

**BEFORE THE
NEW JERSEY BOARD OF PUBLIC UTILITIES**

**In The Matter Of The Petition Of Jersey Central Power &
Light Company For Approval Of An Infrastructure
Investment Program (Reliability Plus)**

BPU Docket No. _____

VERIFIED PETITION

**On Behalf Of
Jersey Central Power & Light Company**

July 13, 2018

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

In the Matter of the Verified Petition of **Jersey** :
Central Power & Light Company For : BPU Docket No.
Approval of An Infrastructure Investment :
Program (**JCP&L Reliability Plus**) :
: **VERIFIED PETITION**

TO THE HONORABLE BOARD OF PUBLIC UTILITIES:

Petitioner, Jersey Central Power & Light Company (the "Petitioner", the "Company" or "JCP&L"), an electric public utility company of the State of New Jersey subject to the regulatory jurisdiction of the Board of Public Utilities (the "Board"), and maintaining principal offices at 300 Madison Avenue, Morristown, New Jersey 07962-1911 and 101 Crawford Corner Road, Building 1, Suite 1-511, Holmdel, New Jersey 07733, in support of its above-captioned Verified Petition, respectfully shows:

OVERVIEW

1. By way of this Verified Petition and its supporting testimony, the Company is proposing the JCP&L Reliability Plus Infrastructure Investment Program (“JCP&L Reliability Plus” or “Program”). JCP&L Reliability Plus focuses on concerns raised by the Board. The Company proposes to accelerate electric distribution infrastructure investment to meet expected future storm-related and blue-sky challenges as well as to enhance long-term distribution system safety, reliability, and resiliency and support economic growth in New Jersey.

2. Overhead Circuit Reliability and Resiliency projects will make JCP&L’s electric distribution system less susceptible to storm damage and enhance resiliency by addressing the primary cause of outages – tree damage. These projects also will reduce the length of outages due

to transient faults. Substation Reliability Enhancement projects will make the Company's substations less susceptible to storm damage by implementation of flood mitigation measures, upgrade distribution substation equipment, enhance substation fencing and acquire four mobile substations. These projects will increase the distribution system's resiliency, operational flexibility, safety and security. Distribution Automation projects will provide intelligent control over the system and allow for rapid fault location, isolation and service restoration. These projects will reduce the number of customers affected by outages and shorten the duration of outages. Underground System Improvements projects will accelerate replacement of aging underground cable and submersible transformers and rehabilitate underground systems. These programmatic projects will increase customer reliability by reducing future outages and their duration and will enhance current operations.

3. JCP&L's Reliability Plus will provide accelerated investments that produce many benefits for the Company's customers, its electric distribution system and the economy of the State. As a whole, the Program will enhance safety, make JCP&L's distribution system more resistant to outages (*i.e.*, more reliable) during storms and blue-sky events and enable the system to recover more quickly (*i.e.*, be more resilient) when outages do occur.

INTRODUCTION

4. JCP&L is a New Jersey electric public utility primarily engaged in the purchase, transmission, distribution, and sale of electric energy and related utility services to approximately 1.1 million residential, commercial and industrial customers located within 13 counties and 236 municipalities of the State of New Jersey.

5. JCP&L files this Petition to seek approval of JCP&L Reliability Plus, including its cost recovery mechanism, pursuant to *N.J.A.C. 14:3-2A.1 et seq* and any other provision deemed

applicable by the Board. JCP&L anticipates that the Program will commence on January 1, 2019 and be performed over a four-year period.

6. As described in the attached Direct Testimony of Dennis Pavagadhi, the proposed JCP&L Reliability Plus investments are directed to projects supportive of four categories: Overhead Circuit Reliability and Resiliency, Substation Reliability Enhancement, Distribution Automation and Underground System Improvements.

7. JCP&L Reliability Plus would result in the projected accelerated capital investment of \$386.8 million over four years.

8. These investments will enable the Company to enhance the safety, reliability and resiliency of its electric distribution system. Projects undertaken through JCP&L Reliability Plus will provide benefits to JCP&L's customers and the State of New Jersey, including improved service levels, reductions in the length of customer outages, reductions in distribution system losses, job creation, and promote economic growth in New Jersey resulting from a more reliable and resilient electric distribution system. In addition, deployment of state-of-the-art devices and controls will better prepare the distribution system for future increases in distributed energy resources and other emerging technologies, such as electric vehicles. Lastly, a programmatic approach to these system enhancements affords efficiencies and economies of scale that will result in benefits for customers.

9. It is reasonable and prudent for JCP&L to provide for accelerated investments in its electric distribution system to enhance the long-term safety, reliability and resiliency of the system and the continued provision of safe, reliable and resilient service. JCP&L has developed JCP&L Reliability Plus to further these goals and is making this filing in conformance with the Board's recently adopted rules for utility infrastructure investment and recovery. JCP&L

respectfully requests that the Board approve JCP&L Reliability Plus to provide for a capital investment of up to \$386.8 million.

BACKGROUND

10. In 2011 and 2012, New Jersey experienced unprecedented weather events, including Hurricane Irene, an October snowstorm and Superstorm Sandy, that extensively damaged the State's energy infrastructure and economy. These storms caused substantial damage to JCP&L's distribution system and extensive outages to its customers, as described in the attached Direct Testimony of Dennis Pavagadhi. During the three unprecedented weather events, tree damage was the primary cause of outages on the Company's distribution system. Tree damage also caused the vast number of road closures during these events. Following these weather events, New Jersey's Energy Master Plan ("EMP") was updated in December 2015 ("EMP Update"). The EMP Update (at p. 46) included an overarching goal to Improve Energy Infrastructure Resiliency & Emergency Preparedness and Response. The EMP Update (at pp. 49-50) added a goal of reducing the vulnerability of the State's critical energy infrastructure and recommended that the State should emphasize infrastructure resiliency and system hardening measures. The EMP also added a goal (at p. 50) for the electric distribution companies ("EDCs") to develop and enhance a smarter grid through distribution automation deployment. Pursuant to Governor Murphy's Executive Order 28, the Board has convened the 2019 EMP Committee to deliver a new EMP by June 1, 2019. It is expected that the new EMP will continue focus on resilient utility infrastructure and electric grid modernization.

11. On December 19, 2017, the Board adopted new rules for utility "Infrastructure Investment and Recovery" to encourage utilities to implement infrastructure investment programs. These rules are codified at *N.J.A.C. 14:3-2A.1 et seq.* ("II&R Rules") and became

effective on January 16, 2018. The II&R Rules are a Board-developed regulatory initiative which creates an important mechanism for utilities to accelerate desired safety, reliability and resiliency investments for the benefit of customers. 49 *N.J.R.* 2489(a) (Aug. 7, 2017) (Summary). The II&R Rules explain their purpose:

(a) This subchapter establishes a regulatory mechanism concerning an Infrastructure Investment Program, which will allow a utility to accelerate its investment in the construction, installation, and rehabilitation of certain non-revenue producing utility plant and facilities that enhance safety, reliability, and/or resiliency. Through an Infrastructure Investment Program approved by the Board, a utility may obtain accelerated recovery of qualifying investments....

(b) The purpose of an Infrastructure Investment Program is to provide a rate recovery mechanism that encourages and supports necessary accelerated construction, installation, and rehabilitation of certain utility plants and equipment. As set forth in this subchapter, such investment would occur in a systematic and sustained way to advance construction, installation, and rehabilitation of utility infrastructure needed for a continued system safety, reliability, and resiliency, and sustained economic growth in the State of New Jersey. [*N.J.A.C.* 14:3-2A.1]

In the impact statements in its rule proposal, the Board noted that “planned” investments improve service reliability and resiliency at costs many multiples lower than the costs of emergency replacements following service outages. 49 *N.J.R.* 2489(a), 2490 (Social Impact Statement). The Board also noted that systematic utility investment, via an infrastructure investment program, will promote sustained economic growth in New Jersey, and should generate additional jobs. *Id.* (Economic Impact Statement/Jobs Impact Statement)

12. The need for the utility investment mechanism in the II&R Rules was confirmed by the three successive March 2018 nor’easters: Riley, Quinn and Toby. Winter Storm Riley produced over sixteen inches of wet snow in JCP&L’s Northern Region and seven inches in JCP&L’s Central Region with accompanying wind gusts of more than 70 miles per hour. As JCP&L continued with the restoration efforts from Winter Storm Riley, a second winter storm, Quinn, moved into the service territory, bringing high winds and additional wet, heavy snow,

totaling an additional thirteen inches of snow in the Northern Region and an additional seven inches of snow in the Central Region. Winter storms Riley and Quinn caused power outages that affected more than 526,000 of JCP&L's 1.1 million customers. The combination of the two storms caused damage requiring JCP&L to issue 2,507 cross-arms, 805 poles, 517 transformers and more than 68 miles of replacement wire. Later in March, Winter Storm Toby brought to the Northern Region winds between 20 to 30 miles per hour and up to six inches of snow in some areas and brought to the Central Region winds between 30 to 40 miles per hour and up to twelve inches of snow in some areas. This storm event caused approximately 70,836 outages with 4,492 outages in the JCP&L Northern Region and 66,344 outages in the JCP&L Central Region and caused JCP&L to issue 183 cross-arms, 47 poles, 27 transformers, and 19,152 feet of replacement wire. During the March 2018 storms, trees were the primary cause of the damage and outages. In the aftermath of the March 2018 storms, Board President Joseph Fiordaliso stated the Board's storm investigation would provide information leading to improvements, and that he "would like to see all of our utilities submit infrastructure plans." (March 26, 2018 Agenda Meeting, opening remarks, Tr. at 12).

13. JCP&L's proposed JCP&L Reliability Plus investments: will benefit JCP&L's customers and the State of New Jersey; comply with and further the purposes of the Board's new II&R Rules; and respond to President Fiordaliso's call for action; and are a step towards implementation of key EMP goals.

14. Appendix A attached to this Petition, and made a part hereof, sets forth the location in this filing of all the information required by the Board's II&R Rules.

JCP&L RELIABILITY PLUS

15. JCP&L Reliability Plus benefits customers and New Jersey by providing for significant accelerated infrastructure investment to enhance the safety, reliability and resiliency of its electric distribution system and promote economic growth in New Jersey and in JCP&L's service territory. JCP&L proposes to invest \$386.8 million over four years in fifteen eligible electric distribution infrastructure projects, grouped in four Program categories:

Program Category	Capital \$ 2019-2022 (millions)
Overhead Circuit Reliability & Resiliency	\$ 132.9
Substation Reliability Enhancement	\$ 85.9
Distribution Automation	\$ 108.4
Underground System Improvements	\$ 59.7
JCP&L RELIABILITY PLUS TOTAL	\$ 386.8

This level of investment is over and above JCP&L's proposed annual baseline capital spending for the same period, which proposed capital baseline is \$141 million per year. JCP&L's proposed baseline spending is based on a 5-year historical average of base capital expenditures. Forecasted baseline capital expenditures will maintain spending on projects similar to the projects in JCP&L Reliability Plus and will be recovered in the normal course through a base rate proceeding.

16. JCP&L Reliability Plus will have a maximum cumulative bill impact on residential customers over the Program's entire duration of approximately 1.8% of the current average monthly bill. However, the average incremental bill impact from any individual rate adjustment over the course of the Program will be significantly lower. Those modest impacts will afford

substantial benefits to customers and the State. Customers will benefit from projects that will make JCP&L's electric distribution system safer, more resistant to outage events and able to recover more quickly from outages. The fifteen projects within four categories which make up JCP&L Reliability Plus and the associated benefits are summarized in the following paragraphs.

17. Overhead Circuit Reliability and Resiliency. This category includes the following projects: Lateral Fuse Replacement with Trip Saver II (replace lateral fuses with "Trip Saver II" circuit-mounted reclosers); Enhanced Vegetation Management (accelerated removal of hazard trees, remove Ash trees and overhang on selected circuits in Zone 2); and Install Generators at District Line Shops (install permanent entire-facility back-up generators at operation centers, which include line and substation shops).

18. Projects within the Overhead Circuit Reliability and Resiliency category will enhance the customer experience during both severe weather events as well as during normal operating conditions. To address damage from severe weather events, the Company plans to target removal of hazard trees and Ash trees and expand its vegetation clearing corridors to reduce the potential for tree damage -- the primary cause of outages. The Company also proposes to replace lateral fuses with S&C TripSaver II reclosers. During normal operating conditions, the proposed project is designed to enable the restoration of service in less than 90 seconds to customers on laterals when a temporary fault occurs. In addition, JCP&L will install permanent back-up generation at operations centers whose functioning is critical for service restoration following outages.

19. Substation Reliability Enhancement. This category includes the following projects: Flood Mitigation (add permanent flood walls and automatic flood gates at nine substations and purchase additional high capacity water pumps); Substation Equipment Replacement (replace

distribution substation equipment such as breakers, transformers and switchgear); Mobile Substations (purchase four mobile substations – one in each year from 2019-2022); Modernize Protective Equipment (replace relays with new technology); and Substation Fencing Enhancement (install strengthened, high security fencing at distribution substations that have experienced theft, vandalism, animal related outages or have close proximity to the public).

20. Projects within the Substation Reliability Enhancement category will make substations less susceptible to storm damage by flood mitigation measures, equipment enhancements and **the addition of mobile substations.** These projects also will increase distribution system resiliency, operational flexibility and safety. Certain projects will enhance safety and security and protect infrastructure at substations which will result in enhanced service to customers.

21. Distribution Automation. Projects in this category include: Circuit Protection and Sectionalization (replace fuses on 4.8kV circuits with electronic reclosers and supervisory control and data acquisition (“SCADA”) control); Install SCADA-Line Devices (replace existing reclosers with upgraded reclosers and install communications equipment for SCADA); Distribution Automation (Loop Schemes) (construct distribution automatic loop schemes with reclosers and SCADA control for real time system monitoring and remote control capability); ADMS and RTU Upgrades (implement an Advanced Distribution Management System (“ADMS”), and install load voltage and data monitoring points to gather circuit level data via SCADA along with necessary upgrades to remote terminal units (“RTU’s”) in substations).

22. Projects within the Distribution Automation category will provide intelligent monitoring and control over the distribution system and allow for rapid fault location, isolation and service restoration. **These projects will reduce the number of customers affected by outages**

and shorten the duration of outages. They will also provide the platform for future smart grid investments, like Volt/VAR control, and support the integration of power flows from distributed energy resources (“DER”) into the distribution system.

23. Underground System Improvements. This category of projects includes: Underground Cable Replacement (replace underground bare concentric neutral cable in areas with pre-1986 construction with new jacketed cable and replace associated underground switches and pad-mounted transformers as needed); Submersible Transformer Replacement (replace submersible transformers with pad-mounted transformers); and Conventional and Network Rehabilitation (reinforce and rehabilitate underground network ducted distribution system and conventional ducted distribution system consisting of vaults, manholes, covers, duct, cable, transformers and switches).

24. Projects in the Underground System Improvements category provide for accelerated replacement of underground cable and submersible transformers. This will increase reliability of service to customers by reducing the number and duration of future outages and will enhance current operations. A programmatic approach will reduce the occurrences where the Company has to make repairs on an emergency basis, which emergency repairs may result in greater costs.

25. As demonstrated in the Engineering Evaluation and Report attached as Appendix B to the Direct Testimony of Dennis Pavagadhi, JCP&L Reliability Plus is estimated to provide benefits to customers of \$1.905 billion, compared to estimated costs of \$400 million (including capital and expense), or a benefit to cost ratio of 4.8.

26. JCP&L Reliability Plus will support economic development and job opportunities in New Jersey. The Board’s Jobs’ Impact statement in its rule proposal cites a Rutgers University study which concluded that, for every \$1 million of utility infrastructure project spending, a total

of 6.5 or 7.5 full time jobs are created, respectively, depending on whether key materials are manufactured outside New Jersey or in-State. 49 *N.J.R.* 2489(a), 2490. Using the more conservative metric (6.5 full time jobs per \$1 million of infrastructure spending), JCP&L Reliability Plus would create 2,514 full-year jobs or 628 current full-time jobs per year. Moreover, proceeding on a planned four-year Program also will provide stability in the jobs that the Program creates and result in efficient and cost-effective planning, engineering, permitting, contracting and project scheduling.

27. In addition, enhancing the already reliable energy supply provided to customers in the JCP&L service territory will encourage employers to locate businesses in New Jersey, maintain business operations in New Jersey and expand business operations in the State, which will result in opportunities for New Jersey residents to secure additional jobs. Moreover, outages cause residential, business and industrial customers to incur costs. A reduction in outages and their duration results in qualitative and quantitative benefits to all customers.

COST RECOVERY

28. JCP&L proposes a cost recovery mechanism to recover the costs of JCP&L Reliability Plus, which is consistent with the II&R Rules. As detailed in the attached Direct Testimony of Mark A. Mader, the cost recovery method involves semi-annual rate filings for recovery of investments placed in service to the benefit of customers. Cost recovery will occur through a separate clause of JCP&L's tariff, Rider RP- JCP&L Reliability Plus Charge ("Rider RP"). The Rider RP clause employs a per kWh charge for residential and small commercial and small industrial customers, per kW RP charge for large commercial and large industrial customers and a per fixture RP charge for lighting customers to recover the costs of plant placed in service;

the charge will not include projections, and, thus, will not need to be trued-up after the fact. The proposed tariff clause is set forth in Schedule MAM-6 to Mr. Mader's Direct Testimony.

29. JCP&L proposes to make semi-annual rate filings to recover revenue requirements as follows. JCP&L anticipates that each year, a filing will be made by May 15 to recover the revenue requirements for plant placed in-service during the period through and including July 31, with an update for actual data provided by August 15, for a rate adjustment effective November 1. Each year, a filing will also be made by November 15 to recover the revenue requirements for plant placed in-service during the period through and including of January 31, with an update for actual data provided by February 15 of the following year for a rate adjustment effective May 1 of the following year. A detailed schedule for the anticipated JCP&L Reliability Plus rate filings is set forth in the direct testimony of Mr. Mader.

30. The Company proposes that the costs to be included in the tariffed JCP&L Reliability Plus rates will include: depreciation/amortization expense providing for the recovery of the investment over its useful book life and return on net investment, where net investment is the capital expenditures less accumulated depreciation/amortization, less associated accumulated deferred income taxes. The return on net investment will be based on a weighted average cost of capital ("WACC"). The initial WACC will be based on the return on equity ("ROE"), long term debt rate, and capital structure approved by Order dated December 12, 2016 in JCP&L's base rate proceeding in Docket No. ER16040383. A Board-approved change in the WACC in a future base rate case will be reflected in any subsequent revenue requirement calculations for JCP&L Reliability Plus. The Company will also apply the appropriate factor to collect applicable sales and use tax ("SUT").

31. Board Staff and Rate Counsel will have the opportunity to review each semi-annual rate filing to ensure that the revenue requirements and proposed rates are being determined in accordance with the Board's Order approving JCP&L Reliability Plus. The prudence of the expenditures in JCP&L Reliability Plus will be reviewed as part of the base rate case(s) following the semi-annual rate filings. The rate changes via the semi-annual filings are subject to refund based on a Board finding that JCP&L imprudently incurred capital expenditures. In the base rate case, plant investment being recovered through the Rider RP will be included in base rates. The Company proposes that it will file its next base rate case no later than five years after the start date of JCP&L Reliability Plus; the JCP&L Reliability Plus start date is proposed to be January 1, 2019. JCP&L will continue to file semi-annual rate filings during the Board-approved period for JCP&L Reliability Plus, notwithstanding the filing of a base rate case. Should the Company elect to file a base rate case before the conclusion of JCP&L Reliability Plus, thus meeting the base rate case filing requirement of the II&R regulations, the Company would maintain Rider RP subsequent to the conclusion of JCP&L Reliability Plus until the time of the conclusion of its next base rate case, when all JCP&L Reliability Plus investments would be recovered through base rates.

32. Consistent with the II&R rules, JCP&L's semi-annual rate filings will each seek recovery at a minimum of ten percent of the total Program expenditures. JCP&L also proposes, consistent with the II&R Rules, that its semi-annual rate filing for the applicable filing period will not be made at the scheduled filing date should its calculated ROE (as addressed in the Direct Testimony of Mark A . Mader) exceeds the allowed ROE from its last base rate case by 50 basis points or more.

PREFILED TESTIMONY, SCHEDULES, EXHIBITS AND APPENDICES

33. Attached hereto and made a part of this Verified Petition are the following Exhibits, including prefiled Direct Testimony (which further includes schedules and appendices thereto):

<u>Witness</u>	<u>Exhibit No.</u>	<u>Topics</u>
This Petition	JC-1	JCP&L Reliability Plus Overview, Filing Requirements Chart (Appendix A)
Dennis Pavagadhi Direct Testimony	JC-2	JCP&L Reliability Plus Capital Investments (Projects), Benefits and Savings, Engineering Evaluation and Report, Reporting
Mark A. Mader Direct Testimony	JC-3	Cost Recovery Mechanism, Revenue Requirements, Rate Filings, Bill Impacts

Several schedules to the Engineering Evaluation and Report (attached as Appendix B to the direct testimony of Dennis Pavagadhi) contain information considered to be confidential and are provided in redacted form. Unredacted schedules containing the confidential information will be provided to the parties upon their execution of an Agreement of Non-disclosure of Confidential Information, a form of which is enclosed herewith.

