
11 Port of New York and New Jersey reside, 25 percent of children suffer from asthma.²⁶ With
12 an asthma incidence rate that is three times the state average, asthma is the leading cause of
13 absenteeism for Newark school-age children.²⁷ Children riding in school buses have an
14 additional layer of exposure to diesel emissions since they breathe the harmful exhaust while
15 they wait for buses, disembark, and while they ride school buses. Based on analysis by Noel
16 and McCormack and the National Academy of Sciences, the estimated public health damages
17 due to diesel emissions are \$0.08 per vehicle mile driven, inclusive of diesel emissions
18 contributions to heart disease, respiratory illnesses, such as asthma, and increased cancer

²³ EPA Community Air Monitoring Where you Live in EPA Region 2, <https://19january2017snapshot.epa.gov/air-sensor-toolbox/community-air-monitoring-where-you-live-epa-region-2.html>.

²⁴ Cheryl Katz, People in Poor Neighborhoods Breathe More Hazardous Particles, Scientific American, Nov. 1, 2012, <https://www.scientificamerican.com/article/people-poor-neighborhoods-breathe-more-hazardous-particles/>.

²⁵ EPA, *supra* note 23.

²⁶ EPA, Community Air Monitoring Where you Live in EPA Region 2, <https://www.epa.gov/air-sensor-toolbox/community-air-monitoring-where-you-live-epa-region-2>

²⁷ *Id.*

1 risk.²⁸ PSE&G's proposed Vehicle Innovation subprogram will address these public health
2 issues and foster cleaner air and healthier children in New Jersey.

3 **Q. What are the additional benefits of the electric bus part of this subprogram?**

4 A. Beyond the electrification benefits described in the introduction section, the electric
5 school bus initiative will reduce schools' reliance on diesel fuel, provide material reductions
6 in greenhouse gas emissions in New Jersey, and assist in spreading electrification benefits to
7 school-aged children in low-income communities.

8 Electric school buses present an attractive option for school districts looking to reduce
9 their reliance on diesel fuel. The majority of diesel fuel is imported, not just into New Jersey,
10 but into the United States from other nations. By shifting schools' fuel to one that is locally
11 produced, this initiative can strengthen overall energy security, insulate schools from price
12 fluctuations, and invigorate local economies.²⁹

13 The environmental benefits of electric school buses are substantial. According to the
14 publication *School Bus Fleet*, there are currently at least 23,000 school buses operating in
15 New Jersey,³⁰ which collectively produce an estimated 476,000 tons of CO₂ annually.³¹ A
16 diesel bus emits about 21 tons of CO₂ per year, whereas the tailpipe emissions from electric

²⁸ See Lance Noel and Regina McCormack, [A cost benefit analysis of a V2G-capable electric school bus compared to a traditional diesel school bus](#), 126 Applied Energy 246 (Aug. 2014); Nat'l Research Council, Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use (2010).

²⁹ VEIC Electric School Bus Report developed for PSE&G.

³⁰ School Bus Fleet, [School Transportation: 2014-15 School Year](#), <http://files.schoolbusfleet.com/stats/SBFFB17SchoolTransportationStatistics201415.pdf>.

³¹ Based on an emissions rate of 22.4 lbs/gallon diesel fuel, average school bus efficiency of 6.5 miles per gallon, and 12,000 annual miles driven per bus.

1 school buses are zero.³² Using New Jersey’s low-carbon generating fleet, switching just one
2 bus from diesel to electric would save about 12 tons of CO₂ per year.

3 The PSE&G electric school bus initiative will help ensure that the benefits of electric
4 vehicles are directly shared with low- and moderate-income communities. By ensuring that
5 participating school districts reflect the socioeconomic and geographic diversity of the
6 PSE&G service territory, PSE&G will bring the multitude of benefits of electric school buses
7 to the low-income communities.

8 PSE&G’s proposed electric school bus initiative will demonstrate that this technology
9 is implementation-ready and will help to catalyze the electric school bus market in New
10 Jersey, bringing more benefits to local school districts faster.

11 **Q. What is the cost of ownership for electric school buses?**

12 A. Electric school bus technology has developed rapidly over the past decade, with five
13 manufacturers now building or developing electric school buses in the United States and
14 Canada.³³ Currently, electric school buses are estimated to cost between \$300,000 and
15 \$325,000, making them two to three times more expensive than conventional diesel buses.³⁴

16 Although electric school buses offer substantial fuel and maintenance savings, at
17 current prices, these savings are not yet sufficient to offset the considerable upfront
18 investment required. School transportation is almost exclusively funded locally, unlike many
19 other types of transportation, such as transit, highway and airport infrastructure, which are

³² EIA, *Frequently Asked Questions*, <https://www.eia.gov/tools/faqs/faq.php?id=307&t=11>.

³³ VEIC Electric School Bus Report developed for PSE&G.

³⁴ *Id*

1 largely federally funded. In addition, school transportation is a secondary function of school
 2 districts. This makes it difficult for school districts to invest in new technologies, especially
 3 technologies that are not directly tied to the classroom. Consequently, despite clear public
 4 health and societal benefits, electric school buses remain cost-prohibitive for all but the
 5 wealthiest school districts. Also, since the payback period of buying the electric bus is
 6 around 29 years, school districts currently operating electric school buses have almost
 7 exclusively been funded with grants or support from external partners like utilities. Figure 7
 8 below summarizes the total ownership costs of diesel and electric school buses.

9 **Figure 7: Total Ownership Cost of Diesel and Electric School Bus**

	Cost of bus	EV Charger Cost	Fueling cost per mile	Maintenance cost per mile	Electric School Bus Payback Period
Diesel	\$100,000	\$0	\$0.42 ³⁵	\$0.46 ³⁶	-
Electric	\$310,000	\$30,000	\$0.09 ³⁷	\$0.09 ³⁸	29 years

10 The grants that PSE&G proposes will help schools overcome the barrier of high
 11 upfront cost, and realize the benefits of reduced fueling costs (up to 75% less expensive) and
 12 reduced maintenance (up to 80% cheaper). These cost savings will flow back to local
 13 communities through lower and more predictable school transportation costs.

³⁵ Based on average school bus vehicle efficiency reported by school districts and diesel cost per gallon in NJ.

³⁶ Robert T. Pudlewski, *Fleet Breakdown: Public Sector Maintenance-Cost Analysis*, School Transportation News (Feb. 3, 2016), <http://stnonline.com/news/web-exclusives/item/7224-fleet-breakdown-public-sector-maintenance-cost-analysis>.

³⁷ Based on PSE&G electricity rates and typical electric school bus load profile (assumes charging is controlled to avoid peak charges).

³⁸ Preliminary estimate from electric school bus manufacturers and ongoing electric school bus pilots.

1 **Q. How will electric school buses interact with the grid?**

2 A. When electric vehicles are equipped with appropriate connections and
3 communication technology, they can dispatch energy back to the grid or to a building, in
4 addition to pulling energy from the grid while charging. These concepts, termed vehicle-to-
5 grid (“V2G”) and vehicle-to-building (“V2B”), present the opportunity for electric vehicles
6 to provide various ancillary services in addition to transportation. The value of V2G or V2B
7 services are of interest to school districts because lower operating costs alone are not enough
8 to offset the higher purchase price of electric school buses.

9 PSE&G proposes to test V2G or V2B technology in a portion of the electric school
10 buses deployed through this subprogram. The number of locations to be tested depends on
11 interest from participating school districts.

12 **Q. Collectively, for the four proposed EV subprograms, how will PSE&G address**
13 **customer education and outreach?**

14 A. PSE&G will use multiple approaches to engage customers and encourage them to
15 sign up for the EV subprograms. First, PSE&G will provide EV subprogram marketing
16 materials to regional EV dealers in order to promote the EV subprograms at the point of sale.
17 PSE&G will also hold EV ride and drive events and collaborate with EV advocacy groups,
18 coalitions such as ChargeVC, and local and community organizations to increase EV
19 subprogram awareness. Other methods for customer engagement may include the PSE&G
20 website, the customer’s utility bill, home energy reports, online advertising, email marketing
21 and direct mailings. The investment in education and outreach is included in the cross-offer
22 investment category in Figure 8.

1 **D. Credits, Budgets and Administrative Costs**

2 **Q. What is the overall proposed investment, expense budget and effective term of**
 3 **the proposed EV subprograms?**

4 A. PSE&G proposes to commit up to \$261 million of investment over a period of
 5 approximately six years and proposes a \$103 million administrative budget for the EV
 6 subprograms. The six year period will commence upon Board approval of the CEF-EVES
 7 Program. The expense budget includes all identified administrative costs necessary to
 8 support the delivery of the subprograms, including administration, IT system costs, training,
 9 program management, inspections, evaluations, quality assurance/quality control efforts, and
 10 rebates offsetting electric costs such as the \$0.02/kWh rebate provided in the Residential
 11 Smart Charging subprogram.

12 **Q. What is the proposed budget breakdown for the proposed subprograms, IT costs**
 13 **and administrative costs?**

14 A. Please see the EV cost overview in Figure 8 below.

15 **Figure 8: Electric Vehicle Cost Overview**

Description	2019	2020	2021	2022	2023	2024	2025	Beyond 2025	TOTAL
Program Investment (millions of \$)									
Residential Smart Charging	\$1.3	\$4.3	\$9.6	\$15.0	\$21.9	\$32.0	\$8.7	\$0	\$92.9
Level 2 Mixed-Use Charging	\$2.4	\$4.9	\$6.2	\$6.9	\$8.1	\$8.5	\$2.1	\$0	\$39.0
Public DC Fast Charging	\$4.2	\$12.5	\$15.0	\$13.6	\$10.4	\$6.9	\$0	\$0	\$62.5
Vehicle Innovation	\$3.4	\$7.0	\$7.3	\$8.1	\$8.4	\$8.4	\$2.1	\$0	\$44.8
Cross-Offer Investment	\$3.2	\$6.2	\$4.1	\$3.0	\$2.5	\$2.1	\$5	\$0	\$21.7
Total Program Investment	\$14.6	\$34.8	\$42.2	\$46.6	\$51.3	\$57.9	\$13.4	\$0	\$260.8
Program Expenses									
Offer-Specific Expenses	\$4	\$4.5	\$10.6	\$13.8	\$10.7	\$4.6	-\$3	\$4.1	\$48.4
Administrative (Labor) Expenses	\$3.7	\$5.0	\$5.2	\$5.3	\$5.5	\$5.7	\$3.5	\$5.4	\$39.3
IT Expenses	\$1.1	\$1.7	\$2.0	\$2.3	\$2.6	\$3.1	\$9	\$1.6	\$15.4
Total Program Expenses	\$5.2	\$11.2	\$17.8	\$21.5	\$18.8	\$13.3	\$4.2	\$11.1	\$103.1
Total Spend									\$364

16

1 **Q. Please describe the IT services that are necessary to support these programs.**

2 A. Due to the scale and scope of PSE&G's EV subprograms, significant investment in
3 technology systems and services will be required to ensure that prospective and current
4 participants have easy access to subprogram information and incentives. The investment will
5 also ensure that PSE&G is able to qualify, process, and fulfill orders in an efficient and
6 timely manner while also understanding customer and owner/operator behavior and
7 marketplace trends. Spending is specific to the EV subprograms, and is not duplicative of IT
8 spending that is related to PSE&G's other clean energy programs. The key technology
9 investment areas include:

- 10 • **EV Charging Operating Platform** - This is a collection of seamlessly integrated and
11 PSE&G-branded applications that will provide essential automation and support for
12 the operation and management of PSE&G's EV subprograms, along with a user-
13 friendly interface for PSE&G, participants and EVSPs. These applications will likely
14 be sourced from multiple specialized vendors with deep expertise in the EV charging
15 station marketplace and will include modules to support marketing, order processing,
16 rebates, on-bill financing, billing, order fulfillment, scheduling, charging station
17 operating services, and analytics.
- 18 • **Integration Platform** - The integration platform is an essential element to ensure
19 accurate, timely, and secure information flows between customers, suppliers, vendors,
20 and PSE&G's internal call center and workforce personnel. The platform will
21 support a wide variety of secure protocols and data/message delivery styles.

- 1 • **Security** - Customer data security and privacy remain key focus areas for PSE&G.
2 The proposed systems and services will include prudent and reasonable customer and
3 data security protections.

4 ***E. Program Evaluation and Reporting***

5 **Q. How will subprogram evaluation be administered for the EV subprograms?**

6 A. PSE&G proposes to take an innovative approach to monitoring and evaluation by
7 leveraging the operating platform to provide automated dashboards and reports, subprogram
8 statistics, and charging analytics. By providing PSE&G with ongoing access to real-time
9 data, this approach will also play an important role in proactive grid monitoring and early
10 detection of potential EV impacts on the grid.

11 In addition to the continuous monitoring and evaluation functions provided by the
12 core operating platform, PSE&G will also conduct surveys of subprogram participants.
13 These monitoring and evaluation activities will deliver critical insights and will enable
14 PSE&G to achieve the following objectives.

- 15 • Determine the impact of customer outreach and education efforts on EV subprogram
16 participation rates;
- 17 • Gauge the ability of the EV subprograms to influence EV adoption;
- 18 • Identify subprogram impacts on customer attitudes about EVs;
- 19 • Measure electric distribution system impacts from EV charging;
- 20 • Analyze clustering of EV loads and localized EV charging patterns;
- 21 • Explore the impact of various financial incentives and rebate structures on charging
22 behavior. Determine which is most effective at influencing when participants charge;

- 1 • Evaluate the need for and design of a potential rate structure that could be
2 implemented in the future to serve EV customers;
- 3 • Quantify actual costs of EV installations under a variety of conditions; and
- 4 • Inform potential subprogram enhancements and future design considerations.

5 Related to the DC Fast Charging segment specifically, PSE&G plans to study the impact
6 of increased availability of public DC Fast Charging infrastructure on EV adoption in
7 neighboring communities, and how utilization at the charging stations changes over time.
8 Additionally, PSE&G will analyze demand charges and overall electricity rates that pertain
9 to the DC Fast Charging stations, to see how utilization affects electricity rates and determine
10 if a new rate should be developed in the future to support DC Fast Charging.

11 **Q. How will PSE&G report to the BPU and Rate Counsel about the proposed EV**
12 **subprogram implementation?**

13 A. PSE&G proposes to provide annual electronic reports for the proposed EV
14 subprograms to the Board and the Division of Rate Counsel. The reports will provide
15 information about the EV subprograms such as participation and investment levels.

16 **III. CONCLUSION**

17 **Q. Do you have any concluding statements?**

18 A. Yes. The BPU's approval of PSE&G's CEF-EVES Program is expected to provide
19 valuable support to the important initiatives of electrification and grid modernization in New
20 Jersey. PSE&G is eager to begin seeding the market through the CEF-EVES Program to
21 help New Jersey recognize the benefits described herein.

1 **Q. Does this conclude your testimony at this time?**

2 **A. Yes.**

1 system implementation, business relationship management and project management /
2 quality support. Prior to becoming Vice President of Renewables and Energy
3 Solutions, I served as the Senior Director of Continuous Improvement for PSEG
4 Services Corporation. I established this function for PSEG, which is responsible for
5 developing sustainable and quantifiable business improvements based on industry
6 best practices. In July of 2018, I was named Vice President of Renewables and
7 Energy Solutions. My professional experience includes finance, strategy, business
8 relationships, application implementation, quality assurance, process management and
9 program management.

10 I have the following certifications: Project Management Professional,
11 Lean Six Sigma, and Information Technology Infrastructure Library Foundation.

**STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES**

**IN THE MATTER OF THE PETITION OF PUBLIC
SERVICE ELECTRIC AND GAS COMPANY
FOR APPROVAL OF ITS CLEAN ENERGY FUTURE –
ELECTRIC VEHICLE AND ENERGY STORAGE
PROGRAM ON A REGULATED BASIS**

BPU Docket No. _____

**PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
JORGE L. CARDENAS
VICE PRESIDENT ASSET MANAGEMENT
AND CENTRALIZED SERVICES**

October 11, 2018

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**PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
JORGE L. CARDENAS
VICE PRESIDENT – ASSET MANAGEMENT
AND CENTRALIZED SERVICES**

1 **Q. Please state your name and professional title.**

2 A. My name is Jorge L. Cardenas. I am the Vice President of Asset Management and
3 Centralized Services at Public Service Electric and Gas Company (“PSE&G” or the
4 “Company”). My credentials are set forth in the attached Schedule JLC-CEF-ES-1.

5 **I. SCOPE OF TESTIMONY**

6 **Q. Can you provide a summary of your testimony?**

7 A. I am testifying in support of the Company’s Clean Energy Future-Electric Vehicle and
8 Energy Storage Program (“CEF-EVES”) filing that supports the Company’s broader clean
9 energy goals. The focus of my testimony will be on the energy storage component of the CEF-
10 EVES. This component will be referred to as the Clean Energy Future-Energy Storage Program
11 (“CEF-ES Program”). The goal of the CEF-ES Program is to start to incorporate utility-scale
12 energy storage into the Company’s distribution system to optimize electricity costs for our
13 customers, support grid operations, and facilitate the integration of renewables on the PSE&G
14 grid. Our hope is that this program helps establish New Jersey as the national leader in clean
15 energy, advanced technology development, and environmental excellence.

16 **Q. Has PSE&G filed other testimony in support of its CEF-ES Program?**

17 A. Yes, Stephen Swetz has filed testimony addressing revenue requirements, cost recovery,
18 and rate impacts. Also submitted with this filing is the testimony of Daniel Hansen of
19 Christensen Associates Energy Consulting, LLC. Mr. Hansen’s testimony supports the
20 Company’s proposed Green Enabling Mechanism (“GEM”).

1 **Q. Do you sponsor any schedules as part of your direct testimony?**

2 A. Yes. I sponsor Schedule JLC-CEF-ES-1, which was prepared by me or under my
3 supervision and direction, and describes my professional credentials.

4 **II. PROGRAM OVERVIEW**

5 **Q. Please describe the CEF-ES Program and its overall benefits.**

6 A. The CEF-ES Program is projected to install 35 MW of energy storage capacity across the
7 PSE&G distribution system, with an investment of \$109 million over six year period, and with
8 ongoing expenses of \$70 million through the balance of the 15 year life of the systems installed.

9 Across the country, utilities have deployed energy storage systems (“ESSs”) as flexible
10 tools to solve an array of issues. As costs for ESSs decline in the coming years, energy storage
11 will likely transform how the modern utility manages the supply and demand of electricity on its
12 network. The collection of projects proposed in this filing will help to ensure that when energy
13 storage applications become more widely adopted and cost feasible, PSE&G will be well-
14 positioned to effectively deploy ESSs in the appropriate applications.

15 PSE&G is also pursuing this program in support of the State’s goal of making New
16 Jersey a national leader in the deployment of a clean energy economy. The State’s goals were
17 recently codified in the Clean Energy Law enacted on May 23, 2018 (“Clean Energy Law”). The
18 Clean Energy Law sets the State’s energy storage goals at 600 MW of energy storage by 2021
19 and 2,000 MW by 2030. Zero carbon and low carbon generation resources are vital to
20 maintaining a clean energy future, and energy storage will be an important resource New Jersey
21 can use to accommodate low carbon, intermittent generation like offshore wind, solar, and
22 distributed generation.

1 Beyond this, PSE&G’s proposed 35 MW program will help to ensure that New Jersey
2 becomes a center for energy storage jobs, and that the network and economic development
3 benefits associated with this effort will yield benefits to the state that last far longer than the term
4 of the CEF-ES Program. The CEF-ES Program is expected to increase employment through the
5 creation of approximately 1,930 direct, indirect, and induced clean energy job-years. We expect
6 the creation of 7.91 direct job-years for every one-million dollars spent in energy storage in New
7 Jersey. Indirect and induced jobs were estimated using the National Renewable Energy
8 Laboratories (“NREL”) Jobs and Economic Development Impact (“JEDI”) model. The CEF-ES
9 Program’s expenditures will also have a “multiplier effect” on New Jersey’s economy in that the
10 people employed through the CEF-ES Program will spend part of their wages on other goods and
11 services in New Jersey, creating additional economic value.¹ PSE&G’s hope is that it will also
12 create an ecosystem around which the maturing national energy storage market can grow.

13 **Q. What is the current state of the energy storage market?**

14 A. The energy storage industry has grown rapidly over the past decade, resulting in an
15 increasing recognition of the benefits provided by the technology to the power grid. Dramatic
16 declines in cost, increases in manufacturing capacity, and market and regulatory reforms have all
17 contributed to the growth of utility-scale energy storage applications. As such, energy storage
18 systems are increasingly being recognized by utilities and grid operators as tools to:

- 19 • Optimize the utilization of the grid; and
- 20 • Integrate new sources of intermittent renewable or distributed generation (“DG”).

¹ The value of job-years is based on the Rutgers report “Analysis for the 2011 Draft New Jersey Energy Master Plan Update” using the factor 7.91 jobs per one million dollars in program spend and the National Renewable Energy Laboratory Jobs and Economic Development Impact Model multiplier for indirect and induced jobs:
<http://policy.rutgers.edu/ceeep/publications/2011/2011DraftEnergyMasterPlanUpdate.pdf>.

1 Within each of these categories there are several specific applications that an ESS can
2 provide. While ESSs can be designed to provide only a single service to the grid (*e.g.*, frequency
3 regulation), a key driver for energy storage is its ability to deliver multiple benefits from a single
4 installation. This concept, known as “value stacking,” is typically implemented to improve
5 individual project economics. As wholesale and retail power market rules continue to evolve to
6 support energy storage, it is expected that it will become more common for an individual ESS to
7 serve multiple applications. PSE&G has developed this filing with the intention of stacking
8 multiple value streams from each deployment in order to maximize customer benefits.

9 **Q. What does optimize the utilization of the grid mean?**

10 A. Grid optimization support utilizes energy storage to optimize existing utility assets and
11 defer the need for additional investments. Utilities have deployed this strategy to avoid
12 permanent grid upgrades that are only needed for a few hours a year. By using energy storage,
13 utilities are able to accommodate the short term needs of the grid while also using the ESSs for
14 other purposes as appropriate. These other purposes could include participating in PJM ancillary
15 services markets, providing emergency support during outages, or smoothing the output of
16 renewable sources of generation. The flexibility and modular nature of storage (the ability to add
17 and modify ESS capacity) is key to the primary and secondary use cases in the subprograms that
18 PSE&G has developed.

19 **Q. What does renewable and DG integration refer to?**

20 A. Renewable and DG integration refers to smoothing generation output and controlling the
21 voltage fluctuations associated with intermittent solar, wind, and other DG. The variable output
22 generated by these sources often presents challenges to grid operators, as changing conditions
23 can lead to dramatic swings in the amount of energy and voltage being fed onto the grid.

1 Smoothing these swings with an ESS can help ensure stable voltage from circuits connected to
 2 renewable or DG assets. This stable output can protect grid infrastructure from unnecessary
 3 damage or degradation due to fluctuations in voltage or energy output.

4 PSE&G believes that the State’s renewable generation targets will make this application
 5 increasingly important as the Company accommodates the injection of increasing quantities of
 6 intermittent renewable generation into its system.

7 **III. SUBPROGRAM DESCRIPTIONS**

8 **Q. Can you provide a description of the CEF-ES subprograms?**

9 A. PSE&G proposes to implement the CEF-ES component through five subprograms as
 10 summarized below:

11 **Table 1: CEF-ES Subprogram Overview**

Use	Description	Customer Benefit	Number of Installations	Storage MW	Program Cost
1. Solar Smoothing	ESS used to smooth short-term changes in voltage due to intermittent generation	Relieves rapid power fluctuations on distribution circuits, extends life of impacted infrastructure and mitigates voltage disturbances at customer locations	5	10	\$13.1
2. Distribution Deferral	ESSs that resolve forecasted overloads on the system	Utilizes non-wires alternatives to defer or eliminate the need for traditional utility upgrades	7	13	\$38.6
3. Outage Management	Deploy fleet of mobile ESSs for contingency resources during substation construction	ESSs to help reduce the cost of substation construction by reducing the need for mobile transformers	6	6	\$20.0
4. Microgrids for Critical Facilities	Provide capital to support the development of microgrids	Enables critical facilities to operate independent of the electric grid during extended grid outages	1 to 4	2	\$25.7*
5. Peak Reduction for Public Sector Facilities	ESSs sited at public sector facilities and deployed to reduce peak demand	ESSs to help resolve potential overloads, address power quality issues at host sites, reduce bills for public sector customers	4	4	\$11.9
Total			23-26	35	\$109.4

12 *Program Cost includes funding for 2 MW of storage and 4 MW of solar, or additional generation, to supplement storage

1 **Q. Please describe the Solar Smoothing subprogram.**

2 A. PSE&G proposes to develop and construct ESSs for solar smoothing. The ESSs will help
3 relieve rapid power fluctuations from solar arrays that result from changes in cloud cover. The
4 following sections outline the grid's need for solar smoothing, the proposed application of the
5 ESSs, the associated costs, and the anticipated outcomes from the installations.

6 **Q. Please explain the grid's need for Solar Smoothing.**

7 A. Solar generation has expanded significantly in New Jersey over the past ten years. While
8 this growth has helped the State become a leader in the solar industry, additional expansion may
9 cause customers located near large arrays to be exposed to power quality issues due to the
10 voltage fluctuations and excursions driven by the output of the solar arrays. To alleviate the
11 extremes of these fluctuations, energy storage systems can be installed along the impacted
12 circuits with mitigating control strategies, improving customer power quality. As additional
13 solar is integrated to the grid, ESSs are expected to be increasingly useful in providing power
14 quality support to customers located near large intermittent power sources.

15 In order to smooth the voltage variations on the distribution circuits, an ESS will be
16 designed to dispatch or charge reactive and real power when signaled by its control software.
17 This software is typically triggered by monitoring the ramp-rate and moving average of the
18 output from the solar plant, but can vary based on the software programming, monitoring, and
19 implementation strategy. The ESSs are expected to provide customers with power quality
20 benefits, allow PSE&G to gain further knowledge of the operation and integration of the
21 combination of renewables and storage, and provide infrastructure that enables growth in
22 renewable energy development. The ESSs may also participate in the PJM frequency regulation

1 markets or offer their energy into the wholesale energy markets when favorable to help offset the
2 overall cost of the program.

3 The State has recently emphasized its commitment to the development of new solar and
4 offshore wind generation resources. This commitment underscores the need to look at how
5 energy storage can be used as a resource to manage the impacts of large quantities of intermittent
6 resources on the grid.

7 **Q. Please describe the application for Solar Smoothing.**

8 A. To address the grid's need outlined above, PSE&G is proposing to install 2 MW/2 MWh
9 ESSs on circuits where high solar penetration can have a large impact on customer facilities.
10 PSE&G has identified thirty five (35) such circuits that have high quantities of solar
11 interconnected and where ESSs may be used to address circuit impacts.