PUBLIC HEARING, NOTICE AND SERVICE OF FILING

34. The Board must conduct a public hearing regarding JCP&L Reliability Plus pursuant to *N.J.A.C.* 14:3-2A.5(d). JCP&L proposes that two public hearings be held, one in each region of in its service territory. JCP&L will shortly provide a draft form of public notice of the public hearings to Staff and Rate Counsel for comment, setting forth the dates, times and places of the public hearings, the maximum dollar amount JCP&L seeks to recover through JCP&L Reliability Plus and the estimated overall impact on customers attributable to implementation of the Program. JCP&L proposes that notice of this filing be combined with notice of the public

hearings and be published in daily and weekly newspapers published and/or circulated in the Company's service areas, after the dates, times and places of all such public hearings thereon have been scheduled by the Board or the Presiding Officer. The notice will also be served by mail upon the municipal clerks, the clerks of the Boards of Chosen Freeholders and, where appropriate, the County Executive Officers of all counties and municipalities located in the Company's service territory.

35. Copies of this Verified Petition and of all appendices, supporting testimony (including schedules and exhibits thereto) have been or will be duly 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, P.O. Box 003, Trenton, N.J. 08625-0003.

REQUEST FOR DIRECT BOARD REVIEW

36. The JCP&L Reliability Plus investment plans are based on a January 1, 2019 commencement date. JCP&L requests that the Board retain jurisdiction of this filing, directly review it and designate a Commissioner as the Presiding Officer to oversee the proceeding. This has been the Board's customary practice with electric and gas utility infrastructure filings. The Board's direct review will facilitate the expeditious resolution of the Petition and provision of reliability and resiliency benefits to customers and will ensure that the procedures utilized in the review of the filing are consistent with the II&R Rules. JCP&L requests that the Board issue a final decision and order no later than the date of its December 2018 Agenda meeting, currently scheduled for December 18, 2018.

37. Copies of all correspondence and other communications relating to this proceeding should be addressed to:

**James C. Meyer, Esq.
Edward K. DeHope, Esq.
Riker Danzig Scherer Hyland Perretti, LLP
Headquarters Plaza
One Speedwell Avenue
Morristown, New Jersey 07962-1981**

- and -

**Mark A. Mader
Jersey Central Power & Light Company
300 Madison Avenue
Morristown, New Jersey 07962-1911**

- and -

**Lauren Lepkoski, Esq.
FirstEnergy Corp.
2800 Pottsville Pike
P.O. Box 16001
Reading, PA 19612-6001**

CONCLUSION AND REQUEST FOR APPROVAL

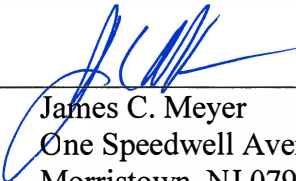
WHEREFORE, the Petitioner respectfully requests that the Board issue a final decision and order:

- (1) finding that JCP&L Reliability Plus satisfies the requirements of *N.J.A.C.* 14:3-2A.1 et seq. and is in the public interest;
- (2) finding that JCP&L Reliability Plus as described in this Petition is reasonable and prudent;
- (3) authorizing JCP&L to implement the JCP&L Reliability Plus Program starting January 1, 2019 under the terms set forth in this Petition;
- (4) determining that the cost recovery mechanism set forth in this Petition (including Rider RP) will provide for just and reasonable rates and is approved;
- (5) authorizing JCP&L to recover JCP&L Reliability Plus costs, on a full and timely basis, under the cost recovery mechanism set forth in this Petition; and
- (6) granting such other and further relief as the Board shall deem just, lawful and proper.

Dated: July 13, 2018

Respectfully submitted,
RIKER DANZIG SCHERER HYLAND &
PERRETTI, LLP
Attorneys for Petitioner,
Jersey Central Power & Light Company

By: _____


James C. Meyer
One Speedwell Avenue
Morristown, NJ 07962
jmeyer@riker.com

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

In the Matter of the Verified Petition of **Jersey** : BPU Docket No.
Central Power & Light Company For :
Approval of An Infrastructure Investment :
Program (**JCP&L Reliability Plus**) :

:

AFFIDAVIT
OF
VERIFICATION

Mark A. Mader, being duly sworn upon his oath, deposes and says:

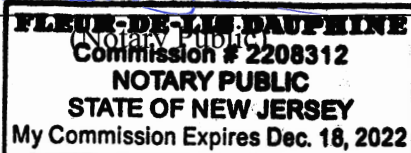
1. I am Director of Rates & Regulatory Affairs – New Jersey for First Energy Service Company, and I am duly authorized to make this Affidavit of Verification on behalf of Jersey Central Power & Light Company ("JCP&L"), the Petitioner named in the foregoing Verified Petition.

2. I have read the contents of the foregoing Verified Petition by JCP&L for approval of the proposed JCP&L Reliability Plus Infrastructure Investment Program, and I hereby verify that the statements of fact and other information contained therein are true and correct to the best of my knowledge, information and belief.



Mark A. Mader

Sworn to and subscribed before me
this 12th day of July, 2018.



Jersey Central Power & Light Company JCP&L Reliability Plus Program		Appendix A
Filings Requirement Per N.J.A.C. 14:3-2A.1 et. seq.	Filing Location	
14:3-2A.2 Project eligibility		
<p>(a) The projects within an Infrastructure Investment Program shall be:</p> <ol style="list-style-type: none"> 1. Related to safety, reliability, and/or resiliency; 2. Non-revenue producing; 3. Specifically identified by the utility within its petition in support of an Infrastructure Investment Program; and 4. Approved by the Board for inclusion in an Infrastructure Investment Program, in response to the utility’s petition. 	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>	
<p>(b) Projects within an Infrastructure Investment Program may include:</p> <ol style="list-style-type: none"> 5. Electric distribution automation investments, including, but not limited to, supervisory control and data acquisition equipment, cybersecurity investments, relays, reclosers, voltage and reactive power control, communications networks, and distribution management system integration; <li style="text-align: center;">* * * 6. Other projects deemed appropriate by the Board. 	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>	
<p>(c) A utility shall maintain its capital expenditures on projects similar to those proposed within the utility’s Infrastructure Investment Program. These capital expenditures shall amount to at least 10 percent of any approved Infrastructure Investment Program. These capital expenditures shall be made in the normal course of business and recovered in a base rate proceeding, and shall not be subject to the recovery mechanism set forth in N.J.A.C. 14:3-2A.6.</p>	<p>Exhibit JC-2, Schedule DP-1, of Direct Testimony of Dennis Pavagadhi</p>	
14:3-2A.3 Annual baseline spending levels		
<p>(a) A utility seeking to establish an Infrastructure Investment Program shall, within its petition, propose annual baseline spending levels to be maintained by the utility throughout the length of the proposed Infrastructure Investment Program. These expenditures shall be recovered by the utility in the normal course within the utility’s next base rate case.</p>	<p>Exhibit JC-2, Schedule DP-1, of Direct Testimony of Dennis Pavagadhi; Exhibit JC-3, Direct Testimony of Mark A. Mader</p>	

<p>(b) In proposing annual baseline spending levels, the utility shall provide appropriate data to justify the proposed annual baseline spending levels, which may include historical capital expenditure budgets, projected capital expenditure budgets, depreciation expenses, and/or any other data relevant to the utility's proposed baseline spending level.</p>	<p>Exhibit JC-2, Schedule DP-1, of Direct Testimony of Dennis Pavagadhi; Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>14:3-2A.4 Infrastructure Investment Program length and limitations</p>	
<p>(a) A utility may petition the Board for approval of an Infrastructure Investment Program extending for a period of five years or less.</p>	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi and Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(e) Allowance for Funds Used During Construction (AFUDC) shall be permitted under an Infrastructure Investment Program, but a utility shall not utilize AFUDC once Infrastructure Investment Program facilities are placed in service.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(f) Year-to-year variations in an Infrastructure Investment Program's annual budget up to 10 percent shall be permitted, provided that the total Program budget is not exceeded. Variations in excess of 10 percent shall require Board-approval.</p>	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>
<p>14:3-2A.5 Infrastructure Investment Program minimum filing and reporting requirements</p>	
<p>(b) A utility requesting approval of an Infrastructure Investment Program shall include within its petition:</p> <ol style="list-style-type: none"> 1. Projected annual capital expenditure budgets for a five-year period, identified by major categories of expenditures; 	<p>Exhibit JC-2, Schedule DP-2, of Direct Testimony of Dennis Pavagadhi</p>
<ol style="list-style-type: none"> 2. Actual annual capital expenditures for the previous five years, identified by major categories of expenditures; 	<p>Exhibit JC-2, Schedule DP-2, of Direct Testimony of Dennis Pavagadhi</p>
<ol style="list-style-type: none"> 3. An engineering evaluation and report identifying the specific projects to be included in the proposed Infrastructure Investment Program, with descriptions of project objectives, detailed cost estimates, in-service dates, and any applicable cost-benefit analysis for each project; 	<p>Exhibit JC-2, Appendix B of Direct Testimony of Dennis Pavagadhi</p>
<ol style="list-style-type: none"> 4. An Infrastructure Investment Program budget setting forth annual budget expenditures; 	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>

<p>5. A proposal addressing when the utility intends to file its next base rate case, consistent with N.J.A.C. 14:3-2A.6(f);</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>6. Proposed annual baseline spending levels, consistent with N.J.A.C. 14:3-2A.3(a) and (b);</p>	<p>Exhibit JC-2, Schedule DP-1, of Direct Testimony of Dennis Pavagadhi and Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>7. The maximum dollar amount, in aggregate, the utility seeks to recover through the Infrastructure Investment Program; and</p>	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>
<p>8. The estimated rate impact of the proposed Infrastructure Investment Program on customers.</p>	<p>Exhibit JC-3, Schedule MAM-4, of Direct Testimony of Mark A. Mader</p>
<p>(e) Following the Board’s approval of a utility’s petition in support of an Infrastructure Investment Program, the utility shall file supportive semi-annual status reports with the Board and the Division of Rate Counsel for project management and oversight purposes that, at a minimum, contain the following:</p> <ol style="list-style-type: none"> 1. Forecasted and actual costs of the Infrastructure Investment Program for the applicable reporting period, and for the Infrastructure Investment Program to date, where Infrastructure Investment Program projects are identified by major category; 2. The estimated total quantity of work completed under the Infrastructure Investment Program identified by major category. In the event that the work cannot be quantified, major tasks completed shall be provided; 3. Estimated completion dates for the Infrastructure Investment Program as a whole, and estimated completion dates for each major Program category; 	<p>Exhibit JC-2, Direct Testimony of Dennis Pavagadhi</p>

<p>4. Anticipated changes to Infrastructure Investment Program projects, if any;</p> <p>5. Actual capital expenditures made by the utility in the normal course of business on similar projects, identified by major category; and</p> <p>6. Any other performance metrics concerning the Infrastructure Investment Program required by the Board.</p>	
<p>14:3-2A.6 Infrastructure Investment Program Recovery</p>	
<p>(a) A utility may file for annual or semi-annual rate recovery for facilities constructed and placed in-service under an Infrastructure Investment Program.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(b) Each filing made by a utility seeking accelerated recovery under an Infrastructure Investment Program shall seek recovery, at a minimum, of at least 10 percent of overall Infrastructure Investment Program expenditures.</p>	<p>Exhibit JC-3, Direct Testimony of Mark. A. Mader</p>
<p>(c) A utility's expenditures made prior to the Board's approval of an Infrastructure Investment Program shall not be eligible for accelerated recovery.</p>	<p>N/A</p>
<p>(d) Rates approved by the Board for recovery of expenditures under an Infrastructure Investment Program shall be accelerated, and recovered through a separate clause of the utility's Board-approved tariff.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader; Schedule MAM-5</p>
<p>(e) Rates approved by the Board for recovery of expenditures under an Infrastructure Investment Program shall be provisional, subject to refund and interest. Prudence of Infrastructure Investment Program expenditures shall be determined in the utility's next base rate case.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(f) A utility shall file its next base rate case not later than five years after the Board's approval of the Infrastructure Investment Program start date, although the Board, in its discretion, may require a utility to file its next base rate case within a shorter period.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(g) A utility may continue to file for accelerated recoveries during the approved Infrastructure Investment Program Period notwithstanding the filing of the utility's next base rate case.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>

<p>(h) An earnings test shall be required, where Return on Equity (ROE) shall be determined based on the actual net income of the utility for the most recent 12-month period divided by the average of the beginning and ending common equity balances for the corresponding period.</p>	<p>Exhibit JC-3, Direct Testimony of Mark A. Mader</p>
<p>(i) For any Infrastructure Investment Program approved by the Board, if the calculated ROE exceeds the allowed ROE from the utility's last base rate case by 50 basis points or more, accelerated recovery shall not be allowed for the applicable filing period.</p>	<p>See Exhibit JC-3, Direct Testimony of Mark A. Mader</p>

**BEFORE THE
NEW JERSEY BOARD OF PUBLIC UTILITIES**

**In The Matter Of The Verified Petition Of Jersey Central
Power & Light Company For Approval Of An
Infrastructure Investment Program
(JCP&L Reliability Plus)**

BPU Docket No. _____

**Direct Testimony
Of
Dennis Pavagadhi**

**On Behalf Of
Jersey Central Power & Light Company**

July 13, 2018

**DIRECT TESTIMONY OF DENNIS PAVAGADHI ON BEHALF OF
JERSEY CENTRAL POWER & LIGHT COMPANY**

INTRODUCTION

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Q. Please state your name and business address.

A. My name is Dennis Pavagadhi. My business address is 300 Madison Avenue, Morristown, New Jersey 07962-1911.

Q. Please identify your employer and describe your current position.

A. I am employed by Jersey Central Power & Light Company (“JCP&L” or “Company”) as Director, Operations Support and I am responsible for the Distribution Control Centers (“DCCs”) and the Substation Department at JCP&L. Prior to my current position, I was the manager of Engineering Services, which provides engineering services to the Company in support of its distribution operations. Over my career, I have held a number of engineering and management positions at JCP&L. My qualifications are set forth in detail in Appendix A hereto.

Q. Have you previously testified in BPU proceedings?

A. Yes, I provided testimony in the Company’s 2012 base rate case in BPU Docket No. ER12111052. I have also testified on behalf of the Company in other proceedings. I previously testified before several municipal Land Use and Planning Boards in support of distribution and sub-transmission projects, including the Lake Iliff and Tewksbury modular substation projects. In addition, in my prior position as Supervisor of Planning and Reliability Engineering for the Northern New Jersey Region of JCP&L, I testified before municipal Land Use and Planning Boards regarding the need for proposed projects within JCP&L’s service territory, which required local approvals.

1 **Q. What is the purpose of your direct testimony?**

2 A. My testimony addresses JCP&L’s proposed Infrastructure Investment Program (“JCP&L
3 Reliability Plus” or “Program”). I will describe the four categories of projects and the
4 fifteen projects within these categories that constitute JCP&L Reliability Plus. I am the
5 sponsor of the engineering evaluation and report (“Engineering Report”), attached hereto
6 as Appendix B, detailing the fifteen specific projects in JCP&L Reliability Plus. My
7 testimony, including the Engineering Report, identifies and describes the JCP&L
8 Reliability Plus projects and their objectives, estimated costs and timeframes, along with
9 the benefits and savings generated by JCP&L Reliability Plus. My testimony will discuss
10 how JCP&L Reliability Plus satisfies the requirements of and furthers the goals of the
11 Board’s Infrastructure Investment and Recovery Rules codified at *N.J.A.C. 14:3-2A.1 et*
12 *seq.* (“II&R Rules”).

13 **Q. How is the remainder of your testimony organized?**

14 A. Following this introduction, my testimony is organized as follows:

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16 Executive Summary	3
17 JCP&L’s Electric Distribution System	6
18 The JCP&L Reliability Plus Proposal	16
19 JCP&L Reliability Plus Benefits and Savings	39
20 Reporting	42
21 List of Attachments	43
22 Conclusion	44

23

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1 **EXECUTIVE SUMMARY**

2 **Q. Please summarize the JCP&L Reliability Plus proposal.**

3 A. The Company serves approximately 1.1 million residential, commercial and industrial
4 electric distribution customers in a vast and diverse service territory through an extensive
5 system of hundreds of substations and thousands of miles of distribution circuits. Within
6 the last decade, unprecedented weather events such as Hurricane Irene, the October 2011
7 snowstorm and Superstorm Sandy have severely impacted the Company’s system. In
8 their aftermath, JCP&L has undertaken substantial capital investments and implemented
9 operational improvements. As a result, the Company has continued to provide safe,
10 adequate, proper and reliable service to its customers and has improved distribution
11 system reliability.

12 Effective January 16, 2018, the Board adopted II&R rules enabling approval of
13 utility “Infrastructure Investment Programs,” including accelerated rate recovery
14 mechanisms, to encourage and support accelerated, systematic and sustained
15 infrastructure investment that enhances safety, reliability and/or resiliency and sustained
16 economic growth in New Jersey. The need for this rule adoption was clear given
17 subsequent storm events.

18 In March 2018, severe weather events, including nor’easters Riley, Quinn and
19 Toby, again inflicted severe damage on utility plant in JCP&L’s service territory, resulted
20 in numerous customer outages, and identified areas where the Company’s system would
21 benefit from accelerated capital improvements. In the aftermath of these most recent
22 storms, at the March 26, 2018 Board Agenda Meeting Board President Fiordaliso
23 announced the Board’s goal to minimize storm-related outages and abbreviate the time

1 frame of those outages and stated his desire for all New Jersey's utilities to submit
2 infrastructure plans.

3 JCP&L Reliability Plus focuses on the concerns raised by the Board. In JCP&L
4 Reliability Plus, the Company proposes to accelerate electric distribution infrastructure
5 investment to meet expected future storm-related and blue-sky challenges as well as
6 address the goals of the Board to enhance long-term distribution system safety, reliability,
7 and resiliency and support sustained economic growth in New Jersey. JCP&L seeks
8 Board approval to undertake a four-year Program that commences on January 1, 2019.
9 The proposed Program would result in accelerated capital investment by the Company of
10 \$386.8 million over four years.

11 The Company proposes to undertake a number of capital projects in four
12 categories: (1) Overhead Circuit Reliability and Resiliency (\$132.9 million); (2)
13 Substation Reliability Enhancement (\$85.9 million), (3) Distribution Automation (\$108.4
14 million), and (4) Underground System Improvements (\$59.7 million). An Engineering
15 Report provided in Appendix B details the specific projects in JCP&L Reliability Plus
16 and includes cost estimates, project objectives, project timing, and other information.
17 Consistent with the II&R Rules, during the four-year Program the Company will provide
18 semi-annual progress reports to Board Staff and Rate Counsel.

19 The Program's accelerated investments will produce many benefits for the
20 Company's customers, its electric distribution system, and the economy of the State. As
21 a whole, JCP&L Reliability Plus will make JCP&L's distribution system more resistant
22 to outages (*i.e.*, more reliable) during storm and blue-sky events, enable the system to

1 recover more quickly (*i.e.*, be more “resilient”) when outages do occur, and enhance
2 safety.

3 Customers and the overhead distribution system will benefit from projects that
4 enhance vegetation management, replace overhead lateral fuses with automated reclosers,
5 and install permanent back-up generators at line shops. They will also benefit from
6 substation enhancements to mitigate flooding, install new equipment, add mobile
7 substations, and improve fencing. Customers and the system will also benefit from
8 accelerated distribution automation investment; JCP&L plans to install supervisory
9 control and data acquisition (“SCADA”) equipment providing improved communications
10 and information availability to operations personnel, DCCs, and the Automated
11 Distribution Management Systems (“ADMS”) that is also included in JCP&L Reliability
12 Plus. The distribution automation projects will allow real-time monitoring and evaluation
13 of system conditions and load flows, which in turn supports an increasingly complex
14 electrical distribution system with increased Distributed Energy Resources (“DER”) and
15 other emerging technologies. Customers and the distribution system will also benefit
16 from installation of the latest equipment and technology, by way of programmatic
17 replacement which avoids emergency replacements that can be more expensive. An
18 example of this programmatic approach will occur with the replacement of pre-1986
19 underground concentric-neutral cable (*i.e.*, neutral is exposed to the earth on the outside
20 of the cable) with jacketed cable, replacement of submersible transformers with pad-
21 mounted transformers, and rehabilitation of underground network and conventional
22 ducted distribution systems. When service to customers must be temporarily interrupted
23 to safely replace equipment, as in the case of submersible transformers, customers will be

1 notified, and the planned outages will be scheduled in advance to limit customer
2 inconvenience.

3 The Company's cost benefit analysis estimated storm and general reliability
4 benefits to customers from JCP&L Reliability Plus of \$1.905 billion, compared to
5 estimated costs of \$400 million (including capital and expense), or a benefit to cost ratio
6 of 4.8. Further, JCP&L Reliability Plus will benefit the economy of the State by directly
7 generating engineering and construction jobs and will support sustained economic
8 growth, by using new technology that will result in a more reliable and resilient electric
9 distribution system, which will enhance the State's ability to attract and retain
10 commercial and industrial investment.

11 As described in the testimony of Mark A. Mader, the Company proposes semi-
12 annual rate filings for recovery of investments in the Program through a per kWh, per kW
13 or per fixture charge set forth in a separate clause in its tariff. Board Staff and Rate
14 Counsel will review each rate filing to ensure that the revenue requirements and proposed
15 rates are determined in accordance with the II&R Rules and the Board's Order approving
16 JCP&L Reliability Plus.

17 As described in my testimony below, JCP&L Reliability Plus meets the
18 requirements of the II&R Rules and should be approved by the Board.

19 **JCP&L's ELECTRIC DISTRIBUTION SYSTEM**

20 **Q. Please describe JCP&L's electric distribution system.**

21 A. The Company provides electric distribution service to approximately 1.1 million
22 residential, commercial and industrial customers, representing approximately 25% of the
23 metered electric customers in New Jersey. The customer base is 88% residential, 11%

1 commercial and 1% industrial. JCP&L owns, operates and maintains 326 substations,
2 and 1,174 primary distribution circuits. The Company operates and maintains over
3 35,000 conductor miles (more than 19,000 circuit miles) of primary distribution circuits.
4 The JCP&L distribution system is mainly a 12.47kV multi-grounded wye system.
5 Circuits operating at this voltage make up about 55% of the distribution circuits
6 throughout JCP&L's service territory. Other primary voltages include 4.16kV wye,
7 4.8kV delta, and 19.9kV wye. The Company's electrical distribution system includes
8 both overhead infrastructure and underground infrastructure, including underground
9 infrastructure that was installed to meet growth in the late 1960s and early 1970s.

10 **Q. Please describe the service territory in which the electric distribution system is**
11 **located.**

12 A. The Company's service territory is vast and diverse in terms of customer demographics
13 and terrain. The territory encompasses 3,300 square miles, covering approximately 43%
14 of New Jersey's land mass, in all or parts of thirteen counties and 236 municipalities (or
15 about 45% of all New Jersey municipalities). The territory includes two distinct regions
16 of New Jersey: the Northern Region, which includes the heavily-forested Northwestern
17 portion of New Jersey, and the Central Region in the central coastal portion of the State.

18 The Northern Region includes all or parts of the counties of Essex, Hunterdon,
19 Mercer, Morris, Passaic, Somerset, Sussex, Union and Warren. It extends south from
20 Montague and follows along the eastern bank of the Delaware River to Washington's
21 Crossing, northeast to Somerset, east to Millburn, north to Ringwood, west to the Sussex
22 County border, then north to Vernon and back to Montague. Portions are more densely
23 populated, and others are sparsely populated. The Northern Region includes Morristown,

1 with its underground network ducted system and a banked secondary network system in
2 Summit and Pompton Lakes. The Northern Region also includes areas that are among
3 the most heavily treed and mountainous in the State. In addition, the Northern Region
4 serves as a national or international headquarters for many large corporations, including
5 pharmaceutical companies, technology companies, insurance companies and financial
6 institutions. Many of these corporations have located major research and development,
7 manufacturing, operating or data center facilities in this area. Morris County, located 30
8 miles west of New York City, is in the heart of the region. Several Fortune 500 company
9 headquarters are located here including pharmaceuticals such as Merck, Novartis, Roche
10 and Aventis, and insurance companies such as Chubb and Met Life. In addition, the
11 Northern Region is home to many farms, as well as several colleges and universities.
12 Approximately 2,300 critical facilities are located in the Northern Region, including
13 nearly 30 hospitals.

14 The Central Region includes all or parts of the counties of Burlington, Mercer,
15 Middlesex, Monmouth and Ocean. It follows the Raritan River from Sayreville to the
16 Atlantic Coast and covers the coast south to Barnegat, inland and west to Wrightstown,
17 north to Hightstown and northeast back to Sayreville. The western portion of the central
18 Region has many farmland communities as well as major warehouse and distribution
19 centers bordering the New Jersey Turnpike, while the eastern portion of the Region is
20 home to Jersey Shore communities (including on a barrier island) where significant
21 rebuilding of homes, businesses and utility infrastructure impacted by Superstorm Sandy
22 is ongoing. It includes the conventional underground ducted distribution system in Deal,
23 Asbury Park, and Allenhurst. The Central Region serves as headquarters for several

1 large corporations as well as home to corporate parks, communications companies,
2 medical centers, retirement communities, amusement parks and major military
3 complexes. Approximately 2,200 critical facilities are located in the Central Region,
4 including nearly 20 hospitals.

5 **Q. Please describe the impact of multiple major weather events in 2011 and 2012 on the**
6 **Company's system.**

7 A. Three significant weather events occurred over the course of 2011 and 2012, each
8 causing a substantial amount of damage to the distribution system in the JCP&L service
9 territory. The first, Hurricane Irene, made landfall near Atlantic City, New Jersey as a
10 Category I Hurricane in the early morning hours of Sunday, August 28, 2011. Hurricane
11 Irene brought with it heavy rainfall amounting to eight to ten inches over a 24-hour
12 period and wind gusts of more than 70 miles per hour. This hurricane left approximately
13 780,000 of JCP&L's 1.1 million customers without power for some period of time and
14 caused damage to parts of 88% of JCP&L's circuits. Tree damage to overhead
15 infrastructure was the primary cause of damage and outages. Damage was substantial;
16 15,000 hazard locations were identified, and over 400 crossarms, 360 poles, 300
17 transformers and 47 miles of wire were issued. In addition, seven substations
18 experienced flooding.

19 A second major snowstorm (the "October Snowstorm") began to impact the
20 JCP&L service territory on October 29, 2011, after the storm developed off the Carolina
21 coast. The storm system moved north along the coast and brought rain turning to heavy
22 wet snow to New Jersey. The three to nineteen inches of snow from the snow storm
23 caused outages to almost 450,000 of JCP&L's approximately 1.1 million customers,

1 predominantly from fallen trees and tree limbs because of accumulating heavy snow on
2 the many trees that still had significant amounts of their leaves present. Although fewer
3 customers experienced outages during the October Snowstorm, the distribution system
4 damage was as extensive as in Hurricane Irene, with 18,000 hazard locations identified,
5 and over 2,400 crossarms, 600 poles, 300 transformers and 136 miles of wire issued.

6 The third storm, Superstorm Sandy, proved to be one of the most destructive
7 storms to ever hit the East Coast of the United States, interrupting power to 8.5 million
8 customers across 21 states. New Jersey took a direct hit from Sandy during October 29-
9 30, 2012, which inflicted unprecedented damage across the state. Portions of the service
10 territory received up to seven inches of rainfall in a short period of time. The estimated
11 storm surge from Sandy along the New Jersey coast ranged from four to eight feet and up
12 to six to eleven feet on the north shore of New Jersey. The hurricane also produced wind
13 gusts near 90 miles per hour. The Barrier Islands that protect New Jersey's coastline were
14 among the hardest hit areas during Hurricane Sandy. This major hurricane had an
15 unprecedented destructive impact by affecting service to nearly all of JCP&L's 1.1
16 million customers. Further complicating restoration efforts, a nor'easter (known as winter
17 storm Athena) dumped more than a foot of heavy, wet snow on parts of central New
18 Jersey on November 7, 2012, causing an additional 130,000 customer outages. Together,
19 these storms did more damage to the JCP&L infrastructure than Hurricane Irene and the
20 October Snowstorm of 2011 combined. Once again, tree damage to overhead
21 infrastructure was the primary cause of damage and outages. Damage was so severe that
22 approximately 65,000 trees were cut and cleared to restore power, 34,000 hazard
23 locations were identified, and over 19,000 crossarms, 6,700 poles, 3,600 transformers and

1 400 miles of wire were issued. Thirteen substations experienced flooding, including two
2 substations that flooded in Hurricane Irene. Overall, JCP&L experienced more than 1.3
3 million customer interruptions from Hurricane Sandy and winter storm Athena as many
4 customers experienced multiple service interruptions.

5 In total, the Company incurred storm restoration costs for the 2011-2012 events of
6 over \$700 million, including over \$400 million in capital expenditures.

7 **Q. Following those weather events, did the Company undertake infrastructure**
8 **investments to enhance the overall reliability of the utility's distribution system?**

9 A. Yes. In the years following those major storm events, the Company made capital
10 investments in many areas of its service territory to enhance the reliability of its service.
11 For instance, JCP&L completed construction of the new Tewksbury substation that went
12 into service in October 2013 along with two distribution circuits associated with the
13 substation. During 2013, among other things, JCP&L also: (i) completed an auto loop tie
14 scheme associated with the Iliff substation; (ii) installed a circuit switcher on the Bank
15 No. 2 transformer at Texas Road Substation to increase loading capability and enhance
16 transformer protection; and (iii) upgraded circuit egresses on circuits out of the Cozy
17 Lake and Chambers Brook Substations. Among other projects and programs completed
18 during 2014, the Company completed the replacement of the distribution line associated
19 with the Manalapan Substation and replaced the relays associated with three distribution
20 circuits to enhance protection to customers served from the Seaside Park Substation.
21 Capital additions made through year-end 2015 included an overhead reconductoring to
22 distribution circuits from the Rocktown substation in Northern New Jersey and created an
23 auto loop scheme tie in Central New Jersey. In 2016, the Company engaged in flood

1 mitigation work and capital upgrades associated with new business system
2 reinforcements, mobile radio system replacement, and reliability improvements,
3 including the replacement of underground cable in a large commercial underground
4 development in Northern New Jersey. In 2017, JCP&L engaged in major construction to
5 rebuild the Barrier Island distribution system and rebuilt switchgear at the Alderney
6 substation. From 2013 through 2017, JCP&L made capital investments in the
7 distribution system totaling approximately \$975 million. During this same period, the
8 Company also undertook other reliability initiatives described in the Engineering Report.

9 **Q. Have JCP&L's investment levels enabled it to operate and manage its electric**
10 **distribution system in a safe and reliable manner?**

11 A. Yes. The safe operation and reliable operation of JCP&L's electric distribution system
12 are the Company's foremost operational goals and recognized as core objectives of its
13 provision of public utility service. The Company's efforts to enhance its performance,
14 including its major investments since the 2011 and 2012 major storm events, have
15 provided benefits to customers.

16 The chart below reflects the Company's 2017 performance relative to assigned
17 minimum and benchmark levels for the Company's Northern and Central New Jersey
18 Regions. JCP&L exceeded minimum levels and met or performed better than the
19 Board's benchmark levels for Customer Average Interruption Duration Index ("CAIDI")
20 and System Average Interruption Frequency Index ("SAIFI") in both regions.

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	CAIDI			SAIFI		
Region	Benchmark Reliability Level	Minimum Reliability Level	2017 Actual (Minutes)	Benchmark Reliability Level	Minimum Reliability Level	2017 Actual (Outages)
JCP&L Overall	N/A	N/A	113	N/A	N/A	1.04
JCP&L Northern	128	151	125	1.18	1.35	1.12
JCP&L Central	101	110	101	1.01	1.22	0.98

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2 **Q. Since the Company currently satisfies both the Board’s minimum and benchmark**
3 **reliability levels for CAIDI and SAIFI, is it an appropriate time for it to propose**
4 **additional accelerated infrastructure investments?**

5 A. Yes, for several reasons. As I discuss further below, in its recent II&R Rules, the Board
6 affirmatively encouraged utilities to seek approval of accelerated Infrastructure
7 Investment Programs to enhance the safety, reliability and resiliency of utility systems
8 and thereby support sustained economic growth in the State.

9 In addition, in March of 2018, nor’easters Riley, Quinn, and Toby and other
10 storms demonstrated that JCP&L’s system will continue to be subjected to major storm
11 events. On March 2, 2018, Winter Storm Riley resulted in over fifteen inches of wet
12 snow in JCP&L’s Northern Region and seven inches in JCP&L’s Central Region.
13 Accompanying the wet snow, JCP&L experienced wind gusts of more than 70 miles per
14 hour. This combination of devastating wind and heavy wet snow caused many tree and
15 limbs to break causing tremendous damage to JCP&L’s distribution system. As JCP&L
16 continued with the restoration efforts from Winter Storm Riley, a second winter storm,
17 Quinn, moved into the service territory the morning of March 7, 2018. Winter Storm

1 Quinn brought high winds and additional wet, heavy snow. The Northern Region
2 received up to an additional thirteen inches and the Central Region received more than an
3 additional seven inches of snow. In addition, the Northern Region experienced wind
4 gusts up to 30 miles per hour, and the Central Region up to 40 miles per hour. The
5 effects of Winter Storm Quinn compounded the effects and damage caused by Winter
6 Storm Riley. Winter storms Riley and Quinn caused power outages that affected more
7 than 526,000 of JCP&L's 1.1 million customers. As with the prior major storms
8 discussed above, tree damage to overhead infrastructure was the primary cause of
9 damage and outages. The combination of the two storms caused damage requiring
10 issuance of 2,507 cross arms, 805 poles, 517 transformers and more than 68 miles of
11 wire.

12 Approximately one week after JCP&L finished power restoration from Winter
13 Storms Riley and Quinn, Winter Storm Toby hit on March 21, 2018. The Northern
14 Region experienced winds between 20 to 30 miles per hour and received up to six inches
15 of snow in some areas. The Central Region experienced winds between 30 to 40 miles
16 per hour and received up to twelve inches of snow in some areas. This storm event
17 caused approximately 70,836 outages with 4,492 outages in the JCP&L Northern Region
18 and 66,344 outages in the JCP&L Central Region and resulted in issuance of 183
19 crossarms, 47 poles, 27 transformers, and 19,152 feet of replacement wire. In these
20 storms, much of the damage was caused by trees or limbs falling on circuits thereby
21 causing poles to break.

22 Following those recent storms, Board president Fiordaliso remarked that "I would
23 like to see all of our utilities to submit infrastructure plans." (Transcript, March 26, 2018

1 Board Agenda Meeting). Indeed, in the December 2015 Update to the 2011 Energy
2 Master Plan (“2015 EMP Update”) (at pp. 46-51), the Board recognized that there is an
3 ongoing threat from future major storm events and concluded that utilities should look to
4 reduce the vulnerability of the State’s critical energy infrastructure, improve energy
5 infrastructure resiliency, emphasize system resiliency and hardening measures, and
6 develop a smarter grid through distribution automation deployment. Further, the Board
7 has convened the 2019 Energy Master Plan Committee to develop a new Energy Master
8 Plan by June 1, 2019. Based on the Board’s June 18, 2018 Press Release, my
9 expectation is that the 2019 Energy Master Plan will continue to focus on resilient utility
10 infrastructure and building a modern electric grid, among other areas.

11 As discussed in my testimony below, the Company has identified specific areas
12 where accelerated capital improvements could enhance reliability and resiliency in such
13 major weather events and has incorporated projects into JCP&L Reliability Plus to
14 address these areas. For example, the Company has included accelerated capital projects:
15 to aggressively address vegetation that is a primary cause of overhead outages, add flood
16 protection to substations, and install distribution automation equipment to more rapidly
17 restore service when outages occur.

18 Further, the Company recognizes that minimization of customer outages and their
19 duration in all conditions is more important now than ever before. Customers continue to
20 depend on electric service for many basic necessities of life such as heating, lighting,
21 cooking, refrigeration, water pumps, and transportation (*i.e.*, electric vehicle charging)
22 and these critical items are impacted by any weather-related or other outages. In
23 addition, today’s customers rely more than ever on electric service to power numerous

1 technologically advanced products, such as computers, mobile phone and tablet chargers,
2 broadband modems (*i.e.*, internet access), security systems, high definition large screen
3 televisions, automatic garage door openers, lighting timers, timed thermostats, and other
4 programmable devices. New Jersey Industrial and Commercial Customers, competing
5 globally, have become more dependent on reliable power-driven technology, improving
6 their processes, efficiencies and competitiveness. Thus, the impact of service
7 interruptions on today's customers is much greater than the impact on customers of
8 disruptions years ago. Accordingly, customers today are understandably less tolerant of
9 service interruptions of any kind.

10 For all these reasons, the Company is now proposing accelerated infrastructure
11 investments that will enhance the ability of its distribution system to meet the challenges
12 of both future major storm events and enhance system reliability under more typical
13 operating conditions.

14 **THE JCP&L RELIABILITY PLUS PROPOSAL**

15 **Q. Please describe the type of Infrastructure Investment Programs described in the**
16 **Board's II&R Rules.**

17 A. The II&R Rules establish a regulatory mechanism for an Infrastructure Investment
18 Program ("IIP") designed to "allow a utility to accelerate its investment in the
19 construction, installation and rehabilitation of certain non-revenue producing utility plant
20 and facilities that enhance safety, reliability, and/or resiliency." *N.J.A.C. 14:3-2A.1(a)*.
21 The Rules further state the purpose of an IIP is "to provide a rate recovery mechanism
22 that encourages and supports necessary accelerated construction, installation and
23 rehabilitation of certain utility plants and equipment....[S]uch investment would occur in

1 a systematic and sustained way to advance construction, installation, and rehabilitation of
2 utility infrastructure needed for continued system safety, reliability, and resiliency, and
3 sustained economic growth in the State of New Jersey.” *N.J.A.C. 14:3-2A.1(b)*.

4 **Q. Did the Board impose any requirements for a utility filing seeking to establish an**
5 **Infrastructure Investment Program?**

6 A. Yes, the Board established a number of requirements in its II&R Rules applicable to a
7 utility filing seeking approval to implement an IIP. Appendix A to JCP&L’s Verified
8 Petition lists all of the requirements in the II&R Rules and the location within the JCP&L
9 Reliability Plus filing where each such requirement is addressed. My direct testimony,
10 including Appendix B, addresses the requirements relating to the proposed JCP&L
11 Reliability Plus capital investments. In this testimony, I identify and describe each
12 specific project contained within the Program and provide the reasons why it is eligible as
13 an infrastructure investment under the II&R Rules. Appendix B describes the
14 components of each specific project, and their objectives, estimated costs and the
15 timeframes for completion. My testimony also addresses the periodic reporting of the
16 Program’s status and satisfaction of the other requirements relating to IIP capital
17 investments. Mr. Mader’s direct testimony will address the Company’s proposal for cost
18 recovery, proposed rate filing schedule, revenue requirements calculation and estimated
19 rate impacts.

20 **Q. Please describe JCP&L Reliability Plus.**

21 A. JCP&L Reliability Plus is a four-year Program consisting of projects in four categories.
22 There are fifteen specific projects in all, containing multiple components. JCP&L

1 Reliability Plus’ projected capital investment (in millions of dollars) by category and in
 2 total is as follows:

JCP&L Reliability Plus Categories	2019	2020	2021	2022	Total
Overhead Circuit Reliability and Resiliency	\$ 38.0	\$ 33.0	\$ 31.0	\$ 31.0	\$ 132.9
Substation Reliability Enhancement	\$ 17.4	\$ 22.5	\$ 22.5	\$ 23.5	\$ 85.9
Distribution Automation	\$ 17.3	\$ 31.3	\$ 30.4	\$ 29.4	\$ 108.4
Underground System Improvements	\$ 16.4	\$ 14.8	\$ 15.8	\$ 12.6	\$ 59.7
Total	\$ 89.2	\$ 101.6	\$ 99.6	\$ 96.4	\$ 386.8

3
 4 **Q. Do the projects in the four JCP&L Reliability Plus categories each provide for**
 5 **accelerated investment in the construction, installation and rehabilitation of utility**
 6 **infrastructure that enhances safety, reliability, and/or resiliency?**

7 A. Yes, they do. The following table summarizes the safety, reliability and/or resiliency
 8 objectives of the projects in the four categories.

Program Category	Objectives
Overhead Circuit Reliability and Resiliency	These projects will make the system less susceptible to storm damage and enhance resiliency by addressing a primary cause of outages – tree damage. In addition, these projects will reduce the length of outages due to transient faults, making JCP&L’s system more reliable and resilient.
Substation Reliability Enhancement	These projects will make the Company’s substations less susceptible to storm damage by flood mitigation measures, equipment enhancements and the addition of mobile substations. These projects also will increase the distribution system’s resiliency, operational flexibility, safety and security.
Distribution Automation	Distribution automation projects will provide intelligent control over the distribution system and allow for rapid fault location, isolation and service restoration (“FLISR”). The objectives of these projects include reduction of the number of customers affected by outages and shortening of the duration of outages.
Underground System Improvements	Accelerated replacement of aging underground cable and submersible transformers and rehabilitation of underground systems will increase customer reliability by reductions in future outages and their duration and enhancement of current operations.