12 The proposed 2 MW/2 MWh ESSs have been designed to adequately smooth the
13 fluctuations in solar power provided to the grid, and to be able to participate in PJM ancillary
14 services markets, such as frequency regulation, in a revenue stacking control scheme to offset the
15 cost of the systems to ratepayers. Conversations with ESS providers have indicated that an ESS
16 of one third to one half the size of the interconnected solar capacity on a circuit is expected to be
17 able to sufficiently smooth the voltage fluctuations found on the circuit. Due to PSE&G
18 planning standards, many solar arrays interconnected on the 13kV system are between 4 MW
19 and 5 MW, so the solar smoothing program has been developed with the assumption that a 2
20 MW/2 MWh ESS would be an optimal configuration for this subprogram. The proposed
21 configuration is expected to be able to participate for one hour with its maximum power capacity
22 in the PJM frequency regulation market. The ability to use the full power capacity for regulation
23 may vary with the level of solar production and with the possible impact of regulation power

1 variability on the distribution circuit, depending upon location. Alternatively, the ESSs could
2 offer their capacity into the wholesale energy markets when full regulation participation is not
3 feasible.

4 The ESSs are expected to be designed to provide a high discharge and charge rate for the
5 quick response times required to smooth intermittent solar. The operating systems for the ESSs
6 will help analyze and react to real-time weather and system conditions and variables to smooth
7 out voltage fluctuations along the feeder.

8 Below is an example of a solar array along a 13 kV circuit with high solar penetration
9 that has experienced significant voltage fluctuation events. To limit fluctuation events, a 2
10 MW/2 MWh energy storage system could be installed in the proposed location below –
11 highlighted in yellow shading.

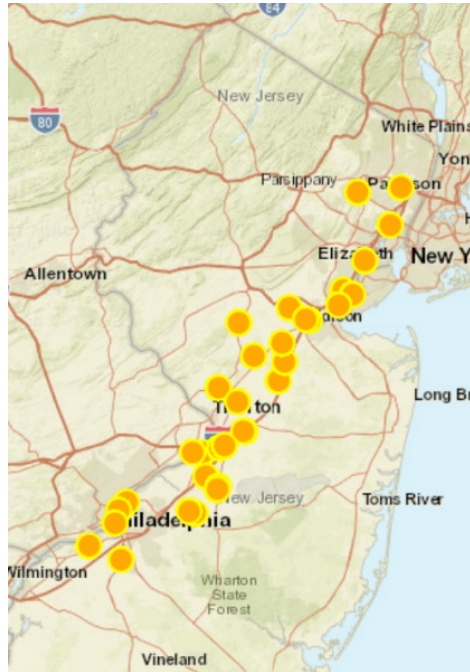
12 **Figure 1: PSE&G circuit with Solar PV Installation**



13
14 Operationally, the ESS is expected to be available with the required capacity for all hours
15 of daylight, with specific availability during the middle of the day when solar energy output is

1 highest and cloud coverage is most impactful. The ESS’s primary function will be to smooth
 2 solar fluctuations to provide more consistent voltage to customers on the shared distribution
 3 circuit. During evenings or hours when solar output is not expected to vary widely, the ESS can
 4 be bid into the PJM frequency regulation market or offered into the energy markets.

5 **Figure 2: Map of Potential Solar Smoothing Locations**



6

7 **Q. What is the estimated investment for the Solar Smoothing subprogram?**

8 A. PSE&G proposes to deploy ESSs for solar smoothing applications in the first five years
 9 of the CEF-ES Program. The overall installed investment for these systems is projected to
 10 decrease each year, primarily due to decreasing costs for batteries, inverters, and power
 11 electronics. The table below lists the expected annual investment for the Solar Smoothing
 12 subprogram. PSE&G expects to implement five (5) solar smoothing energy storage projects
 13 throughout the course of the Program, subject to the approved budget. The subprogram consists
 14 of deploying a total of 10 MW of ESSs at a total projected investment of \$13.1 million.

1 **Table 2: Projected Investment for Solar Smoothing Subprogram**
 2

Solar Smoothing	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Installations	1	1	1	1	1
Investment (\$ millions)	\$2.8	\$2.7	\$2.6	\$2.5	\$2.5

3
 4 **Q. Please describe the Distribution Deferral subprogram.**

5 A. PSE&G proposes to develop and construct ESSs to defer distribution system upgrades.
 6 The following sections outline the grid's needs, proposed application of the ESSs, the associated
 7 investment, and the anticipated outcomes from the installations.

8 **Q. Please describe the grid's need for Distribution Deferral.**

9 A. PSE&G uses a standard electric distribution planning process to estimate load growth on
 10 the distribution grid each year. This analysis is completed by gathering information from
 11 customer requests for additional loads and then preparing circuit improvement strategies to meet
 12 new load requirements. Circuit improvements to accommodate load growth typically range from
 13 simple solutions like moving load to a nearby circuit, to more complex upgrades like
 14 constructing an entirely new circuit. The costs associated with these upgrades can range from
 15 \$300k to \$8M per circuit.

16 For reliability reasons, circuits that violate planning capacities require stopgap measures
 17 until permanent solutions can be implemented. For instance, 13kV looped circuits above the
 18 16MVA planning thresholds (8MVA per 13kV circuit) may be forced to have reclosers locked in
 19 the open position during peak hours, eliminating the automated and self-healing loop features of
 20 the system. While this strategy temporarily relieves an overloaded circuit, it can turn what
 21 would have been a momentary outage into a sustained outage, potentially leaving customers
 22 without power for an extended period of time.

1 There are times, however, when such simple measures like locking open reclosers are
 2 insufficient to address potential overloads. In these times, reconfiguring substations, adding new
 3 looped circuits, and making additional system investments are required to ensure reliability
 4 standards. In the 13 kV system, these upgrades can cost up to \$8 million per circuit, depending
 5 on the level of complexity of the overload.

6 To defer these more substantial overloads, PSE&G is proposing to deploy ESSs as
 7 supplemental capacity on the 13 kV and 4 kV systems. The ESSs will help supplement the
 8 operating capacity of the substation transformer (which typically acts as the limiting factor on the
 9 system), thereby ensuring that demand can be met during peak periods during the deferral period.

10 **Q. Please describe the grid storage applications for the Distribution Deferral**
 11 **subprogram.**

12 A. The following table summarizes the PSE&G circuits with projected planning capacity
 13 violations and their total capacity deficiency. This is based on an analysis of previous summer
 14 peak loads, with a safety factor to account for weather variations.

15 **Table 3: Summary of PSE&G Potential Overloaded Circuits**

Circuit Size	Number of Potential Planning Capacity Violations	Average Deficiency
4kV	28 circuits	0.7 MVA
13kV	43 circuits	2.3 MVA

16 A representative example of the circuits identified in Table 3 is the 13 kV circuit loop
 17 that runs between the Devils Brook and Plainsboro substations. A permanent solution to this
 18 projected overload is a station upgrade that will alleviate the planning criteria violations in the
 19 Cranbury Township area. Figure 3 illustrates the circuits potentially adversely affected and
 20 associated with the new station upgrade. Due to the large amount of circuits in the area, the costs

1 to implement seven energy storage projects throughout the course of the program, subject to the
 2 approved budget. The table below lists the expected upfront investment for the Distribution
 3 Deferral subprogram by year. Note that the capacity of each ESS installed will depend on the
 4 specific overload that is being addressed. PSE&G intends to address overloads on both the 4kV
 5 and 13kV circuits, so we anticipate each ESS will be between 1 MW and 3 MW of total capacity.
 6 The total program investment for this subprogram is estimated to be \$38.6 million.

7 **Table 4: Installed Investment for the Distribution Deferral Subprogram**
 8

Distribution Deferral	Year 1	Year 2	Year 3	Year 4	Year 5
MW Installed	2	2	1	2	6
Investment (\$ millions)	\$6.5	\$6.3	\$3.0	\$5.9	\$16.9

9 **Q. Please describe the mobile storage for Outage Management subprogram.**

10 A. PSE&G proposes to utilize mobile ESSs for outage management solutions. The
 11 following sections describe the grid’s need for mobile ESSs, the proposed application of the
 12 ESSs, the associated investment, and the anticipated outcomes from the installations.

13 **Q. Please describe the need for mobile storage for Outage Management.**

14 A. PSE&G normally utilizes portable transformer equipment, or temporary substations, to
 15 maintain reliability on the electric distribution system during abnormal operating conditions,
 16 such as during substation upgrades and during planned and unplanned outages. These temporary
 17 substations are implemented based on their ability to ensure station reliability during peak and
 18 off peak times of the year. They also are designed to relieve spatial constraints, to ensure access
 19 to existing and future equipment, and to avoid potential underground and overhead conflicts
 20 during abnormal operating conditions.

1 Generally, these temporary stations include extra transformer capacity to meet the N-1²
2 planning criteria for reliability and redundancy. By doing this, the temporary stations offer the
3 same level of reliability as the existing station, thereby minimizing the likelihood of an outage
4 while the construction project takes place at the site. PSE&G currently maintains a fleet of
5 mobile transformers and unit substations that can be utilized for these substation contingency
6 installations. PSE&G regularly replaces and replenishes its existing fleet of unit substations and
7 mobile transformers based on asset condition and life cycle. PSE&G expects to acquire new
8 equipment in the coming years.

9 Peak load analysis is the driving factor associated with the design of the substation
10 contingency, as meeting reliability standards on the system is always a priority. In the Outage
11 Management subprogram, PSE&G envisions ESSs being deployed to reduce the peak load on the
12 impacted substations, so as to reduce the number of mobile transformers and/or unit substations
13 required to complete the work. This subprogram would not eliminate the need for contingency
14 planning entirely; however, it should allow PSE&G to deploy fewer mobile transformers and
15 unit substations than would otherwise be needed, since the peak demand on the station will be
16 reduced below the threshold that would require an additional contingency resource. This should
17 result in savings for customers and is the basis for the use-case.

18 While the primary use case for this subprogram envisions mobile ESSs being deployed
19 during substation construction projects, the ESSs may also be mobilized to address outage
20 management conditions ranging from emergency response, to equipment failure, to temporary
21 load relief. The ESSs also have the capability to participate in the PJM frequency regulation

² An N-1 planning criterion refers to the industry standard associated with designing the electricity grid for reliability and redundancy. When designed with these criteria, the system will remain in a secure state in the event there is a loss of one critical element (“N”), like a substation transformer, transmission line or supply feeder.

1 market or offer their capacity into the energy markets, returning value to the customer when not
2 being utilized for their primary function, unlike traditional substation contingency equipment.
3 Still, these technologies are relatively new and the Company will continue to assess their long
4 term benefit to the system.

5 **Q. Please describe the storage applications for mobile storage for outage management.**

6 A. PSE&G evaluated a number of recently completed conventional substation contingency
7 projects to determine whether a mobile ESS could have been deployed to assist in the design and
8 cost associated with the project. In one representative example, summer load forecasts exceeded
9 the planning capacity criteria of 16 MVA for a substation that was being converted from 26 kV
10 to 69 kV. The capacity of the 4 kV breakers, limited surrounding property around the station,
11 and the fact that the location of the new station equipment was in the same location as the
12 existing equipment, caused the need for an extensive contingency plan. Additionally, planning
13 analysis concluded that the contingency scenario would need to be in place for two summers,
14 during the system's highest peak load. To meet the N-1 redundancy factor, a minimum of two
15 transformers were required to be in service at any point in time. Therefore, due to the high loads
16 on the station, extended abnormal operating conditions, and the limited operating capacity of the
17 4 kV breakers, three contingency transformers and a four-section 26 kV bus had to be
18 temporarily installed to maintain network flow through. The cost associated with this installation
19 was approximately \$4.3 million. In this scenario, using an ESS could have assisted in providing
20 supplemental capacity for the station by reducing the load below the next-level planning criteria
21 threshold. The contingency design would therefore have included only two transformers,
22 resulting in lower capital and installation costs. The mobile ESSs would assist in shedding the
23 peak loads the impacted substation would see during the summer, and could also participate in

1 the frequency regulation market when not needed for the temporary substation. Additional
 2 revenues procured by the ESS will be credited to customers.

3 The example noted is one type of substation contingency installation. Contingency
 4 installations can vary depending on the station’s load, the layout of the new project, and other
 5 restrictions. The intention of the ESSs in this subprogram is to avoid the next tier of cost and
 6 complexity in the design strategy by assisting the existing substation equipment in reducing peak
 7 load. A table of potential costs for different contingency configurations is noted as follows:

8 **Table 5: Estimated Costs by Substation Contingency Type**

Contingency Type	Estimated Cost
Temporary Station – 3 Transformers	\$4.3M
2 Mobile Transformers + Strain Bus	\$1.75M
1 Mobile Transformer	\$500k-\$750k
69kV Line Relocation	\$250k-\$500k

9 It is envisioned that using energy storage resources for substation contingencies in lieu of
 10 the traditional equipment identified in Table 5 would result in similar or slightly reduced costs
 11 for those contingency installations. The core benefit to utilizing storage, however, would be an
 12 ability to use the mobile ESSs for many of the other purposes described in this filing when not
 13 needed for those contingency situations. As an example, these mobile ESSs could be deployed
 14 to support circuit overloads, handle renewable smoothing, or be used as a contingency resource
 15 during an extended outage. Mobile transformers and unit substations are effective, but they lack
 16 the versatility that an ESS could provide.

1 **Q. What is the estimated investment for the Outage Management subprogram?**

2 A. PSE&G proposes to deploy mobile ESSs for outage management purposes in the first
 3 five years of the CEF-ES Program. The overall installed investment for these systems is
 4 projected to decrease each year, primarily due to falling costs for batteries, inverters, and power
 5 electronics. PSE&G expects to implement six energy storage projects for outage management
 6 throughout the course of the program, subject to the approved budget. The table below lists the
 7 expected upfront total installed investment for a 1 MW / 4 MWh mobile energy storage system
 8 for the Outage Management subprogram. A total of 6 MW of ESSs will be deployed with an
 9 estimated investment of \$20 million.

10 **Table 6: Installed Investment for the Outage Management Subprogram**

11

Outage Management	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Installations	1	1	1	1	2
Investment (\$ millions)	\$3.8	\$3.7	\$3.4	\$3.2	\$5.9

12 **Q. Please describe the Microgrids for Critical Facilities subprogram.**

13 A. PSE&G intends to develop, install, and operate microgrids with energy storage that can
 14 enable critical facilities within a community to maintain a reliable supply of electricity during an
 15 unplanned outage. To select the facilities that will receive the microgrid pilot projects, PSE&G
 16 intends to consult with entities in its service territory that received funding as part of New Jersey
 17 Board of Public Utility’s (“Board” or “BPU”) Town Center DER Microgrid initiative, or other
 18 local governments that would like to ensure that electricity supply is resilient during extended
 19 outages.

20 There are two outcomes that PSE&G hopes to achieve through this program. The first is
 21 to improve the resiliency of electric supply for critical facilities in the communities served by

1 PSE&G. The second is to understand how to configure a microgrid in such a way that utilizes
2 PSE&G's existing assets and day-to-day operational expertise.

3 Microgrids, which supply critical facilities with on-site or networked generation
4 resources, are a means for communities to provide electricity for essential services and shelter
5 during an extended outage or emergency. Microgrids can be difficult to value, since it is
6 impossible to predict how frequently an emergency situation may arise. Nevertheless,
7 microgrids may be a part of the next-generation energy grid. PSE&G believes that utilities
8 should have a core role in their operation and ongoing management, given their expertise in
9 managing the day-to-day reliability of the system.

10 **Q. What is the estimated investment for the Microgrids for Critical Facilities**
11 **subprogram?**

12 A. PSE&G proposes to deploy microgrids at critical facilities over the course of this
13 program. The overall installed investment for the energy storage component of these systems is
14 projected to decrease each year, primarily due to falling costs for batteries, inverters, and power
15 electronics. The subprogram investment may be deployed on a single microgrid or a number of
16 smaller microgrids. The table below lists the expected upfront investment for four microgrid
17 projects. The projection envisions a 0.5 MW/4 MWh energy storage system paired with a 1 MW
18 solar array, for a total expected investment of \$25.7 million, subject to the approved budget.
19 Solar was chosen as a representative generation source since it was anticipated that many
20 municipalities would prefer their microgrid be partially supplied from a renewable resource. The
21 actual generation resources used in the microgrid(s) will depend on the specific applications.

1 Note that the investment for four smaller installations could also be combined for a
 2 single, larger installation like those envisioned by the applicants to the BPU’s Town Center DER
 3 Microgrid program.

4 **Table 7: Installed Investment for Four Community Microgrids**

5

Community Microgrid	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7-21
Number of Installations	0	0	1	0	2	1	
Investment (\$ millions)*	\$0	\$0	\$5.7	\$1.0	\$7.8	\$10.1	\$1.1

6 *Cost assumptions include equipment lifecycle replacements for the potential solar arrays incorporated into the subprogram

7 **Q. Please describe the Peak Reduction for Public Sector Facilities subprogram.**

8 A. PSE&G proposes to locate ESSs at public sector facilities to both help provide energy
 9 cost management services for the customer, and to potentially defer traditional distribution
 10 upgrades.

11 **Q. Please describe the application for the Peak Reduction for Public Sector Facilities**
 12 **subprogram.**

13 A. The use of ESSs to reduce demand charges at facilities has become one of the fastest
 14 growing segments of the storage market. Large users of energy are shifting away from solely
 15 purchasing electricity from the grid to procuring a diverse suite of onsite technologies including
 16 energy storage, solar PV, energy management systems, and demand response. The rapid growth
 17 of distributed solar PV in recent years has helped drive the transformation to a more
 18 decentralized grid.

19 Land is at a premium in PSE&G’s service territory, and storage sites might not be
 20 available in certain areas where interconnection is needed. To interconnect utility scale energy
 21 storage systems where PSE&G has distribution deferral needs but does not have available sites,
 22 the Peak Reduction for Public Sector Facilities subprogram seeks to leverage storage systems

1 located behind the meters of public sector facilities. These systems can offer utility benefits in
2 the form of distribution deferral, in addition to behind the meter benefits for the host customer.

3 The customer benefits of the solution come from the reduction of the municipality's
4 electricity consumption during peak times due to the storage asset. These savings can deliver
5 significant economic value, which can help lower energy costs for the selected municipal and
6 public sector facilities. The ESSs may also provide power quality support or provide back-up
7 power to the host customer if configured appropriately.

8 There are three key potential outcomes from the deployment of energy storage at public
9 sector facilities for host peak shaving/distribution deferral by PSE&G:

- 10 • Greater Customer Engagement and Satisfaction: By offering energy storage, PSE&G
11 can help public sector customers reduce their energy costs, thus providing benefits to
12 the communities they serve;
- 13 • Improved Resiliency: Energy storage can provide long-term backup power if paired
14 with on-site generation such as solar PV. These systems could allow customer
15 facilities to maintain critical operations during outages and potentially serve as
16 emergency/community shelters in the event of a disaster or major outage, depending
17 on size of load and capacity of the ESS; and
- 18 • Reduced Transmission & Distribution Investments: Over time, the properly
19 coordinated siting of the ESSs can reduce customer load during peak demand periods,
20 deferring or potentially avoiding the need to invest in T&D infrastructure upgrades,
21 resulting in a benefit for all customers.

1 **Q. What is the estimated investment for the Peak Reduction for Public Sector Facilities**
 2 **subprogram?**

3 A. PSE&G proposes to deploy ESSs for host customer peak shaving and distribution
 4 deferral over the course of this program. The overall installed investment for these systems is
 5 projected to decrease each year, primarily due to falling costs for batteries, inverters, and power
 6 electronics. PSE&G expects to implement four energy storage projects as part of the
 7 subprogram, subject to the approved budget. The table below lists the expected upfront
 8 investment for a 1 MW / 4 MWh energy storage system for the Peak Reduction for Public Sector
 9 Facilities subprogram. This subprogram consists of a total of 4 MW of ESS deployed and a total
 10 estimated investment of \$11.9 million.

11 **Table 8: Projected Investment for Peak Reduction for Public Sector Facilities**
 12

Peak Reduction for Municipal Facilities	Year 1	Year 2	Year 3	Year 4	Year 5
Number of Installations	0	1	1	1	1
Investment (\$ millions)	\$0	\$3.1	\$3.0	\$3.0	\$2.8

13 **IV. ONGOING AND ADMINISTRATIVE EXPENSE DESCRIPTIONS**

14 **Q. Can you provide a description of the Company’s anticipated expenses?**

15 A. In addition to the upfront investment required to deploy energy storage systems, annual
 16 expenses will be incurred to administer the program, maintain system equipment, provide for
 17 insurance, and relocate mobile ESSs to new locations as required. All ongoing and
 18 administrative expenses described here are estimates. Actual expenses may change depending
 19 on the specific configurations of the ESSs deployed in the CEF-ES Program.

1 **Q. What are the total estimated investment and ongoing expenses of the CEF-ES**
 2 **Program?**

3 A. The total estimated investment and ongoing expenses for the CEF-ES Program are
 4 detailed in the following tables. The investment table follows the deployment of storage systems
 5 themselves and the associated administrative expenses, through the end of the deployment period
 6 in year 6. Maintenance expenses start as ESSs are deployed in year 1 and increase annually
 7 throughout the life of the program. As shown in the tables below, the CEF-ES Program's
 8 projected investment is \$109.38 million, and projected ongoing expenses are \$70.47 million.
 9 The expected total combined program expenditure is \$179.85 million.

10 **Table 9: Estimated Total CEF-ES Program Investment**

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7-21	Total
Battery	\$3.4	\$4.9	\$4.8	\$4.3	\$6.9	\$4.7	\$0.0	\$29.0
Inverters	\$0.9	\$1.1	\$1.0	\$0.9	\$1.3	\$0.6	\$0.0	\$5.8
Software & Control	\$0.4	\$0.6	\$0.6	\$0.6	\$1.0	\$0.6	\$0.0	\$3.8
Balance of Plant	\$0.3	\$0.4	\$0.4	\$0.3	\$0.6	\$0.4	\$0.0	\$2.3
Integration & Installation	\$4.4	\$6.3	\$6.8	\$6.5	\$11.4	\$8.2	\$0.0	\$43.6
Capital Labor	\$2.2	\$2.3	\$2.1	\$1.7	\$0.8	\$0.6	\$0.0	\$9.7
Microgrids*	\$0.0	\$0.0	\$2.8	\$1.0	\$2.7	\$7.5	\$1.2	\$15.2
Total	\$11.7	\$15.6	\$18.5	\$15.2	\$24.7	\$22.6	\$1.2	\$109.4

11
12

*Cost assumptions include equipment lifecycle replacements for the potential solar arrays incorporated into the subprogram

13 **Table 10: Estimated Total CEF-ES Program Ongoing Expenses**

Component	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7-21	Total
PSE&G Administrative Labor	\$0.0	\$0.0	\$0.1	\$0.1	\$0.1	\$0.1	\$9.5	\$10.0
Equipment O&M Expense	\$0.0	\$0.2	\$0.5	\$0.8	\$1.1	\$1.5	\$23.8	\$27.9
Insurance	\$0.0	\$0.0	\$0.1	\$0.2	\$0.2	\$0.3	\$5.4	\$6.3
Mobile ESS Re-location	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$7.2	\$7.2
Battery Refurbishing	\$0.0	\$0.1	\$0.3	\$0.5	\$0.7	\$1.0	\$16.2	\$19.0
Total	\$0.0	\$0.4	\$1.1	\$1.6	\$2.2	\$3.0	\$62.1	\$70.5

1 **Q. Please describe the PSE&G administrative expenses associated with owning the**
2 **storage equipment.**

3 A. PSE&G will utilize internal staff and third party support to manage the CEF-ES Program.
4 PSE&G employees will be responsible for evaluating potential circuits for participation in the
5 project, managing contracts with subcontractors and landowners, and reporting out on the
6 ongoing management of the program to the Board.

7 Third party support will primarily be utilized to manage the day-to-day deployment
8 strategies of the various projects. PSE&G will work with one or more third-party providers to
9 design a series of protocols around which the assets will charge and discharge to meet the goals
10 of the various subprograms.

11 **Q. Please describe the O&M expenses associated with maintaining the storage**
12 **equipment.**

13 A. Maintenance services for battery storage system equipment are estimated using an
14 industry average assumption of 2.2% of the upfront investment for a system required annually
15 (including communication, battery management, testing and analysis). Note that maintenance
16 expenses are separate from the battery refurbishment expenses listed in the following section.

17 Maintenance is required to keep the components within the ESS balanced and
18 operational. This includes operation of the system and its control software platform to ensure
19 optimal performance both economically and for the health of the system. Typically,
20 maintenance procedures also require site visits to confirm that all systems are performing
21 properly.

22 The ESSs in this program are expected to have one annual site visit by an electrical
23 engineer to review potential issues that cannot be remotely corrected. While much of the
24 ongoing monitoring can be handled by system software and automation, a periodic visit will

1 likely be required to confirm status reported by system software. This can include testing cell-
2 level voltage and temperature, condition of power electronics, HVAC and fire suppression
3 systems, as well as the state of the system container/building.

4 Maintenance expenses for the ESSs included in the CEF-ES Program also include
5 warranties on all of the components of the ESS. Those expenses are paid directly to the ESS
6 supplier and are expected to cover any components that may need to be replaced in the ESS from
7 commissioning to the end of the CEF-ES program.

8 **Q. Please describe the expenses associated with insurance in the CEF-ES Program.**

9 A. The cost to insure each ESS installed in the CEF-ES Program is assumed to be 0.5% of
10 the installed hardware costs for each ESS, annually, for the presumed 15 year life of the ESS.

11 **Q. Please describe the expenses associated with mobile ESS relocation in the CEF-ES**
12 **Program.**

13 A. The ESSs implemented in the Outage Management subprogram are expected to be
14 mobile units that will be able to be relocated for different outage management scenarios
15 throughout the duration of the program. As such, PSE&G has presumed that it will cost
16 \$400,000 each time each unit will be moved. Those costs are intended to cover permitting, site
17 preparation, transportation, and IT configuration. Each of the six ESSs in the Outage
18 Management subprogram is expected to be moved three times throughout the life of the program
19 after they are initially installed.

20 **Q. Please describe the expenses associated with battery refurbishment that are**
21 **required to maintain the storage equipment.**

22 A. PSE&G has assumed it will replenish the battery capacity on a regular basis by adding
23 fresh modules to the system to keep the overall system capacity at the nameplate level.

1 The CEF-ES program assumes a top-up approach for refurbishment, in which the lowest
2 performing modules are replaced as required, and a small number of additional modules are
3 added to maintain nameplate capacity as battery cells degrade. It is assumed that annual
4 refurbishment expenses will be 1.5% of upfront investment for ESS hardware and services.
5 PSE&G does not know specifically when each ESS will need refurbishment, and has used a
6 general annual presumed cost based on industry guidance.

7 **Q. Does PSE&G’s proposal include the flexibility to move funds within subprograms?**

8 A. Yes. The CEF-ES Program requires the flexibility to transfer funds between
9 subprograms and across program years to respond to market conditions and participant demands
10 to further maximize energy savings and program resources.

11 **Q. What is the expected effective date of the implementation of the CEF-ES Programs?**

12 A. PSE&G intends to deploy storage systems through this program over the course of a six
13 year period. The six year period will commence upon Board approval of the CEF-EVES
14 Program. The table below provides an outline of the expected implementation schedule for the
15 ESSs through this program. Please note that the table lists the year when systems are expected to
16 begin deployment, and the average installation is expected to take 12 months. Given that, some
17 systems are expected to be commissioned in the year after their deployment begins.