1 **Q. Please describe generally the projects within these four Program categories, and**
2 **how they will address reliability, resiliency, and safety.**

3 A. JCP&L has included fifteen specific projects within the four categories of JCP&L
4 Reliability Plus. As described below, each project is designed to address reliability,
5 resiliency and/or safety. More specific information on each of the projects (and their
6 individual components) is set forth in Appendix B.

7 **Overhead Circuit Reliability and Resiliency**

8 **Enhanced Vegetation Management** - The Company will undertake a significant,
9 expanded, vegetation management capital project specifically targeting hazard trees, Ash
10 tree removal and overhang removal in Zone 2. This initiative consists of targeted tree
11 removal that is not covered by the standard 4-year tree trimming cycle. The project will
12 focus on Ash trees (which are or eventually will be dying from the ongoing Emerald Ash
13 Borer infestation), trees that are a weak structure tree species, or trees having split trunks,
14 co-dominate stems, lightning or mechanical damage, or exposed roots. Because of the
15 weaker nature of these trees, they are more likely than other trees to fall under any
16 conditions and damage the Company's distribution infrastructure, causing outages.
17 Overhang will be removed on selected circuits within Zone 2, as currently required by the
18 Board's regulations in Zone 1, and utilizing the same methods and practices currently
19 being used in Zone 1.

20 This capital project will significantly enhance the overhead distribution system,
21 customer and employee safety, reliability and storm protection by reducing the potential
22 for damage from dead, dying, weakened or diseased trees and overhanging branches, that
23 impact the distribution system and cause road closures and lengthy outages. The

1 Company's strategy with this project is to first address the primary cause of outages on
2 the Company's overhead distribution system – tree damage. JCP&L believes that the
3 most effective and economic deployment of capital at this time is to address the *cause* of
4 the damage itself. This project will expand its clearing corridors, thus removing the
5 cause of damage, rather than significantly reconstructing the distribution system to
6 withstand tree impacts. With this approach, JCP&L will be able to meaningfully and
7 substantially address the potential for tree damage on 90% of its circuits in Zone 2. In
8 most storms, tree damage is the greatest cause of distribution outages for JCP&L, and it
9 is responsible for a substantial portion of distribution outages in all conditions. This was
10 the case in the 2011-2012 storms and the recent winter storms JCP&L experienced in
11 March of this year. The average number of customer affected annually from 2012 to
12 2017 from tree-related outages was approximately 288,000 customers. Tree-caused
13 outages typically are longer in duration and more costly to repair since they necessitate
14 both repairs to the electrical distribution system infrastructure as well as the clearing of
15 the trees or limbs by a tree crew before line work can be performed. Over the past four
16 years, the duration of tree-caused outages averaged 225 minutes. By targeting on an
17 accelerated basis Ash trees, hazard trees and Zone 2 overhang likely to fall and damage
18 the distribution system and cause lengthy outages, the project will enhance reliability in
19 both blue-sky and storm conditions. This project will enhance customer safety and
20 reliability by reducing the number of lengthy outages caused by trees and limbs falling on
21 overhead circuits. Tree damage is also the main cause of road closures during storms.
22 The removal of overhang, hazard, and Ash trees will reduce the number of road closures
23 and allow resources to focus on customer restoration.

1 In sum, this project provides a major enhancement to the Company’s overhead
2 distribution facilities and significant customer benefits by preventing damage from trees,
3 which are the primary cause of damage and outages on the JCP&L overhead distribution
4 system.

5 **Lateral Fuse Replacement with TripSaver II** – The Company will replace 25K to
6 100K lateral fuses with S&C TripSaver II cutout-mounted reclosers. This project will
7 reduce sustained outages on laterals due to temporary faults, as would occur if a limb or
8 animal momentarily contacted a lateral. If the power line is currently protected by a fuse,
9 the fuse will operate causing an extended outage. A customer serviced by that line would
10 be without power until a crew is dispatched and is able to replace the fuse. Conversely,
11 the TripSaver II device is programmed to automate the reset process, restoring service to
12 customers protected by that device after the momentary contact and the temporary fault is
13 cleared. Many of the faults on laterals are temporary. TripSaver II reclosers clear
14 temporary faults and are designed to restore customers in less than 90 seconds, avoiding
15 an extended outage that would have occurred with a fused lateral.

16 **Install Generators at District Line Shops** – JCP&L will install permanent, entire-
17 facility back-up generators at its operation centers, which includes line and substation
18 shops. These facilities are critical for the restoration of the distribution system during
19 outages.

20 This project enhances resiliency. Having full, permanent back-up generation
21 available to power the entire facility will ensure that customer service restoration is not
22 delayed during storms and other emergencies. The generators will allow the shops to be
23 fully functional, including having access to the outage management system, full operation

1 of fuel pumps and the communications systems, during a time when electric power is out
2 to these locations. This will ensure there are no delays in responding to outage
3 restoration. During Hurricane Irene and Superstorm Sandy, personnel had to dedicate
4 time to connect and maintain temporary generators to power critical facilities (including
5 for communication and fueling) at a number of JCP&L line and substation shops that lost
6 power.

7 **Substation Reliability Enhancement**

8 **Flood Mitigation** - This project will add permeant flood walls and automatic flood gates
9 to enhance flood protection at nine substations that experienced flooding in prior storms.
10 In addition, JCP&L proposes to purchase additional high capacity pumps to remove
11 water at substations, should it become necessary.

12 This project will provide enhanced storm hardening and reliability. During
13 Hurricane Irene and Sandy, 18 substations across JCP&L's service territory flooded
14 (including two substations that flooded during both events). The permanent flood walls
15 and automatic flood gates will enhance the protection against flooding and storm surges
16 at nine of these stations. In addition, the permanent flood walls and automatic flood gates
17 will eliminate the time consuming and labor-intensive task of closing the entrances to
18 substations in anticipation of incoming storms. This will save human and capital
19 resources that could be used for other critical preparation tasks. The additional pumps
20 will supplement existing pumps and ensure that a pump is available to mitigate water
21 intrusion at each of the 18 substations that flooded in Hurricane Irene and Superstorm
22 Sandy.

1 **Substation Equipment Replacement** – The Company will replace distribution
2 substation equipment such as breakers, transformers, and switchgear with new
3 equipment, reflecting currently available technology. Circuit breakers will be upgraded
4 from oil-insulated to vacuum circuit breakers and/ or distribution style reclosers.
5 Portable distribution station (PDS) transformer units will be replaced with standard
6 modular transformers and circuit breakers. Where feasible, switchgear will be replaced
7 with open air bus and free-standing vacuum breakers.

8 The replacement of this equipment will have several benefits. State-of-the-art
9 equipment and technology replacements made programmatically will avoid expensive
10 emergency replacements which often result in prolonged outages, including where
11 replacement parts for failed equipment are unavailable. In proposing the II&R Rules, the
12 Board recognized that it is far less expensive to replace equipment on a planned basis
13 than an emergency basis when failures occur. 49 *N.J.R.* 2489(a), 2490 (Aug. 7, 2017)
14 (Social Impact Statement). This project also will result in more reliable substations with
15 state of the art equipment providing enhanced performance. Further, the installation of
16 gas insulated circuit breakers reduces the environmental impacts of breaker leaks.

17 **Mobile Substations** – Four mobile substations will be purchased; one in each year from
18 2019 through 2022. Mobile substations increase the capability of the Company to effect
19 emergency restoration in the event of substation equipment failure. During the
20 restoration efforts for Hurricane Irene and Superstorm Sandy, mobile substations played a
21 role in restoring service and reducing the length of outages where substations had been
22 damaged. The use of mobile substations is part of the Company’s flood mitigation
23 planning. The mobile substations will also be utilized to assist in construction of some of

1 the other beneficial projects in JCP&L Reliability Plus. For example, when the Company
2 replaces substation transformers, it will need to use a mobile substation to serve load
3 while the substation bank is being replaced

4 **Modernize Protective Equipment** – This Project modernizes substation protective
5 equipment, including by: replacing existing, electromechanical overcurrent relays with
6 electronic multifunction relays (Schweitzer SEL-351 (“SEL 351”) relays) (or equivalent);
7 replacing ABB distribution protection unit (“DPU”) type relays that have experienced
8 failures with SEL-351 multi-function relays (or equivalent); and replacing Under
9 Frequency Load Shed (“UFLS”) MDF or SFF type relays with SEL-351 or Basler 81
10 relays (or equivalent).

11 This project will enhance system reliability by installing new relaying equipment,
12 reflecting currently available technology, that will provide increased protection and
13 monitoring capabilities. In addition, the new microprocessor-based relays replacing
14 electromechanical relays are more reliable and can remotely provide fault information,
15 which can be used by engineering and operations personnel to locate the cause of an
16 outage. Further, replacement of the ABB DPU relays and UFLS relays, which are no
17 longer supported by the manufacturers, with current microprocessor-based relays will
18 provide more secure operations and increased monitoring capabilities, thereby enhancing
19 reliability.

20 **Substation Fencing Enhancement** – The Company will install high security, animal
21 deterrent, climb-proof (i.e., non-chain link), strengthened perimeter fencing with barbed
22 wire at distribution substations. The project will focus on locations that have experienced
23 theft, vandalism, or animal related outages, or have close proximity to the public.

1 recloser is programmed to automate the reset process, restoring service after the limb falls
2 through the distribution line and the temporary fault is cleared. Many faults on the
3 system are temporary in nature and in such cases the replacement of fuses with reclosers
4 will reduce what would have been extended outages to momentary interruptions.

5 **Install SCADA Line Devices** – JCP&L will replace existing hydraulic and electronic
6 reclosers with Elastimold reclosers containing SEL 651 relays and will install
7 communications equipment for SCADA.

8 Advanced reclosers and controls enable real-time monitoring of the recloser status
9 as well as distribution system conditions (voltage, current, etc.). Monitoring of the
10 recloser status enables the Company to identify and respond to customer outages at the
11 circuit level. Monitoring of the system conditions (voltage, current, etc.) enables the
12 Company to make informed decisions on a more rapid basis regarding the use of system
13 infrastructure to enhance customer restoration. These improvements will enable the

14 Company to reduce sustained outages and limit the number of customers affected by
15 outages. These improvements also allow for remote control to open and close reclosers
16 to connect and disconnect certain portions of the grid, which increases safety and
17 reliability and decreases operations costs.

18 **Distribution Automation (Loop Schemes)** -- The Company will construct distribution
19 automatic loop schemes with Elastimold reclosers and SEL 651 relays (or equivalent) and
20 will install SCADA control for real-time system monitoring and remote control
21 capability. This project will target areas with critical customers. Critical customers are
22 most dependent on reliable energy supply during severe weather events to fulfill their
23 critical functions.

1 The project will enable a customer on an enhanced loop scheme that experiences
2 an outage to be automatically transferred to an adjacent circuit to restore service. This
3 project provides resiliency benefits by enabling the prompt restoration of service,
4 particularly for critical customers.

5 **ADMS and RTU Upgrades** – The Company proposes to implement an ADMS, which
6 integrates all the SCADA information from various substation and circuit locations into
7 one centralized software system. The ADMS software provides the distribution system
8 operators with a complete view of operational conditions of the system. It will provide
9 immediate resiliency benefits to customers by enabling advanced, real-time analysis and
10 decision-making for the re-routing of power in the event of outages. It will also enhance
11 the functionality of the other distribution automation projects in JCP&L Reliability Plus,
12 by permitting the automatic isolation and restoration of sections of the distribution
13 system, such that many customers may only experience a momentary outage when a fault
14 occurs. ADMS also provides the platform for future grid modernization investments,
15 such as Volt/VAR control, and supports the future integration of power flows from
16 distributed energy resources into the distribution system.

17 In addition, the Company will be installing additional load and voltage monitoring
18 points to gather data via SCADA at the distribution level where no such points or limited
19 points currently exist and will also be upgrading remote terminal units (“RTU’s”) in
20 substations when necessary. Such RTU upgrades include replacing the RTU itself and
21 may involve replacing copper-based communications using technology with superior
22 availability, such as fiber, cellular or radio. This project will enhance reliability by
23 allowing real-time monitoring of loads, voltage and power factor. In addition, RTUs and

1 associated communications media are the equipment used for planning and execution of
2 outage restoration following an outage.

3 **Underground System Improvements**

4 **Underground Cable Replacement** – JCP&L will replace underground cable in areas
5 with pre-1986 construction, having bare concentric neutral cable (“BCN”), and also will
6 replace associated switches and pad-mount transformers, as needed. The primary focus of
7 the project will be on large residential developments in Central New Jersey with
8 underground distribution infrastructure. This project will enhance reliability and
9 customer service by installing, new jacketed underground cable that is not susceptible to
10 the neutral deterioration experienced with the BCN. Programmatic replacement of BCN
11 underground cable will reduce the occurrences where the Company has to make repairs
12 on an emergency basis, which emergency repairs may result in greater costs.

13 **Submersible Transformer Replacement** – The Company will replace submersible
14 transformers with pad-mount transformers. Submersible transformers are located in
15 underground chambers and are susceptible to corrosion over time due to exposure to
16 water with salt or other contaminants. When a submersible transformer fails, the damage
17 is usually catastrophic, requiring replacement. Oil spills associated with failed
18 submersible transformers require specialized environmental crews to clean up the spill
19 before work may be performed.

20 Pad-mounted transformers are easier to inspect, maintain and repair and will not
21 be submerged in water. This will reduce outages and the outage duration in the event of
22 transformer failure. Replacing submersible transformers on a programmatic basis
23 provides efficiencies and economies as compared to piecemeal replacement. In addition,

1 the project reduces the environmental risk of an undetected oil leak from a submersible
2 transformer potentially impacting groundwater.

3 **Conventional and Network Underground Rehab** – JCP&L will reinforce and
4 rehabilitate its underground network ducted distribution system and conventional ducted
5 distribution system, consisting of vaults, manholes, ducts, covers, cable, transformers and
6 switches. This project includes both civil and electrical infrastructure construction.

7 The project will replace and rehabilitate equipment in the underground network
8 and conventional ducted distribution system. JCP&L also intends to enhance its
9 underground network, located in Morristown, to full N minus 2 (“N-2”), capability,
10 meaning that two components can fail without having a network outage, to enhance
11 reliability and provide system operational flexibility. The Company will install
12 additional underground primary and secondary cable within the Morristown network, and
13 make other reconfiguring enhancements to strengthen N-2 capability. For the
14 conventional ducted distribution system, the Company will target locations within urban
15 areas where facilities have deteriorated and require replacement due to age and harsh
16 environmental and weather conditions.

17 Q. **What are the investment levels needed to successfully implement the above-**
18 **described projects in JCP&L Reliability Plus?**

19 A. The projected capital investment for the specific projects described above is set forth in
20 the Table below.

JCP&L RELIABILITY PLUS 2019-2022					
Projects	2019	2020	2021	2022	Total
Lateral Fuse Replacement with TripSaver II	4.9	5.0	5.0	5.0	19.8
Enhanced Vegetation Management	28.0	28.0	26.0	26.0	108.0
Install Back-up Generation	5.1	0.0	0.0	0.0	5.1
Substation Enhanced Flood Mitigation	3.5	3.8	3.8	6.7	17.8
Substation Equipment Replacement	6.6	10.5	10.5	9.5	37.0
Mobile Substations	2.1	2.2	2.2	2.2	8.7
Modernize Protective Equipment	2.9	3.8	3.8	2.9	13.4
Substation Fencing Enhancement	2.3	2.3	2.3	2.3	9.1
Circuit Protection and Sectionalization	2.9	2.9	2.9	2.9	11.5
Install SCADA - Line Devices	11.3	11.3	11.3	11.3	45.2
Distribution Automation	3.1	3.8	2.9	1.9	11.7
ADMS and RTU Upgrades	0.0	13.4	13.4	13.4	40.1
Underground Cable Replacement	12.6	11.4	11.4	9.5	44.9
Submersible Transformer Replacement	3.8	0.0	0.0	0.0	3.8
Conventional and Network UG Rehab and Resiliency	0.0	3.4	4.4	3.1	11.0
Totals	89.2	101.6	99.6	96.4	386.8

1
2 **Q. Will any of the proposed project-types result in increased maintenance costs in the**
3 **future?**

4 A. The Company will perform maintenance on new equipment and devices in accordance
5 with and as prescribed by its preferred practices. Notably, however, with respect to
6 Enhanced Vegetation Management, the Company expects that the expanded clearing
7 corridor will be more costly to maintain. Once JCP&L expands the clearing corridor in
8 Zone 2, it will trim to maintain the expanded clearing corridor going forward. Therefore,
9 the Company expects that it will incur greater expense to complete its regular vegetation
10 management maintenance cycles.

11 **Q. How does the Company propose to recover its higher expense for vegetation**
12 **management cycle maintenance?**

13 A. JCP&L will defer any increases in vegetation management expense, as provided in the
14 Board’s Order dated March 26, 2015 in the Company’s 2012 base rate case, Docket No.

1 ER12111052 (at 74-75) until it can reset the level of vegetation management expense in
2 its base rates in a subsequent base rate case.

3 **Q. Are the projects proposed in JCP&L Reliability Plus eligible projects (see the**
4 **Board’s II&R Rules at N.J.A.C. 14:3-2A.2)?**

5 A. Yes, all of the JCP&L Reliability Plus projects are eligible because each of the projects is
6 related to safety, reliability and/or resiliency. Further, the projects are non-revenue
7 producing; they do not relate to the addition of new customers or enhanced revenue.
8 Each of the JCP&L Reliability Plus projects is specifically identified in my testimony and
9 Appendix B hereto. The Board has confirmed that projects meeting these general
10 eligibility criteria are properly included in a proposed IIP. 50 *N.J.R.* 625(b), 641 (Jan. 16,
11 2018) (Response to Comments 38 and 39 (citing *N.J.A.C.* 14:3-2A.2(c) and noting that the
12 recitation of includable projects in *N.J.A.C.* 14:3-2A.2(b) is a “non-exhaustive” list)).

13 In addition, distribution automation projects (such as installation of SCADA line
14 devices, enhanced protection devices, and ADMS, which are proposed by the Company),
15 are cited in the II&R Rules as projects that may be included in an IIP. That is, the II&R
16 Rules state that an IIP may include electric distribution automation investments,
17 including SCADA equipment, cybersecurity investments, relays, reclosers, voltage and
18 reactive power control, and distribution management system integration. *N.J.A.C.* 14:3-
19 2A.2(b)4.

20 **Q. Does the Company propose annual baseline capital spending levels over the life of**
21 **JCP&L Reliability Plus (see N.J.A.C. 14:3-2A.3(a) &(b) and 14:3-2A.5(b)6)?**

22 A. Yes. The Company proposes substantial annual baseline capital spending levels over the
23 JCP&L Reliability Plus period as set forth in Schedule DP-1. The spending the Company

1 is proposing through JCP&L Reliability Plus is incremental to its proposed base capital
2 spending.

3 **Q. What is the basis for the Company's proposed annual baseline capital spending**
4 **levels?**

5 A. Mr. Mader determined the Company's proposed annual baseline. As set forth in Mr.
6 Mader's testimony, the proposed annual baseline capital spending level was established
7 using a 5-year historical average of base capital expenditures.

8 **Q. Does the Company propose to maintain, within its baseline capital expenditures,**
9 **capital expenditures on projects similar to those in JCP&L Reliability Plus that**
10 **amount to at least 10 percent of the approved IIP (see N.J.A.C. 14:3-2A.2(c))?**

11 A. Yes. In the normal course of business, the Company will spend an amount that is at least
12 10 percent of the capital expenditures in JCP&L Reliability Plus on projects similar to
13 those in JCP&L Reliability Plus. JCP&L's historical base capital has included
14 investments in project-types similar to those selected for JCP&L Reliability Plus and
15 there are also amounts in its forecasted base capital for investments in projects-types
16 similar to JCP&L Reliability Plus. That said, the II&R regulation and JCP&L Reliability
17 Plus generally have provided an opportunity for JCP&L to accelerate certain future
18 planned work and move forward reliability, resiliency and safety benefits to customers.
19 Schedule DP-1 sets forth the projected annual breakdown. Such amounts will be
20 expended in the normal course of business and recovered in a base rate proceeding.
21 Costs associated with projects undertaken as baseline capital expenditures will not be
22 subject to the accelerated recovery mechanism for JCP&L Reliability Plus expenditures
23 proposed by the Company.

1 **Q. Please address the “minimum filing requirements” for an IIP Petition set forth at**
2 ***N.J.A.C. 14:3-2A.5(b)1 through 8?***

3 A. Certainly. I will address each requirement in the testimony that follows.
4

5 **Q. Have you provided the Company’s projected annual capital expenditure budget for**
6 **a prospective five-year period, identified by major categories of expenditures (see**
7 ***N.J.A.C. 14:3-2A.5(b)1?***

8 A. Yes, please refer to Schedule DP-2, specifically the years 2018 to 2022.

9 **Q. Have you provided the Company’s actual capital expenditures over the past five**
10 **years, identified by major categories of expenditures (see *N.J.A.C. 14:3-2A.5(b)2?***

11 A. Yes, please refer to Schedule DP-2, specifically the years 2013 to 2017.

12 **Q. Has the Company included in its JCP&L Reliability Plus filing an engineering**
13 **evaluation and report identifying the specific projects included in JCP&L**
14 **Reliability Plus, cost estimates, in-service dates, and benefits of Reliability Plus (see**
15 ***N.J.A.C. 14:3-2A.5(b)3?***

16 A. Yes. The Engineering Report is attached hereto as Appendix B. The Report describes in
17 detail the specific projects included JCP&L Reliability Plus, project cost estimates,
18 project timing, project objectives and the results of a cost benefit analysis.

19 **Q. Have you provided annual budgets for JCP&L Reliability Plus (see *N.J.A.C. 14:3-***
20 ***2A.5(b)4?***

21 A. Yes. Please see the table in my testimony above (at page 30) for the budgeted annual
22 expenditures for JCP&L Reliability Plus. In addition, please refer to schedule DP-3 for
23 the JCP&L IIP Net Plant In Service for 2019 through 2022.

1 **Q. What is the maximum dollar amount, in aggregate, that JCP&L seeks to recover**
2 **through JCP&L Reliability Plus (see *N.J.A.C. 14:3-2A.5(b)7*)?**

3 A. As noted above and set forth on Schedule DP-3, the maximum capital expenditure
4 amount the Company seeks to recover through JCP&L Reliability Plus \$386.8 million.

5 **Q. Has the Company addressed the minimum filing requirements set forth in *N.J.A.C.***
6 **14:3-2A.5(b)5, 6 and 8?**

7 A. Yes. The requirement of *N.J.A.C. 14:3-2A.5(b)6* to set forth proposed baseline spending
8 levels, consistent with *N.J.A.C. 14:3-2A.3(a)* and (b), has already been addressed in my
9 testimony above (at page 32) and in Schedule DP-1. The requirements of *N.J.A.C. 14:3-*
10 *2A.5(b)5* (proposing when the Company intends to submit its next base rate case) and
11 *N.J.A.C. 14:3-2A.5(b)8* (providing the estimated rate impact of an IIP on customers) are
12 addressed in the direct testimony of Mark A. Mader.

13 **Q. Please provide a general overview of how the Company's estimates of capital costs**
14 **for JCP&L Reliability Plus, discussed above, were developed.**

15 A. The Company has extensive experience in preparing accurate and detailed cost estimates
16 for distribution projects. The detailed estimates of JCP&L Reliability Plus capital costs
17 have been developed by the Company utilizing its customary estimation techniques.

18 For distribution line projects, like those included in JCP&L Reliability Plus, the
19 Company uses estimates based on its Customer Request Work Scheduling System
20 ("CREWS"). CREWS is a software system that generates cost estimates based on the
21 project designs created in the system. (The design work for the JCP&L Reliability Plus
22 projects is discussed further below). For proposed JCP&L Reliability Plus projects, the
23 CREWS estimates include: direct labor (labor hours and internal labor costs), direct

1 material costs and direct equipment estimated costs. Ancillary direct projects costs
2 necessary for a JCP&L Reliability Plus project have been added, including, for example,
3 traffic control, tree work, and permitting. The JCP&L Reliability Plus projects require a
4 blend of internal and contractor resources. In producing the final distribution project
5 estimates, the CREWS estimates were therefore adjusted to blend internal and contractor
6 labor costs based on the projected workforce for the particular project component. The
7 Company's Supply Chain department provided current contractor labor rates. In
8 addition, for the Underground Cable Replacement project, the labor estimates based on
9 CREWS were compared to contractor quotes to ensure the direct cost estimates reflect
10 current contractor labor pricing. The foregoing process develops the direct project costs
11 for labor, material equipment and ancillary costs. The Company developed estimates
12 using CREWS, as described in this paragraph, for all the JCP&L Reliability Plus
13 distribution line projects for 2019 other than projects in the Substation Reliability
14 Enhancement category, the Enhanced Vegetation Management project, and the Install
15 Generators at District Line Shops, which are discussed below.

16 For substation projects the Company utilized a similar approach but using its
17 substation estimation tool. This provided estimates for direct labor and materials costs
18 for substation projects that are similar to the estimates CREWS provides for distribution
19 line work. Ancillary direct project costs and labor-related costs are also applied, as
20 appropriate.

21 For 2019, projects (other than Enhanced Vegetation Management) reflect design
22 work, the application of unit costs and vendor quotations, as discussed in this paragraph.
23 As noted above, CREWS and the Company's substation estimation tool generate direct

1 cost estimates based on project designs. For 2019, full designs have been completed for
2 all components of the Install SCADA - Line Devices project and Distribution Automation
3 (Loop Schemes) project. However, a unit approach using sample designs was warranted
4 for several of the projects in the IIP where the component projects are repetitive in nature
5 and similar in scope, including: Lateral Fuse Replacement with TripSaver II, Substation
6 Enhanced Flood Mitigation, Substation Equipment Replacement, Modernize Protective
7 Equipment, Circuit Protection and Sectionalization, Underground Cable Replacement,
8 and Submersible Transformer Replacement. By way of example, it would not be
9 appropriate to create a design for every TripSaver II installation, since those undertakings
10 are repetitive and similar in scope, even though there could be some variance in certain
11 individual replacements. The Company estimated the cost of these projects using a
12 “unit” approach whereby at least 10 to 20 percent of the project components were
13 designed, which are representative of the components for the project. Vendor quotations
14 for all components have been obtained for the following projects: Install Generators at
15 District Line Shops, Mobile Substations, Substation Fencing Enhancement and ADMS.
16 For the Enhanced Vegetation Management project, the cost estimates were based on
17 current vendor pricing and targeted overhead circuit miles.

18 For years beyond 2019, the Company developed estimated annual budget
19 expenditures for the proposed JCP&L Reliability Plus projects. The Company will have
20 available project cost estimates, each fall, for the upcoming JCP&L Reliability Plus
21 calendar year that will be available to Board Staff and Rate Counsel. These estimates
22 will reflect wage increases and adjustments for fuel in addition to other market conditions
23 that may affect labor or material costs.

1 **Q. Are the Company's capital cost estimates considered to be final construction costs?**

2 A. No. These estimates are used for budgeting purposes and are reasonable and reliable for
3 purposes of JCP&L Reliability Plus development and approval based on JCP&L's
4 costing experience. However, final construction costs for projects may deviate from
5 these estimates.

6 **Q. Does JCP&L Reliability Plus accommodate year to year variations from the annual
7 Program budget?**

8 A. Yes. JCP&L Reliability Plus allows variations in its annual capital expenditures of up to
9 10 percent from its overall total annual Program budget (such that variances from budgets
10 are allowed for individual categories, projects and project components), provided that the
11 overall total approved JCP&L Reliability Plus budget is not exceeded. It is my
12 understanding that this proposal is consistent with the II&R Rules, specifically *N.J.A.C.*
13 *14:3-2A.4(f)*. JCP&L will seek approval for any year-to year variances in its overall total
14 annual JCP&L Reliability Plus budget that are anticipated to exceed 10 percent. Subject
15 to these limitations, JCP&L proposes to maintain the ability to substitute projects and
16 components within and among the fifteen Reliability Plus projects.

17 **Q. Are there circumstances where the Company would need to seek an adjustment to
18 its overall annual budget beyond 10%?**

19 A. It is difficult to predict the future, and the Company does not currently anticipate seeking
20 such relief. However, there may be circumstances beyond the Company's control that it
21 may need to bring to the Board's attention. For example, it is unknown what impact on
22 materials prices over the course of JCP&L Reliability Plus will occur as a result of the

1 United States' tariff policy regarding steel imports or how labor conditions will be
2 impacted in the event natural disasters occur in the future.

3 **Q. Will the Company implement JCP&L Reliability Plus if the Board does not approve**
4 **accelerated cost recovery for it in this proceeding?**

5 A. No, it will not. The Program entails a significant, acceleration of future planned
6 investments. Without favorable rate treatment, such as that offered under the II&R rules,
7 the Company would continue to make these investments in the normal course and not on
8 an accelerated basis.

9 **Q. What is the basis for JCP&L Reliability Plus' four-year duration?**

10 A. The four-year duration is within the five-year investment period permitted in the Board's
11 II&R Rules (*N.J.A.C. 14:3-2A.4(a)*), and is consistent with the Rules' recognition that IIP
12 investments should occur in a systematic and sustained way (*N.J.A.C. 14:3-2A.1(b)*).
13 The four-year Program duration will efficiently and cost-effectively accommodate:
14 engineering, permitting, contracting and project scheduling; contractors' planning with
15 regards to labor and equipment procurement and mobilization; and coordination with
16 municipalities and other utilities. In general, the longer four-year Program duration
17 should drive reduced bid prices by contractors. In addition, a four-year duration should
18 lead to lower average costs as fixed aspects of planning, engineering and mobilization are
19 spread over certain larger projects. A four-year Program also creates long-term
20 employment opportunities.

1 **Q. Please describe the Company’s capability to successfully complete the projects in**
2 **JCP&L Reliability Plus.**

3 A. The four-year Program is well within the Company’s ability to perform, using internal
4 and contract resources and available material resources. JCP&L has managed numerous
5 large capital projects (see testimony above, describing large capital projects completed
6 since 2013) and has successfully met its objectives while managing the resources and
7 cost of the projects.

8 JCP&L has internal engineering and constructions resources that will be utilized
9 in the design and construction of the IIP projects. In addition to the internal resources
10 that JCP&L plans to use for the design and construction of the JCP&L Reliability Plus
11 projects, JCP&L anticipates using contractors for a majority of the work under JCP&L
12 Reliability Plus with direct Company oversight of the work to ensure it meets JCP&L
13 specifications and standards. The Company’s Supply Chain Department provided current
14 contractor availability to ensure JCP&L Reliability Plus project schedules can be met.

15 In sum, although JCP&L Reliability Plus will require considerable human and
16 material resources, the Company has the requisite managerial experience to oversee
17 Program implementation and access to all the resources necessary to complete JCP&L
18 Reliability Plus in a timely, efficient manner.

19 **JCP&L RELIABILITY PLUS BENEFITS AND SAVINGS**

20 **Q. Please summarize the safety, reliability and resiliency benefits associated with**
21 **JCP&L Reliability Plus.**

22 A. The fifteen specific projects will generate benefits to safety, reliability and/or resiliency,
23 as I discussed in detail above and summarize below.

1 While specific benefits of each JCP&L Reliability Plus project have been
2 discussed above and will be discussed in detail in the Engineering Report, safety of our
3 customers and employees is the Company's top objective. For example, by installing
4 SCADA at line devices equipment can be energized remotely and workers will not have
5 to manually energize equipment. Other projects directly promote customer safety, such
6 as substation fencing.

7 JCP&L Reliability Plus projects enhance reliability by reducing outages for
8 customers. The reliability benefits of each project is detailed in the Engineering Report.

9 JCP&L Reliability Plus projects will enable JCP&L's electrical system to
10 continue to operate despite damage or enable the Company to reduce the duration of
11 outages for customers when outages do occur. This is accomplished either by enhancing
12 the design of the electrical system or by utilizing advanced technologies.

13 **Q. Is job creation expected to result from JCP&L Reliability Plus?**

14 A. Yes, JCP&L Reliability Plus is expected to create jobs in New Jersey. The Board's rule-
15 proposal for the II&R Rule cited a Rutgers study which concluded that for every \$1
16 million of utility infrastructure project spending 6.5 to 7.5 full-year jobs are created,
17 depending on whether key materials are manufactured outside New Jersey or in-state. 49
18 *N.J.R.* 2489(a), 2490 (Aug. 7, 2017). Using this metric, and based on the Company's
19 proposed IIP total investment of approximately \$386.8 million, JCP&L Reliability Plus
20 would conservatively create approximately 2,514 full-year jobs, or 628 current full-time
21 jobs per year in New Jersey over the four-year Program. The four-year Program should
22 also foster stability in the jobs the Program creates. These additional jobs should provide
23 additional indirect economic stimulus.

1 **Q. Are there any other economic benefits from the Program?**

2 A. Yes. Businesses require reliable energy supplies. Reducing the frequency and severity
3 of outages prevents negative economic impacts on employers in the State and encourages
4 employers to locate businesses in New Jersey, maintain business operations in New
5 Jersey, or expand business operations in New Jersey. As stated in the 2015 EMP Update
6 (at p.1), “[t]he production and distribution of clean, reliable, safe and sufficient supplies
7 of energy is essential to New Jersey’s economy and way of life. Energy is a vital tool of
8 economic growth and job creation across New Jersey’s entire economy. Economic
9 growth depends on abundant, affordable supplies of energy. When considering where to
10 locate or expand businesses often identify energy costs as second only to labor costs in
11 their decision-making process.” Energy costs and service reliability also are a
12 consideration when a business evaluates whether to leave New Jersey in the face of
13 efforts from other jurisdictions. Likewise, JCP&L Reliability Plus will have a positive
14 economic impact on residential customers who are spared from power disruptions and
15 associated costs such as physical damage to premises heated with electricity and
16 temporary housing costs.

17 **Q. Please identify any areas of quantifiable dollar benefits to customers associated with**
18 **the Program.**

19 A. As a whole, JCP&L Reliability Plus is designed to increase reliability and resiliency and
20 reduce the frequency and duration of outages. A reduction in outages and their duration
21 provides quantifiable benefits to customers in both major storm events and under normal
22 conditions. As described in the attached Engineering Report, the Company undertook an
23 analysis to quantify those benefits. Based on that analysis, JCP&L Reliability Plus is

1 estimated to provide benefits to customers of \$1.905 billion, compared to estimated costs
2 of \$400 million (including capital and expense), or a benefit to cost ratio of 4.8. On a Net
3 Present Value (“NPV”) basis, JCP&L Reliability Plus is estimated to provide benefits to
4 customers of \$1.027 billion, compared to estimated costs of \$335 million (including
5 capital and expense), or a benefit to cost ratio of 3.1.

6 In addition, JCP&L Reliability Plus includes equipment replacement projects that
7 will reduce the occurrence of emergency replacements that have much higher costs than
8 planned replacements. In its proposal of the II&R Rules, the Board noted that emergency
9 replacement costs can run multiple times over the level of costs incurred in a well-
10 planned program implemented over time in a cost-effective manner. 49 *N.J.R.* at 2490

11 JCP&L Reliability Plus is a well-planned Program that could be implemented
12 over four years in a cost-effective manner to provide these cost-saving benefits.

13 **REPORTING**

14 **Q. What is the Company’s proposal for reporting on the progress of JCP&L Reliability**
15 **Plus?**

16 A. Consistent with the reporting requirements of *N.J.A.C.* 14:3-2A.5(e), the Company
17 proposes to provide semi-annual status reports to Board Staff and Rate Counsel
18 containing the following:

- 19 1. Forecasted and actual costs of the Program for the applicable reporting period, and
20 for the Program to date, where Program projects are identified by major category;
- 21 2. The estimated total quantity of work completed under Program identified by major
22 category. In the event that the work cannot be quantified, major tasks completed
23 shall be provided;

3. Estimated completion dates for the Program as a whole, and estimated completion dates for each major Program category;
4. Anticipated changes to Program projects, if any; and
5. Actual capital expenditures made by JCP&L in the normal course of business on similar projects, identified by major category.

The proposed semi-annual reporting beneficially provides the Board with current information and allows the Board to monitor the progress of JCP&L Reliability Plus as investments are placed into service throughout its term.

LIST OF ATTACHMENTS

Q. Please summarize the attachments to this testimony described above.

A. I have attached the following schedules setting forth information required by the II&R

Rules:

Appendix A	Qualifications
Appendix B	Engineering Evaluation and Report
Schedule DP- 1	JCP&L Annual Baseline Spending Level Calculation, including Capital Summary and Base Capital by Major Category (DP-1A) and Base Capital Similar to JCP&L Reliability Plus (DP-1B)
Schedule DP-2	JCP&L Capital Expenditure Summary 2013-2022 Identified By Major Categories
Schedule DP-3	JCP&L Reliability Plus Net Plant In Service 2019-2022

CONCLUSION

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Q. Please provide any concluding remarks to your testimony.

A. JCP&L Reliability Plus consists of four major categories including fifteen specific projects. Taken as a whole, this accelerated investment Program over four years will improve the safety, reliability and resiliency of service by JCP&L to its customers. It will do so by improving system performance during all operating conditions, while advancing the modernization and automation of the distribution system. The projects in JCP&L Reliability Plus are incremental to the Company’s normal capital programs. They are near-term prudent investments that will generate long-term benefits to consumers and the State. Accordingly, Board-approval of JCP&L Reliability Plus is sought.

Q. Does this conclude your pre-filed direct testimony at this time?

A. Yes.

Experience and Qualifications-Dennis Pavagadhi

I am the Director, Operations Support at Jersey Central Power & Light Company, for whom I have worked for over 23 years. I am responsible for the two Distribution Control Centers and the Substation Department at JCP&L. I have been in my current position since 2014. Prior to my current position, I was Manager of Engineering Services beginning in 2005. In that capacity, I was responsible for the distribution and sub-transmission planning, protection, new business and reliability engineering groups for the Morristown. In addition, I also managed the asset records, mapping, joint use, rights-of-way and project management groups within the engineering department. Prior to 2005, I was held various engineering and managerial positions at the Company.

Prior to joining JCP&L, I served as an engineer for Decision System Technologies at Picatinny Arsenal and John Brown Engineering & Construction. At Decision System Technologies, I designed defense systems. At John Brown Engineering & Construction, I designed various electrical and mechanical systems.

I am a licensed Registered Professional Engineer in New Jersey and Pennsylvania, and a Certified Energy Manager.

I hold a Bachelor of Science degree in Engineering from the New Jersey Institute of Technology, a Master of Science degree from the New Jersey Institute of Technology and a Master of Science degree in Management from the College of Saint Elizabeth.

Jersey Central Power & Light Company

JCP&L Reliability Plus

Engineering Evaluation and Report

July 13, 2018

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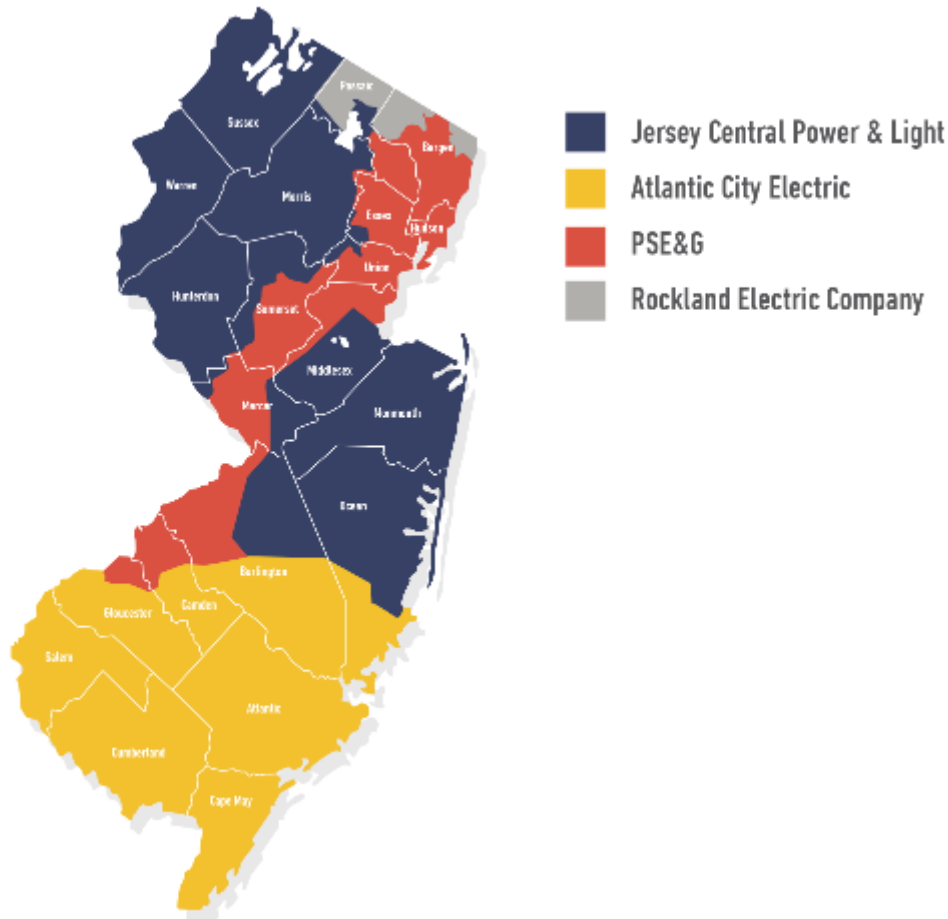
VII. Conclusion 30

Schedules to Engineering Evaluation and Report Attached

I. Introduction

Pursuant to the requirements of the New Jersey Administrative Code (“N.J.A.C”) § 14:3-2A.1 et. seq., Jersey Central Power & Light Company (“JCP&L” or “Company”) respectfully submits this Engineering Evaluation and Report (“Engineering Report”) in support of its proposed JCP&L Reliability Plus Infrastructure Investment Program (“JCP&L Reliability Plus” or “Program”) that the Company has filed for approval by the New Jersey Board of Public Utilities (“Board” or “BPU”).