1 **Table 11: Projected Battery Storage System Implementation Schedule**

Use Case	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Solar Smoothing	2MW	2 MW	2 MW	2 MW	2 MW	-	10 MW
Distribution Deferral	2MW	2 MW	1 MW	2 MW	6 MW	-	13 MW
Mobile Storage for Contingencies	1MW	1 MW	1 MW	1 MW	2 MW	-	6 MW
Microgrids for Critical Facilities	-	-	0.5 MW	-	1 MW	0.5 MW	2 MW
Host Peak Shaving/Deferral	-	1 MW	1 MW	1 MW	1 MW		4MW
Total	5MW	6MW	5.5MW	6MW	12MW	0.5MW	35MW

2 Once fully commissioned, it is expected that each ESS will have a useful life of 15 years.
3 This useful life corresponds to the extended warranties offered by several leading ESS
4 developers, and includes periodic battery refurbishment to maintain nameplate system capacity
5 through the useful life. Ongoing expenses associated with ESS equipment, including battery
6 refurbishment, insurance, and administrative/labor expenses for the program, are expected to
7 continue through 2040 until all systems are decommissioned.

8 **Q. What is the procurement process for this CEF-ES Program?**

9 A. PSE&G intends to procure third-party implementation managers, equipment,
10 engineering, and related services. Project implementation is expected to be overseen and
11 managed by PSE&G personnel.

12 **Q. What are the potential Program risks and risk mitigation strategies?**

13 A. Given the early state of the energy storage industry's development, there are several
14 potential risks to this program. These risks are explained in the following sections, categorized
15 broadly as either regulatory and market uncertainty or operational and equipment issues.

1 **Q. Please explain the regulatory and market uncertainties.**

2 A. The energy storage industry has experienced regulatory and market uncertainty
3 throughout its growth around the world. In many electricity markets, ESSs are not yet permitted
4 to provide many of the services they are technically capable of, limiting potential revenue
5 streams and overall project economics. While there are efforts to reform these regulations at
6 both the federal, state, and RTO levels in the United States, there remains uncertainty and
7 barriers to the market's growth.

8 PSE&G will closely monitor and manage the regulatory risks outlined below to mitigate
9 the impact to the CEF-ES implementation. These regulatory risks, if realized, could have
10 material impacts on the expenses and revenues envisioned in the energy storage program.
11 Regulatory risks identified include:

- 12 • Rule changes from the Federal Energy Regulatory Commission (FERC) relative to
13 energy storage wholesale power market and ancillary services market participation;
 - 14 ▪ FERC has an active Notice of Proposed Rulemaking that would allow
15 distribution storage systems with a primary purpose of grid reliability or
16 renewable integration, and which are regulated assets, to also participate in
17 wholesale markets so long as all market benefits are passed to ratepayers.
18 While the outcome of this NOPR is unknown, the PSE&G proposed
19 storage pilots and stacked applications are consistent with this NOPR.
- 20 • Rule changes within PJM and the State of New Jersey regarding energy storage
21 wholesale market participation;
- 22 • Wholesale power and ancillary services market changes and related uncertainty;

1 ▪ The market prices for ancillary services, especially PJM frequency
2 regulation, can be volatile based on factors such as the amount of supply
3 that participates and the current energy prices.

- 4 • Local permitting and approval processes; and
- 5 • Uncertainty related to evolving utility demand charges and customer tariffs.

6 Performance of the ESSs in the CEF-ES Program will help to inform future state, RTO,
7 and federal energy policy. In this way, the program can help establish industry standards around
8 energy storage.

9 Aside from potential regulatory risks, PSE&G will closely monitor and manage the
10 operational risks outlined below to mitigate the impact to the CEF-ES implementation. These
11 operational risks are highlighted as follows:

- 12 • There is limited experience with energy storage across the energy storage value chain,
13 which creates risk around optimizing system dispatch for maximum value. While
14 significant advances have been made in ESS dispatch and economic optimization
15 software, it remains challenging to ensure the proper coordination of the multiple
16 services a system can provide;
- 17 • The value of and demand for frequency regulation services in PJM; and
- 18 • Performance issues relative to providing each of the services described (including
19 measured demand reduction, regulation services, capacity reduction, and energy
20 arbitrage);
- 21 • Mobile energy storage is an emerging technology that has not been widely deployed.

22 As such, the Company's ability to successfully implement the Outage Management

1 subprogram will depend on the ability of mobile energy storage providers to provide
2 a mobile ESS that meets the technical requirements of the subprogram.

3 **V. PROGRAM REPORTING**

4 **Q. Does PSE&G intend to provide reports to Board Staff and the Division of Rate
5 Counsel concerning the progress of the CEF-ES Program?**

6 A. PSE&G proposes to provide electronic reports concerning the CEF-ES Program to the
7 Board and the Division of Rate Counsel annually. The reports will provide information about
8 the Program such as participation and investment levels.

9 **VI. DECOUPLING/LOST REVENUE**

10 **Q. Are there challenges associated with the proposed CEF-ES subprograms that
11 warrant approval of a decoupling or lost revenue mechanism?**

12 A. Yes. In PSE&G's pending base rate case, the Company proposed a revenue decoupling
13 mechanism to remove barriers to expanding the Company's clean energy and related offerings to
14 its customers and allow the Company to make a substantial contribution toward helping New
15 Jersey meet its clean energy goals. Approval of a decoupling or lost revenue adjustment
16 mechanism will provide customers and the State with the benefits of the CEF-ES program that I
17 described earlier in my testimony, while neutralizing the potential revenue loss to the Company.
18 To that end, the Company is reintroducing its proposed decoupling mechanism from the pending
19 base rate case (*i.e.*, the GEM) in its Clean Energy Future – Energy Efficiency filing being made
20 at the same time as this proceeding in a separate docket for consideration by the Parties to that
21 proceeding. If approved, the Company's proposed decoupling mechanism would address the lost
22 revenues from this proceeding and thus a separate mechanism for recovering loss revenue for

1 Energy Storage would not be needed. In the event that the Company's decoupling mechanism is
2 not approved, the Company would be open to considering another form of decoupling or an
3 annual lost revenue adjustment mechanism to address the impact of lost revenues created by the
4 CEF-ES Program.

5 **Q. Please explain.**

6 A. Some of the subprograms included in the CEF-ES Program raise the potential for lost
7 revenue because they reduce the participant's consumption of electricity that would otherwise be
8 obtained from electric service provided by PSE&G. For example, the Peak Reduction for Public
9 Sector Facilities subprogram will help public entities with the opportunity to reduce their
10 electricity consumption during peak times due to the storage asset. As a result, the participating
11 entity has the potential benefit of a lower electric bill, but for PSE&G, there is also a
12 corresponding potential lost revenue impact. Consistent with the Clean Energy Law, similar
13 mechanisms approved by the Board and established regulatory policies in other jurisdictions, a
14 decoupling or lost revenue adjustment mechanism, such as the proposed GEM, will help mitigate
15 the potential lost revenue impact to the Company, while appropriately aligning the Company's
16 business interests with the expected benefits to customers and the State associated with the CEF-
17 ES.

18 **VII. CONCLUSION**

19 **Q. Do you have any concluding statements?**

20 A. Yes, the proposed CEF-ES Program should allow PSE&G a hands-on understanding of
21 the multitude of ways to apply energy storage systems to our evolving distribution system, and
22 make New Jersey a leader in the growing energy storage space. Beyond that, it will also help

1 meet the State's targets for energy storage and clean energy adoption as set forth by the Clean
2 Energy Law, by supporting the deployment of new renewable generation. Like the State,
3 PSE&G believes that energy storage holds great promise, and it looks forward to gaining
4 experience managing an array of energy storage applications while the capabilities of the
5 technology continue to evolve.

6 **Q. Does this conclude your testimony at this time?**

7 A. Yes.

**QUALIFICATIONS
OF
JORGE L. CARDENAS
VICE PRESIDENT – ASSET MANAGEMENT AND
CENTRALIZED SERVICES**

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I received a Bachelors Degree in Engineering from Stevens Institute of Technology in 1977. I received a Masters Degree in Business Administration from Rutgers University in 1995. I also participated in the Penn State Executive Development Program in 1992 and the Leadership New Jersey Program in 2000.

I was employed by PSE&G in June 1977. After a training program, I worked as an Engineer in the Palisades Electric Transmission and Distribution Division, where I provided engineering and managerial support for all phases of planning, design, construction and maintenance of the electric distribution system.

In 1981, I was promoted to the position of lead engineer in the Electric Standards and Performance department and assigned responsibility for the design and specification of outside plant switchgear for Electric Distribution. In 1984 I was promoted to the position of supervising engineer in the Metropolitan Electric Division and given the responsibility for the New Business department covering Essex and Passaic counties in the PSE&G franchised territory.

In 1986, I was promoted to the position of Line Engineer in the Elizabeth Electric Division with responsibility for overhead and underground distribution, and transmission operations, construction and maintenance of facilities in central New Jersey.

ATTACHMENT 2
SCHEDULE JLC-CEF-ES-1
PAGE 2 OF 3

1 In 1987, I was promoted to Product Service Manager – Corporate Services
2 and was given the responsibility to re-engineer and downsize the Nuclear Operations at the
3 Hope Creek and Salem nuclear stations, the corporate Engineering and Construction
4 Departments, the Corporate Real Estate Department, and the Customer Services and
5 Marketing Departments of the Company.

6 I was promoted to Planning and Customer Operations Manager at Palisades
7 Electric Division in 1990 with responsibility for the overall electric distribution planning,
8 operations, and customer interactions in Bergen and Hudson Counties in northern New
9 Jersey. In 1992 I became the Manager of Regulatory and Customer Operations for the
10 Electric Transmission and Distribution department of PSE&G. In this position I had
11 responsibility for new business policy, regulatory liaison with the BPU, environmental
12 services, customer satisfaction, new products and services, and EMF issues management.

13 In 1995, I was promoted to the position of Division Manager – Metropolitan
14 Electric Division, where I had overall responsibility for the electric transmission and
15 distribution system operation, construction, and maintenance for Essex and Passaic counties,
16 serving over 500,000 industrial, commercial, and distribution customers.

17 In 1997, I was named Division Manager Northern Gas Division. I was given
18 responsibility for the gas distribution operations, maintenance, and construction for Hudson,
19 Bergen, Essex, and Passaic counties in northern New Jersey, serving 700,000 gas customers.

20 In 2006, I was promoted to Vice President – Gas Delivery. My
21 responsibilities included the overall design, engineering, construction and maintenance of

ATTACHMENT 2
SCHEDULE JLC-CEF-ES-1
PAGE 3 OF 3

1 PSE&G's gas distribution system serving more than 1.7 million gas customers. The position
2 also includes oversight of the Appliance Service Business, which provides utility (i.e., leak
3 response, meter connection, appliance diagnostics) and competitive, revenue generating (i.e.,
4 parts replacement, water heater replacement, HVAC installations) services.

5 In July 2012 I assumed my current position, which involves overall
6 responsibility for gas and electric asset strategy, asset reliability, electric delivery planning,
7 gas system operations, operation and maintenance of metering and regulating stations and
8 technical services, utility business performance and improvement, utility operations services,
9 utility financial support, basic generation services, basic gas supply services and energy
10 supplier services. In addition, in coordination with the Vice President – Electric Operations,
11 I also have responsibility for the performance and safe conduct of all aspects of the Electric
12 Delivery business and have governance of all Electric Delivery Core Functions. From
13 January 2016 to December 2017, I was the chairman of the Northeast Gas Association. Since
14 July of 2016, I have responsibility for the areas of Operational Technology, Asset Strategy,
15 Reliability and Business Improvement for PSEG Long Island.

16 I am a member of the Leadership Council of the American Gas Association. I
17 am also currently the Vice Chair of the Board of Directors of the Northeast Gas Association.

**STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES**

**IN THE MATTER OF THE PETITION OF PUBLIC
SERVICE ELECTRIC AND GAS COMPANY
FOR APPROVAL OF ITS CLEAN ENERGY FUTURE-
ELECTRIC VEHICLE AND ENERGY STORAGE
PROGRAMS ON A REGULATED BASIS**

BPU Docket No. _____

**PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
STEPHEN SWETZ
SR. DIRECTOR – CORPORATE RATES
AND REVENUE REQUIREMENTS**

October 11, 2018

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**PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DIRECT TESTIMONY
OF
STEPHEN SWETZ
SR. DIRECTOR – CORPORATE RATES AND REVENUE REQUIREMENTS**

1 **I. INTRODUCTION AND PURPOSE**

2 **Q. Please state your name and professional title.**

3 A. My name is Stephen Swetz and I am the Sr. Director – Corporate Rates and Revenue
4 Requirements for PSEG Services Corporation. My credentials are set forth in the attached
5 Schedule SS-CEF-1.

6 **Q. What is the purpose of your direct testimony in this proceeding?**

7 A. The purpose of this testimony is to support Public Service Electric and Gas
8 Company’s (“PSE&G” or “the Company”) proposed methodology for recovery of the costs
9 related to PSE&G’s Clean Energy Future Electric Vehicle (“CEF-EV”) Program and Clean
10 Energy Future Energy Storage (“CEF-ES”) Programs (collectively “CEF-EVES”). I will
11 also address projected bill impacts.

12 **II. CEF-EVES PROGRAMS REVENUE REQUIREMENTS AND COST**
13 **RECOVERY**

14 A. *CEF-EV Revenue Requirements Formula and Components*

15 **Q. Please briefly describe PSE&G’s proposed cost recovery program for the CEF-**
16 **EV Program.**

17 A. PSE&G is proposing to recover the revenue requirements associated with the direct
18 costs of the CEF-EV Program. The CEF-EV Program direct costs include all costs related to

1 CEF-EV Program capital expenditures, AFUDC, and operations and maintenance costs
 2 including the administrative costs of running the Program.

3 These costs would be partially offset by the revenues derived from the CEF-EV
 4 Program, including, but not limited to, CEF-EV charging revenue associated with Company-
 5 owned chargers and revenues derived through the PJM frequency regulation market
 6 associated with the battery component associated with certain CEF-EV chargers. In addition,
 7 if the Company can derive any additional revenue in the future from the CEF-EVES
 8 Program, all net proceeds will be credited to ratepayers as a reduction to revenue
 9 requirements.

10 **Q. How does PSE&G propose to calculate the CEF-EV revenue requirements on a**
 11 **monthly basis?**

12 A. The CEF-EV Program investments are proposed to be treated as separate classes of
 13 utility plant, and depending on the type of investment, depreciated or amortized as described
 14 in the corresponding section below. The revenue requirements associated with the direct
 15 costs of the CEF-EV Program would be expressed as:

16
$$\text{Revenue Requirements} = (\text{Pre-Tax Cost of Capital} * \text{Net Investment}) +$$

 17
$$\text{Amortization and/or Depreciation} + \text{Expenses} + \text{Revenue Offsets} + \text{Flow-}$$

 18
$$\text{Thru}$$

19 **Q. Please describe the components and defined terms in PSE&G’s proposed**
 20 **monthly revenue requirement calculation.**

21 A. The following is a description of each term proposed in PSE&G’s revenue
 22 requirement calculation.

23 Cost of Capital – This is PSE&G’s requested overall WACC for the CEF-EV Program.

24 PSE&G shall earn a return on its net investment in the CEF-EV Program based upon an

1 authorized ROE and capital structure including income tax effects. The Company is
2 proposing to utilize the latest cost of capital authorized by the Board in a base rate case
3 proceeding. Since the CEF-EV Program is anticipated to commence after Board approval of
4 the Company's pending base rate case, PSE&G is utilizing the WACC submitted in the
5 pending base rate case for forecasting purposes. See Schedule SS-CEF-TIC-1 for the
6 calculation of the current After-Tax WACC utilized in the revenue requirement calculation.
7 Any change in the WACC authorized by the Board in the pending or any subsequent electric,
8 gas, or combined base rate case would be reflected in the subsequent monthly revenue
9 requirement calculations. Any changes to current tax rates would also be reflected in an
10 adjustment to the After-Tax WACC.

11 Net Investment – This is the Gross Plant-in-Service less associated accumulated depreciation
12 and/or amortization less ADIT. ADIT will be computed at all times utilizing a normalization
13 method of accounting as required by applicable IRS and Treasury Regulations for
14 depreciable assets and a flow-thru methodology for all intangible assets. Further, the ADIT
15 balance for the CEF-EV Program depreciable assets incorporate the federal tax proration
16 methodology as required by the IRS for depreciable assets recovered over a forecasted
17 period. The proration methodology and flow-thru methodology utilized in the calculation of
18 ADIT are described in more detail below. The assumptions supporting the capital
19 expenditures related to the CEF-EV Program are found in the direct testimony and
20 workpapers of Ms. Reif.

21 With regard to the Make-Ready Infrastructure investments, the Company retains the
22 right to transfer the net investment to base rates in the subsequent base rate case proceeding.

1 Depreciation/Amortization – The depreciation or amortization of the CEF-EV Program assets
 2 will vary depending on asset class. The table below summarizes the proposed book recovery
 3 and associated tax depreciation applied to the corresponding asset classes. The tax
 4 depreciation is calculated on the total tax cost of the asset. The book recovery for the Make-
 5 Ready Infrastructure Investment is based on the Company’s current depreciation rate for
 6 electric distribution assets. This rate will be updated to the latest rate approved by the BPU
 7 in the pending or any subsequent base rate case proceeding.

Asset Class	Book Recovery	Base Tax Depreciation	Tax Treatment
Make-Ready Infrastructure Investment ¹	40 years dep.	20 years MACRS	Proration
Chargers Utility Owned	10 years dep.	5 years MACRS	Proration
Battery Storage	15 years dep.	7 years MACRS	Proration
Chargers Regulatory Asset (Non-Loan)	10 years dep.	One Month	Flow-Thru
Chargers Regulatory Asset (Loan)	10 years dep.	Loan	N/A
IT Software Investment	5 years dep.	3 yrs. (Straight Line)	Flow-Thru

8 The amortization/depreciation would be based on a monthly vintaging methodology instead
 9 of the mass property accounting typically used for utility property. Please see the testimony
 10 of Ms. Reif for the support for the book recovery of each asset class.

11 Expenses – Expenses will include:

- 12 • Billed rebates on electric bills for participants
- 13 • Administrative costs related to the management of the EV Program
- 14 • Loan repayments (expressed as a negative expense)

¹ This investment includes distribution circuits, service drops, transformers, conductors, connectors, conduits, electric meters and breaker panels.

- 1 • Unrecovered loan repayments
- 2 • IT expenses
- 3 • Other/Cost of removal expenditures

4 The assumptions supporting the estimated operations and maintenance costs are described in
5 the Direct Testimony and workpapers of Ms. Reif.

6 Revenues Offsets – PSE&G will pursue generating revenues from the following sources:

- 7 • Charging revenues from Company-owned CEF-EV charging stations; and
- 8 • Participation in the PJM frequency regulation market.

9 As described above, any net revenue received from any future source shall be credited to
10 ratepayers as a reduction to revenue requirements.

11 Flow Thru - PSE&G is proposing three flow-thru adjustments to customers:

- 12 • Amortization Tax Flow-Thru – Rather than normalizing the timing difference
13 between book and tax depreciation over the life of the assets, the Company will
14 immediately credit/recover the timing difference between book and tax amortization
15 on regulatory assets to customers;
- 16 • Gross-up of Amortization Tax Flow-Thru – As the Amortization Flow-Thru impacts
17 above are after-tax, an income tax gross-up is required on the Amortization Flow-
18 Thru;

19 Tax Adjustment on Loans – According to current Internal Revenue Service regulations, the
20 portion of the investment that will be repaid by the participant must be treated as a loan for
21 tax purposes. The portions of the investments that are expected to be repaid by the
22 participant are not tax deductible. Therefore, when the loan portions of the investments are
23 amortized and added to revenue requirements, taxable income increases and current taxes
24 increase. The Company must increase the revenue requirement to pay for the increase in

1 current taxes. Conversely, when the participant repayment is returned to the ratepayers, it is
2 non-taxable revenue, which reduces taxable income and current taxes, which further reduces
3 revenue requirements. This flow-thru adjustment affects monthly revenue requirements;
4 there is no net impact to ratepayers over the life of the investments.

5 **B. CEF-EV Monthly Revenue Requirement Calculation**

6 **Q. Please describe the monthly detailed revenue requirement calculations.**

7 A. The monthly detailed calculations of the Revenue Requirements through September
8 2020 and the annual revenue requirements through 2064 are shown in Schedules SS-CEF-
9 EV-1.

10 **Q. What are the revenue requirements for the initial rate recovery period?**

11 A. The expected initial revenue requirement for the CEF-EV Program is \$9,710,572 for
12 the initial period,² as shown in Schedule SS-CEF-EV-2. The peak revenue requirement in
13 the first five subsequent annual periods is \$42,335,468 and occurs in the period October 2024
14 through September 2025 based upon the Program assumptions as shown in Schedule SS-
15 CEF-EV-3.

16 **C. CEF-ES Revenue Requirements Formula and Components**

17 **Q. Please briefly describe PSE&G's proposed cost recovery for the CEF-ES**
18 **Program.**

19 A. PSE&G is proposing to recover the revenue requirements associated with the direct
20 costs of the CEF-ES Program. The direct costs include all costs related to CEF-ES Program
21 capital expenditures, AFUDC, and operations and maintenance costs, including the
22 administrative costs of running the CEF-ES Program.

² See the following section entitled "Method for Recovery of Direct Costs" for a description of the "initial period"

1 These costs would be offset by the benefits derived from the CEF-ES Program,
2 including, but not limited to, the revenues derived through the PJM frequency regulation
3 market and any revenue generated from solar systems attached to specific battery units. The
4 solar revenue would include revenue from participation in the PJM energy market and net
5 revenue associated with the sale of Solar Renewable Energy Credits (“SRECs”). If PJM
6 capacity market rules change and solar capacity once again becomes a viable capacity
7 resource, PSE&G will also offer capacity into the auctions and credit ratepayers with the
8 revenue produced from participation. In addition, if the Company can derive any additional
9 revenue in the future from the ES Program, all net proceeds will be credited to ratepayers as a
10 reduction to revenue requirements.

11 In addition to the revenues associated with solar output, the Company will also claim
12 the investment tax credit (“ITC”) on the solar systems and the amortization of the ITC will be
13 returned to customers as an offset to revenue requirements. The details of the costs proposed
14 to be recovered, as well as the mechanism for such recovery, are described in the following
15 sections of this testimony.

16 **Q. How does PSE&G propose to calculate the Energy Storage revenue**
17 **requirements on a monthly basis?**

18 A. The ES Program investments are proposed to be treated as separate classes of utility
19 plant, and depending on the type of investment, depreciated or amortized as described in the
20 corresponding section below. The revenue requirements associated with the direct costs of
21 the ES Program would be expressed as:

1 *Revenue Requirements = (Pre-Tax Cost of Capital * Net Investment) +*
2 *Amortization and/or Depreciation + Expenses + Revenue Offsets + ITC*
3 *Amortization w/ Tax Gross Up + Tax Associated with ITC Basis Reduction*

4 **Q. Please describe the components and defined terms in PSE&G's proposed**
5 **monthly revenue requirement calculation.**

6 A. The following is a description of each term proposed in PSE&G's revenue
7 requirement calculation.

8 Cost of Capital – This is PSE&G's requested overall WACC for the Energy Storage
9 Program. PSE&G shall earn a return on its net investment in the CEF-ES Program based
10 upon an authorized ROE and capital structure including income tax effects. The Company is
11 proposing to utilize the latest cost of capital authorized by the Board in a base rate case
12 proceeding. Since the ES Program is anticipated to commence after Board approval of the
13 Company's pending base rate case, PSE&G is utilizing the WACC submitted in the
14 Company's pending base rate case for forecasting purposes. See Schedule SS-CEF-TIC-1
15 for the calculation of the current After-Tax WACC utilized in the revenue requirement
16 calculation. Any change in the WACC authorized by the Board in the pending or any
17 subsequent electric, gas, or combined base rate case would be reflected in the subsequent
18 monthly revenue requirement calculations. Any changes to current tax rates would also be
19 reflected in an adjustment to the After-Tax WACC.

20 Net Investment – This is the Gross Plant-in-Service less associated accumulated depreciation
21 and/or amortization less ADITADIT. ADIT will be computed at all times utilizing a
22 normalization method of accounting as required by applicable IRS and Treasury Regulations.
23 Further, the ADIT balance for the CEF-ES Program incorporates the federal tax proration
24 methodology as required by the IRS for depreciable assets recovered over a forecasted

1 period. The proration methodology is described in more detail below. The assumptions
 2 supporting the capital expenditures related to the ES Program are found in the direct
 3 testimony and workpapers of Jorge L. Cardenas.

4 Depreciation/Amortization – The depreciation or amortization of the ES Program assets will
 5 vary depending on the asset class. The table below summarizes the proposed book recovery
 6 and associated tax depreciation applied to the corresponding asset classes. The tax
 7 depreciation is calculated on the total tax cost of the asset, less 50% of the ITC.

Asset Class	Book Recovery	Tax Depreciation
Batteries	15 year dep.	7 year MACRS
Solar Panels, acquisition and installation costs	20 year dep.	5 year MACRS
Inverters	10 year dep.	
Communications Equipment		
Meters/Interconnection	20 year dep.	20 year MACRS

8 The amortization/depreciation would be based on a monthly vintaging methodology instead
 9 of the mass property accounting typically used for utility property.

10 Expenses – Expenses will include:

- 11 • PSE&G labor and other related ongoing costs required to manage the physical assets;
- 12 • Administrative costs related to the management of the ES Program;
- 13 • Rent/lease payments or bill credits made to host sites/facilities, if necessary;
- 14 • Insurance expense; and
- 15 • Cost of removal expenditures.

16 The assumptions supporting the estimated operations and maintenance costs are described in
 17 the Direct Testimony and workpapers of Mr.Cardenas.

1 Revenues Offsets – PSE&G will pursue revenues the following sources:

- 2 • Participation in the PJM frequency regulation market;
- 3 • Sales of ancillary services and energy in the applicable PJM wholesale markets;
- 4 • As noted above, if solar once again becomes a viable capacity resource, capacity
- 5 payments from the PJM capacity market; and
- 6 • Sales of SRECs through an auction process.

7 PSE&G will apply all net revenues it receives from the frequency regulation, energy
8 and any capacity sales in the PJM markets, and the sale of SRECs to customers to offset the
9 Energy Storage Program revenue requirements. As described above, any net revenue
10 received from any future source shall be credited to ratepayers as a reduction to revenue
11 requirements. All revenue assumptions are provided in Mr. Cardenas’ workpaper (WP-JLC-
12 CEF-ES-1.xlsx).

13 **Q. Are there any impacts on the revenue requirement that arise from the**
14 **investment tax credit?**

15 A. The solar system assets associated with the Solar Smoothing component of the
16 Energy Storage Program remain eligible for ITC for solar investments. For projects placed
17 in service through December 31, 2019, the ITC rate is 30%. The rate decreases to 26% for
18 projects that begin construction in 2020 and further decreases to 22% for all projects that
19 commence construction in 2021, provided all projects are placed into service by 2024. The
20 ITC rate decreases to 10% for all projects that commence construction post 2021. Please
21 note that the revenue requirements assume all projects commence construction and are placed
22 into service in the same year. The ITC credit will be flowed back to ratepayers over the book
23 life of the plant in accordance with Federal income tax law.