JCP&L provides electric service to more than one million residential, commercial and industrial customers in two geographically separate regions. The Central New Jersey (“CNJ”) Region is based in Holmdel, New Jersey and the Northern New Jersey Region (“NNJ”) is based in Morristown, New Jersey. The 3,312 square miles of service territory is comprised of 13 counties and 236 municipalities. JCP&L employs approximately 1,360 personnel across its 14 operating districts.



JCP&L is actively engaged and diligently committed to continuing to perform in a manner that results in satisfactory and cost-effective reliability performance for its customers. Reliability indices such as System Average Interruption Frequency Index (“SAIFI”), System Average Interruption Duration Index (“SAIDI”), and Customer Average Interruption Duration Index (“CAIDI”) indicate that JCP&L has succeeded in maintaining electric distribution system reliability. However, increased spending to accelerate projects beyond what historically has been required for system reliability, resiliency and safety is now appropriate to respond to the Board’s new Infrastructure Investment and Recovery Rules, recent extreme weather events, and customer expectations. JCP&L Reliability Plus proposes a portfolio of accelerated capital projects that are intended to upgrade the electric distribution system by incorporating new equipment, reflecting currently available technology; enhance service to customers; and enhance overall system reliability, resiliency and safety.

JCP&L’s top priority is the safety of its employees and customers. This priority is followed closely by the Company’s commitment to provide reliable and resilient service. This means reducing outages and the number of customers affected by them. This also means reducing the duration of the outages that do occur. JCP&L Reliability Plus seeks to accelerate projects that further these priorities and increase electric distribution system safety, reliability and resiliency in severe weather and blue-sky days, as well as provide for upgrades to JCP&L’s distribution infrastructure.

II. Board Requirements for Infrastructure Investment Plans

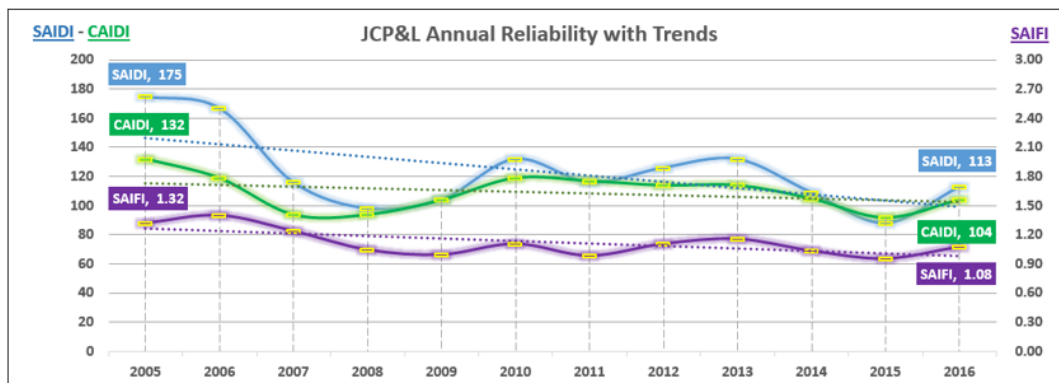
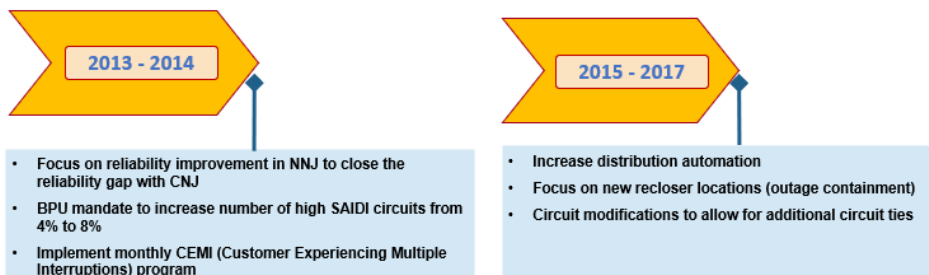
The Board’s Infrastructure Investment and Recovery Rules at N.J.A.C. § 14:3-2A.5(b), require a utility seeking approval of an Infrastructure Investment Program (“IIP”) to include within its petition the following:

1. Projected annual capital expenditure budgets for a five-year period, identified by major categories of expenditures;
2. Actual annual capital expenditures for the previous five years, identified by major categories of expenditures;
3. **An engineering evaluation and report identifying the specific projects to be included in the proposed Infrastructure Investment Program, with descriptions of project objectives-including the specific expected resilience benefits, detailed cost estimates, in service dates, and any applicable cost-benefit analysis for each project;**
4. An Infrastructure Investment Program budget setting forth annual budget expenditures;
5. A proposal addressing when the utility intends to file its next base rate case, consistent with N.J.A.C. 14:3-2A.6(f);
6. Proposed annual baseline spending levels, consistent with N.J.A.C. 14:3-2A.3(a) and (b);
7. The maximum dollar amount, in aggregate, the utility seeks to recover through the Infrastructure Investment Program; and
8. The estimated rate impact of the proposed Infrastructure Investment Program on customers.

Each of these requirements is addressed in the JCP&L Reliability Plus filing, as identified in Appendix A to the Company’s Petition. This Engineering Report is provided to address the third requirement listed above at N.J.A.C. § 14:3-2A.5(b)3.

III. Electric Distribution Reliability

JCP&L has made significant progress with respect to its reliability performance over time. All reliability indices have trended in the positive (downward) direction since 2005, as illustrated in the slide below. The slide also illustrates several initiatives and programs the Company has undertaken since 2013 in furtherance of the objective of continuing to enhance reliability.



All indices trending downward since 2005

JCP&L performs a suite of programs to address reliability of electric service. The Company has multiple distribution inspection and maintenance (I&M) programs that address its electric distribution equipment including distribution lines, underground facilities, substations and aerial equipment. In addition, JCP&L’s CEMI (Customer Experiencing Multiple Interruptions) program focuses on customers who may be experiencing more frequent outages than are typically experienced on the JCP&L distribution system. JCP&L also performs work on 8% of circuits identified as the highest priority annually. Further, JCP&L maintains a four-year vegetation management program on its distribution circuits.

As a result, JCP&L has performed better than the Board’s minimum reliability levels. JCP&L has also typically performed better than the benchmark reliability levels.

Nonetheless, one of JCP&L’s goals is to provide its customers with enhanced reliability both on blue-sky days and on days in which storm events occur. An important strategy JCP&L utilizes to meet this goal is to install new equipment, reflecting currently available technology, to increase reliability and advance system resiliency. The Board’s Infrastructure Investment and Recovery Rules provide a means to accelerate this strategy and the provision of resulting benefits to customers.

IV. Recent Major Weather Events

Although JCP&L’s overall system reliability has improved, JCP&L and its customers have experienced unprecedented catastrophic storms over the past seven years. These storms have included Hurricane Irene, Superstorm Sandy, and an October 2011 snow storm, as well as three recent nor’easters in March 2018 (Riley, Quinn and Toby).

In 2011 and 2012, JCP&L and its customers were impacted by three of the most devastating storms JCP&L and the state of New Jersey have ever experienced: Hurricane Irene in August, 2011, a severe snowstorm in October 2011, and Superstorm Sandy in October 2012. The impact of these three events caused outages affecting 2.4 million Company customers, more than double the 1.1 million customers in JCP&L’s service territory, meaning that many customers endured multiple outages. The three events caused a combination of wind and tree damage to poles, transformers, crossarms and wires. Hurricane Irene and Superstorm Sandy also resulted in extensive flooding, which affected 18 substations, two of which flooded in both events.

Trees impacting the Company’s electric distribution facilities were the largest cause of damage and resulting outages during these three catastrophic storm events. The below chart depicts the customers affected and the damage caused by these storms.¹

	Hurricane Sandy	Hurricane Irene	October Snowstorm
JCP&L customer service interruptions	1.2 million	780,858	443,334
Poles issued	6,700	360	612
Transformers issued	3,600	300	300
Crossarms issued	19,200	400	2,400
Miles of wire issued	400	47	136
Locations with downed wires/hazard	34,512	12,924	15,923
Hazard orders	39,143	15,032	18,205
Outage-related calls from customers	854,631	370,957	334,791

¹ The table totals reflect the counts of equipment issued from JCP&L’s stores facility and were not all necessarily installed in the field.

The below pictures illustrate the flooding damage to the Morristown Substation during Hurricane Irene in August 2011.



After the extreme weather events in 2011 and 2012, JCP&L undertook and completed many initiatives to mitigate future storm impacts. For example, the Company implemented a flood mitigation plan for all 18 Substations affected by Hurricane Irene and Superstorm Sandy, undertook the rebuilding of Barrier Island infrastructure with enhanced construction and implemented enhanced vegetation practices.

Winter storms Riley and Quinn, which occurred from March 2 to March 13, 2018, affected more than 526,000 customers. The snow fall accumulations were up to 18 inches of wet heavy snow in some areas of the service territory. The dense forestation in the Company's Northern New Jersey Region, coupled with the large tree species present there, resulted in limb and tree breakage which caused extensive damage to the Company's electric distribution facilities. Accompanying the wet snow, JCP&L experienced wind gusts of more than 70 miles per hour.

Damage from these storms required issuance of 2,507 cross arms, 805 poles, 517 transformers, and more than 68 miles of wire. The Company's restoration efforts required over 7,000 full time equivalent ("FTE") workers, which included more than 3,400 line workers.

Approximately one week after the restoration of service to customers affected by nor'easters Riley and Quinn, a third storm, Toby, struck the JCP&L territory. The Central Region experienced winds between 30 to 40 miles per hour and received up to twelve inches of snow in some areas. Toby affected over 70,000 customers and required 4,000 FTE's, including 1,800 line workers, to complete restoration. Damage from this storm required issuance of 183 cross arms, 47 poles, 27 transformers, and 19,152 feet of wire.

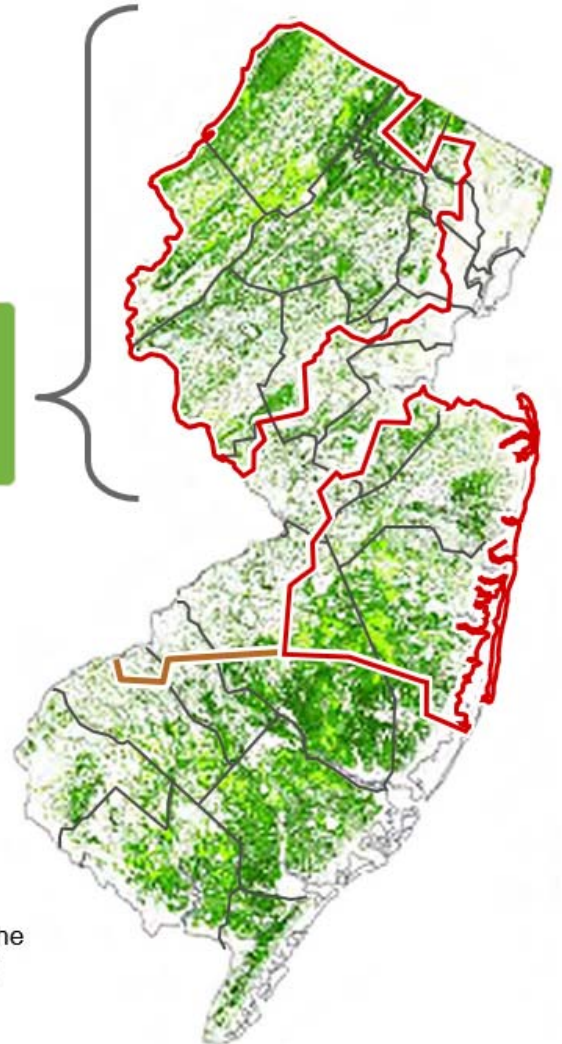
As in the 2011-2012 storms discussed above, the majority of the damage from the early 2018 storms resulted from trees affecting the Company's electric distribution facilities.

The entire JCP&L service territory is generally wooded and the northwestern part of the territory is one of the most heavily forested area in New Jersey, as depicted on the next page.

JCP&L's service territory in Northern NJ is one of the most heavily forested areas in New Jersey

-  JCP&L Service Territory
- Forestation**
-  High Forestation
-  Medium Forestation
-  Low Forestation
-  Minimal Forestation

Note: The darker the color, the higher the tree density



The following pictures illustrate examples of the tree damage in the Company's Northern New Jersey Region during the recent March, 2018 storms.



March Winter Storm Damage in Summit



March Winter Storm Damage in Branchville



March Winter Storm Damage in Basking Ridge

As discussed further below, in addition to enhancing overall electric distribution system safety, reliability and resiliency, JCP&L Reliability Plus proposes projects that are targeted to reducing the damage to JCP&L's distribution system and increase the speed with which JCP&L recovers from storm events similar to those discussed in this section.

V. Implementation of JCP&L Reliability Plus

JCP&L Reliability Plus is a portfolio of fifteen projects in four categories: Overhead Circuit Reliability and Resiliency, Substation Reliability Enhancement, Distribution Automation and Underground System Improvements. The Chart below summarizes the projected JCP&L Reliability Plus costs per project per year and in total.

JCP&L RELIABILITY PLUS 2019-2022					
Projects	2019	2020	2021	2022	Total
Enhanced Vegetation Management	28.0	28.0	26.0	26.0	108.0
Lateral Fuse Replacement with TripSaver II	4.9	5.0	5.0	5.0	19.8
Install Back-up Generation	5.1	0.0	0.0	0.0	5.1
Substation Enhanced Flood Mitigation	3.5	3.8	3.8	6.7	17.8
Substation Equipment Replacement	6.6	10.5	10.5	9.5	37.0
Mobile Substations	2.1	2.2	2.2	2.2	8.7
Modernize Protective Equipment	2.9	3.8	3.8	2.9	13.4
Substation Fencing Enhancement	2.3	2.3	2.3	2.3	9.1
Circuit Protection and Sectionalization	2.9	2.9	2.9	2.9	11.5
Install SCADA - Line Devices	11.3	11.3	11.3	11.3	45.2
Distribution Automation	3.1	3.8	2.9	1.9	11.7
ADMS and RTU Upgrades	0.0	13.4	13.4	13.4	40.1
Underground Cable Replacement	12.6	11.4	11.4	9.5	44.9
Submersible Transformer Replacement	3.8	0.0	0.0	0.0	3.8
Conventional and Network UG Rehab and Resiliency	0.0	3.4	4.4	3.1	11.0
Totals	89.2	101.6	99.6	96.4	386.8

JCP&L Reliability Plus projects provide immediate customer benefits and also prepare the Company's distribution system for future integration of more advanced technology. The discussion in this Section provides a description of the fifteen projects included in the four categories (and their components), the project benefits, the selection of project components and a summary of each project's cost over the term of JCP&L Reliability Plus. The schedules to this Engineering Report detail the project components for each project in JCP&L Reliability Plus.

Category 1: Overhead Circuit Reliability and Resiliency

The three projects in this category are directed at enhancing key portions of the distribution overhead lines to provide benefits to customers in both normal and adverse weather conditions.

Projects in this category will increase reliability and resiliency to the overhead electric distribution system by making overhead equipment less susceptible to tree damage, installing upgraded protective equipment on laterals, and providing necessary power back-up to keep the Company's facilities in operation during major events. Specifically, the Enhanced Vegetation

Management project, which targets removal of Ash trees, hazard trees, and Zone 2 overhang, will increase reliability and reduce outages related to trees, which are the primary cause of overhead distribution system damage and resulting outages for JCP&L. The replacement of lateral fuses with S&C TripSaver II reclosers will prevent overhead transient faults from becoming extended outages. The installation of permanent back-up generators at operations centers will enhance the resiliency of overhead facilities by ensuring that the Company has power and communications at the facilities it relies on to support service restoration.

JCP&L's distribution system largely consists of overhead wires, poles and other overhead infrastructure. Accordingly, projects that addresses the tree-related causes of damage to such overhead facilities and resulting outages, reduce outage durations due to overhead lateral faults, and ensure back-up power to JCP&L, will increase resiliency and positively impact customer reliability. The three projects within this category are designed to strengthen the distribution system and reduce the number of customers affected during weather events and blue-sky events.

Enhanced Vegetation Management

The Enhanced Vegetation Management capital project has three aspects. First, it will target the removal of Ash trees, subject to property owner permission when necessary. JCP&L proposes to begin removing Ash trees (live or dead) across the service territory due to the impact of an insect called the Emerald Ash Borer ("EAB"). The EAB is a highly destructive and non-native insect that feeds on Ash tree species. Once infected, the EAB kills the Ash tree in a period of three to five years by burrowing between the bark and trunk and starving the tree of water and nutrients. **The Ash removal is imperative since these trees have a high mortality rate.**

Second, this project targets the removal of hazard² trees located in distribution circuit areas, subject to property owner permission when necessary. Trees with the following conditions are subject to removal:

- Trees that are dead or dying;
- Trees with visible signs of decay, disease, or severely leaning;
- Trees that have animal or mechanical damage; and
- Trees that are significantly encroaching the clearing zone.

Such trees will be removed on a targeted, accelerated basis. This work is above and beyond the work performed in the standard four-year tree trimming cycle. **For both hazard trees and Ash trees, the Company anticipates greater levels of investment in the Northern New Jersey region due to the greater density of trees in this area.**

² A hazard tree means a structurally unsound tree or tree limb that could strike distribution electric plant when it falls.

Third, overhang will be removed on selected circuits within Zone 2 utilizing the same vegetation methods and practices that are currently being used in Zone 1³, subject to property owner permission when necessary.

Removing Ash trees and hazard trees is designed to reduce the frequency of falling or broken tree limbs causing lengthy outages, and thereby enhancing customer safety and reliability. This is true for both blue sky days as well as during severe weather events.

The three components in this project are intended to reduce tree-related damage to and outages on JCP&L's overhead distribution system. Tree damage has been a major driver of distribution outages on JCP&L's overhead distribution system. As described earlier in this Report, trees were the largest cause of outages during the storms JCP&L experienced in 2011-2012 and in the nor'easters experienced earlier this year.

Indeed, tree-caused outages are the largest cause of customer outages in all circumstances for JCP&L. With respect to the over one million customers served by JCP&L, the average number of customer affected annually from 2012 to 2017 from tree-related outages was approximately 288,000 customers. Tree-caused outages are typically longer in duration and higher cost to repair since they require the removal of trees or limbs by a tree crew first, followed by the subsequent repair to the damaged infrastructure. Further, tree damage, such as downed power lines and broken poles, often causes road closures. Addressing road closures consumes significant Company resources in the restoration process that could otherwise be directed to facilities restoration. In the aftermath of recent storms, customers have expressed concerns regarding the extent of damage and outages caused by trees. Due to such significant impacts that trees have on the Company's overhead distribution system, the three components of the enhanced vegetation management program are designed to reduce tree-caused damage and outages.

This project provides a major enhancement to the Company's overhead distribution facilities by reducing potential damage from trees, which are the primary cause of damage and outages on the JCP&L overhead distribution system.

All expenditures associated with the clearing or expansion of distribution horizontal and vertical clearing corridors and the removal of trees or limbs located within or outside the clearing corridor that could damage poles, circuits and conductors are capitalized. Capitalization of costs associated with the removal of trees or limbs located within or outside the clearing corridor is appropriate for any "initial clearing", whether such clearing and/or removal of trees or limbs that were not previously effected takes place immediately preceding the construction of the line, or years later where the clearing corridor is improved and/or expanded.

³ Zone 1 is defined as the portion of the circuit from the substation breaker to the first protective device. As noted above, Zone 2 is defined as the three-phase conductor and devices after the first protective device.

JCP&L’s Enhanced Vegetation Management projects identified under its JCP&L Reliability Plus Program are to improve and/or expand the clearing corridor beyond that initially cleared. The initial corridor was cleared 15 feet above the conductor and maintained to this height, in accordance with the BPU regulations. Under JCP&L Reliability Plus, vegetation management practices will include removal of overhanging vegetation from Zone 2 on the distribution circuit, similar to that provided by N.J.A.C § 14:5-9.8 (Distribution Line Vegetation Management) regarding the lock-out zone. Mature trees may be exempt from the above requirements at the reasonable discretion of the electric distribution company’s Vegetation Manager as it pertains to Zone 2. In addition, these projects also include the removal of Ash trees and hazard trees outside of the clearing corridor, where the Company has either sufficient rights or has obtained permission to conduct tree removal. Once the clearing corridor has been improved or expanded, JCP&L will maintain the clearing corridor in the context of its routine vegetation management programs⁴.