1 The ITC benefit is partially offset by the tax impact associated with the tax basis
 2 reduction equal to 50% of the ITC. This tax basis reduction is prescribed by Federal income
 3 tax law governing the ITC. The impact on revenue requirements is generated by applying the
 4 book depreciation method to the difference between the book basis and the tax basis
 5 multiplied by the tax rate, and then multiplied by the revenue conversion factor.

6 ***D. CEF-ES Monthly Revenue Requirement Calculation***

7 **Q. Please describe the monthly detailed revenue requirement calculations.**

8 A. The monthly detailed calculations of the Revenue Requirements through September
 9 2020 and the annual revenue requirements through the life of the CEF-ES Program are
 10 shown in Schedules SS-CEF-ES-1.

11 **Q. What are the revenue requirements for the initial rate recovery period?**

12 A. The expected revenue requirement for the ES Program is \$697,093 for the initial
 13 period,³ as shown in Schedule SS- CEF-ES-2. The peak revenue requirement is \$16,190,359
 14 and occurs in the period October 2025 through September 2026 based upon the ES Program
 15 assumptions as shown in Schedule SS- CEF-ES-3.

16 ***E. Cost Recovery Method for the CEF-EV and CEF-ES Programs***

17 **Q. Please describe the cost recovery mechanism for the Energy Storage and Electric
 18 Vehicle Programs.**

19 A. PSE&G proposes to recover the net revenue requirements associated with the Electric
 20 Vehicle and Energy Storage Programs via two components of a new Technology Innovation
 21 Charge (“TIC”) to the Company’s Tariff for Electric Service, *i.e.*, the Clean Energy Future-

³ See the section entitled “Method for Recovery of Direct Costs” for a description of the “initial period”.

1 Electric Vehicle component (“CEF-EVC”) and the Clean Energy Future-Energy Storage
2 component (“CEF-ESC”). See Attachment 5 for the proposed TIC tariff sheet. The CEF-
3 EVC and CEF-ESC are proposed to be applicable to all electric rate schedules on an equal
4 cents per kilowatt-hour basis in the same manner as currently utilized for all electric
5 components of the GPRC.

6 **Q. When is the anticipated implementation of the CEF-EVC and CEF-ESC?**

7 A. PSE&G is proposing to implement the CEF-EVC and CEF-ESC of the TIC charge
8 simultaneously with Board approval of the Electric Vehicle and Energy Storage Program
9 based upon forecasted expenditures and usage. Since Board approval is anticipated by the
10 end of March 2019 for rates effective April 1, 2019, the initial period for determining rates
11 will be from April 1, 2019 through September 30, 2020 consistent with the rate recovery
12 period for similar GPRC programs. If Board approval is received prior to April 1, 2019,
13 rates will still go into effect as filed for the initial rate period. All CEF-EVES Program costs
14 incurred prior to April 1, 2019 will be deferred. If Board approval is received after April 1,
15 2019 but prior to September 30, 2020, the proposed initial rate period charge will still be
16 implemented for the remaining months of the initial rate period. In that instance, all CEF-
17 EVES Program costs incurred prior to the rate-effective date will be deferred until rates go
18 into effect.

19 **Q. How is recovery for the CEF-EV and CEF-ES Programs anticipated for the**
20 **subsequent rate periods?**

21 A. For all subsequent rate periods, a true-up filing will be made no later than July of
22 each year for the period of October 1 of the year through September 30 of the subsequent

1 year plus the projected over/under deferred balance as of September 30 for the current year.
2 The over/under deferred balance will include actual revenue requirements through March of
3 the current year. The charges proposed in the annual filings made by July 1 of each year will
4 go into effect provisionally or as final rates, on October 1 of the current year, upon issuance
5 of a Board Order authorizing these provisional or final rates.

6 **Q. Please describe the calculation of the CEF-EVC and CEF-ESC.**

7 A. The calculation of the proposed CEF-EVC and CEF-ESC is shown in Schedules SS-
8 CEF-EV-3 and SS-CEF-ES-3, respectively. The revenue requirements, for the initial and all
9 subsequent rate periods, are divided by the current forecasted kilowatt-hours sales to
10 determine the CEF-EVC and CEF-ESC of the TIC without the SUT applied. The proposed
11 CEF-EVC and CEF-ESC for each period is then applied to all the existing class average rates
12 and the percentage change is calculated. In addition, the annual bill impacts for the typical
13 RS customer are calculated for each period through the end of each program. The expected
14 increase from the CEF-EVC for the initial recovery period for a residential customer would
15 be \$0.000152 per kWh without SUT (\$0.000162 per kWh including SUT) with an expected
16 maximum increase to the RS typical annual bill occurring in the period October 1, 2024
17 through September 30, 2025 with a rate of \$0.001009 per kWh without SUT (\$0.001076 per
18 kWh including SUT). The expected increase from the CEF-ESC for the initial recovery
19 period for a residential customer would be \$0.000011 per kWh without SUT (\$0.000012 per
20 kWh including SUT) with an expected maximum increase to the RS typical annual bill
21 occurring in the period October 1, 2025 through September 30, 2026 with a rate of
22 \$0.000386 per kWh without SUT (\$0.000412 per kWh including SUT).

1 **F. *Projected CEF-TIC Bill Impacts***

2 **Q. What is the initial proposed rate for the TIC?**

3 A. As shown in Schedule SS-CEF-TIC-2, the initial TIC rate comprised of the CEF-
4 EVC and CEF-ESC is proposed at \$0.000163 per kWh without SUT (\$0.000174 per kWh
5 with SUT).

6 **Q. Please describe the calculation of the CEF-EVC and CEF-ESC.**

7 A. The calculation of the proposed CEF-EVC and CEF-ESC is shown in Schedules SS-
8 EV-3 and SS-ES-3, respectively. The revenue requirements, for the initial and all
9 subsequent rate periods, are divided by the current forecasted kilowatt-hours sales to
10 determine the CEF-EVC and CEF-ESC of the TIC without the SUT applied. The proposed
11 CEF-EVC and CEF-ESC for each period is then applied to all the existing class average rates
12 and the percentage change is calculated. In addition, the annual bill impacts for the typical
13 RS customer are calculated for each period through the end of each program.

14 **Q. What are the initial and maximum residential rate impacts for the CEF-ES?**

15 A. As shown in Schedule SS-CEF-ES-3, PSE&G's typical electric residential customer
16 using 750 kWh in a summer month and 7,200 kWh annually would experience an initial
17 increase in their annual bill from \$1,233.72 to \$1,233.84 or \$0.12, or approximately 0.01%,
18 or an average of about \$0.01 per month (based upon Delivery Rates and BGS-RSCP charges
19 in effect September 8, 2018 assuming that the customer receives BGS-RSCP service from
20 PSE&G), with the expected maximum increase in the period from October 1, 2025 through
21 September 30, 2026 of approximately \$3.00 (0.24%), or about \$0.25 per month from rates in
22 effect September 8, 2018.

1 **Q. What are the initial and maximum residential rate impacts for the CEF-EV?**

2 A. As shown in Schedule SS-CEF-EV-3, PSE&G's typical electric residential customer
3 using 750 kWh in a summer month and 7,200 kWh annually would experience an initial
4 increase in their annual bill from \$1,233.72 to \$1,234.92 or \$1.20, or approximately 0.10%,
5 or an average of about \$0.10 per month (based upon Delivery Rates and BGS-RSCP charges
6 in effect September 8, 2018 assuming that the customer receives BGS-RSCP service from
7 PSE&G), with the expected maximum increase in the period from October 1, 2024 through
8 September 30, 2025 of approximately \$7.72 (0.63%), or about \$0.64 per month from rates in
9 effect September 8, 2018.

10 **Q. What are the combined initial and maximum rate impacts from the CEF-EVES**
11 **components of the TIC?**

12 A. As shown in Schedule SS-CEF-TIC-3, PSE&G's typical residential customer using
13 750 kWh in a summer month and 7,200 kWh annually would experience an initial increase in
14 their annual bill from \$1,233.72 to \$1,234.96 or \$1.24, or approximately 0.10%, or an
15 average of about \$0.12 per month (based upon Delivery Rates and BGS-RSCP charges in
16 effect September 8, 2018 assuming that the customer receives BGS-RSCP service from
17 PSE&G), with the expected maximum increase in the period from October 1, 2025 through
18 September 30, 2026 of approximately \$10.60 (0.86%), or about \$0.88 per month from rates
19 in effect September 8, 2018. See Attachment 6 for the Residential bill impacts for the CEF-
20 EV and CEF-ES components of the TIC individually as well as for the TIC in total.

1 **G. Other Schedules**

2 **1. Over / Under Calculation**

3 **Q. Based on the Company's proposal, please describe how any monthly under or**
4 **over recovery will be treated.**

5 A. Under the Company's proposal, any over/under recovery of the actual revenue
6 requirements compared to revenues would be deferred. In calculating the monthly interest on
7 net over and under recoveries, the interest rate shall be based upon the Company's interest
8 rate obtained on its commercial paper and/or bank credit lines utilized in the preceding
9 month. If both commercial paper and bank credit lines have been utilized, the weighted
10 average of both sources of capital shall be used. In the event that neither commercial paper
11 nor bank credit lines were utilized in the preceding month, the last calculated rate will be
12 used. The interest rate shall not exceed PSE&G's overall rate of return as authorized by the
13 Board as utilized in calculating revenue requirements for the corresponding period. The
14 calculation of monthly interest shall be based on the net of tax average monthly balance,
15 consistent with the methodology set forth in Schedules SS-CEF-EV-4 for the CEF-EV
16 Program and Schedule SS-CEF-ES-4 for the CEF-ES Program. Simple interest shall accrue
17 on any under and over recovered balances, and shall be included in the deferred balances at
18 the end of each reconciliation period. Near the end of the initial and each subsequent
19 recovery period, the corresponding deferred balances would be included with forecasted
20 revenue requirements for the succeeding period for purpose of setting the revised CEF-ESC
21 and CEF-EVC.

1 **2. Income Statement / Balance Sheet**

2 **Q. Have you provided an Income Statement and Balance Sheet for the CEF-EV and**
3 **CEF-ES Programs?**

4 A. Yes. The Company has prepared a projected Income Statement and Balance Sheet
5 for the Electric Vehicle and Energy Storage Programs from 2019 through the life of each
6 program. See Schedules SS-CEF-EV-5 and SS-CEF-ES-5 for the income statement and
7 balance sheets associated with the CEF-EV and CEF-ES Programs, respectively.

8 **III. FEDERAL INCOME TAX PRORATION METHODOLOGY**

9 **Q. Why are you utilizing the proration methodology?**

10 A. In accordance with current IRS regulations, the accumulated deferred Federal income
11 tax (“ADFIT”) balance used in the calculation of Net Investment must be compliant with the
12 IRS Normalization Rules. This entails applying a proration methodology to the forecasted
13 changes in the ADFIT balance for depreciable utility-owned plant recovered over a
14 forecasted period.

15 **Q. How does the proration methodology work?**

16 A. During the forecasted rate period, which is proposed to be October 1 through
17 September 30 for a program after the initial period, the monthly Federal deferred income tax
18 balance is adjusted by a proration percentage. However, at the conclusion of each rate period
19 the actual ADFIT balance is substituted for the prorated ADFIT balance.

1 **Q. How is the proration percentage calculated?**

2 A. The proration percentage is calculated as a fraction, the numerator of which is the
3 remaining days in the forecasted portion of the rate period after the accrual of a change in the
4 ADFIT balance and the denominator of which is the total number of days in the forecasted
5 portion of the rate period.

6 For example, if the rate period is October 2018 through September 2019, the
7 proration factor for changes in the ADFIT balance occurring in October 2018 is
8 approximately 92%, calculated as the days between October 31, 2018 (the last day of the
9 month) and September 30, 2019 (the end of the rate period), or 335 days, divided by the total
10 days in the rate period (365).

11 **Q. Does this conclude your testimony at this time?**

12 A. Yes, it does.

SCHEDULE INDEX

Schedule SS-CEF-1	CEF Steve Swetz Credentials
Schedule SS-CEF-TIC-1	CEF-TIC Weighted Average Cost of Capital (WACC)
Schedule SS-CEF-TIC-2	CEF-TIC Initial Proposed Rate Calculation
Schedule SS-CEF-TIC-3	CEF-TIC Rate Impact Analysis
Schedule SS-CEF-EV-1	CEF-EV Revenue Requirements Summary
Schedule SS-CEF-EV-2	CEF-EV Initial Proposed Rate Calculation
Schedule SS-CEF-EV-3	CEF-EV Rate Impact Analysis
Schedule SS-CEF-EV-4	CEF-EV Over / Under Balance
Schedule SS-CEF-EV-5	CEF-EV Income Statement and Balance Sheet
Schedule SS-CEF-ES-1	CEF-ES Revenue Requirements Summary
Schedule SS-CEF-ES-2	CEF-ES Initial Proposed Rate Calculation
Schedule SS-CEF-ES-3	CEF-ES Rate Impact Analysis
Schedule SS-CEF-ES-4	CEF-ES Over / Under Balance
Schedule SS-CEF-ES-5	CEF-ES Income Statement and Balance Sheet

ELECTRONIC WORKPAPER INDEX

WP-SS-CEF-EV-1.xlsx	CEF-EV Revenue Requirements Summary and Rate Analysis Calculations
WP-SS-CEF-ES-1.xlsx	CEF-ES Revenue Requirements Summary and Rate Analysis Calculations

1 contributed to other filings including unbundling electric rates and Off-Tariff Rate
2 Agreements. I have had a leadership role in various economic analyses, asset valuations,
3 rate design, pricing efforts and cost of service studies.

4 I am an active member of the American Gas Association's Rate and
5 Strategic Issues Committee, the Edison Electric Institute's Rates and Regulatory Affairs
6 Committee and the New Jersey Utility Association (NJUA) Finance and Regulatory
7 Committee.

8 **EDUCATIONAL BACKGROUND**

9 I hold a B.S. in Mechanical Engineering from Worcester Polytechnic
10 Institute and an MBA from Fairleigh Dickinson University.

LIST OF PRIOR TESTIMONIES

Company	Utility	Docket	Testimony	Date	Case / Topic
Public Service Electric & Gas Company	E/G	ER18070688 and GR18070689	written	Jul-18	Green Programs Recovery Charge (GPRC)-Including CA, DR, EEE, EEE Ext, S4All, S4AEXT, S4AEXT II, SLII, SLIII / Cost Recovery
Public Service Electric & Gas Company	E	ER18060681	written	Jul-18	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR18060675	written	Jun-18	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	E/G	EO18060629 - GO18060630	written	Jun-18	Energy Strong II / Revenue Requirements & Rate Design
Public Service Electric & Gas Company	G	GR18060605	written	Jun-18	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E/G	ER18030231	written	Mar-18	Tax Cuts and Job Acts of 2017
Public Service Electric & Gas Company	E/G	GR18020093	written	Feb-18	Remediation Adjustment Charge-RAC 25
Public Service Electric & Gas Company	E/G	ER18010029 and GR18010030	written	Jan-18	Base Rate Proceeding / Cost of Service & Rate Design
Public Service Electric & Gas Company	E	ER17101027	written	Sep-17	Energy Strong / Revenue Requirements & Rate Design
Public Service Electric & Gas Company	G	GR17070776	written	Jul-17	Gas System Modernization Program II (GSMP II)
Public Service Electric & Gas Company	G	GR17070775	written	Jul-17	Gas System Modernization Program (GSMP) - Second Roll-In
Public Service Electric & Gas Company	G	GR17060720	written	Jul-17	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	E/G	ER17070724 - GR17070725	written	Jul-17	Green Programs Recovery Charge (GPRC)-Including CA, DR, EEE, EEE Ext, S4All, S4AEXT, S4AEXT II, SLII, SLIII / Cost Recovery
Public Service Electric & Gas Company	E	ER17070723	written	Jul-17	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR17060593	written	Jun-17	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E/G	ER17030324 - GR17030325	written	Mar-17	Energy Strong / Revenue Requirements & Rate Design - Sixth Roll-in
Public Service Electric & Gas Company	E/G	EO14080897	written	Mar-17	Energy Efficiency 2017 Program
Public Service Electric & Gas Company	E	ER17020136	written	Feb-17	Societal Benefits Charge (SBC) / Cost Recovery
Public Service Electric & Gas Company	E/G	GR16111064	written	Nov-16	Remediation Adjustment Charge-RAC 24
Public Service Electric & Gas Company	E	ER16090918	written	Sep-16	Energy Strong / Revenue Requirements & Rate Design - Fifth Roll-in
Public Service Electric & Gas Company	E	EO16080788	written	Aug-16	Construction of Mason St Substation
Public Service Electric & Gas Company	E	ER16080785	written	Aug-16	Non-Utility Generation Charge (NGC) / Cost Recovery
Public Service Electric & Gas Company	G	GR16070711	written	Jul-16	Gas System Modernization Program (GSMP) - First Roll-In
Public Service Electric & Gas Company	G	GR16070617	written	Jul-16	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	E/G	ER16070613 - GR16070614	written	Jul-16	Green Programs Recovery Charge (GPRC)-Including CA, DR, EEE, EEE Ext, S4All, S4AEXT, SLII, SLIII / Cost Recovery
Public Service Electric & Gas Company	E	ER16070616	written	Jul-16	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR16060484	written	Jun-16	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E	EO16050412	written	May-16	Solar 4 All Extension II (S4AllExt II) / Revenue Requirements & Rate Design
Public Service Electric & Gas Company	E/G	ER16030272 - GR16030273	written	Mar-16	Energy Strong / Revenue Requirements & Rate Design - Fourth Roll-in
Public Service Electric & Gas Company	E/G	GR15111294	written	Nov-15	Remediation Adjustment Charge-RAC 23
Public Service Electric & Gas Company	E	ER15101180	written	Sep-15	Energy Strong / Revenue Requirements & Rate Design - Third Roll-in
Public Service Electric & Gas Company	E/G	ER15070757-GR15070758	written	Jul-15	Green Programs Recovery Charge (GPRC)-Including CA, DR, EEE, EEE Ext, S4All, S4AEXT, SLII, SLIII / Cost Recovery
Public Service Electric & Gas Company	E	ER15060754	written	Jul-15	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR15060748	written	Jul-15	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	G	GR15060646	written	Jun-15	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E/G	ER15050558	written	May-15	Societal Benefits Charge (SBC) / Cost Recovery
Public Service Electric & Gas Company	E	ER15050558	written	May-15	Non-Utility Generation Charge (NGC) / Cost Recovery
Public Service Electric & Gas Company	E/G	ER15030389-GR15030390	written	Mar-15	Energy Strong / Revenue Requirements & Rate Design - Second Roll-in
Public Service Electric & Gas Company	G	GR15030272	written	Feb-15	Gas System Modernization Program (GSMP)
Public Service Electric & Gas Company	E/G	GR14121411	written	Dec-14	Remediation Adjustment Charge-RAC 22
Public Service Electric & Gas Company	E/G	ER14091074	written	Sep-14	Energy Strong / Revenue Requirements & Rate Design - First Roll-in
Public Service Electric & Gas Company	E/G	EO14080897	written	Aug-14	EEE Ext II
Public Service Electric & Gas Company	G	ER14070656	written	Jul-14	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	E/G	ER14070651-GR14070652	written	Jul-14	Green Programs Recovery Charge (GPRC)-Including CA, DR, EEE, EEE Ext, S4All, S4AEXT, SLII, SLIII / Cost Recovery
Public Service Electric & Gas Company	E	ER14070650	written	Jul-14	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR14050511	written	May-14	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E/G	GR14040375	written	Apr-14	Remediation Adjustment Charge-RAC 21
Public Service Electric & Gas Company	E/G	ER13070603-GR13070604	written	Jun-13	Green Programs Recovery Charge (GPRC)-Including DR, EEE, EEE Ext, CA, S4All, SLII / Cost Recovery
Public Service Electric & Gas Company	E	ER13070605	written	Jul-13	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	G	GR13070615	written	Jun-13	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	G	GR13060445	written	May-13	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	E/G	EO13020155-GO13020156	written/oral	Mar-13	Energy Strong / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	G	GO12030188	written/oral	Mar-13	Appliance Service / Tariff Support
Public Service Electric & Gas Company	E	ER12070599	written	Jul-12	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	E/G	ER12070606-GR12070605	written	Jul-12	RGGI Recovery Charges (RRC)-Including DR, EEE, EEE Ext, CA, S4All, SLII / Cost Recovery
Public Service Electric & Gas Company	E	EO12080721	written/oral	Jul-12	Solar Loan III (SLIII) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E	EO12080721	written/oral	Jul-12	Solar 4 All Extension(S4AllExt) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	G	GR12060489	written	Jun-12	Margin Adjustment Charge (MAC) / Cost Recovery
Public Service Electric & Gas Company	G	GR12060583	written	Jun-12	Weather Normalization Charge / Cost Recovery
Public Service Electric & Gas Company	E/G	ER12030207	written	Mar-12	Societal Benefits Charge (SBC) / Cost Recovery
Public Service Electric & Gas Company	E	ER12030207	written	Mar-12	Non-Utility Generation Charge (NGC) / Cost Recovery

LIST OF PRIOR TESTIMONIES

Company	Utility	Docket	Testimony	Date	Case / Topic
Public Service Electric & Gas Company	G	GR11060338	written	Jun-11	Margin Adjustment Charge (MAC) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	G	GR11060395	written	Jun-11	Weather Normalization Charge / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E	EO11010030	written	Jan-11	Economic Energy Efficiency Extension (EEEext) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E/G	ER10100737	written	Oct-10	RGGI Recovery Charges (RRC)-Including DR, EEE, CA, S4All, SLII / Cost Recovery
Public Service Electric & Gas Company	E/G	ER10080550	written	Aug-10	Societal Benefits Charge (SBC) / Cost Recovery
Public Service Electric & Gas Company	E	ER10080550	written	Aug-10	Non-Utility Generation Charge (NGC) / Cost Recovery
Public Service Electric & Gas Company	E/G	GR09050422	written/oral	Mar-10	Base Rate Proceeding / Cost of Service & Rate Design
Public Service Electric & Gas Company	E	ER10030220	written	Mar-10	Solar Pilot Recovery Charge (SPRC-Solar Loan I) / Cost Recovery
Public Service Electric & Gas Company	E	EO09030249	written	Mar-09	Solar Loan II(SLII) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E/G	EO09010056	written	Feb-09	Economic Energy Efficiency(EEE) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E	EO09020125	written	Feb-09	Solar 4 All (S4All) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E	EO08080544	written	Aug-08	Demand Response (DR) / Revenue Requirements & Rate Design - Program Approval
Public Service Electric & Gas Company	E/G	ER10100737	written	Jun-08	Carbon Abatement (CA) / Revenue Requirements & Rate Design - Program Approval

PSE&G Electric Vehicle Infrastructure Program
Weighted Average Cost of Capital (WACC)

Schedule SS-CEF-TIC-1

	<u>Percent</u>	<u>Cost</u>	<u>Weighted Cost</u>	<u>Revenue Conversion Factor</u>	<u>Pre-Tax Weighted Cost</u>	<u>Revenue Conversion Factor</u>	<u>Discount Rate</u>
Other Capital	45.53%	3.96%	1.80%		1.80%	1.3910	1.30%
Customer Deposits	<u>0.47%</u>	0.87%	<u>0.00%</u>		0.00%	1.3910	<u>0.00%</u>
Sub-total	46.00%		1.81%		1.81%		1.30%
Preferred Stock	0.00%	0.00%	0.00%	1.3910	0.00%		0.00%
Common Equity	<u>54.00%</u>	10.30%	<u>5.56%</u>	1.3910	<u>7.74%</u>		<u>5.56%</u>
Total	100.00%		7.37%		9.55%		6.86%
Monthly WACC			0.6139%		0.7955%		

Reflects a tax rate of 28.11%

PSE&G Electric Vehicle & Electric Storage Program Proposed Rate Calculations

Schedule SS-CEF-TIC-2

Actual results through

SUT Rate 6.6250%

<u>Line</u>	<u>Date(s)</u>		<u>Electric</u>	<u>Source/Description</u>
1	Apr 2019 - Sep 2020	Revenue Requirements	10,407,664	SS-CEF-EV-1, Col 29 SS-CEF-ES-1, Col 27
2		(Over) / Under Recovered Balance	0	SS-CEF-EV-4 & SS-CEF-ES-4, Line 4, Col 1
3		Cumulative Interest Exp / (Credit)	0	SS-CEF-EV-4 & SS-CEF-ES-4, Line 7, Col 1
4	Apr 2019 - Sep 2020	Total Target Rate Revenue	10,407,664	Line 1 + Line 2 + Line 3
5	Apr 2019 - Sep 2020	Forecasted kWh (000)	63,853,501	
6		Calculated Rate w/o SUT (\$/kWh)	0.000163	(Line 4 / (Line 5*1,000)) [Rnd 6]
7		Public Notice Rate w/o SUT (\$/kWh)	0.000163	Line 6
8		Existing Rate w/o SUT (\$/kWh)	0.000000	
9		Proposed Rate w/o SUT (\$/kWh)	0.000163	Line 7
10		Proposed Rate w/ SUT (\$/kWh)	0.000174	(Line 9 * (1 + SUT Rate)) [Rnd6]
11		Difference in Proposed and Previous Rate	0.000163	(Line 9 - Line 8)
12		Resultant TIC Revenue Increase / (Decrease)	10,408,121	(Line 5 * Line 11 * 1,000)

**PSE&G CEF -TIC
Electric Vehicle and Energy Storage Combined - Rate Impact Analysis**

6.625% SUT Rate

63,853,501 kWh Sales (000) - Initial Period (April 2019/Sep 20)
41,942,182 kWh Sales (000) - Annual (Oct 20/Sep 21)

7,200 Avg RS kWh / yr.
750 Avg RS kWh / Summer Month
525 Avg RS kWh / Winter Month
- Current electric TIC (\$/kWh)

(1)	(2)	(3)	(4)	(5)-(10)							(11)-(13)			(14)	(15)	(16)		
				Class Average Rate w/SUT - \$/kWh ²							Typical RS GPRC (\$)							
CEF-ES Revenue Requirements ²	CEF-EV Revenue Requirements ³	Total TIC Revenue Requirement	CEF-ES w/o SUT (\$/kWh) ³	CEF-ES w/SUT (\$/kWh)	RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S	Summer Monthly Bill	Winter Monthly Bill	Annual Bill	Change in RS Typical Annual Bill (\$)	RS Typical Annual Bill (\$)	% Change in RS Typical Annual Bill	
Current					0.171350	0.135833	0.169821	0.162301	0.131789	0.109024	0.095542	-	-	-		1,233.72		
April 2019 - Sep 2020	697,093	9,710,572	10,407,664	0.000163	0.000174	0.171524	0.136007	0.169995	0.162475	0.131963	0.109198	0.095716	0.13	0.09	1.24	1.24	1,234.96	0.101%
Oct 2020 - Sep 2021	2,996,208	17,209,174	20,205,382	0.000481	0.000513	0.171863	0.136346	0.170334	0.162814	0.132302	0.109537	0.096055	0.38	0.27	3.68	3.68	1,237.40	0.298%
Oct 2021 - Sep 2022	5,593,420	27,669,913	33,263,333	0.000793	0.000846	0.172196	0.136679	0.170667	0.163147	0.132635	0.109870	0.096388	0.63	0.44	6.04	6.04	1,239.76	0.490%
Oct 2022 - Sep 2023	7,874,323	33,138,884	41,013,207	0.000978	0.001043	0.172393	0.136876	0.170864	0.163344	0.132832	0.110067	0.096585	0.78	0.55	7.52	7.52	1,241.24	0.610%
Oct 2023 - Sep 2024	9,635,341	35,814,659	45,450,000	0.001084	0.001156	0.172506	0.136989	0.170977	0.163457	0.132945	0.110180	0.096698	0.87	0.61	8.36	8.36	1,242.08	0.678%
Oct 2024 - Sep 2025	14,784,181	42,335,468	57,119,649	0.001361	0.001451	0.172801	0.137284	0.171272	0.163752	0.133240	0.110475	0.096993	1.09	0.76	10.44	10.44	1,244.16	0.846%
Oct 2025 - Sep 2026	16,190,359	41,876,229	58,066,588	0.001384	0.001476	0.172826	0.137309	0.171297	0.163777	0.133265	0.110500	0.097018	1.11	0.77	10.60	10.60	1,244.32	0.859%
Oct 2026 - Sep 2027	14,862,581	40,345,695	55,208,276	0.001316	0.001403	0.172753	0.137236	0.171224	0.163704	0.133192	0.110427	0.096945	1.05	0.74	10.12	10.12	1,243.84	0.820%
Oct 2027 - Sep 2028	13,932,588	39,877,321	53,809,909	0.001283	0.001368	0.172718	0.137201	0.171189	0.163669	0.133157	0.110392	0.096910	1.03	0.72	9.88	9.88	1,243.60	0.801%
Oct 2028 - Sep 2029	13,238,737	37,821,044	51,059,781	0.001218	0.001299	0.172649	0.137132	0.171120	0.163600	0.133088	0.110323	0.096841	0.97	0.68	9.32	9.32	1,243.04	0.755%
Oct 2029 - Sep 2030	13,897,735	34,369,022	48,266,757	0.001150	0.001226	0.172576	0.137059	0.171047	0.163527	0.133015	0.110250	0.096768	0.92	0.64	8.80	8.80	1,242.52	0.713%
Oct 2030 - Sep 2031	11,091,151	29,635,241	40,726,392	0.000971	0.001035	0.172385	0.136868	0.170856	0.163336	0.132824	0.110059	0.096577	0.78	0.54	7.44	7.44	1,241.16	0.603%
Oct 2031 - Sep 2032	10,674,840	24,279,615	34,954,455	0.000834	0.000889	0.172239	0.136722	0.170710	0.163190	0.132678	0.109913	0.096431	0.67	0.47	6.44	6.44	1,240.16	0.522%
Oct 2032 - Sep 2033	10,160,770	18,670,589	28,831,369	0.000687	0.000733	0.172083	0.136566	0.170554	0.163034	0.132522	0.109757	0.096275	0.55	0.38	5.24	5.24	1,238.96	0.425%
Oct 2033 - Sep 2034	9,672,812	12,846,799	22,519,611	0.000537	0.000573	0.171923	0.136406	0.170394	0.162874	0.132362	0.109597	0.096115	0.43	0.30	4.12	4.12	1,237.84	0.334%
Oct 2034 - Sep 2035	8,868,537	6,966,591	15,835,128	0.000377	0.000402	0.171752	0.136235	0.170223	0.162703	0.132191	0.109426	0.095944	0.30	0.21	2.88	2.88	1,236.60	0.233%
Oct 2035 - Sep 2036	7,384,976	5,349,425	12,734,401	0.000304	0.000324	0.171674	0.136157	0.170145	0.162625	0.132113	0.109348	0.095866	0.24	0.17	2.32	2.32	1,236.04	0.188%
Oct 2036 - Sep 2037	5,946,097	5,007,882	10,953,979	0.000261	0.000278	0.171628	0.136111	0.170099	0.162579	0.132067	0.109302	0.095820	0.21	0.15	2.04	2.04	1,235.76	0.165%
Oct 2037 - Sep 2038	4,885,185	4,675,490	9,560,675	0.000227	0.000242	0.171592	0.136075	0.170063	0.162543	0.132031	0.109266	0.095784	0.18	0.13	1.76	1.76	1,235.48	0.143%
Oct 2038 - Sep 2039	3,677,555	4,352,593	8,030,148	0.000192	0.000205	0.171555	0.136038	0.170026	0.162506	0.131994	0.109229	0.095747	0.15	0.11	1.48	1.48	1,235.20	0.120%
Oct 2039 - Sep 2040	1,440,651	4,047,017	5,487,668	0.000130	0.000139	0.171489	0.135972	0.169960	0.162440	0.131928	0.109163	0.095681	0.10	0.07	0.96	0.96	1,234.68	0.078%
Oct 2040 - Sep 2041	782,583	3,879,946	4,662,530	0.000112	0.000119	0.171469	0.135952	0.169940	0.162420	0.131908	0.109143	0.095661	0.09	0.06	0.84	0.84	1,234.56	0.068%
Oct 2041 - Sep 2042	659,788	3,723,724	4,383,512	0.000105	0.000112	0.171462	0.135945	0.169933	0.162413	0.131901	0.109136	0.095654	0.08	0.06	0.80	0.80	1,234.52	0.065%
Oct 2042 - Sep 2043	492,891	3,580,488	4,073,379	0.000097	0.000103	0.171453	0.135936	0.169924	0.162404	0.131892	0.109127	0.095645	0.08	0.05	0.72	0.72	1,234.44	0.058%
Oct 2043 - Sep 2044	458,256	3,451,456	3,909,712	0.000093	0.000099	0.171449	0.135932	0.169920	0.162400	0.131888	0.109123	0.095641	0.07	0.05	0.68	0.68	1,234.40	0.055%
Oct 2044 - Sep 2045	140,215	3,336,597	3,476,812	0.000083	0.000088	0.171438	0.135921	0.169909	0.162389	0.131877	0.109112	0.095630	0.07	0.05	0.68	0.68	1,234.40	0.055%

See SS-CEF-ES-1, Col 27

Col 1 / [kWh Sales] / (Rnd to 6 dec.)

Col 2 * (1 + SUT Rate) Rnd 6

Current Class Avg Rate + Col 3 for Each Rate Class (Col 4 thru Col 10)

(Cur. TIC + Col 3) * Avg RS kWh Sum Mo Rnd 2

(Cur. TIC + Col 3) * Avg RS kWh Win Mo Rnd 2

(4 * Col 11) + (8 * Col 12)

Col 13 - Current Col 13

Current Col 15 + Col 14

Col 14 / Current Col 15

	% Change from Current Class Average Rate w/SUT						
	RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S
April 2019 - Sep 2020	0.102%	0.128%	0.102%	0.107%	0.132%	0.160%	0.182%
Oct 2020 - Sep 2021	0.299%	0.378%	0.302%	0.316%	0.389%	0.471%	0.537%
Oct 2021 - Sep 2022	0.494%	0.623%	0.498%	0.521%	0.642%	0.776%	0.885%
Oct 2022 - Sep 2023	0.609%	0.768%	0.614%	0.643%	0.791%	0.957%	1.092%
Oct 2023 - Sep 2024	0.675%	0.851%	0.681%	0.712%	0.877%	1.060%	1.210%
Oct 2024 - Sep 2025	0.847%	1.068%	0.854%	0.894%	1.101%	1.331%	1.519%
Oct 2025 - Sep 2026	0.861%	1.087%	0.869%	0.909%	1.120%	1.354%	1.545%
Oct 2026 - Sep 2027	0.819%	1.033%	0.826%	0.864%	1.065%	1.287%	1.468%
Oct 2027 - Sep 2028	0.798%	1.007%	0.806%	0.843%	1.038%	1.255%	1.432%
Oct 2028 - Sep 2029	0.758%	0.956%	0.765%	0.800%	0.986%	1.191%	1.360%
Oct 2029 - Sep 2030	0.715%	0.903%	0.722%	0.755%	0.930%	1.125%	1.283%
Oct 2030 - Sep 2031	0.604%	0.762%	0.609%	0.638%	0.785%	0.949%	1.083%
Oct 2031 - Sep 2032	0.519%	0.654%	0.523%	0.548%	0.675%	0.815%	0.930%
Oct 2032 - Sep 2033	0.428%	0.540%	0.432%	0.452%	0.556%	0.672%	0.767%
Oct 2033 - Sep 2034	0.334%	0.422%	0.337%	0.353%	0.435%	0.526%	0.600%
Oct 2034 - Sep 2035	0.235%	0.296%	0.237%	0.248%	0.305%	0.369%	0.421%
Oct 2035 - Sep 2036	0.189%	0.239%	0.191%	0.200%	0.246%	0.297%	0.339%
Oct 2036 - Sep 2037	0.162%	0.205%	0.164%	0.171%	0.211%	0.255%	0.291%
Oct 2037 - Sep 2038	0.141%	0.178%	0.143%	0.149%	0.184%	0.222%	0.253%
Oct 2038 - Sep 2039	0.120%	0.151%	0.121%	0.126%	0.156%	0.188%	0.215%
Oct 2039 - Sep 2040	0.081%	0.102%	0.082%	0.086%	0.105%	0.127%	0.145%
Oct 2040 - Sep 2041	0.069%	0.088%	0.070%	0.073%	0.090%	0.109%	0.125%
Oct 2041 - Sep 2042	0.065%	0.082%	0.066%	0.069%	0.085%	0.103%	0.117%
Oct 2042 - Sep 2043	0.060%	0.076%	0.061%	0.063%	0.078%	0.094%	0.108%
Oct 2043 - Sep 2044	0.058%	0.073%	0.058%	0.061%	0.075%	0.091%	0.104%
Oct 2044 - Sep 2045	0.051%	0.065%	0.052%	0.054%	0.067%	0.081%	0.092%

¹All customers assumed to have BGS Supply

²Initial Rate period is April 2019 to September 2020 for the CEF-ES Program

³SUT is assumed at the current SUT rate effective January 1, 2018 through the life of the Program

⁴The rates are based on a typical residential bill as of September 8, 2018

**PSE&G CEF Electric Vehicle Program
Revenue Requirements Calculation**

Schedule SS-CEF-EV-1

Page 1 of 2

Annual Pre-Tax WACC	9.5458%
Monthly Pre-Tax WACC	0.7955%

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Plant												
Month	Program Investment	Gross Plant	Depreciation Expense	Accumulated Depreciation	Net Plant	Tax Depreciation	Book Deprec Tax Basis	Prorated Deferred Tax Exp	Beginning Accumulated Deferred Income Tax	Ending Accumulated Deferred Income Tax	Accumulated Retention	Average Net Investment	Return Requirement
Jan-19	-	-	-	-	-	-	-	-	-	-	-	-	-
Feb-19	-	-	-	-	-	-	-	-	-	-	-	-	-
Mar-19	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr-19	1,125,604	891,354	2,738	2,738	888,617	421,218	2,075	29,898	-	29,898	-	429,359	3,415
May-19	1,125,604	1,782,708	8,213	10,950	1,771,758	422,683	6,225	29,759	29,898	59,658	-	1,285,409	10,225
Jun-19	2,260,604	3,809,063	18,370	29,321	3,779,742	1,544,437	15,058	108,933	168,591	168,591	-	2,661,626	21,173
Jul-19	1,125,604	4,700,417	28,528	57,849	4,642,568	426,390	23,890	28,832	197,422	197,422	-	4,028,148	32,043
Aug-19	1,125,604	5,591,771	34,003	91,852	5,499,919	428,733	28,041	28,695	226,117	226,117	-	4,859,474	38,656
Sep-19	2,260,604	7,618,125	44,161	136,012	7,482,113	1,551,803	36,873	107,872	226,117	333,989	-	6,210,963	49,407
Oct-19	1,475,604	8,859,479	55,386	191,398	8,668,081	452,271	46,773	34,077	372,069	372,069	-	7,720,066	61,412
Nov-19	1,475,604	10,100,833	62,996	254,394	9,846,439	482,973	53,059	40,378	412,447	412,447	-	8,865,002	70,519
Dec-19	2,610,604	12,477,188	75,289	329,684	12,147,504	1,664,939	64,027	132,360	544,807	544,807	-	10,518,345	83,671
Jan-20	1,475,604	13,718,542	87,582	417,266	13,301,276	462,476	74,995	31,765	576,571	576,571	-	12,163,701	96,760
Feb-20	1,825,604	15,309,896	96,261	513,527	14,796,369	594,485	81,936	40,626	617,198	617,198	-	13,451,938	107,007
Mar-20	2,960,604	18,036,250	110,689	624,216	17,412,034	1,721,150	94,214	119,757	736,955	736,955	-	15,427,126	122,720
Apr-20	1,799,042	19,469,458	124,739	748,955	18,720,503	826,435	106,392	54,715	791,669	791,669	-	17,301,957	137,634
May-20	2,149,042	21,252,667	134,798	883,753	20,368,914	834,861	114,854	54,668	846,338	846,338	-	18,725,705	148,959
Jun-20	4,089,042	24,975,875	153,882	1,037,635	23,938,240	2,744,705	132,342	189,010	1,035,348	1,035,348	-	21,212,734	168,743
Jul-20	2,149,042	26,759,083	172,966	1,210,601	25,548,483	855,939	149,831	53,105	1,088,453	1,088,453	-	23,681,161	188,381
Aug-20	2,499,042	28,892,292	185,160	1,395,760	27,496,532	996,358	160,016	61,841	1,150,293	1,150,293	-	25,403,134	202,077
Sep-20	6,439,042	34,965,500	211,935	1,607,695	33,357,805	2,986,206	184,370	202,097	1,352,390	1,352,390	-	29,175,827	232,088
	Program Assumption	Program Assumption	Refer to WP_SS 1.xls "Depr-Total" Worksheet Row 23	Prior Month + Col 3	Col 2 - Col 4	Refer to WP_SS 1.xls "Sched-IS and BS" Worksheet Row 82	Refer to WP_SS 1.xls "Sched-IS and BS" Worksheet Row 83	Refer to WP_SS 1.xls "Depr-Total" Worksheet Row 488	Refer to WP_SS 1.xls "Depr-Total" Worksheet Row 491	Refer to WP_SS 1.xls "Depr-Total" Worksheet Row 492	Program Assumption	(Prev Col 5 - Col 9 + Col 5 - Col 10 - Prev Col 11 - Col 11) / 2	Col 11 * Monthly Pre Tax WACC
Annual Summary													
2018	-	-	-	-	-	-	-	-	-	-	-	-	-
2019	14,585,438	12,477,188	329,684	329,684	12,147,504	7,395,448	276,021	540,804	544,807	544,807	-	10,518,345	370,522
2020	34,823,188	43,305,125	2,041,883	2,371,567	40,933,558	17,399,011	1,765,602	1,252,574	1,877,958	1,877,958	-	37,279,663	2,237,375
2021	42,150,688	92,030,572	6,156,920	8,528,487	83,502,085	27,648,396	5,547,639	1,850,933	3,944,041	3,944,041	-	77,757,472	5,759,953
2022	46,608,250	138,638,822	9,999,460	18,527,947	120,110,875	35,052,386	9,040,304	2,223,676	6,475,984	6,475,984	-	111,620,900	9,108,341
2023	51,327,313	189,966,134	13,954,265	32,482,212	157,483,923	41,085,695	12,674,952	2,443,926	9,277,033	9,277,033	-	146,206,333	12,392,351
2024	57,867,313	247,833,447	18,395,907	50,878,119	196,955,328	46,819,548	16,858,407	2,557,220	12,222,541	12,222,541	-	182,828,267	15,802,230
2025	13,407,813	261,241,259	21,859,045	72,737,164	188,504,096	16,641,948	20,183,264	97,697	12,670,186	12,670,186	-	176,732,584	17,662,831
2026	-	261,241,259	20,792,144	93,529,308	167,711,952	5,525,028	19,112,144	(729,071)	12,670,186	12,177,408	-	156,362,714	15,810,596
2027	-	261,241,259	20,450,742	113,980,049	147,261,210	4,626,616	18,770,742	(864,805)	12,177,408	11,455,162	-	136,625,129	13,908,963
2028	-	261,241,259	20,449,754	134,429,804	126,811,456	3,915,099	18,769,754	(991,561)	11,455,162	10,531,446	-	117,092,162	12,033,504
2029	-	261,241,259	20,147,932	154,577,736	106,663,523	3,414,599	18,521,595	(1,061,574)	10,531,446	9,484,492	-	97,954,236	10,181,435
2030	-	261,241,259	18,614,099	173,191,835	88,049,424	3,067,585	17,210,381	(1,010,953)	9,484,492	8,467,785	-	80,274,729	8,420,878
2031	-	261,241,259	16,081,971	189,273,806	71,967,453	2,821,410	15,011,252	(869,736)	8,467,785	7,593,393	-	64,955,414	6,849,344
2032	-	261,241,259	12,985,648	202,259,453	58,981,806	2,713,255	12,264,804	(664,651)	7,593,393	6,940,226	-	52,495,006	5,532,488
2033	-	261,241,259	9,458,488	211,717,941	49,523,318	2,711,393	9,057,801	(414,918)	6,940,226	6,556,972	-	43,277,019	4,508,243
2034	-	261,241,259	5,471,290	217,189,231	44,052,028	2,711,426	5,328,790	(132,968)	6,556,972	6,474,786	-	37,723,219	3,813,465
2035	-	261,241,259	2,294,410	219,483,641	41,757,618	2,711,393	2,290,191	92,251	6,474,786	6,622,193	-	35,227,364	3,465,594
2036-2064	-	261,241,259	41,757,618	261,241,259	-	18,181,023	41,757,618	(4,188,501)	6,622,193	-	-	-	39,091,886
Total	260,770,000		261,241,259			244,441,259	244,441,259						186,949,999
Apr 2019 - Sep 2020	39,971,500	259,210,500	1,607,695	9,543,604	249,666,896	19,418,063	1,374,970	1,348,387	9,191,826	10,540,213	-	223,121,974	1,774,891

PSE&G CEF Electric Vehicle Program Proposed Rate Calculations

Schedule SS-CEF-EV-2

Actual results through

SUT Rate 6.6250%

<u>Line</u>	<u>Date(s)</u>		<u>Electric</u>	<u>Source/Description</u>
1	Apr 2019 - Sep 2020	Revenue Requirements	9,710,572	SS-EV-1, Col 29
2		(Over) / Under Recovered Balance	0	SS-EV-4, Line 4, Col TBD
3		Cumulative Interest Exp / (Credit)	0	SS-EV-4, Line 7, Col TBD
4	Apr 2019 - Sep 2020	Total Target Rate Revenue	9,710,572	Line 1 + Line 2 + Line 3
5	Apr 2019 - Sep 2020	Forecasted kWh (000)	63,853,501	
6		Calculated Rate w/o SUT (\$/kWh)	0.000152	(Line 4 / (Line 5*1,000)) [Rnd 6]
7		Public Notice Rate w/o SUT (\$/kWh)	0.000152	Line 6
8		Existing Rate w/o SUT (\$/kWh)	0.000000	
9		Proposed Rate w/o SUT (\$/kWh)	0.000152	Line 7
10		Proposed Rate w/ SUT (\$/kWh)	0.000162	(Line 9 * (1 + SUT Rate)) [Rnd6]
11		Difference in Proposed and Previous Rate	0.000152	(Line 9 - Line 8)
12		Resultant EV Revenue Increase / (Decrease)	9,705,732	(Line 5 * Line 11 * 1,000)

PSE&G CEF Electric Vehicle Program
Electric Vehicle Infrastructure Charge - Rate Impact Analysis

Schedule SS-CEF-EV-3

7.200 Avg RS kWh / yr.
 750 Avg RS kWh / Summer Month
 525 Avg RS kWh / Winter Month

6.625% SUT Rate effective 1/1/2018
 63,853,501 kWh Sales (000) - Apr 19 - Sep 20
 41,942,182 kWh Sales (000) - Oct 20 - thereafter

- Current electric TIC (\$/kWh)

(1)	(2)	(3)	(4)-(10)							(11)-(13)			(14)	(15)	(16)	
			Class Average Rate w/SUT - \$/kWh ¹							Typical RS GPRC (\$)						
			RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S	Summer Monthly Bill	Winter Monthly Bill	Annual Bill				Change in RS Typical Annual Bill (\$/s)
Current			0.171350	0.135833	0.169821	0.162301	0.131789	0.109024	0.095542	-	-	-	\$1.23	1,233.72	-	
Apr 2019 - Sep 2020	9,710,572	0.000152	0.000162	0.171512	0.135995	0.169983	0.162463	0.131951	0.109186	0.095704	0.12	0.09	1.20	\$1.20	1,234.92	0.10%
Oct 2020 - Sep 2021	17,209,174	0.000410	0.000437	0.171787	0.136270	0.170258	0.162738	0.132226	0.109461	0.095979	0.33	0.23	3.16	\$3.16	1,236.88	0.26%
Oct 2021 - Sep 2022	27,669,913	0.000660	0.000704	0.172054	0.136537	0.170525	0.163005	0.132493	0.109728	0.096246	0.53	0.37	5.08	\$5.08	1,238.80	0.41%
Oct 2022 - Sep 2023	33,138,884	0.000790	0.000842	0.172192	0.136875	0.170653	0.163143	0.132634	0.109966	0.096394	0.63	0.44	6.94	\$6.94	1,239.76	0.49%
Oct 2023 - Sep 2024	35,814,659	0.000854	0.000911	0.172281	0.136744	0.170732	0.163212	0.132700	0.109935	0.096453	0.68	0.48	6.56	\$6.56	1,240.28	0.53%
Oct 2024 - Sep 2025	42,335,468	0.001009	0.001076	0.172426	0.136909	0.170897	0.163377	0.132865	0.110100	0.096618	0.81	0.56	7.72	\$7.72	1,241.44	0.63%
Oct 2025 - Sep 2026	41,876,229	0.000998	0.001064	0.172414	0.136897	0.170885	0.163365	0.132853	0.110088	0.096606	0.80	0.56	7.68	\$7.68	1,241.40	0.62%
Oct 2026 - Sep 2027	40,345,695	0.000962	0.001026	0.172376	0.136859	0.170847	0.163327	0.132815	0.110050	0.096568	0.77	0.54	7.40	\$7.40	1,241.12	0.60%
Oct 2027 - Sep 2028	39,877,321	0.000951	0.001014	0.172364	0.136847	0.170835	0.163315	0.132803	0.110038	0.096556	0.76	0.53	7.28	\$7.28	1,241.00	0.59%
Oct 2028 - Sep 2029	37,821,044	0.000902	0.000962	0.172312	0.136795	0.170783	0.163263	0.132751	0.109986	0.096504	0.72	0.51	6.96	\$6.96	1,240.68	0.56%
Oct 2029 - Sep 2030	34,369,022	0.000819	0.000873	0.172223	0.136706	0.170694	0.163174	0.132662	0.109897	0.096415	0.65	0.46	6.28	\$6.28	1,240.00	0.51%
Oct 2030 - Sep 2031	29,635,241	0.000707	0.000754	0.172104	0.136587	0.170575	0.163055	0.132543	0.109778	0.096296	0.57	0.40	5.48	\$5.48	1,239.20	0.44%
Oct 2031 - Sep 2032	24,279,615	0.000579	0.000617	0.171967	0.136450	0.170438	0.162918	0.132406	0.109641	0.096159	0.46	0.32	4.40	\$4.40	1,238.12	0.36%
Oct 2032 - Sep 2033	18,670,589	0.000445	0.000474	0.171824	0.136307	0.170295	0.162775	0.132263	0.109498	0.096016	0.36	0.25	3.44	\$3.44	1,237.16	0.28%
Oct 2033 - Sep 2034	12,846,799	0.000306	0.000326	0.171676	0.136159	0.170147	0.162627	0.132115	0.109350	0.095868	0.24	0.17	2.52	\$2.52	1,236.04	0.19%
Oct 2034 - Sep 2035	6,966,591	0.000166	0.000177	0.171527	0.136010	0.169998	0.162478	0.131966	0.109201	0.095719	0.13	0.09	1.24	\$1.24	1,234.96	0.10%
Oct 2035 - Sep 2036	5,349,425	0.000128	0.000136	0.171486	0.135969	0.169957	0.162437	0.131925	0.109160	0.095678	0.10	0.07	0.96	\$0.96	1,234.68	0.08%
Oct 2036 - Sep 2037	5,007,882	0.000119	0.000127	0.171477	0.135960	0.169948	0.162428	0.131916	0.109151	0.095669	0.10	0.07	0.96	\$0.96	1,234.68	0.08%
Oct 2037 - Sep 2038	4,675,490	0.000111	0.000118	0.171468	0.135951	0.169939	0.162419	0.131907	0.109142	0.095660	0.09	0.06	0.84	\$0.84	1,234.56	0.07%
Oct 2038 - Sep 2039	4,352,593	0.000104	0.000111	0.171461	0.135944	0.169932	0.162412	0.131900	0.109135	0.095653	0.08	0.06	0.80	\$0.80	1,234.52	0.06%
Oct 2039 - Sep 2040	4,047,017	0.000096	0.000102	0.171452	0.135935	0.169923	0.162403	0.131891	0.109126	0.095644	0.08	0.05	0.72	\$0.72	1,234.44	0.06%
Oct 2040 - Sep 2041	3,879,946	0.000093	0.000099	0.171449	0.135932	0.169920	0.162400	0.131888	0.109123	0.095641	0.07	0.05	0.68	\$0.68	1,234.40	0.06%
Oct 2041 - Sep 2042	3,723,724	0.000089	0.000095	0.171445	0.135928	0.169916	0.162396	0.131884	0.109119	0.095637	0.07	0.05	0.68	\$0.68	1,234.40	0.06%
Oct 2042 - Sep 2043	3,580,488	0.000085	0.000091	0.171441	0.135924	0.169912	0.162392	0.131880	0.109115	0.095633	0.07	0.05	0.68	\$0.68	1,234.40	0.06%
Oct 2043 - Sep 2044	3,451,456	0.000082	0.000087	0.171437	0.135920	0.169908	0.162388	0.131876	0.109111	0.095629	0.07	0.05	0.68	\$0.68	1,234.40	0.06%
Oct 2044 - Sep 2045	3,336,597	0.000080	0.000085	0.171435	0.135918	0.169906	0.162386	0.131874	0.109109	0.095627	0.06	0.04	0.56	\$0.56	1,234.28	0.05%
Oct 2045 - Sep 2046	3,230,325	0.000077	0.000082	0.171432	0.135915	0.169903	0.162383	0.131871	0.109106	0.095624	0.06	0.04	0.56	\$0.56	1,234.28	0.05%
Oct 2046 - Sep 2047	3,125,962	0.000075	0.000080	0.171430	0.135913	0.169901	0.162381	0.131869	0.109104	0.095622	0.06	0.04	0.56	\$0.56	1,234.28	0.05%
Oct 2047 - Sep 2048	3,021,696	0.000072	0.000077	0.171427	0.135910	0.169898	0.162378	0.131866	0.109101	0.095619	0.06	0.04	0.56	\$0.56	1,234.28	0.05%
Oct 2048 - Sep 2049	2,917,435	0.000070	0.000075	0.171425	0.135908	0.169896	0.162376	0.131864	0.109099	0.095617	0.06	0.04	0.56	\$0.56	1,234.28	0.05%
Oct 2049 - Sep 2050	2,813,171	0.000067	0.000071	0.171421	0.135904	0.169892	0.162372	0.131860	0.109095	0.095613	0.05	0.04	0.52	\$0.52	1,234.24	0.04%
Oct 2050 - Sep 2051	2,708,907	0.000065	0.000069	0.171419	0.135902	0.169890	0.162370	0.131858	0.109093	0.095611	0.05	0.04	0.52	\$0.52	1,234.24	0.04%
Oct 2051 - Sep 2052	2,604,641	0.000062	0.000066	0.171416	0.135899	0.169887	0.162367	0.131855	0.109090	0.095608	0.05	0.03	0.44	\$0.44	1,234.16	0.04%
Oct 2052 - Sep 2053	2,500,380	0.000060	0.000064	0.171414	0.135897	0.169885	0.162365	0.131853	0.109088	0.095606	0.05	0.03	0.44	\$0.44	1,234.16	0.04%
Oct 2053 - Sep 2054	2,396,116	0.000057	0.000061	0.171411	0.135894	0.169882	0.162362	0.131850	0.109085	0.095603	0.05	0.03	0.44	\$0.44	1,234.16	0.04%
Oct 2054 - Sep 2055	2,291,852	0.000055	0.000059	0.171409	0.135892	0.169880	0.162360	0.131848	0.109083	0.095601	0.04	0.03	0.40	\$0.40	1,234.12	0.03%
Oct 2055 - Sep 2056	2,187,586	0.000052	0.000056	0.171405	0.135889	0.169876	0.162356	0.131844	0.109079	0.095597	0.04	0.03	0.40	\$0.40	1,234.12	0.03%
Oct 2056 - Sep 2057	2,083,325	0.000050	0.000055	0.171403	0.135886	0.169874	0.162354	0.131842	0.109077	0.095595	0.04	0.03	0.40	\$0.40	1,234.12	0.03%
Oct 2057 - Sep 2058	1,979,061	0.000047	0.000050	0.171400	0.135883	0.169871	0.162351	0.131839	0.109074	0.095592	0.04	0.03	0.40	\$0.40	1,234.12	0.03%
Oct 2058 - Sep 2059	1,863,122	0.000044	0.000047	0.171397	0.135880	0.169868	0.162348	0.131836	0.109071	0.095589	0.04	0.02	0.32	\$0.32	1,234.04	0.03%
Oct 2059 - Sep 2060	1,652,225	0.000039	0.000042	0.171392	0.135875	0.169863	0.162343	0.131831	0.109066	0.095584	0.03	0.02	0.28	\$0.28	1,234.00	0.02%
Oct 2060 - Sep 2061	1,356,163	0.000032	0.000034	0.171384	0.135867	0.169855	0.162335	0.131823	0.109058	0.095576	0.03	0.02	0.28	\$0.28	1,234.00	0.02%
Oct 2061 - Sep 2062	1,019,437	0.000024	0.000026	0.171376	0.135859	0.169847	0.162327	0.131815	0.109050	0.095568	0.02	0.01	0.16	\$0.16	1,233.88	0.01%
Oct 2062 - Sep 2063	679,814	0.000016	0.000017	0.171367	0.135850	0.169838	0.162318	0.131806	0.109041	0.095559	0.01	0.01	0.12	\$0.12	1,233.84	0.01%
Oct 2063 - Sep 2064	333,794	0.000008	0.000009	0.171359	0.135842	0.169830	0.162310	0.131798	0.109033	0.095551	0.01	-	0.04	\$0.04	1,233.76	0.00%
Oct 2064 - Sep 2065	38,126	0.000001	0.000001	0.171351	0.135834	0.169822	0.162302	0.131790	0.109025	0.095543	-	-	-	\$0.00	1,233.72	0.00%