ENHANCED VEGETATION MANAGEMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Circuits):	245	212	258	218	933
Costs:	\$28.0	\$28.0	\$26.0	\$26.0	\$108.0

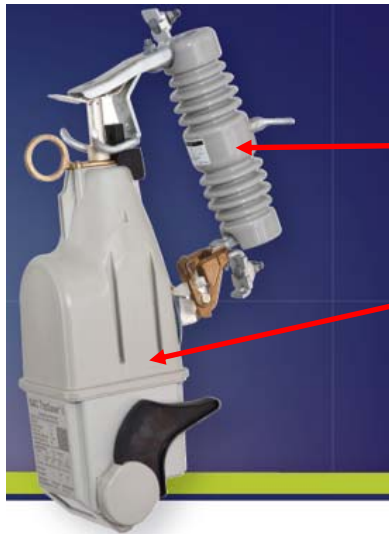
*2019 project cost based on current vendor pricing and targeted overhead circuit miles.

Lateral Fuse Replacement with TripSaver II

This project will replace lateral fuses with S&C TripSaver II cutout-mounted reclosers. The Company will replace 25K to 100K fuses with TripSaver II reclosers. This project is a cost-effective means to bring reclosing technology to customers served from laterals. A lateral is a line tapped from the three-phase portion of a circuit. The TripSaver II prevents temporary faults (as would occur if a limb or animal impacted a lateral) from becoming extended outages. In the event of a temporary fault, a traditional fuse would operate causing an extended outage until the fuse was replaced. The TripSaver II reclosers automate the reset process such that temporary faults will clear, and customers will instead experience a momentary outage, with the device recloser designed to restore service in less than 90 seconds. This is a substantial benefit to customers since a significant portion of faults are temporary in nature.

⁴ Expenditures associated with the maintenance or reclamation of an existing corridor clearing zone are expensed, which includes routine circuit maintenance, customer ticket work, clearing overgrown vegetation and overhang within the initial corridor clearing zone and herbicide programs.

The photographs below illustrate the TripSaver II in isolation and as installed on the distribution system.



The Company selected fuse locations for installation of TripSaver II by first identifying the zones of protection (i.e., the area on the circuit between the fuse and the next protective device where damage would cause the fuse to operate) for 25K up to 100K fuses. The Company eliminated from consideration fuses that have less than ten customers in their zones of protection or have less than 35 customers downstream. Finally, the Company included in the project fuses based on the length of the overhead portions in their zones of protection, prioritizing those fuses with the largest such portions. The average overhead portion of the zone of protection for the selected fuses is 0.96 miles as compared with an average zone of protection for all 25K to 100K fuses of 0.7 miles.

LATERAL FUSE REPLACEMENT WITH TRIPSAVER II					
	2019	2020	2021	2022	TOTAL
Project Units (Poles):	401	409	404	321	1535
Costs:	\$4.9	\$5.0	\$5.0	\$5.0	\$19.8

Install Generators at District Line Shops

This project involves the installation of permanent, full-building back-up generators at operation centers, including line and substation shops.

This project is designed to enhance resiliency by ensuring that uninterrupted power is available to the entire facility during storms or other emergencies so that normal operations are maintained, and customer service restoration efforts addressing overhead outages are not delayed.

The full, permanent back-up generators are designed to ensure that these facilities are fully functional, which includes access to the outage management system, full operation of fuel pumps and available communications systems during a time when electric power is unavailable at these locations. These facilities and the systems utilized therein must be powered to facilitate physical restoration efforts as well as communication of real-time information to customers. During Hurricane Irene and Superstorm Sandy, personnel had to dedicate time to connect and maintain temporary generators to power critical facilities (*i.e.*, communications and fuel pumps) at line shops and substation shops that lost power. Additionally, during large scale outage events, this project will aid in efforts to maintain safety and security to these facilities. Without power to operation centers, electric entrance gates would be left open and key card door security systems would not be functional, thereby providing unrestricted access to the facilities.

The project provides for installation of permanent, full building back-up generators at all operations centers that do not have such generators installed and are not planned for installation of back-up generators as part of the Company's normal capital investments.

INSTALL GENERATORS AT DISTRICT LINE SHOPS					
	2019	2020	2021	2022	TOTAL
Project Units (Generators):	13	0	0	0	13
Costs:	\$5.1	\$0.0	\$0.0	\$0.0	\$5.1

Category 2: Substation Reliability Enhancement

Five projects have been identified in this category, which will provide hardening to the many of Company's electric distribution substations and substation equipment.

JCP&L will construct permanent flood wall protection so that substation equipment is less susceptible to flood damage. Ensuring substation availability is critically important so that customers' power can be restored following a major storm event. In addition, projects in this category are designed to enhance reliability by replacing substation equipment with newer, more reliable, equipment with greater functionality. Enhanced protection, monitoring and controls to support greater grid visibility will also be installed. Further, enhanced fencing will be installed to enhance substation safety and reliability. Finally, the Company plans to purchase four additional mobile substations to enhance restoration capabilities and to support JCP&L Reliability Plus construction.

Flood Mitigation

During Hurricane Irene and Superstorm Sandy, 18 of JCP&L's substations flooded; two of which flooded during both events (see pictures on page 5 for examples of Hurricane Irene flooding). This project will provide enhanced storm hardening to nine of these substations by adding permanent flood walls and automatic flood gates. In addition, JCP&L will purchase eight high capacity pumps that will be used to remove water from substations when necessary.

Permanent flood walls and automatic flood gates will enhance the protection against storm surges at the nine substations where they will be installed. In addition, having permanent flood walls and automatic flood gates also will reduce the time consuming, labor intensive task, of closing substation entrances with temporary barriers in anticipation of upcoming storms. This labor can be utilized for other critical storm preparation work. Also, automatic gates will facilitate substation access until the time that they need to be closed. The additional pumps will ensure that a pump is available to mitigate water intrusion at each of the 18 substations that flooded in Hurricane Irene and Superstorm Sandy.

SUBSTATION ENHANCED FLOOD MITIGATION					
	2019	2020	2021	2022	TOTAL
Project Units (Substations):	3	3	2	3	11
Costs:	\$3.5	\$3.8	\$3.8	\$6.7	\$17.8

*One of the project units in each of 2019 and 2020 reflects the purchase of four pumps.

Substation Equipment Replacement

This project will replace distribution substation equipment such as breakers, transformers, and switchgear with new equipment, reflecting currently available technology. Oil circuit breakers will be replaced with vacuum circuit breakers and/or distribution style reclosers with single phase tripping, which will reduce the environmental impacts of oil leaks. Portable distribution station ("PDS") transformer units will be replaced with standard modular transformers and circuit breakers. Where feasible, switchgear will be replaced with open air bus and free-standing

vacuum breakers. Equipment replaced programmatically will avoid expensive emergency replacement, which can result in prolonged outages. In summary, the project is designed to result in more reliable substations.

The circuit breakers were selected for replacement based on the availability of replacement parts, which could lead to delays in restoring equipment to service. PDS units and switchgear were selected for replacement based on historical performance.

SUBSTATION EQUIPMENT REPLACEMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Breakers/Transformers):	19	17	20	25	81
Costs:	\$6.6	\$10.5	\$10.5	\$9.5	\$37.0

Mobile Substations

This project provides for the purchase of four mobile substations; one in each year 2019 through 2022. One of the new mobile substations will be equipped with a dual voltage, high side transformer for use at either 34.5 kV or 115 kV operation. The Company does not currently own a mobile substation with this voltage configuration. Once purchased, the mobile substations are immediately available to support emergency restoration consistent with the Company's emergency restoration plans and to support JCP&L Reliability Plus construction throughout the Company's service territory.

JCP&L has twelve mobile substations currently available. In the normal course of business, a mobile substation may be installed to facilitate planned maintenance activities, attend to corrective maintenance, support service restoration from an emergency equipment failure, or support planned capital improvement projects. During the proposed four-year JCP&L Reliability Plus Program, JCP&L will need additional mobile substations to support proposed JCP&L Reliability Plus projects, including Substation Equipment Replacement and Modernize Protective Equipment. The additional four mobile units will enable multiple construction projects to be undertaken concurrently without impairing the Company's ability to address emergencies as they may arise. The new units will be located in New Jersey and will be used directly for JCP&L Reliability Plus support (along with other existing mobile substations, as required).

In addition to supporting the increased construction activity, the new mobile substations will be available for emergency use. Weather and natural disasters, such as tornadoes, hurricanes and flooding, can have a determinantal impact to our substation infrastructure. When a substation is out of service, a mobile substation can be deployed to more quickly restore power. The new mobile substations purchased under JCP&L Reliability Plus, as well as JCP&L's existing mobile

substations, will be located in protected facilities throughout the territory such that they can quickly be deployed where required, to restore impacted customers.

MOBILE SUBSTATIONS					
	2019	2020	2021	2022	TOTAL
Project Units (Mobile Sub):	1	1	1	1	4
Costs:	\$2.1	\$2.2	\$2.2	\$2.2	\$8.7

Modernize Protective Equipment

This project will modernize substation protective equipment by replacing and upgrading distribution relays as follows:

- Electromechanical Relay replacement
 - Changeout existing electromechanical overcurrent relays on mobile substations to Schweitzer SEL-351 relays (or equivalent);
- ABB DPU Relay replacement
 - Change out ABB distribution protection unit (“DPU”) style relays to single SEL-351 multi-function relays (or equivalent); and
- Under Frequency Load Shed (“UFLS”) Relay replacement
 - Changeout MDF or SFF style relays to SEL-351 or Basler 81 relays (or equivalent).

This project is designed to improve distribution system reliability by replacing relaying equipment with new equipment, reflecting currently available technology, that will provide increased monitoring and protection. In addition, the electromechanical relays, being replaced with new microprocessor-based relays, require recalibration following the travel of the mobile substation. Changing these relays to the more reliable, standard microprocessor units removes this concern and shortens the installation time of the mobile units. The new microprocessor-based relays can also be interrogated to determine fault information. Operations and engineering personnel can use this data to better locate faults, which will contribute to shorter outage durations. Further, the ABB DBU relays have experienced failures. In addition, the ABB DPU relays and the UFLS relays are no longer supported by the manufacturers and generally have no or limited event reporting and analysis capabilities. Replacing these relays with current microprocessor-based relays will provide more secure operations and increased monitoring capabilities thereby enhancing reliability.

In this project, the Company will replace all ABB DPU style relays and all UFLS relays and all electromechanical relays on mobile substations.

MODERNIZE PROTECTIVE EQUIPMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Relays):	30	33	35	35	133
Costs:	\$2.90	\$3.8	\$3.8	\$2.9	\$13.4

Substation Fencing Enhancement

This project will install high security, animal deterrent, climb-proof (*i.e.*, non-chain link), strengthened perimeter fencing with barbed wire at distribution substations selectively over the term of JCP&L Reliability Plus.

The project has safety, security, and reliability benefits. The enhanced fencing will improve the safety of the public and JCP&L employees by reducing the likelihood of unauthorized and potentially dangerous access to substations. When vandalism and theft occur, typically grounds are cut and removed on both the fence and the equipment, which puts the intruder, employees and equipment at greater risk. Anti-theft deterrent will also reduce financial losses from substation copper theft. The enhanced features of the climb-proof strengthened fencing will protect against animal related outages and mitigate vehicles from driving into the property, intentionally or by accident.

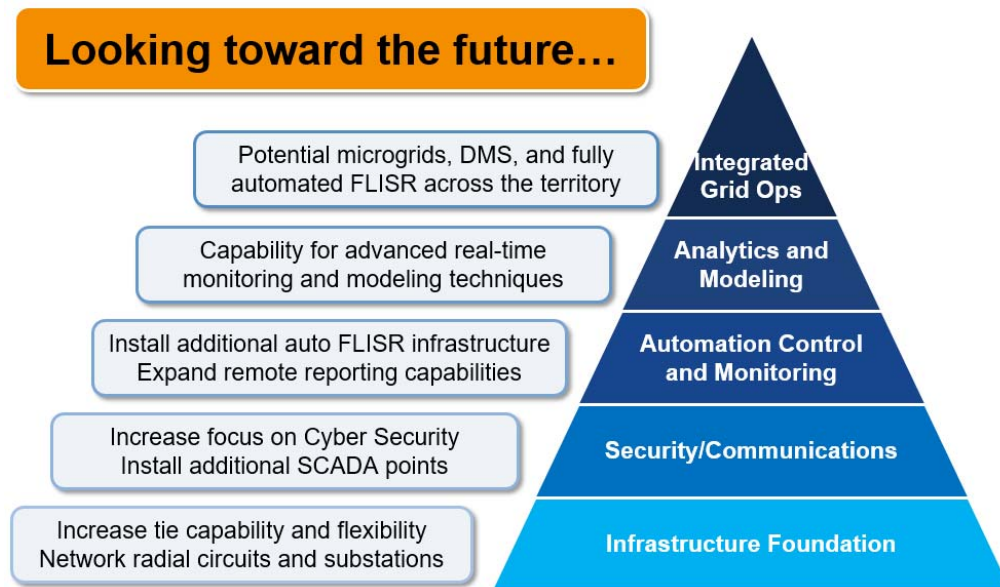
The project will first target installations at substations that have been victim to previous theft and vandalism. JCP&L will also target substations that have experienced animal related outages or those that are in close proximity to the public.

SUBSTATION FENCING ENHANCEMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Substations):	13	14	14	15	56
Costs:	\$2.3	\$2.3	\$2.3	\$2.3	\$9.1

Category 3: Distribution Automation

The four projects in the Distribution Automation category will provide monitoring and intelligent control over the distribution system and allow for more rapid fault location, isolation and service restoration (“FLISR”). This is designed to create a more resilient distribution system and reduce the length of customer outages. The Distribution Automation projects are designed to provide remote real-time monitoring and control of key system devices (*i.e.*, reclosers, substation breakers and transformers), which will allow the Company’s operations personnel to respond more rapidly to outages, reduce the duration and number of customers affected by an outage, and enhance the safety of workers. Cyber security is critical to the Company’s distribution system and protection against cyber security risks will be integrated into the Distribution Automation and other projects in JCP&L Reliability Plus.

These technologies will provide the Company with increased flexibility and the potential for more integrated operations as well as increased grid visibility in support of distributed energy resources. The diagram below illustrates how the projects in JCP&L Reliability Plus provide a platform for the future.



Circuit Protection and Sectionalization

This project will replace fuses on 4.8kV circuits with Elastimold electronic reclosers with Schweizer SEL 651 intelligent relays (or equivalent) and SCADA control. Reclosers are electronic devices that protect circuits, similar to the way circuit breakers work in a home. However, unlike the circuit breaker at home, reclosers are programmed to automatically reclose in programmed time periods to allow certain types of temporary faults to clear. The replacement of fuses (which require the dispatch of a crew to repair the fuse following even a temporary fault) with the proposed electronic reclosers (which are programmed to reset and restore service automatically) is designed to shorten many outages to a momentary duration. Indeed, a large percentage of faults on the system (*e.g.*, as would occur with a tree branch hitting a wire and then falling to the ground) are temporary in nature.

Reclosers also function to divide the distribution circuit into smaller sections, which allows faults to be isolated to smaller groups of customers and reduce the impacts of outages to customers. The Company notes that this protection philosophy was successfully implemented on its 12.47 kV system.

The electronic reclosers and controls enable real-time monitoring of the recloser status as well as system conditions such as voltage and current. They also allow for remote control which improves safety, increases reliability, and decreases operational costs.

All installations of three-phase 200K main-line fuses will be replaced with electronic reclosers. In addition, certain main-line 140K fuses and 140K fuses protecting large laterals were selected based on consideration of the length of the zone of protection for the circuit that is overhead (i.e., consideration of the length of the portion of the circuit where damage would cause the fuse to operate). The average zone of protection for the selected 140K fuses included an overhead circuit portion of 1.53 miles as compared with the average of 0.52 miles for other 140K fuses. Consideration was also given to whether the 140K fuse is part of a circuit tie, such that replacement with a recloser will provide greater operational flexibility and capacity during emergency conditions.

CIRCUIT PROTECTION AND SECTOINALIZATION					
	2019	2020	2021	2022	TOTAL
Project Units (Circuits):	39	38	38	37	152
Costs:	\$2.9	\$2.9	\$2.9	\$2.9	\$11.5

Install SCADA Line Devices

JCP&L will remove existing three-phase hydraulic and electronic reclosers and replace them with Elastimold Molded Vacuum Reclosers (“MVR”) with SEL 651 relays (or equivalent). The Company will also install the necessary communication equipment for SCADA. The SCADA to be installed at circuit recloser locations can be used to remotely open and close reclosers to connect and disconnect certain portions of the distribution grid as real-time operating conditions warrant. Advanced reclosers, like the Elastimold MVR, along with SCADA control, enable monitoring of the recloser status as well as system conditions (voltage, current, etc.) in order to more easily identify and respond to customer outages at the circuit level. It also allows real-time decision-making regarding the use of system infrastructure to enable more rapid customer restoration. These enhancements increase worker safety by avoiding the manual operation of devices, enhance reliability, and decrease operational costs. Further, these enhancements are necessary to provide the proposed Advanced Distribution Management System (“ADMS”) discussed below with information regarding the operational conditions and status of the distribution system.

JCP&L will replace all three-phase hydraulic and electronic reclosers with Elastimold MVR and SEL-651 relays (or equivalent).

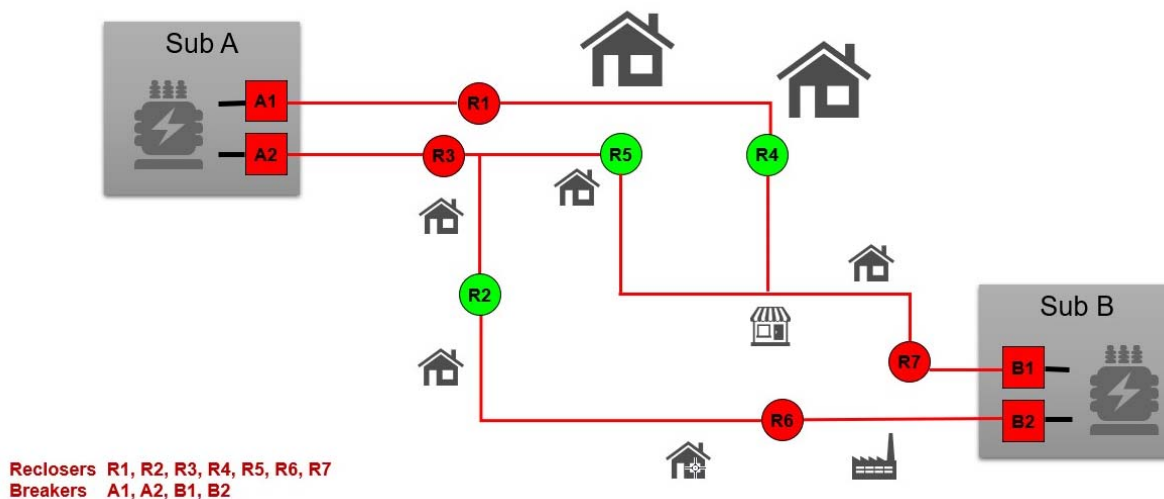
INSTALL SCADA LINE DEVICES					
	2019	2020	2021	2022	TOTAL
Project Units (Poles):	187	189	178	178	732
Costs:	\$11.3	\$11.3	\$11.3	\$11.3	\$45.2

Distribution Automation (Loop Schemes)

JCP&L will construct distribution automation loop schemes with Elastimold MVR reclosers with SEL 651 controls (or equivalent) and will install SCADA control for real-time system monitoring and remote-control capability. Additionally, SCADA that will be installed at circuit recloser locations can be used to open and close reclosers as well as to connect and disconnect certain portions of the distribution grid as real-time operating conditions warrant. The project will target areas of critical customers and provide N-1 capability (i.e., one level of system redundancy).

These loop schemes are designed to automatically transfer customers experiencing an outage to an adjacent circuit in order to restore service. This project thereby provides resiliency benefits. Critical customers are most dependent on reliable energy supply during severe weather events in order to fulfill their critical functions. For this reason, this project will target loop schemes to be installed on circuits that serve critical customer facilities.

The following illustration depicts the addition of protective and tie reclosers on distribution circuits. The installation of circuit ties along with the addition of remote controlled reclosers, are designed to isolate outages to fewer customers and facilitate more timely restoration. For example, if a fault occurred between breaker A2 and recloser R3 prior to the installation of recloser R2, all the customers served from circuit A2 would have experienced a sustained outage. With the construction of the loop schemes, recloser R3 is programmed to open on loss of potential and recloser R2 will close, restoring customers by re-routing the flow of power between reclosers R2 and R3 within 5 minutes.



The installation of reclosers with SCADA control in the loop schemes better positions the JCP&L distribution system for additional grid modernization and automation. Indeed, as with the SCADA Line devices discussed above, these enhancements also provide the proposed ADMS with necessary information regarding the operational conditions and status of the distribution system.

Approximately 75% of the locations selected were identified using a graphical approach, which overlaid all critical customers on a map of all distribution circuits; critical customers include police stations, fire stations, hospitals, city water infrastructure, and similar customers. This visualization highlighted pockets of these critical customers near existing circuit ties, and these pockets were chosen for distribution automation loop scheme implementation. On average, each loop scheme was designed to benefit four critical customers. The remaining locations were selected because of the ability to leverage in a loop scheme strong existing circuit ties.