(1)	(2)	(3)	(4)-(10)							(11)-(13)			(14)	(15)	(16)	
From Schedule SS-EV-1	Col 1 / kWh Sales (Rnd to 6 dec.)	Col 2 * (1 + SUT Rate) Rnd 6	Current Class Avg Rate + Col 3 for Each Rate Class (Col 4 thru Col 11)							Col 3 - RS kWh Sum Rnd 2	Col 3 - TIC + Avg RS kWh Win Mo Rnd 2	(4 * Col 11) + (8 * Col 12)	Col 13 - Current Col 13	Current Col 15 + Col 14	Col 14 / Current Col 15 Rnd 4	
% Change from Current Class Average Rate w/SUT																
RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S										
Apr 2019 - Sep 2020	0.09%	0.12%	0.10%	0.10%	0.12%	0.15%	0.17%									
Oct 2020 - Sep 2021	0.26%	0.32%	0.26%	0.27%	0.33%	0.40%	0.46%									
Oct 2021 - Sep 2022	0.41%	0.52%	0.41%	0.43%	0.53%	0.65%	0.74%									
Oct 2022 - Sep 2023	0.49%	0.62%	0.50%	0.52%	0.64%	0.77%	0.88%									
Oct 2023 - Sep 2024	0.53%	0.67%	0.54%	0.												

**PSE&G CEF Electric Vehicle Program
(Over)/Under Calculation**

Schedule SS-CEF-EV-4

Page 1 of 3

Existing / Forecasted CEF-EV Rate (w/o SUT)	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520
	4	5	6	7	8	9	10	11	
<u>Electric Vehicle (Over)/Under Calculation</u>	<u>Apr-19</u>	<u>May-19</u>	<u>Jun-19</u>	<u>Jul-19</u>	<u>Aug-19</u>	<u>Sep-19</u>	<u>Oct-19</u>	<u>Nov-19</u>	
(1) EV Revenue	435,004	462,140	580,363	678,628	660,450	522,760	491,561	452,154	
(2) Revenue Requirements (excluding Incremental WACC)	<u>419,494</u>	<u>431,622</u>	<u>129,088</u>	<u>478,747</u>	<u>492,741</u>	<u>187,431</u>	<u>546,286</u>	<u>569,718</u>	
(3) Monthly (Over)/Under Recovery	(15,510)	(30,518)	(451,276)	(199,881)	(167,709)	(335,328)	54,724	117,564	
(4) Deferred Balance	(15,510)	(46,028)	(497,303)	(697,185)	(864,893)	(1,200,222)	(1,145,498)	(1,027,934)	
(5) Monthly Interest Rate	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%
(6) After Tax Monthly Interest Expense/(Credit)	(10)	(40)	(352)	(773)	(1,011)	(1,336)	(1,518)	(1,406)	
(7) Cumulative Interest	(10)	(50)	(401)	(1,174)	(2,185)	(3,521)	(5,039)	(6,445)	
(8) Balance Added to Subsequent Year's Revenue Requirements	(15,520)	(46,078)	(497,705)	(698,359)	(867,078)	(1,203,743)	(1,150,536)	(1,034,379)	
(9) Net Sales - kWh (000)	2,861,867	3,040,395	3,818,180	4,464,658	4,345,063	3,439,210	3,233,956	2,974,696	
(10) Incremental Interest From WACC Change									
(11) Cummulative Incremental Interest									
(12) Average Net of Tax Deferred Balance	(5,575)	(22,120)	(195,300)	(429,359)	(561,489)	(742,306)	(843,169)	(781,240)	

**PSE&G CEF Electric Vehicle Program
(Over)/Under Calculation**

Schedule SS-CEF-EV-4

Page 2 of 3

Existing / Forecasted CEF-EV Rate (w/o SUT)	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520	0.0001520
	12	13	14	15	16	17	18	19	
<u>Electric Vehicle (Over)/Under Calculation</u>	<u>Dec-19</u>	<u>Jan-20</u>	<u>Feb-20</u>	<u>Mar-20</u>	<u>Apr-20</u>	<u>May-20</u>	<u>Jun-20</u>	<u>Jul-20</u>	
(1) EV Revenue	505,205	538,466	500,688	506,988	428,918	476,500	583,064	683,479	
(2) Revenue Requirements (excluding Incremental WACC)	<u>273,622</u>	<u>636,698</u>	<u>620,875</u>	<u>338,186</u>	<u>836,750</u>	<u>843,835</u>	<u>379,866</u>	<u>984,008</u>	
(3) Monthly (Over)/Under Recovery	(231,582)	98,232	120,188	(168,802)	407,832	367,334	(203,199)	300,529	
(4) Deferred Balance	(1,259,516)	(1,161,284)	(1,041,096)	(1,209,898)	(802,066)	(434,732)	(637,931)	(337,402)	
(5) Monthly Interest Rate	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	0.1800%	
(6) After Tax Monthly Interest Expense/(Credit)	(1,480)	(1,566)	(1,425)	(1,456)	(1,302)	(800)	(694)	(631)	
(7) Cumulative Interest	(7,925)	(9,491)	(10,916)	(12,373)	(13,674)	(14,475)	(15,169)	(15,800)	
(8) Balance Added to Subsequent Year's Revenue Requirements	(1,267,441)	(1,170,775)	(1,052,012)	(1,222,271)	(815,741)	(449,207)	(653,099)	(353,202)	
(9) Net Sales - kWh (000)	3,323,715	3,542,536	3,293,997	3,335,448	2,821,831	3,134,871	3,835,949	4,496,574	
(10) Incremental Interest From WACC Change									
(11) Cummulative Incremental Interest									
(12) Average Net of Tax Deferred Balance	(822,224)	(870,157)	(791,646)	(809,120)	(723,201)	(444,567)	(385,569)	(350,583)	

**PSE&G CEF Electric Vehicle Program
(Over)/Under Calculation**

Schedule SS-CEF-EV-4
Page 3 of 3

Existing / Forecasted CEF-EV Rate (w/o SUT)	0.0001520	0.0001520	
	20	21	
<u>Electric Vehicle (Over)/Under Calculation</u>	<u>Aug-20</u>	<u>Sep-20</u>	
(1) EV Revenue	670,505	528,859	SS-EV Rate * Row 9
(2) Revenue Requirements (excluding Incremental WACC)	<u>1,007,517</u>	<u>534,089</u>	From SS-EV-1, Col 29
(3) Monthly (Over)/Under Recovery	337,012	5,230	Row 2 - Row 1
(4) Deferred Balance	(391)	4,839	Prev Row 4 + Row 3
(5) Monthly Interest Rate	0.1800%	0.1800%	Monthly Interest Rate
(6) After Tax Monthly Interest Expense/(Credit)	(219)	3	$(\text{Prev Row 4} + \text{Row 4}) / 2 * (1 - \text{Tax Rate}) * \text{Row 5}$
(7) Cumulative Interest	(16,018)	(16,015)	Prev Row 7 + Row 6
(8) Balance Added to Subsequent Year's Revenue Requirements	(16,409)	(11,176)	Row 4 + Row 7 + Row 11
(9) Net Sales - kWh (000)	4,411,219	3,479,337	
(10) Incremental Interest From WACC Change			
(11) Cummulative Incremental Interest			Prev Row 11 + Row 10
(12) Average Net of Tax Deferred Balance	(121,420)	1,599	$(\text{Prev Row 4} + \text{Row 4}) / 2 * (1 - \text{Tax Rate})$

PSE&G CEF Electric Vehicle Program
Income Statement and Balance Sheet - Annual
Filing Scenario

Income Statement	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Operating Revenue																		
Charging Revenues	18,495	761,670	3,200,715	7,425,945	13,281,165	18,667,733	19,300,500	19,162,500	17,115,000	16,425,000	16,301,700	13,699,800	9,784,350	5,815,800	2,845,800	383,850	-	-
Capacity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ancillary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue Requirements	3,528,748	9,384,627	20,352,841	29,612,155	33,853,676	36,528,098	43,677,202	40,689,054	40,621,765	39,399,199	37,117,652	33,283,418	28,328,574	22,901,863	17,240,129	11,333,616	6,072,451	5,263,078
Total Operating Revenue	3,547,243	10,146,297	23,553,556	37,038,100	47,134,841	55,195,830	62,977,702	59,851,554	57,736,765	55,824,199	53,419,352	46,983,218	38,112,924	28,717,663	20,085,929	11,717,466	6,072,451	5,263,078
Operating Expenses																		
Usage Expenses (Bill Rebates, Studies)	422,607	5,298,158	13,829,411	21,261,430	23,966,426	23,225,046	18,990,086	17,670,744	17,585,993	17,513,354	17,335,418	14,593,216	10,501,847	6,359,875	3,262,007	695,804	75,000	-
Admin Expenses	3,684,434	5,023,111	5,173,805	5,329,019	5,488,889	5,653,556	3,548,874	1,056,537	474,665	488,905	503,572	518,679	534,239	550,267	566,775	583,778	147,015	-
Loan Repayments	(295,472)	(1,428,856)	(2,797,194)	(3,393,526)	(3,306,619)	(2,845,014)	(1,912,018)	(657,843)	-	-	-	-	-	-	-	-	-	-
Unrecovered Loan Repayment	2,630	12,717	24,895	30,202	29,429	25,321	17,017	5,655	124	-	-	-	-	-	-	-	-	-
IT Expenses	1,143,860	1,656,710	2,022,915	2,306,435	2,622,187	3,083,188	922,384	160,415	162,821	166,077	169,399	172,787	176,242	179,767	183,363	187,030	46,988	-
Total Operating Expenses	4,958,058	10,561,839	18,253,832	25,533,560	28,800,312	29,142,095	21,566,342	18,235,708	18,209,665	18,168,336	18,008,388	15,284,682	11,212,329	7,089,909	4,012,144	1,466,611	269,003	-
Depreciation and Amortization																		
Depreciation	329,684	2,041,883	6,156,920	9,999,460	13,954,265	18,395,907	21,859,045	20,792,144	20,450,742	20,449,754	20,147,932	18,614,099	16,081,971	12,985,648	9,458,488	5,471,290	2,294,410	2,013,782
Operating Income	(1,740,499)	(2,457,425)	(857,197)	1,505,081	4,380,265	7,657,828	19,552,314	20,823,702	19,076,358	17,206,109	15,263,031	13,084,437	10,818,624	8,642,107	6,615,296	4,779,565	3,509,038	3,249,296
AFUDC - Debt	14,500	74,569	26,442	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
AFUDC - Equity	44,656	229,657	81,436	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Interest Expense	84,617	497,642	1,114,546	1,721,166	2,342,069	2,986,922	3,339,041	2,989,398	2,630,256	2,275,948	1,925,932	1,593,041	1,295,756	1,046,542	852,651	721,101	655,255	614,251
Income Before Income Taxes	(1,765,960)	(2,650,841)	(1,863,866)	(216,085)	2,038,195	4,670,907	16,213,273	17,834,305	16,446,102	14,930,160	13,337,099	11,491,396	9,522,868	7,595,565	5,762,645	4,058,463	2,853,783	2,635,044
Income Tax Expense on Pre-tax	(496,411)	(745,151)	(523,933)	(60,742)	572,937	1,312,992	4,557,551	5,013,223	4,622,999	4,196,868	3,749,059	3,230,231	2,676,878	2,135,113	1,619,880	1,140,834	802,198	740,711
AFUDC Equity Flow-thru Tax Adjustments	(12,553)	(64,557)	(22,892)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Depreciation Flow-thru Tax Adjustment	(1,448,901)	(3,047,528)	(4,135,049)	(4,773,193)	(5,181,741)	(5,480,351)	1,429,539	3,318,239	3,246,545	3,246,338	3,195,996	2,958,047	2,552,536	2,032,876	1,402,127	654,473	30,046	-
Loan Tax Adjustment	(68,712)	(327,564)	(622,020)	(692,791)	(578,148)	(374,660)	(71,190)	285,683	468,295	472,248	457,163	394,585	300,979	202,629	112,633	40,057	1,186	-
Total Tax Expense	(2,026,577)	(4,184,800)	(5,303,894)	(5,526,725)	(5,186,952)	(4,542,019)	5,915,901	8,617,145	8,337,840	7,915,454	7,402,218	6,582,864	5,530,394	4,370,619	3,134,640	1,835,363	833,430	740,711
Net Income	260,617	1,533,959	3,440,028	5,310,640	7,225,148	9,212,925	10,297,372	9,217,160	8,108,263	7,014,707	5,934,881	4,908,532	3,992,474	3,224,947	2,628,005	2,223,100	2,020,353	1,894,333
Preferred Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Earnings Available to PSEG	260,617	1,533,959	3,440,028	5,310,640	7,225,148	9,212,925	10,297,372	9,217,160	8,108,263	7,014,707	5,934,881	4,908,532	3,992,474	3,224,947	2,628,005	2,223,100	2,020,353	1,894,333
Balance Sheet																		
Assets																		
Plant In-Service	12,477,188	39,231,917	84,686,447	126,793,134	169,435,968	221,734,593	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259	261,241,259
Plant in CWIP	2,167,405	6,062,704	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Less: Accumulated Depreciation	329,684	2,098,376	7,208,206	15,660,137	27,353,127	42,615,268	61,729,261	81,590,300	100,346,880	119,092,488	137,838,096	156,201,489	173,191,835	188,047,440	200,328,561	209,706,607	215,855,577	218,611,695
Net Property, Plant & Equipment	14,314,909	43,196,244	77,478,241	111,132,997	142,082,841	179,119,324	199,511,999	179,650,960	160,894,379	142,148,771	123,403,163	105,039,771	88,049,424	73,193,819	60,912,698	51,534,652	45,385,682	42,629,564
Total Assets	14,314,909	43,196,244	77,478,241	111,132,997	142,082,841	179,119,324	199,511,999	179,650,960	160,894,379	142,148,771	123,403,163	105,039,771	88,049,424	73,193,819	60,912,698	51,534,652	45,385,682	42,629,564
Liabilities																		
Deferred Income Taxes	552,370	1,638,553	3,497,622	5,764,142	8,171,340	10,904,701	12,841,957	12,473,709	11,951,722	11,233,197	10,357,884	9,394,540	8,468,144	7,657,352	7,032,023	6,628,605	6,471,267	6,554,913
Capitalization:																		
Debt	-	6,331,369	19,118,354	34,034,318	48,474,278	61,605,142	77,386,078	85,876,377	76,908,841	68,520,131	60,226,886	52,005,769	44,000,986	36,610,867	30,149,639	24,787,465	20,658,744	17,902,332
Preferred Stock	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Common Equity	-	7,431,170	22,439,337	39,946,301	56,894,577	72,306,358	90,828,545	100,793,665	90,268,409	80,422,526	70,688,689	61,039,510	51,644,245	42,970,414	35,386,828	29,093,210	24,247,303	21,012,084
Total Capitalization	-	13,762,539	41,557,692	73,980,619	105,368,855	133,911,501	168,214,623	186,670,042	167,177,251	148,942,657	130,915,575	113,045,279	95,645,230	79,581,280	65,536,467	53,880,675	44,906,047	38,914,415
Total Liabilities	-	14,314,909	43,196,244	77,478,241	111,132,997	142,082,841	179,119,324	199,511,999	179,650,960	160,894,379	142,148,771	123,403,163	105,039,771	88,049,424	73,193,819	60,912,698	51,534,652	45,385,682
ROE on Avg Common Equity	10.30%	10.31%	10.32%	10.32%	10.32%	10.32%	10.32%	10.31%	10.31%	10.31%	10.31%	10.30%	10.30%	10.31%	10.31%	10.31%	10.31%	10.32%

**PSE&G CEF - Energy Storage Program
Revenue Requirements Calculation
Total CEF - Energy Storage**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
	PLANT													
	<u>Program Investment</u>	<u>Gross Plant</u>	<u>Depreciation Expense</u>	<u>Accumulated Depreciation</u>	<u>Net Plant</u>	<u>Tax Depreciation</u>	<u>Book Deprec Tax Basis</u>	<u>Prorated Deferred Tax Exp</u>	<u>Beginning Accumulated Deferred Income Tax</u>	<u>Ending Accumulated Deferred Income Tax</u>	<u>Accumulated Retention</u>	<u>Average Net Investment</u>	<u>Return Requirement</u>	
Jan-19	-	-	-	-	-	-	-	-	-	-	-	-	-	
Feb-19	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mar-19	-	-	-	-	-	-	-	-	-	-	-	-	-	
Apr-19	938,581	-	-	-	-	-	-	-	-	-	-	-	-	
May-19	346,578	-	-	-	-	-	-	-	-	-	-	-	-	
Jun-19	346,578	-	-	-	-	-	-	-	-	-	-	-	-	
Jul-19	1,229,066	-	-	-	-	-	-	-	-	-	-	-	-	
Aug-19	1,568,772	-	-	-	-	-	-	-	-	-	-	-	-	
Sep-19	1,635,806	-	-	-	-	-	-	-	-	-	-	-	-	
Oct-19	940,512	-	-	-	-	-	-	-	-	-	-	-	-	
Nov-19	940,512	-	-	-	-	-	-	-	-	-	-	-	-	
Dec-19	940,512	-	-	-	-	-	-	-	-	-	-	-	-	
Jan-20	940,512	-	-	-	-	-	-	-	-	-	-	-	-	
Feb-20	940,512	-	-	-	-	-	-	-	-	-	-	-	-	
Mar-20	940,512	3,137,756	8,716	8,716	3,129,040	62,755	8,716	10,055	-	10,055	-	1,559,492	12,403	
Apr-20	782,377	3,137,756	17,432	26,148	3,111,608	62,755	17,432	7,723	10,055	17,779	-	3,106,407	24,706	
May-20	782,377	3,137,756	17,432	43,580	3,094,176	62,755	17,432	6,990	17,779	24,768	-	3,081,618	24,509	
Jun-20	1,506,605	6,835,285	27,703	71,283	6,764,002	168,399	27,703	19,495	24,768	44,263	-	4,894,573	38,928	
Jul-20	1,598,946	11,105,158	49,835	121,117	10,984,040	310,728	49,835	31,926	44,263	76,189	-	8,813,795	70,099	
Aug-20	2,555,903	14,589,379	71,374	192,491	14,396,888	450,097	71,374	40,215	76,189	116,404	-	12,594,167	100,166	
Sep-20	1,764,179	14,589,379	81,052	273,543	14,315,835	450,097	81,052	33,407	116,404	149,811	-	14,223,254	113,123	
	Program Assumption	Program Assumption	Refer to WP-SS-CEF-ES-1a/1b "Bk Depr" Worksheets	Prior Month + Col 3	Col 2 - Col 4	Refer to WP-SS-CEF-ES-1a/1b "Sched-IS and BS" Worksheet	Refer to WP-SS-CEF-ES-1a/1b "Sched-IS and BS" Worksheet	Refer to WP-SS-CEF-ES-1a/1b "Taxes" Worksheet	Refer to WP-SS-CEF-ES-1a/1b "Taxes" Worksheet	Refer to WP-SS-CEF-ES-1a.xlsx "Taxes" Worksheet	Refer to WP-SS-CEF-ES-1a.xlsx "Taxes" Worksheet	Program Assumption	(Prev Col 5 - Col 9 - Prev Col 11+ Col 5 - Col 10 - Col 11) / 2	Col 12 * Monthly Pre Tax WACC
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	
2019	8,886,917	-	-	-	-	-	-	-	-	-	-	-	-	
2020	15,095,044	14,589,379	516,700	516,700	14,072,679	2,917,876	516,700	426,054	553,843	639,998	-	13,516,285	710,543	
2021	17,981,735	31,670,197	1,527,611	2,044,310	29,625,887	8,084,765	1,527,611	1,164,889	2,267,431	2,445,788	-	27,357,251	1,960,096	
2022	16,062,535	52,429,597	2,754,892	4,799,202	47,630,395	12,358,750	2,750,051	1,707,871	4,869,174	5,118,134	-	42,780,262	3,345,777	
2023	17,547,101	67,464,233	3,866,999	8,666,201	58,798,032	14,515,474	3,856,438	1,911,332	7,841,467	8,107,723	-	51,008,721	4,387,602	
2024	31,053,120	100,678,404	5,001,262	13,667,464	87,010,940	18,980,780	4,990,309	2,703,146	11,076,044	11,899,652	-	71,450,515	5,305,730	
2025	1,588,377	112,873,007	7,252,934	20,920,398	91,952,609	20,932,448	7,216,330	2,438,936	15,625,063	15,894,428	-	76,498,618	7,702,672	
2026	-	112,873,007	7,338,111	28,258,509	84,614,498	15,139,689	7,299,284	1,396,634	17,993,259	18,145,791	-	66,850,728	6,823,238	
2027	-	112,873,007	7,338,111	35,596,619	77,276,387	8,961,165	7,299,284	296,072	18,629,424	18,661,774	-	58,936,543	5,974,478	
2028	-	112,873,007	7,338,111	42,934,730	69,938,277	6,023,965	7,299,284	(227,064)	18,351,252	18,326,441	-	51,905,185	5,257,104	
2029	-	112,873,007	7,338,111	50,272,841	62,600,166	3,259,469	7,299,284	(719,624)	17,291,274	17,212,680	-	45,653,944	4,618,549	
2030	286,005	113,159,012	7,358,369	57,631,210	55,527,802	746,861	7,318,540	(1,170,911)	15,512,947	15,385,295	-	40,385,627	4,070,526	
2031-2045	875,175	114,034,187	56,402,977	114,034,187	(0)	1,334,400	55,882,528	(9,698,351)	-	-	-	(0)	16,196,082	
Total	109,376,009		114,034,187				113,255,642	113,255,642	228,983				66,352,399	
April 2019														
Sep 2020	20,698,842		273,543				1,567,586	273,543	149,811				383,935	

PSE&G CEF - Energy Storage Program Proposed Rate Calculations

Schedule SS-CEF-ES-2

(\$'s Unless Specified)

SUT Rate 6.625%

<u>Line</u>	<u>Date(s)</u>		<u>Electric</u>	<u>Source/Description</u>
1	April 2019 - Sep 2020	Revenue Requirements	697,093	SS-CEF-ES-1, Col 27
2		(Over) / Under Recovered Balance	0	SS-CEF-ES-4
3		Cumulative Interest Exp / (Credit)	<u>0</u>	SS-CEF-ES-4
4		Total Target Rate Revenue	697,093	Line 1 + Line 2 + Line 3
5	April 2019 - Sep 2020	Forecasted kWh (000)	63,853,501	
6		Calculated Rate w/o SUT (\$/kWh)	0.000011	(Line 4 / (Line 5*1,000)) [Rnd 6]
7		Public Notice Rate w/o SUT (\$/kWh)	0.000011	Line 6
8		Existing Rate w/o SUT (\$/kWh)	0.000000	
9		Proposed Rate w/o SUT (\$/kWh)	0.000011	Line 7
10		Proposed Rate w/ SUT (\$/kWh)	0.000012	(Line 9 * (1 + SUT Rate)) [Rnd6]
11		Difference in Proposed and Previous Rate	0.000011	(Line 9 - Line 8)
12		Resultant CEF-ES Revenue Increase / (Decrease)	702,389	(Line 5 * Line 11 * 1,000)

**PSE&G CEF - Energy Storage Program
CEF-Energy Storage - Rate Impact Analysis**

Schedule SS-CEF-ES-3

7,200 Avg RS kWh / yr.
750 Avg RS kWh / Summer Month
525 Avg RS kWh / Winter Month
- Current electric TIC (\$/kWh)

6.625% SUT Rate

63,853,501 kWh Sales (000) - Initial Period (April 2019/Sep 20)
41,942,182 kWh Sales (000) - Annual (Oct 20/Sep 21)

(1) Current	(2) CEF-ES Revenue Requirements ²	(3) CEF-ES w/o SUT (\$/kWh) ³	(4) CEF-ES w/ SUT (\$/kWh)	(6) Class Average Rate w/SUT - \$/kWh ¹							(12) Typical RS GPRC (\$)			(14) Change in RS Typical Annual Bill (\$/s)	(15) RS Typical Annual Bill (\$/s) ⁴	(16) % Change in RS Typical Annual Bill
				RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S	Summer Monthly Bill	Winter Monthly Bill	Annual Bill			
				0.171350	0.135833	0.169821	0.162301	0.131789	0.109024	0.095542	-	-	-			
April 2019 - Sep 2020	697,093	0.000011	0.000012	0.171362	0.135845	0.169833	0.162313	0.131801	0.109036	0.095554	0.01	0.01	0.12	0.12	1,233.84	0.010%
Oct 2020 - Sep 2021	2,996,208	0.000071	0.000076	0.171426	0.135909	0.169897	0.162377	0.131865	0.109100	0.095618	0.06	0.04	0.56	0.56	1,234.28	0.045%
Oct 2021 - Sep 2022	5,593,420	0.000133	0.000142	0.171492	0.135975	0.169963	0.162443	0.131931	0.109166	0.095684	0.11	0.07	1.00	1.00	1,234.72	0.081%
Oct 2022 - Sep 2023	7,874,323	0.000188	0.000200	0.171550	0.136033	0.170021	0.162501	0.131989	0.109224	0.095742	0.15	0.11	1.48	1.48	1,235.20	0.120%
Oct 2023 - Sep 2024	9,635,341	0.000230	0.000245	0.171595	0.136078	0.170066	0.162546	0.132034	0.109269	0.095787	0.18	0.13	1.76	1.76	1,235.48	0.143%
Oct 2024 - Sep 2025	14,784,181	0.000352	0.000375	0.171725	0.136208	0.170196	0.162676	0.132164	0.109399	0.095917	0.28	0.20	2.72	2.72	1,236.44	0.220%
Oct 2025 - Sep 2026	16,190,359	0.000386	0.000412	0.171762	0.136245	0.170233	0.162713	0.132201	0.109436	0.095954	0.31	0.22	3.00	3.00	1,236.72	0.243%
Oct 2026 - Sep 2027	14,862,581	0.000354	0.000377	0.171727	0.136210	0.170198	0.162678	0.132166	0.109401	0.095919	0.28	0.20	2.72	2.72	1,236.44	0.220%
Oct 2027 - Sep 2028	13,932,588	0.000332	0.000354	0.171704	0.136187	0.170175	0.162655	0.132143	0.109378	0.095896	0.27	0.19	2.60	2.60	1,236.32	0.211%
Oct 2028 - Sep 2029	13,238,737	0.000316	0.000337	0.171687	0.136170	0.170158	0.162638	0.132126	0.109361	0.095879	0.25	0.18	2.44	2.44	1,236.16	0.198%
Oct 2029 - Sep 2030	13,897,735	0.000331	0.000353	0.171703	0.136186	0.170174	0.162654	0.132142	0.109377	0.095895	0.26	0.19	2.56	2.56	1,236.28	0.208%
Oct 2030 - Sep 2031	11,091,151	0.000264	0.000281	0.171631	0.136114	0.170102	0.162582	0.132070	0.109305	0.095823	0.21	0.15	2.04	2.04	1,235.76	0.165%
Oct 2031 - Sep 2032	10,674,840	0.000255	0.000272	0.171622	0.136105	0.170093	0.162573	0.132061	0.109296	0.095814	0.20	0.14	1.92	1.92	1,235.64	0.156%
Oct 2032 - Sep 2033	10,160,770	0.000242	0.000258	0.171608	0.136091	0.170079	0.162559	0.132047	0.109282	0.095800	0.19	0.14	1.88	1.88	1,235.60	0.152%
Oct 2033 - Sep 2034	9,672,812	0.000231	0.000246	0.171596	0.136079	0.170067	0.162547	0.132035	0.109270	0.095788	0.18	0.13	1.76	1.76	1,235.48	0.143%
Oct 2034 - Sep 2035	8,868,537	0.000211	0.000225	0.171575	0.136058	0.170046	0.162526	0.132014	0.109249	0.095767	0.17	0.12	1.64	1.64	1,235.36	0.133%
Oct 2035 - Sep 2036	7,384,976	0.000176	0.000188	0.171538	0.136021	0.170009	0.162489	0.131977	0.109212	0.095730	0.14	0.10	1.36	1.36	1,235.08	0.110%
Oct 2036 - Sep 2037	5,946,097	0.000142	0.000151	0.171501	0.135984	0.169972	0.162452	0.131940	0.109175	0.095693	0.11	0.08	1.08	1.08	1,234.80	0.088%
Oct 2037 - Sep 2038	4,885,185	0.000116	0.000124	0.171474	0.135957	0.169945	0.162425	0.131913	0.109148	0.095666	0.09	0.07	0.92	0.92	1,234.64	0.075%
Oct 2038 - Sep 2039	3,677,555	0.000088	0.000094	0.171444	0.135927	0.169915	0.162395	0.131883	0.109118	0.095636	0.07	0.05	0.68	0.68	1,234.40	0.055%
Oct 2039 - Sep 2040	1,440,651	0.000034	0.000036	0.171386	0.135869	0.169857	0.162337	0.131825	0.109060	0.095578	0.03	0.02	0.28	0.28	1,234.00	0.023%
Oct 2040 - Sep 2041	782,583	0.000019	0.000020	0.171370	0.135853	0.169841	0.162321	0.131809	0.109044	0.095562	0.02	0.01	0.16	0.16	1,233.88	0.013%
Oct 2041 - Sep 2042	659,798	0.000016	0.000017	0.171367	0.135850	0.169838	0.162318	0.131806	0.109041	0.095559	0.01	0.01	0.12	0.12	1,233.84	0.010%
Oct 2042 - Sep 2043	492,891	0.000012	0.000013	0.171363	0.135846	0.169834	0.162314	0.131802	0.109037	0.095555	0.01	0.01	0.12	0.12	1,233.84	0.010%
Oct 2043 - Sep 2044	458,256	0.000011	0.000012	0.171362	0.135845	0.169833	0.162313	0.131801	0.109036	0.095554	0.01	0.01	0.12	0.12	1,233.84	0.010%
Oct 2044 - Sep 2045	140,215	0.000003	0.000003	0.171353	0.135836	0.169824	0.162304	0.131792	0.109027	0.095545	-	-	-	-	1,233.72	0.000%
Total	190,038,874															
	See SS-CEF-ES-1, Col 27	Col 1 / [kWh Sales] (Rnd to 6 dec.)	Col 2 * (1 + SUT Rate) Rnd 6	Current Class Avg Rate + Col 3 for Each Rate Class (Col 4 thru Col 10)							(Cur. TIC + Col 3) * Avg RS kWh Sum Mo Rnd 2	(Cur. TIC + Col 3) * Avg RS kWh Win Mo Rnd 2	(4 * Col 11) + (8 * Col 12)	Col 13 - Current Col 13	Current Col 15 + Col 14	Col 14 / Current Col 15

	% Change from Current Class Average Rate w/SUT						
	RS	RHS	RLM	GLP	LPL-S	LPL-P	HTS-S
April 2019 - Sep 20	0.007%	0.009%	0.007%	0.007%	0.009%	0.011%	0.013%
Oct 2020 - Sep 202	0.044%	0.056%	0.045%	0.047%	0.058%	0.070%	0.080%
Oct 2021 - Sep 202	0.083%	0.105%	0.084%	0.087%	0.108%	0.130%	0.149%
Oct 2022 - Sep 202	0.117%	0.147%	0.118%	0.123%	0.152%	0.183%	0.209%
Oct 2023 - Sep 202	0.143%	0.180%	0.144%	0.151%	0.186%	0.225%	0.256%
Oct 2024 - Sep 202	0.219%	0.276%	0.221%	0.231%	0.285%	0.344%	0.392%
Oct 2025 - Sep 202	0.240%	0.303%	0.243%	0.254%	0.313%	0.378%	0.431%
Oct 2026 - Sep 202	0.220%	0.278%	0.222%	0.232%	0.286%	0.346%	0.395%
Oct 2027 - Sep 202	0.207%	0.261%	0.208%	0.218%	0.269%	0.325%	0.371%
Oct 2028 - Sep 202	0.197%	0.248%	0.198%	0.208%	0.256%	0.309%	0.353%
Oct 2029 - Sep 203	0.206%	0.260%	0.208%	0.217%	0.268%	0.324%	0.369%
Oct 2030 - Sep 203	0.164%	0.207%	0.165%	0.173%	0.213%	0.258%	0.294%
Oct 2031 - Sep 203	0.159%	0.200%	0.160%	0.168%	0.206%	0.249%	0.285%
Oct 2032 - Sep 203	0.151%	0.190%	0.152%	0.159%	0.196%	0.237%	0.270%
Oct 2033 - Sep 203	0.144%	0.181%	0.145%	0.152%	0.187%	0.226%	0.257%
Oct 2034 - Sep 203	0.131%	0.166%	0.132%	0.139%	0.171%	0.206%	0.235%
Oct 2035 - Sep 203	0.110%	0.138%	0.111%	0.116%	0.143%	0.172%	0.197%
Oct 2036 - Sep 203	0.088%	0.111%	0.089%	0.093%	0.115%	0.139%	0.158%
Oct 2037 - Sep 203	0.072%	0.091%	0.073%	0.076%	0.094%	0.114%	0.130%
Oct 2038 - Sep 203	0.055%	0.069%	0.055%	0.058%	0.071%	0.086%	0.098%
Oct 2039 - Sep 204	0.021%	0.027%	0.021%	0.022%	0.027%	0.033%	0.038%
Oct 2040 - Sep 204	0.012%	0.015%	0.012%	0.012%	0.015%	0.018%	0.021%
Oct 2041 - Sep 204	0.010%	0.013%	0.010%	0.010%	0.013%	0.016%	0.018%
Oct 2042 - Sep 204	0.009%	0.010%	0.009%	0.009%	0.010%	0.012%	0.014%
Oct 2043 - Sep 204	0.007%	0.009%	0.007%	0.007%	0.009%	0.011%	0.013%
Oct 2044 - Sep 204	0.002%	0.002%	0.002%	0.002%	0.002%	0.003%	0.003%

¹All customers assumed to have BGS Supply

² Initial Rate period is April 2019 to September 2020 for the CEF-ES Program

³ SUT is assumed at the current SUT rate effective January 1, 2018 through the life of the Program

⁴ The rates are based on a typical residential bill as of September 8, 2018

PSE&G CEF - Energy Storage Program

Schedule SS-CEF-ES-4

Under/Over Collection

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CEF-ES Rate	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011
	4	5	6	7	8	9	10	11	12	
<u>Under/(Over) Calculation</u>	<u>Apr-19</u>	<u>May-19</u>	<u>Jun-19</u>	<u>Jul-19</u>	<u>Aug-19</u>	<u>Sep-19</u>	<u>Oct-19</u>	<u>Nov-19</u>	<u>Dec-19</u>	
(1) CEF-ES Revenue	31,481	33,444	42,000	49,111	47,796	37,831	35,574	32,722	36,561	
(2) Revenue Requirements	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558	1,558	
(3) Monthly Under/(Over) Recovery	(29,923)	(31,886)	(40,442)	(47,553)	(46,238)	(36,273)	(34,016)	(31,164)	(35,003)	
(4) Deferred Balance	(29,923)	(61,809)	(102,251)	(149,804)	(196,042)	(232,315)	(266,331)	(297,495)	(332,498)	
(5) Monthly Interest Rate	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	
(6) After Tax Monthly Interest Expense/(Credit)	(26.9)	(82.6)	(147.7)	(226.8)	(311.3)	(385.5)	(448.8)	(507.4)	(567.0)	
(7) Cumulative Interest	(26.9)	(109.5)	(257.1)	(484.0)	(795.3)	(1,180.8)	(1,629.6)	(2,137.0)	(2,704.0)	
(8) Balance Added to Subsequent Year's Revenue Requirements	(29,949.5)	(61,918.5)	(102,508.2)	(150,288.3)	(196,837.3)	(233,496.2)	(267,960.6)	(299,631.7)	(335,201.6)	
(9) Net Sales - kWh (000)	2,861,867	3,040,395	3,818,180	4,464,658	4,345,063	3,439,210	3,233,956	2,974,696	3,323,715	
(10) Incremental Interest From WACC Change										
(11) Cumulative Incremental Interest										
(12) Average Net of Tax Deferred Balance	(10,756)	(32,973)	(58,971)	(90,601)	(124,314)	(153,973)	(179,238)	(202,667)	(226,451)	

PSE&G CEF - Energy Storage Program

Under/Over Collection

Schedule SS-CEF-ES-4

Page 2 of 2

CEF-ES Rate	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	0.000011	
	13	14	15	16	17	18	19	20	21		
<u>Under/(Over) Calculation</u>	<u>Jan-20</u>	<u>Feb-20</u>	<u>Mar-20</u>	<u>Apr-20</u>	<u>May-20</u>	<u>Jun-20</u>	<u>Jul-20</u>	<u>Aug-20</u>	<u>Sep-20</u>		
(1) CEF-ES Revenue	38,968	36,234	36,690	31,040	34,484	42,195	49,462	48,523	38,273	CEF-ES Rate * Row 9	
(2) Revenue Requirements	1,558	1,558	18,782	42,274	42,077	68,841	125,996	179,675	202,310	From SS-CEF-ES-1 (Total Column 27)	
(3) Monthly Under/(Over) Recovery	(37,410)	(34,676)	(17,908)	11,234	7,594	26,645	76,534	131,152	164,037	Row 2 - Row 1	
(4) Deferred Balance	(369,908)	(404,584)	(422,492)	(411,257)	(403,664)	(377,018)	(300,485)	(169,333)	(5,296)	Prev Row 4 + Row 3	
(5) Monthly Interest Rate	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	0.18000%	Monthly Interest Rate	
(6) After Tax Monthly Interest Expense/(Credit)	(632.2)	(697.0)	(744.4)	(750.4)	(733.4)	(702.6)	(609.8)	(422.8)	(157.2)	(Prev Row 4 + Row 4) / 2 * (1 - Tax Rate) * Row 5	
(7) Cumulative Interest Balance Added to Subsequent Year's Revenue Requirements	(3,336.2)	(4,033.2)	(4,777.6)	(5,527.9)	(6,261.4)	(6,964.0)	(7,573.7)	(7,996.6)	(8,153.7)	Prev Row 7 + Row 6	
(8) Net Sales - kWh (000)	3,542,536	3,293,997	3,335,448	2,821,831	3,134,871	3,835,949	4,496,574	4,411,219	3,479,337	Row 4 + Row 7 + Row 11	
(9) Incremental Interest From WACC Change											
(10) Cummulative Incremental Interest										Prev Row 11 + Row 10	
(11) Average Net of Tax Deferred Balance	(252,480)	(278,391)	(297,292)	(299,691)	(292,923)	(280,616)	(243,529)	(168,876)	(62,771)	(Prev Row 4 + Row 4) / 2 * (1 - Tax Rate)	

**PSE&G CEF - Energy Storage Program
Income Statement and Balance Sheet**

SS-CEF-ES-5

Page 3 of 3

Total Program

<u>Income Statement</u>	<u>2041</u>	<u>2042</u>	<u>2043</u>	<u>2044</u>	<u>2045</u>	<u>2046</u>	<u>2047</u>
Operating Revenue							
Frequency Regulation	-	-	-	-	-	-	-
Energy	-	-	-	-	-	-	-
Capacity	-	-	-	-	-	-	-
Other Revenue--Solar	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Revenue Requirements	750,766	608,677	484,228	444,583	35,733	(0)	(0)
Total Operating Revenue	750,766	608,677	484,228	444,583	35,733	(0)	(0)
Operating Expenses							
Operation & Maintenance	-	-	-	-	-	-	-
Administrative	-	-	-	-	-	-	-
Rent	-	-	-	-	-	-	-
Insurance	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-
Total Operating Expenses	-	-	-	-	-	-	-
Depreciation and Amortization							
Depreciation	697,849	588,501	489,439	482,653	38,474	-	-
Amortization of State Rebate	-	-	-	-	-	-	-
Total Depreciation and Amortization	697,849	588,501	489,439	482,653	38,474	-	-
Operating Income							
AFUDC-Debt	0	0	0	0	0	0	0
AFUDC-Equity	0	0	0	0	0	0	0
Interest Expense	(21,762)	(14,234)	(8,378)	(2,704)	37	(0)	(0)
Income Before Income Taxes	(21,762)	(14,234)	(8,378)	(2,704)	37	0	0
Income Tax Expense on Pre-tax	0	0	0	0	0	0	0
ITC Adjustment	(68,726)	(57,507)	(48,454)	(47,111)	(2,462)	-	-
AFUDC Equity Flow Through Tax Adj	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Depreciation Flow-thru Tax Adjustment	-	-	-	-	-	-	-
Loan Tax Adjustment	-	-	-	-	-	-	-
Income Tax Expense	(68,726)	(57,507)	(48,454)	(47,111)	(2,462)	0	0
Net Income	91,123	61,779	38,686	17,799	518	0	0
Preferred Dividends	-	-	-	-	-	-	-
Earnings Available to PSEG	91,123	61,779	38,686	17,799	518	0	0
Balance Sheet							
Assets							
Plant In-Service	114,034,187	114,034,187	114,034,187	114,034,187	114,034,187	114,034,187	114,034,187
Plant in CWIP	0	0	0	0	0	0	0
Less: Accumulated Depreciation	(112,435,120)	(113,023,622)	(113,513,060)	(113,995,713)	(114,034,187)	(114,034,187)	(114,034,187)
Net Property, Plant & Equipment	1,599,066	1,010,565	521,127	38,474	0	0	0
Deferred Income Taxes:							
Deferred Tax Asset	(544,278)	(343,786)	(177,367)	(12,075)	0	0	0
State Rebate	-	-	-	-	-	-	-
Total Assets	1,054,789	666,779	343,760	26,398	0	0	0
Liabilities							
Unamortized State Rebate	-	-	-	-	-	-	-
Accumulated Deferred ITC	155,534	98,027	49,573	2,462	-	-	-
Regulatory Liability	(544,278)	(343,786)	(177,367)	(12,075)	0	0	0
Deferred Income Taxes:							
Plant Related	417,632	264,172	137,736	12,103	(0)	(0)	(0)
Capitalization:							
Debt	471,959	298,277	153,571	10,999	0	0	0
Preferred Stock	-	-	-	-	-	-	-
Common Equity	553,941	350,090	180,247	12,910	0	0	0
Total Capitalization	1,025,901	648,367	333,818	23,909	0	0	0
Total Liabilities							

PUBLIC SERVICE ELECTRIC AND GAS COMPANY**BALANCE SHEET****\$(In Thousands)**

		<u>Dec 31, 2015</u>	<u>Dec 31, 2016</u>	<u>Dec 31, 2017</u>
Assets and Other Debits				
Utility Plant				
Electric Utility Plant				
101	Electric Utility Plant in Service	\$ 13,747,438	\$ 15,540,571	\$ 16,899,618
103	Electric Experimental Plant Unclassified	-	-	-
105	Electric Utility Plant Held for Future Use	26,136	19,257	19,907
106	Electric Completed Construction not classified- Electric	2,221,543	2,455,615	2,872,173
107	Electric Construction Work in Progress	1,432,943	1,423,604	1,588,835
	Total Electric Utility Plant	<u>17,428,059</u>	<u>19,439,047</u>	<u>21,380,534</u>
Gas Utility Plant				
101	Gas Utility Plant in Service	6,109,770	6,624,762	7,307,650
103	Gas Experimental Plant Unclassified	-	-	-
105	Gas Utility Plant Held for Future Use	4	96	96
106	Gas Completed Construction not classified	9,391	9,974	42,626
107	Gas Construction Work in Progress	6,852	17,013	14,301
	Total Gas Utility Plant	<u>6,126,017</u>	<u>6,651,845</u>	<u>7,364,673</u>
Common Utility Plant				
101	Common Utility Plant in Service	268,862	298,049	336,779
106	Common Completed Construction not classified	7,312	8,310	6,238
107	Common Construction Work in Progress	7,273	48,637	122,071
	Total Common Utility Plant	<u>283,447</u>	<u>354,996</u>	<u>465,087</u>
	Total Utility Plant	<u>23,837,523</u>	<u>26,445,887</u>	<u>29,210,294</u>
Accumulated Provisions for Depreciation and Amortization of				
Electric Utility Plant				
108 & 111	Electric Utility Plant in Service	(3,153,541)	(3,315,603)	(3,576,611)
108.5	Electric Utility Plant Held for Future Use	-	-	-
	Total Electric Utility Plant	<u>(3,153,541)</u>	<u>(3,315,603)</u>	<u>(3,576,611)</u>
Gas Utility Plant				
108 & 111	Gas Utility Plant in Service	(2,200,460)	(2,227,924)	(2,259,642)
Common Utility Plant				
108 & 111	Common Utility Plant in Service	(109,963)	(119,612)	(144,439)
	Total Accumulated Provisions for Depreciation and Amortization of Utility Plant	<u>(5,463,964)</u>	<u>(5,663,139)</u>	<u>(5,980,693)</u>
	Net Utility Plant Excluding Nuclear Fuel	<u>18,373,559</u>	<u>20,782,748</u>	<u>23,229,602</u>
Nuclear Fuel				
120.1	120.1 In Process	-	-	-
120.2	120.2 Materials and Assemblies Stock	-	-	-
120.3	120.3 In Reactor	-	-	-
120.4	120.4 Spent	-	-	-
Accumulated Provisions for Amortization				
120.5	120.5 Nuclear Fuel	-	-	-
	Net Nuclear Fuel	-	-	-
	Net Utility Plant	<u>18,373,559</u>	<u>20,782,748</u>	<u>23,229,602</u>
Other Property and Investments				
121	Nonutility Property	3,003	3,079	3,242
122	Accumulated Provision for Depreciation & Amortization of Nonutility Property	(573)	(600)	(628)
123 & 123.1	Investments in Associated & Subsidiary Companies	66,448	66,709	50,883
124	Other Investments	325,539	298,556	279,872
125-8	Special Funds	49,376	42,956	45,971
175	Long-Term Portion of Derivative Assets	-	-	-
	Total Other Property and Investments	<u>443,793</u>	<u>410,700</u>	<u>379,341</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

BALANCE SHEET
\$(In Thousands)

Dec 31, 2015 **Dec 31, 2016** **Dec 31, 2017**

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

BALANCE SHEET

Dec 31, 2015 **Dec 31, 2016** **Dec 31, 2017**

Current and Accrued Assets

131	Cash	\$	12,248	\$	19,831	\$	13,231
132-4	Special Deposits		1,080		2,742		2,026
135	Working Funds		-		-		-
136	Temporary Cash Investments		160,000		365,000		223,000
141-3	Notes and Accounts Receivable		853,115		872,482		935,026
144	Accumulated Provision for Uncollectible Accounts - Credit		(67,116)		(67,619)		(59,315)
145-6	Receivables from Associated Companies		367,754		175,259		16,400
151-5	Materials and Supplies (incl. 163)		147,909		179,674		196,734
158	Allowances		-		-		-
164	Gas Stored Underground - Current		-		-		-
165	Prepayments		31,189		8,281		43,659
171	Interest and Dividends Receivable		0		-		-
172	Rents Receivable		6,223		7,803		7,305
173	Accrued Utility Revenues		197,431		260,355		296,463
174	Miscellaneous Current and Accrued		5,959		3,386		2,833
175	Current Portion of Derivative Instrument Assets		13,576		-		-
	Total Current and Accrued Assets		1,729,369		1,827,193		1,677,360

Deferred Debits

181	Unamortized Debt Expense		40,728		44,819		46,324
182	Unrec'd Plt and Reg Costs and Other Reg Assets		3,382,881		3,530,993		3,441,941
183	Preliminary Survey and Investigation Charges		9,282		12,785		12,434
184	Clearing Accounts		421		421		421
185	Temporary Facilities		-		-		-
186	Miscellaneous Deferred Debits		36,016		41,909		46,516
188	Research and Development Expenditures		-		-		-
189	Unamortized Loss on Reacquired Debt		66,775		61,094		54,827
190	Accumulated Deferred Income Taxes		199,953		218,740		969,270
	Total Deferred Debits		3,736,056		3,910,761		4,571,733
	Total Assets and Other Debits	\$	24,282,776	\$	26,931,402	\$	29,858,036

PUBLIC SERVICE ELECTRIC AND GAS COMPANY**BALANCE SHEET****\$(In Thousands)**

		<u>Dec 31, 2015</u>	<u>Dec 31, 2016</u>	<u>Dec 31, 2017</u>
Liabilities and Other Credits				
Proprietary Capital				
201	Common Stock Issued	\$ 892,260	\$ 892,260	\$ 892,260
204	Preferred Stock Issued	-	-	-
207	Premium on Capital Stock	-	-	-
208	Donations from Stockholders	1,680,903	1,930,903	2,080,903
210	Gain on Resale or Cancellation of Required Capital Stock	-	-	-
211	Miscellaneous Paid-In Capital	-	-	-
215	Appropriated Retained Earnings	-	-	-
216	Unappropriated Retained Earnings	5,051,140	5,947,221	6,929,850
216.1	Unappropriated Undistributed Subsidiary Earnings	3,475	3,188	423
219	Other Comprehensive Income	1,227	816	499
	Total Proprietary Capital	<u>7,629,005</u>	<u>8,774,389</u>	<u>9,903,935</u>
Long-Term Debt				
221	221 Bonds	6,879,626	7,883,381	8,658,381
223	223 Advances from Assoc. Co.	-	-	-
225	225 Unamortized Premium on Long-Term Debt	-	-	-
226	226 Unamortized Discount on Long-Term Debt	(17,767)	(20,683)	(20,576)
	Total Long-Term Debt	<u>6,861,859</u>	<u>7,862,697</u>	<u>8,637,805</u>
Other Non-Current Liabilities				
227-9	Other Non-current Liabilities	1,168,046	1,292,025	1,360,896
244	Long-Term Portion of Derivative Instrument Liabilities	11,217	-	-
230	Asset Retirement Obligation	218,189	212,713	212,036
	Total Other Non-Current Liabilities	<u>1,397,453</u>	<u>1,504,739</u>	<u>1,572,931</u>
Current and Accrued Liabilities				
231	Notes Payable	152,924	-	-
232	Accounts Payable	723,759	718,132	727,745
233-4	Payables to Associated Companies	398,873	354,816	331,219
235	Customer Deposits	96,464	93,992	91,606
236	Taxes Accrued	3,663	3,226	4,630
237	Interest Accrued	90,336	96,183	100,843
238	Dividends Declared	-	-	-
239	Matured Long-Term Debt	-	-	-
241	Tax Collections Payable	2,597	500	3,198
242	Miscellaneous Current and Accrued Liabilities	431,876	439,717	434,154
243	Obligations Under Capital leases	-	-	-
244	Current Portion of Derivative Instrument Liabilities	-	5,447	-
	Total Current and Accrued Liabilities	<u>1,900,492</u>	<u>1,712,013</u>	<u>1,693,395</u>
Deferred Credits				
252	Customer Advances for Construction	48,855	48,815	45,882
253	Other Deferred Credits	427,217	416,089	366,496
254	Other Regulatory Liabilities	392,307	328,646	3,132,156
255	Accumulated Deferred Investment Tax Credits	152,266	151,618	141,244
281-3	Accumulated Deferred Income Taxes	5,473,322	6,132,397	4,364,192
	Total Deferred Credits	<u>6,493,966</u>	<u>7,077,565</u>	<u>8,049,970</u>
	Total Liabilities and Other Credits	<u>\$ 24,282,776</u>	<u>\$ 26,931,402</u>	<u>\$ 29,858,036</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY**INCOME ACCOUNT**

	<u>YTD 2017 *</u> '(\$000)	<u>YTD 2016 *</u> '(\$000)	<u>YTD 2015 *</u> '(\$000)
400 Electric Operating Revenues	3,085,710	3,372,834	3,675,534
Electric Operating Expenses:			
401 Operation Expense	2,125,656	2,429,564	2,655,749
402 Maintenance Expense	118,804	123,045	114,650
403 Depreciation Expense	253,744	240,246	227,282
404 Amortization of Limited Term Plant	8,949	7,498	6,991
407 Amortization of Property Losses	24,343	4,146	112,278
408.1 Taxes Other Than Income Taxes	23,616	23,462	24,382
409.1 Income Taxes - Federal	40,451	75,769	160,902
410.1 Provision for Deferred Income Taxes	362,789	312,579	367,435
411.1 Provision for Deferred Income Taxes - Credit	(250,108)	(256,626)	(372,517)
411.103 Accretion Expense-Electric	0	41	0
411.4 Investment Tax Credit Adjustments (Net)	(14,243)	1,203	5,071
Total Electric Utility Operating Expenses	<u>2,694,000</u>	<u>2,960,926</u>	<u>3,302,224</u>
Electric Utility Operating Income	<u>\$ 391,710</u>	<u>\$ 411,908</u>	<u>\$ 373,310</u>

* Electric Distribution only

	<u>YTD 2017</u>	<u>YTD 2016</u>	<u>YTD 2015</u>
400 Gas Operating Revenues	1,747,800	1,637,774	1,674,924
Gas Operating Expenses:			
401 Operation Expense	1,161,006	1,101,538	1,149,233
402 Maintenance Expense	39,103	39,605	36,067
403 Depreciation Expense	134,631	123,362	112,763
404 Amortization of Limited Term Plant	7,176	6,330	6,180
407 Amortization of Property Losses	29,385	25,751	25,489
407.4 Amortization of Excess cost of removal	0	(13,200)	(13,200)
408.1 Taxes Other Than Income Taxes	18,038	18,556	19,234
409.1 Income Taxes - Federal	(81,297)	(78,656)	(10,177)
410.1 Provision for Deferred Income Taxes	323,891	270,731	212,738
411.1 Provision for Deferred Income Taxes - Cr	(137,358)	(78,156)	(102,659)
411.4 Investment Tax Credit Adjustments (Net)	3,869	(1,268)	(1,269)
Total Gas Utility Operating Expenses	<u>1,498,443</u>	<u>1,414,592</u>	<u>1,434,398</u>
Gas Utility Operating Income	<u>\$ 249,357</u>	<u>\$ 223,181</u>	<u>\$ 240,525</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

BALANCE SHEET
\$ (In Thousands)

June 30, 2018

Assets and Other Debits

Utility Plant

Electric Utility Plant

101	Electric Utility Plant in Service	\$	17,617,192
103	Electric Experimental Plant Unclassified		-
105	Electric Utility Plant Held for Future Use		18,935
106	Electric Completed Construction not classified- Electric		3,608,212
107	Electric Construction Work in Progress		993,066
	Total Electric Utility Plant		<u>22,237,405</u>

Gas Utility Plant

101	Gas Utility Plant in Service	\$	7,648,692
103	Gas Experimental Plant Unclassified		-
105	Gas Utility Plant Held for Future Use		96
106	Gas Completed Construction not classified		76,055
107	Gas Construction Work in Progress		8,340
	Total Gas Utility Plant		<u>7,733,184</u>

Common Utility Plant

101	Common Utility Plant in Service	\$	510,827
106	Common Completed Construction not classified		3,778
107	Common Construction Work in Progress		1,104
	Total Common Utility Plant		<u>515,709</u>

Total Utility Plant

30,486,297

Accumulated Provisions for Depreciation and Amortization of
Electric Utility Plant

108 & 111	Electric Utility Plant in Service		(3,622,878)
108.5	Electric Utility Plant Held for Future Use		-
	Total Electric Utility Plant		<u>(3,622,878)</u>

Gas Utility Plant

108 & 111	Gas Utility Plant in Service		(2,272,045)
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Common Utility Plant

108 & 111	Common Utility Plant in Service		(160,779)
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Total Accumulated Provisions for
Depreciation and Amortization
of Utility Plant

(6,055,702)

Net Utility Plant Excluding Nuclear Fuel

24,430,596

Nuclear Fuel

120.1	120.1	In Process	-
120.2	120.2	Materials and Assemblies Stock	-
120.3	120.3	In Reactor	-
120.4	120.4	Spent	-

Accumulated Provisions for Amortization

120.5	120.5	Nuclear Fuel	-
		Net Nuclear Fuel	-
		Net Utility Plant	<u>24,430,596</u>

Other Property and Investments

121	Nonutility Property		3,249
122	Accumulated Provision for Depreciation & Amortization of Nonutility Property		(641)
123 & 123.1	Investments in Associated & Subsidiary Companies		50,882
124	Other Investments		284,821
125-8	Special Funds		45,329
175	Long-Term Portion of Derivative Assets		-
	Total Other Property and Investments		<u>383,641</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANYBALANCE SHEET

June 30, 2018

Current and Accrued Assets			
131	Cash	\$	14,968
132-4	Special Deposits		15,935
135	Working Funds		-
136	Temporary Cash Investments		-
141-3	Notes and Accounts Receivable		850,862
144	Accumulated Provision for Uncollectible Accounts - Credit		(58,796)
145-6	Receivables from Associated Companies		40,417
151-5	Materials and Supplies (incl. 163)		195,209
158	Allowances		-
164	Gas Stored Underground - Current		-
165	Prepayments		204,765
171	Interest and Dividends Receivable		-
172	Rents Receivable		4,027
173	Accrued Utility Revenues		188,888
174	Miscellaneous Current and Accrued		5,369
175	Current Portion of Derivative Instrument Assets		-
	Total Current and Accrued Assets		1,461,644
Deferred Debits			
181	Unamortized Debt Expense		49,545
182	Unrec'd Plt and Reg Costs and Other Reg Assets		3,528,499
183	Preliminary Survey and Investigation Charges		17,578
184	Clearing Accounts		421
185	Temporary Facilities		-
186	Miscellaneous Deferred Debits		40,557
188	Research and Development Expenditures		-
189	Unamortized Loss on Reacquired Debt		51,694
190	Accumulated Deferred Income Taxes		962,989
	Total Deferred Debits		4,651,283
	Total Assets and Other Debits	\$	<u>30,927,163</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

BALANCE SHEET

June 30, 2018

	Liabilities and Other Credits		
	Proprietary Capital		
201	Common Stock Issued	\$	892,260
204	Preferred Stock Issued		-
207	Premium on Capital Stock		-
208	Donations from Stockholders		2,080,903
210	Gain on Resale or Cancellation of Required Capital Stock		-
211	Miscellaneous Paid-In Capital		-
215	Appropriated Retained Earnings		-
216	Unappropriated Retained Earnings		7,484,871
216.1	Unappropriated Undistributed Subsidiary Earnings		422
219	Other Comprehensive Income		(435)
	Total Proprietary Capital		<u>10,458,021</u>
	Long-Term Debt		
221	221 Bonds		8,958,381
223	223 Advances from Assoc. Co.		-
225	225 Unamortized Premium on Long-Term Debt		-
226	226 Unamortized Discount on Long-Term Debt		(23,156)
	Total Long-Term Debt		<u>8,935,225</u>
	Other Non-Current Liabilities		
227-9	Other Non-current Liabilities		1,283,293
244	Long-Term Portion of Derivative Instrument Liabilities		-
230	Asset Retirement Obligation		214,082
	Total Other Non-Current Liabilities		<u>1,497,375</u>
	Current and Accrued Liabilities		
231	Notes Payable		194,982
232	Accounts Payable		703,902
233-4	Payables to Associated Companies		147,533
235	Customer Deposits		92,848
236	Taxes Accrued		6,063
237	Interest Accrued		104,844
238	Dividends Declared		-
239	Matured Long-Term Debt		-
241	Tax Collections Payable		28,563
242	Miscellaneous Current and Accrued Liabilities		527,299
243	Obligations Under Capital leases		-
244	Current Portion of Derivative Instrument Liabilities		-
	Total Current and Accrued Liabilities		<u>1,806,034</u>
	Deferred Credits		
252	Customer Advances for Construction		45,749
253	Other Deferred Credits		387,863
254	Other Regulatory Liabilities		3,118,832
255	Accumulated Deferred Investment Tax Credits		135,743
281-3	Accumulated Deferred Income Taxes		4,542,321
	Total Deferred Credits		<u>8,230,508</u>
	Total Liabilities and Other Credits	\$	<u><u>30,927,163</u></u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

REVENUE BY CLASS OF BUSINESS
12 MONTHS ENDING DECEMBER 31, 2017

(Thousands)

Electric Operating Revenue	
Residential	1,910,413
Commercial	1,478,628
Industrial	152,182
Public Street & Highway Lighting	67,841
Interdepartmental Revenues	1,230
Sales for Resale	12,026
Forfeited Discounts	3,862
Miscellaneous Service Revenues	37,069
Rent from Electric Property	3,723
Other Electric Revenues	1,279
	<hr/>
Total Revenue from Electric Distribution Sales	3,668,254

*Excludes Transmission

Gas Operating Revenue	
Residential	\$1,071,883
Commercial	\$554,867
Industrial	\$52,989
Street & Yard Light Service	\$519
Cogeneration	\$6,600
Contract Service Gas	\$7,846
Interdepartmental Revenues	\$498
Forfeited Discounts	\$1,069
Miscellaneous Service Revenues	\$47,247
Other Gas Revenues	<u>\$4,283</u>
Total Revenue from Gas Distribution Sales	\$1,747,800

Public Service Electric & Gas Company
Total Utility Payments or Accruals to Affiliates
(\$ THOUSANDS) Net Billing

	2017	2016	2015
PSEG Services	\$ 617,725	\$ 604,583	\$ 553,486
PSEG Power	1,554,409	1,569,706	1,622,226
PSEG Long Island	(820)	(1,348)	(1,420)
PSEG Energy Holdings	(741)	(733)	(736)
PSEG Enterprise	(96,757)	(105,255)	(87,092)
Total Payments to Affiliates	<u>\$ 2,073,816</u>	<u>\$ 2,066,953</u>	<u>\$ 2,086,463</u>

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
Clean Energy Future - Energy Efficiency
Accounting Entries

Entry	Acct. Description	Debit	Credit
R1	To defer direct program expenditures.		
	182 Program Investment Regulatory Asset	XXX	
	131 Cash		XXX
R2	To amortize direct program expenditures.		
	908 Customer Assistance Expenses	XXX	
	182 Program Investment Regulatory Asset		XXX
R3	To record capitalized IT per PSE&G capitalization policy.		
	303 Capitalized IT	XXX	
	131 Cash		XXX
R4	To amortize IT costs over appropriate book life.		
	404 Amortization Expense	XXX	
	111 Accumulated Amortization		XXX
R5	To record incremental admin. costs.		
	908 Customer Assistance Expenses	XXX	
	131 Cash		XXX
R6	To record expenditure reimbursements or repayments		
	131 Cash	XXX	
	908 Customer Assistance Expenses		XXX
R7	To record the monthly Clean Energy Future Energy Efficiency revenues.		
	142 Customer Accounts Receivable	XXX	
	400 Operating Revenues		XXX
R8	To record any over/ under recovery.		
	182 Regulatory Asset - Clean Energy Future Energy Efficiency	XXX	
	908 Customer Assistance Expenses	XXX	XXX
	254 Regulatory Liabilities		XXX
R9	To record cost of capital on any over/ under recovered balance.		
	182 Regulatory Asset - Clean Energy Future Energy Efficiency	XXX	
	419 Other Income	XXX	XXX
	431 Interest Expense	XXX	XXX
	254 Regulatory Liabilities		XXX

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

B.P.U.N.J. No. 15 ELECTRIC

Original Sheet No. 70

TECHNOLOGY INNOVATION CHARGE

**Charge
(per kilowatthour)**

Component:

Clean Energy Future - Energy Storage Program.....\$ 0.000011
Clean Energy Future - Electric Vehicle Program\$ 0.000152
Sub-total per kilowatthour\$ 0.000163

Charge including New Jersey Sales and Use Tax (SUT).....\$ 0.000174

TECHNOLOGY INNOVATION CHARGE

This charge is designed to recover the revenue requirements associated with and offset by the benefits derived from the PSE&G Clean Energy Future Electric Vehicle and Energy Storage Programs. The charge will be reset nominally on an annual basis. Interest at the weighted average of the interest rates on PSE&G's commercial paper and bank credit lines utilized in the prior month will be accrued monthly on any under- or over- recovered balances. The interest rates shall be reset each month.

Date of Issue:

Effective:

Issued by SCOTT S. JENNINGS, Vice President Finance – PSE&G
80 Park Plaza, Newark, New Jersey 07102
Filed pursuant to Order of Board of Public Utilities dated
in Docket No.

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

B.P.U.N.J. No. 15 ELECTRIC

Original Sheet No. 70

TECHNOLOGY INNOVATION CHARGE

**Charge
(per kilowatthour)**

Component:

Clean Energy Future - Energy Storage Program.....	\$ 0.000011
Clean Energy Future - Electric Vehicle Program	\$ <u>0.000152</u>
Sub-total per kilowatthour	\$ 0.000163
Charge including New Jersey Sales and Use Tax (SUT)	\$ 0.000174

TECHNOLOGY INNOVATION CHARGE

This charge is designed to recover the revenue requirements associated with and offset by the benefits derived from the PSE&G Clean Energy Future Electric Vehicle and Energy Storage Programs. The charge will be reset nominally on an annual basis. Interest at the weighted average of the interest rates on PSE&G's commercial paper and bank credit lines utilized in the prior month will be accrued monthly on any under- or over- recovered balances. The interest rates shall be reset each month.

Date of Issue:

Issued by SCOTT S. JENNINGS, Vice President Finance – PSE&G
80 Park Plaza, Newark, New Jersey 07102
Filed pursuant to Order of Board of Public Utilities dated
in Docket No.

Effective:

TYPICAL RESIDENTIAL ELECTRIC BILL IMPACTS

The effect of the proposed Clean Energy Future Electric Vehicle Program, and Clean Energy Future Energy Storage Program components of the Technology Innovation Charge (TIC) on typical residential electric bills, if approved by the Board, is illustrated below:

Residential Electric Service					
If Your Monthly Summer kWhr Use Is:	And Your Annual kWhr Use Is:	Then Your Present Annual Bill (1) Would Be:	And Your Proposed Annual Bill (2) Would Be:	Your Annual Bill Change Would Be:	And Your Percent Change Would Be:
200	1,920	\$348.04	\$348.32	\$0.28	0.08%
450	4,320	746.88	747.60	0.72	0.10
750	7,200	1,233.72	1,234.96	1.24	0.10
803	7,800	1,336.25	1,337.60	1.35	0.10
1,360	13,160	2,257.76	2,260.08	2.32	0.10

- (1) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (2) Same as (1) except includes changes in the Clean Energy Future Electric Vehicle Program, and Clean Energy Future Energy Storage Program components of the TIC.

Residential Electric Service					
If Your Annual kWhr Use Is:	And Your Monthly Summer kWhr Use Is:	Then Your Present Monthly Summer Bill (3) Would Be:	And Your Proposed Monthly Summer Bill (4) Would Be:	Your Monthly Summer Bill Change Would Be:	And Your Percent Change Would Be:
1,920	200	\$35.83	\$35.86	\$0.03	0.08%
4,320	450	77.60	77.68	0.08	0.10
7,200	750	129.79	129.92	0.13	0.10
7,800	803	139.37	139.51	0.14	0.10
13,160	1,360	240.12	240.36	0.24	0.10

- (3) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (4) Same as (3) except includes changes in the Clean Energy Future Electric Vehicle Program, and Clean Energy Future Energy Storage Program components of the TIC.

TYPICAL RESIDENTIAL ELECTRIC BILL IMPACTS

The effect of the proposed Clean Energy Future Electric Vehicle Program component of the Technology Innovation Charge (TIC) on typical residential electric bills, if approved by the Board, is illustrated below:

Residential Electric Service					
If Your Monthly Summer kWhr Use Is:	And Your Annual kWhr Use Is:	Then Your Present Annual Bill (1) Would Be:	And Your Proposed Annual Bill (2) Would Be:	Your Annual Bill Change Would Be:	And Your Percent Change Would Be:
200	1,920	\$348.04	\$348.32	\$0.28	0.08%
450	4,320	746.88	747.56	0.68	0.09
750	7,200	1,233.72	1,234.92	1.20	0.10
803	7,800	1,336.25	1,337.52	1.27	0.10
1,360	13,160	2,257.76	2,259.92	2.16	0.10

- (1) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (2) Same as (1) except includes changes in the Clean Energy Future Electric Vehicle Program component of the TIC.

Residential Electric Service					
If Your Annual kWhr Use Is:	And Your Monthly Summer kWhr Use Is:	Then Your Present Monthly Summer Bill (3) Would Be:	And Your Proposed Monthly Summer Bill (4) Would Be:	Your Monthly Summer Bill Change Would Be:	And Your Percent Change Would Be:
1,920	200	\$35.83	\$35.86	\$0.03	0.08%
4,320	450	77.60	77.67	0.07	0.09
7,200	750	129.79	129.91	0.12	0.09
7,800	803	139.37	139.50	0.13	0.09
13,160	1,360	240.12	240.34	0.22	0.09

- (3) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (4) Same as (3) except includes changes in the Clean Energy Future Electric Vehicle Program component of the TIC.

TYPICAL RESIDENTIAL ELECTRIC BILL IMPACTS

The effect of the proposed Clean Energy Future Energy Storage Program component of the Technology Innovation Charge (TIC) on typical residential electric bills, if approved by the Board, is illustrated below:

Residential Electric Service					
If Your Monthly Summer kWhr Use Is:	And Your Annual kWhr Use Is:	Then Your Present Annual Bill (1) Would Be:	And Your Proposed Annual Bill (2) Would Be:	Your Annual Bill Change Would Be:	And Your Percent Change Would Be:
200	1,920	\$348.04	\$348.04	\$0.00	0.00%
450	4,320	746.88	746.92	0.04	0.01
750	7,200	1,233.72	1,233.84	0.12	0.01
803	7,800	1,336.25	1,336.37	0.12	0.01
1,360	13,160	2,257.76	2,257.92	0.16	0.01

- (1) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (2) Same as (1) except includes changes in the Clean Energy Future Energy Storage Program component of the TIC.

Residential Electric Service					
If Your Annual kWhr Use Is:	And Your Monthly Summer kWhr Use Is:	Then Your Present Monthly Summer Bill (3) Would Be:	And Your Proposed Monthly Summer Bill (4) Would Be:	Your Monthly Summer Bill Change Would Be:	And Your Percent Change Would Be:
1,920	200	\$35.83	\$35.83	\$0.00	0.00%
4,320	450	77.60	77.61	0.01	0.01
7,200	750	129.79	129.80	0.01	0.01
7,800	803	139.37	139.38	0.01	0.01
13,160	1,360	240.12	240.14	0.02	0.01

- (3) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.
- (4) Same as (3) except includes changes in the Clean Energy Future Energy Storage Program component of the TIC.

NOTICE TO PUBLIC SERVICE ELECTRIC AND GAS COMPANY CUSTOMERS

IN THE MATTER OF THE PETITION OF PUBLIC SERVICE ELECTRIC AND GAS COMPANY FOR APPROVAL OF ITS CLEAN ENERGY FUTURE - ELECTRIC VEHICLE AND ENERGY STORAGE ("CEF-EVES") PROGRAM AND RECOVERY OF ASSOCIATED COSTS

Notice of a Filing and Notice of Public Hearings

BPU Docket No. XXXXXXXXXX

TAKE NOTICE that Public Service Electric and Gas Company ("Public Service" or the "Company") filed a Petition with the New Jersey Board of Public Utilities ("Board" or "BPU") in September 2018 requesting approval to implement and administer a PSE&G Clean Energy Future – Electric Vehicle and Energy Storage Program ("CEF-EVES" or the "Program"). The objective of the CEF-EVES Program is to accelerate electric vehicles and the energy storage technology in New Jersey.

For the Electric Vehicle portion of the Program, PSE&G seeks BPU approval to commit up to \$261 million in direct investment over a period of approximately six years. Approval of this filing would initially increase rates to be paid by the Company's electric customers by \$9.7 million over an 18 month period.

For the Energy Storage portion of the Program, PSE&G seeks BPU approval to commit up to \$108 million in direct investment over a period of approximately six years. Approval of this filing would initially increase rates to be paid by the Company's electric customers by \$0.7 million over an 18 month period.

PSE&G proposes to recover all Program costs through a new charge in the PSE&G electric tariff titled the Technology Innovation Charge ("TIC"). The individual components will be applicable to all electric rate schedules and would be reviewed and modified in an annual filing.

The Company is requesting that any over/under recovery of actual revenue requirements compared to revenues would be deferred. In calculating the monthly interest on net over and under recoveries, the interest rate would be based upon the Company's interest rate obtained on its commercial paper and/or bank credit lines utilized in the preceding month. The proposed TIC rates, if approved by the Board, are shown in Table #1.

Table #2 provides the approximate net effect of the proposed increase in rates relating to the CEF-EVES Program, if approved by the Board. The annual percentage increase applicable to specific customers will vary according to the applicable rate schedule and the level of the customer's usage. The approximate effect of the proposed increase on typical electric residential monthly bills, if approved by the Board, is illustrated in Table # 3.

Under the Company's proposal, a typical residential electric customer using 750 kilowatt-hours per summer month and 7,200 kilowatt-hours on an annual basis would see an increase in the annual bill from \$1,233.72 to \$1,234.96, or \$1.24 or approximately 0.10%.

The Board has the statutory authority pursuant to N.J.S.A. 48:2-21, to establish the TIC to levels it finds just and reasonable. Therefore, the Board may establish the TIC at a level other than that proposed by Public Service. Therefore, the described charges may increase or decrease based upon the Board's decision.

Copies of the Company's filing are available for review at the Company's Customer Service Centers, online at the PSEG website at <http://www.pseg.com/pseandgfilings> and at the Board of Public Utilities at 44 South Clinton Avenue, Seventh Floor, Trenton, New Jersey 08625-0350.

The following dates, times and locations for public hearings on the Company's filing have been scheduled so that members of the public may present their views. Information provided at the public hearings will become part of the record of this case and will be considered by the Board in making its decision.

Date 1, 2018
Time 1
Location 1
Location 1 Overflow
Room 1
Room 1 Overflow
Address 1
City 1, New Jersey Zip 1

Date 2, 2018
Time 2
Location 2
Location 2 Overflow
Room 2
Room 2 Overflow
Address 2
City 2, New Jersey Zip 2

Date 3, 2018
Time 3
Location 3
Location 3 Overflow
Room 3
Room 3 Overflow
Address 3
City 3, New Jersey Zip 3

In order to encourage full participation in this opportunity for public comment, please submit any requests for needed accommodations, including interpreters, listening devices or mobility assistance 48 hours prior to the above hearings to the Board's Secretary at the following address.

Customers may file written comments with the Secretary of the Board of Public Utilities at 44 South Clinton Avenue, Third Floor, Suite 314, P.O. Box 350, Trenton, New Jersey, 08625-0350 ATTN: Board Secretary Aida Camacho-Welch whether or not they attend the public hearings. To review PSE&G's rate filing, visit <http://www.pseg.com/pseandgfilings>.

**Table # 1
TIC Charges**

	CEF-EV Program Component of the TIC		CEF-ES Program Component of the TIC		Total TIC	
	Present (Incl SUT)	Proposed (Incl SUT)	Present (Incl SUT)	Proposed (Incl SUT)	Present (Incl SUT)	Proposed (Incl SUT)
TIC Electric - \$ per kWhr	\$0.000000	\$0.000162	\$0.000000	\$0.000012	\$0.000000	\$0.000174

**Table # 2
Impact by Electric Customer Class**

PROPOSED PERCENTAGE INCREASES BY CUSTOMER CLASS FOR ELECTRIC SERVICE		
	Rate Class	% Increase
Residential	RS	0.10%
Residential Heating	RHS	0.13
Residential Load Management	RLM	0.10
General Lighting & Power	GLP	0.11
Large Power & Lighting - Secondary	LPL-S	0.13
Large Power & Lighting - Primary	LPL-P	0.16
High Tension - Subtransmission	HTS-S	0.18

The percent increases noted above are based upon Delivery Rates and the applicable Basic Generation Service (BGS) charges in effect September 8, 2018 and assumes that customers receive commodity service from Public Service Electric and Gas Company.

**Table #3
Residential Electric Service**

If Your Annual kWhr Use Is:	And Your Monthly Summer kWhr Use Is:	Then Your Present Monthly Summer Bill (1) Would Be:	And Your Proposed Monthly Summer Bill (2) Would Be:	Your Monthly Summer Bill Change Would Be:	And Your Monthly Percent Change Would Be:
1,920	200	\$35.83	\$35.86	\$0.03	0.08%
4,320	450	77.60	77.68	0.08	0.10
7,200	750	129.79	129.92	0.13	0.10
7,800	803	139.37	139.51	0.14	0.10
13,160	1,360	240.12	240.36	0.24	0.10

(1) Based upon current Delivery Rates and Basic Generation Service Residential Small Commercial Pricing (BGS-RSCP) charges in effect September 8, 2018 and assumes that the customer receives BGS-RSCP service from Public Service.

(2) Same as (1) except includes the proposed creation of the Technology Innovation Charge.

Matthew M. Weissman, Esq.
General State Regulatory Counsel

PUBLIC SERVICE ELECTRIC AND GAS COMPANY