DISTRIBUTION AUTOMATION (LOOP SCHEMES)					
	2019	2020	2021	2022	TOTAL
Project Units (Circuits):	14	18	12	8	52
Costs:	\$3.1	\$3.8	\$2.9	\$1.9	\$11.7

ADMS and RTU Upgrades

The Company proposes to implement an Advanced Distribution Management System. An ADMS will integrate the SCADA information from various substations and circuit locations into one centralized software system and enhance the Company's data availability by providing the Company's system operators a more complete and aggregate view of the operational conditions on the distribution system.

ADMS benefits customers immediately since the software is capable of advanced, real-time analysis and decision-making, enabling the automatic isolation and restoration of large sections of the grid. The ADMS platform is designed to allow for realization the full benefits of the Distribution Automation projects in JCP&L Reliability Plus. Where customers would have experienced sustained outages in the past, they instead may see only a flicker or momentary outage of their power.

Additionally, the ADMS will also provide a platform for future grid modernization investments in various technologies. The ADMS is a critical component of integrated Volt/VAR control. In addition, ADMS can support the addition of distribution energy resources through a Distributed Energy Resource Management System if implemented in the future, which manages the addition of customer generation sources and integrates their power flow into the distribution system.

In addition to the ADMS, the Company will be installing additional load and voltage monitoring points to gather data via SCADA at the distribution level where no such points or limited points

currently exist and will also be upgrading remote terminal units (“RTUs”) in substations where necessary. Such RTU upgrades include replacing the RTU itself and may involve replacing copper-based communications using technology with superior availability, such as fiber, cellular or radio. This project is designed to enhance reliability by allowing real-time monitoring of loads, voltage and power factor. Additionally, RTUs and associated communication media are the equipment used for service restoration following outages.

The substations were selected to add load and voltage monitoring where it does not exist and to augment existing load and voltage monitoring at stations that serve higher than average numbers of customers and/or load.

ADMS & RTU UPGRADES					
	2019	2020	2021	2022	TOTAL
Project Units (Substations):	0	32	34	36	102
Costs:	\$0.0	\$13.4	\$13.4	\$13.4	\$40.1

Category 4: Underground System Improvements

The three projects within this category will accelerate the replacement of underground cable, replace submersible transformers with above grade pad-mount transformers, and reinforce and rehabilitate underground network and conventional ducted systems. Investment in underground cable and submersible transformers is designed to enhance the reliability of service to the customers served from these systems. When customers experience outages resulting from faults on the underground system, the repairs are typically long in duration since they involve replacement or repair of cable or equipment located underground. In addition, performing this replacement work on a planned, accelerated basis versus an emergency basis, will avoid long unplanned outages and be more convenient to customers.

Underground Cable Replacement

JCP&L will replace selected portions of pre-1986 construction underground cable that contains a non-jacketed concentric neutral cable (“bare concentric neutral” or “BCN”) with new jacketed cable. The associated switches and pad-mount transformers will also be replaced, as needed. In addition, in conjunction with cable replacement, fault indicators will be installed at every transformer location in order to enable a troubleshooter to more easily locate an underground fault. This project addresses certain large residential developments in the Central New Jersey Region with underground infrastructure.

This project is designed to enhance the reliability of the distribution system. The replacement of BCN cable in the JCP&L distribution system with jacketed cable will improve reliability by reducing the frequency of underground cable faults. One of the main causes of underground cable failure typically starts with water ingress into the cable. Water trees are water-filled, tree-like defects, which develop in cable insulation. Water trees initiate at a point of stress, such as a

bend, and grow parallel to the electric field lines. The growth of a water tree causes a reduction of the effective insulation thickness below the point that is required to withstand the electrical stress, eventually causing the cable to fail. In other cases, a damaged or missing concentric neutral results in a concentration of electrical fields at the points of damage, which can also lead to cable failure. The jacketed cable to be installed in JCP&L Reliability Plus will be less susceptible to neutral deterioration and therefore should reduce the frequency of underground cable faults. Underground cable failures often result in prolonged outages since it takes longer to locate and isolate the faults and then make the necessary repairs. The installation of fault indicators will also reduce the time to locate an underground fault which will accelerate the restoration of service following an outage.

As noted above, the areas targeted for underground cable replacement within JCP&L Reliability Plus are primarily large residential developments containing underground cable. Many of these developments are in very large age-restricted communities in the Central New Jersey Region. Some of these communities have over 10,000 homes and were constructed in the mid-sixties. In addition to the residential housing, there are commercial customers and critical health care facilities embedded within these communities as well.

In addition to providing reliability benefits, the project enhances safety by reducing the potential for stray voltage conditions for customers as the BCN cable deteriorates over time. Potential developments to be addressed in this project were identified using a graphical approach, which overlaid pre-1986 underground infrastructure (indicating BCN cable) on a map of all distribution circuits. Underground residential development sections were selected for the project based on consideration of fault frequency and the number of customers.

UNDERGROUND CABLE REPLACEMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Circuits):	4	3	2	3	12
Costs:	\$12.6	\$11.4	\$11.4	\$9.5	\$44.9

Submersible Transformer Replacement

This project will replace submersible transformers with above grade pad-mount transformers. Submersible transformers are installed in underground enclosures and are susceptible to corrosion over time due to salt or other water contaminants. When submersible transformers fail, the damage is typically catastrophic and necessitates replacement of the transformer. In addition, oil spills can occur from submersible transformer failures; such spills require specialized environmental crews to clean up the spill prior to any work being performed. The need to pump water from the underground enclosures along with limited access to the transformer typically results in a lengthy amount of time for replacement while prolonging customer outages. In addition, there can be undetected oil leaks with a submersible transformer, which can cause environmental issues.

The installation of pad-mount transformers is designed to enhance reliability as the pad-mount transformers can be readily inspected and maintained. Above grade transformers are protected in an underground environment, which reduces the likelihood of equipment failure. Oil spills can be readily detected and addressed. Repairs to the more accessible above grade pad-mount transformers can be performed more readily reducing outage durations. JCP&L will focus on replacement of single phase submersible transformers.

SUBMERSIBLE TRANSFORMER REPLACEMENT					
	2019	2020	2021	2022	TOTAL
Project Units (Transformers):	138	0	0	0	138
Costs:	\$3.8	\$0.0	\$0.0	\$0.0	\$3.8

Conventional and Network Underground Rehab

This project will reinforce and rehabilitate JCP&L's underground network and conventional ducted distribution system infrastructure by replacing or upgrading facilities and equipment such as vaults, manholes, covers, duct, cable, transformers and switches. This involves both civil and electrical enhancements. JCP&L has completed similar work on the Morristown network with success and plans to deploy a similar approach, as applicable to other underground systems. JCP&L will also enhance the N-2 capability of the underground network located in Morristown, NJ (*i.e.*, two levels of system redundancy). The Company will install additional underground primary and secondary cable within the Morristown network, and make other reconfiguring enhancements to strengthen N-2 capability. This project will enhance reliability and resiliency and provide system operational flexibility.

Electrical reinforcements are planned for the Morristown underground network system to build on the N-2 capability and improve system resiliency. For the conventional ducted distribution system, the Company targeted locations within urban areas where facilities have deteriorated and require replacement due to age and harsh environmental and weather conditions.

CONVENTIONAL AND NETWORK REHAB					
	2019	2020	2021	2022	TOTAL
Project Units (Circuits):	0	2	2	5	9
Costs:	\$0.0	\$3.4	\$4.4	\$3.1	\$11.0

VI. JCP&L Reliability Plus Benefits

JCP&L Reliability Plus is designed to provide meaningful benefits to customers, both qualitative and quantitative. Many of the qualitative benefits have been discussed above in connection with each project.

To quantify the benefits to customers associated with JCP&L Reliability Plus, the Company used the **Interruption Cost Estimate (“ICE”) tool**, sponsored by the U.S. Department of Energy (“DOE”). This tool was developed by Lawrence Berkeley National Laboratory and Nexant, based on extensive research. The ICE tool is used to estimate the dollar benefits associated with avoided outages and reductions in restoration time.

The results of the ICE tool analysis for JCP&L Reliability Plus are shown in the tables below, reflecting anticipated dollar benefits from improvements in general reliability and in the Company’s ability to restore power following a major storm event, compared with costs (including capital and expense):

Customer Benefit Category	Nominal (\$ millions)				
	Benefits Storm	Benefits Non-Storm	Total	Costs	Benefit/Cost Ratio
Circuit Reliability & Resiliency	\$ 340	\$ 936	\$ 1,276	\$ 133	9.6
Substation Reliability Enhancement	\$ 94	\$ 107	\$ 201	\$ 90	2.2
Distribution Automation	\$ 33	\$ 368	\$ 401	\$ 115	3.5
Underground System Improvements	\$ -	\$ 26	\$ 26	\$ 62	0.4
Total JCP&L Reliability Plus	\$ 467	\$ 1,438	\$ 1,905	\$ 400	4.8

Note that the DOE ICE tool limits storm benefits to 24 hours

Customer Benefit Category	Nominal (\$ millions)			NPV (\$ in millions)		
	Benefits	Costs	Benefit/Cost Ratio	Benefits	Costs	Benefit/Cost Ratio
Circuit Reliability & Resiliency	\$ 1,276	\$ 133	9.6	\$ 802	\$ 112	7.1
Substation Reliability Enhancement	\$ 201	\$ 90	2.2	\$ 72	\$ 75	1.0
Distribution Automation	\$ 401	\$ 115	3.5	\$ 143	\$ 95	1.5
Underground System Improvements	\$ 26	\$ 62	0.4	\$ 9	\$ 52	0.2
Total JCP&L Reliability Plus	\$ 1,905	\$ 400	4.8	\$ 1,027	\$ 335	3.1

Note that the DOE ICE tool limits storm benefits to 24 hours

These results demonstrate that JCP&L Reliability Plus is expected to produce substantial quantitative benefits for customers and a positive nominal benefit to cost ratio in three of the four project categories. While the estimated benefit to cost ratio for Underground System Improvements is less than 1.0 on a nominal basis, JCP&L believes that accelerated work in this category is necessary to avert anticipated future increases in cable failures, power quality issues and potential safety issues related to aging concentric neutral underground cable. Not surprisingly, it is costly to install underground service and, in this case, to replace underground service in the targeted underground residential developments. Therefore, it likewise should not be surprising that the analysis indicates a lower benefit to cost ratio for this category. Nonetheless, these projects are important to service quality for customers in underground residential developments and are a key component to general infrastructure replacement and renewal. Many of these developments are in very large age-restricted communities in the Central New Jersey Region.

The Company performed the cost benefit analysis using the ICE tool as follows. First, the Company analyzed the historical outage information for circuits addressed in JCP&L Reliability

Plus projects for the period 2012 through 2017 to develop bases for measurement of reliability improvement in terms of SAIDI, i.e., the average outage duration for each customer served, and SAIFI, i.e., the average number of interruptions that customers experience, for both storm and non-storm periods. Next, the Company used the approach set forth in a 2008 report published by the Electric Power Research Institute (“EPRI”) entitled “*Quantifying Distribution Reliability Benefits*” (at pages 3-1 to 3-2) as a framework for the Company’s estimation of reliability improvements upon installation of distribution system equipment included in JCP&L Reliability Plus. Specifically, the EPRI methodology was used to estimate reductions CMI (i.e., the total outage minutes that customers experience) and Customers Interrupted (“CI”) (i.e., the total number of customers that experience an outage). These results were used to develop post-plan SAIDI estimates and post-plan SAIFI estimates in both non-storm and major storm periods.

The SAIDI and SAIFI bases and SAIDI and SAIFI post-plan estimates for non-storm and major storm periods discussed above are inputs to the ICE tool. The ICE tool uses these inputs to quantify the dollar benefits to customers from proposed distribution system enhancements. The ICE tool also uses inputs that are specific to the Company, such as number of customers and average annual energy usage by customer class, as well as certain state specific inputs determined by the DOE, such as number of commercial and industrial customers in certain industries, median household income, and time of day outage information, to quantify dollar benefits.

In addition to the quantitative benefits, there are numerous qualitative benefits associated with JCP&L Reliability Plus. JCP&L Reliability Plus projects are intended to reduce and shorten customer outages under normal and major storm conditions. Aspects of JCP&L Reliability Plus will harden substations against flood damage, so there will be fewer outages when severe weather occurs. Aspects of JCP&L Reliability Plus enhance distribution system resiliency, so power can be rerouted and temporary faults cleared quickly so that customer outage durations will be reduced. These initiatives also increase restoration efficiency as the same number of resources may focus on fewer outages, thereby further reducing restoration times. Enhanced vegetation management will also reduce the impacts from tree on the distribution system during severe weather events, such as broken poles and downed conductors, enhancing employee and public safety. Other qualitative benefits include the direct creation of jobs needed to implement JCP&L Reliability Plus and the indirect economic stimulus that such increased labor will generate. In addition, over the duration of JCP&L Reliability Plus, JCP&L will likely utilize additional contractor line, substation and forestry personnel and these resources will be able to support storm restoration work, if and as required. Finally, JCP&L Reliability Plus supports future smart grid operations and enhanced communications that enhance reliability and safety.

VII. Conclusion

JCP&L's overall reliability has steadily improved over more than a decade. Nonetheless, the frequency and severity of catastrophic major storms in recent years in New Jersey reinforces the current need for JCP&L Reliability Plus. Already in 2018, JCP&L has experienced three major storms in March described above.

The projects in JCP&L Reliability Plus are designed to reduce the number of outages in such events and enhance the ability of the Company to more rapidly restore service when outages do occur, and enhance the overall reliability, resiliency and safety of the distribution system throughout the year in all conditions. They will also facilitate the development and installation of future smart grid technologies. JCP&L Reliability Plus will bring economic benefits to New Jersey, including job growth. JCP&L Reliability Plus will also provide cost savings to JCP&L customers by proactively and efficiently performing the work that may have been performed during emergencies. JCP&L Reliability Plus will generate millions of dollars in storm and reliability benefits to customers through a portfolio of projects that have a positive benefit cost ratio.

In sum, JCP&L Reliability Plus will allow JCP&L to accelerate its investment in projects that upgrade, harden and increase the operational flexibility of its distribution system, which will enable JCP&L to provide customers with enhanced service which is safer, more reliable, and resilient which will provide substantial quantifiable benefits to customers.

Capital Summary					
Capital Category	2013	2014	2015	2016	2017
Base Capital	\$107,227,868	\$172,325,199	\$159,351,397	\$133,319,066	\$136,552,001
Customer Requested Work	\$25,597,520	\$40,733,877	\$41,279,947	\$45,835,429	\$40,172,508
Storms/Damage Claims	\$30,184,412	(\$4,334,313)	\$5,160,994	\$27,525,036	\$14,282,657
Total Capital	\$163,009,800	\$208,724,763	\$205,792,337	\$206,679,531	\$191,007,165

Base Capital By Major Category					
Major Category	2013	2014	2015	2016	2017
Metering	\$3,511,323	\$9,557,573	\$8,684,953	\$6,353,165	\$5,227,588
Other	\$26,614,703	\$11,741,883	\$21,596,120	\$2,236,139	\$6,282,655
Replacements & Improvements	\$41,790,206	\$77,918,555	\$69,752,522	\$69,740,591	\$70,218,984
Vegetation Management	\$7,264,569	\$14,075,284	\$13,251,603	\$12,447,966	\$12,777,019
Reliability	\$12,628,563	\$32,815,760	\$25,092,479	\$25,598,458	\$17,093,356
Street Lighting	\$6,537,720	\$7,418,273	\$6,155,755	\$5,980,031	\$6,177,456
System Reinforcements	\$6,936,747	\$13,351,075	\$8,710,174	\$7,067,841	\$6,572,484
Facilities	\$471,848	\$880,785	\$2,362,541	\$2,178,677	\$9,653,947
Tools & Equipment	\$1,472,189	\$4,566,009	\$3,745,250	\$1,716,197	\$2,548,511
Total Base Capital	\$107,227,868	\$172,325,199	\$159,351,397	\$133,319,066	\$136,552,001

Ratio of Similar Base Capital to JCP&L Reliability Plus				
Capital Baseline	2019	2020	2021	2022
Proposed Baseline Capital ¹	\$141,000,000	\$141,000,000	\$141,000,000	\$141,000,000
Base Capital Similar to JCP&L Reliability Plus²				
Distribution Automation	\$3,700,000			
Overhead Circuit Reliability and Resiliency	\$8,300,000			
Underground System Improvements	\$3,800,000			
Substation Reliability Enhancement	\$2,500,000			
Total Base Capital Similar to IIP	\$18,300,000	\$10,200,000	\$10,000,000	\$9,600,000
IIP Capital	\$89,186,659	\$101,580,000	\$99,610,000	\$96,436,000
Base Capital to Total IIP	21%	10%	10%	10%
(1) Proposed baseline is a 5-year average of 2013 - 2017 base capital spend				
(2) Company acknowledges it must maintain capital expenditures in base capital at least equal to 10% of JCP&L Reliability Plus				

JCP&L Capital Expenditure Summary 2013-2022
 Identified By Major Categories

Schedule DP-2

	2013	2014	2015	2016	2017
Metering	3,511,323	9,557,573	8,684,953	6,353,165	\$5,227,588
Other	26,614,703	11,741,883	21,596,120	2,236,139	\$6,282,655
Replacements & Improvements	\$41,790,206	\$77,918,555	\$69,752,522	\$69,740,591	\$70,218,984
Vegetation Management	\$7,264,569	\$14,075,284	\$13,251,603	\$12,447,966	\$12,777,019
Reliability	\$12,628,563	\$32,815,760	\$25,092,479	\$25,598,458	\$17,093,356
Street Lighting	\$6,537,720	\$7,418,273	\$6,155,755	\$5,980,031	\$6,177,456
System Reinforcements	\$6,936,747	\$13,351,075	\$8,710,174	\$7,067,841	\$6,572,484
Facilities	\$471,848	\$880,785	\$2,362,541	\$2,178,677	\$9,653,947
Tools & Equipment	\$1,472,189	\$4,566,009	\$3,745,250	\$1,716,197	\$2,548,511
Total Base Capital	\$107,227,868	\$172,325,199	\$159,351,397	\$133,319,066	\$136,552,001
Damage Claims	\$6,610,309	\$8,878,243	\$3,758,234	\$5,095,480	\$4,531,516
Joint Use	\$318,686	\$1,959,592	\$2,668,493	\$1,644,550	\$519,163
New Business	\$20,700,005	\$38,228,291	\$36,127,765	\$42,018,410	\$37,721,964
Relocations	\$4,578,829	\$545,995	\$2,483,689	\$2,172,469	\$1,931,381
Storms	\$23,574,103	(\$13,212,557)	\$1,402,760	\$22,429,556	\$9,751,141
Total Other Than Base Capital	\$55,781,933	\$36,399,564	\$46,440,941	\$73,360,465	\$54,455,164
Total Distribution	\$163,009,800	\$208,724,763	\$205,792,337	\$206,679,531	\$191,007,165

JCP&L Capital Expenditure Summary 2013-2022
 Identified By Major Categories

Schedule DP-2

	2018	2019	2020	2021	2022
Metering	5,997,837	6,218,359	6,595,985	6,684,718	\$6,894,436
Other	290,834	(1,067,977)	4,973,208	682,922	\$18,258,480
Replacements & Improvements	\$64,171,274	\$54,772,958	\$60,408,007	\$62,035,292	\$63,192,568
Vegetation Management	\$21,200,248	\$22,011,184	\$24,640,886	\$25,099,279	\$24,370,329
Reliability	\$36,030,661	\$35,016,839	\$36,923,105	\$34,661,378	\$36,069,087
Street Lighting	\$11,221,624	\$10,521,235	\$11,435,071	\$11,572,940	\$12,063,430
System Reinforcements	\$4,060,580	\$7,520,877	\$8,792,920	\$7,516,954	\$7,598,165
Facilities	\$843,148	\$3,096,034	\$1,027,856	\$952,874	\$892,526
Tools & Equipment	\$3,658,908	\$3,547,061	\$3,403,235	\$5,406,562	\$5,406,287
Total Base Capital	\$147,475,114	\$141,636,570	\$158,200,272	\$154,612,918	\$174,745,308
Damage Claims	\$1,606,936	\$1,999,106	\$2,061,312	\$2,020,277	\$2,241,823
Joint Use	\$1,116,606	\$1,162,395	\$1,207,508	\$1,139,690	\$1,212,417
New Business	\$34,300,409	\$34,035,044	\$34,204,537	\$33,892,889	\$35,548,822
Relocations	\$2,529,457	\$2,693,793	\$2,899,269	\$2,797,743	\$2,921,055
Storms	\$4,080,034	\$4,108,351	\$4,344,907	\$4,640,998	\$4,867,355
Total Other Than Base Capital	\$43,633,442	\$43,998,689	\$44,717,533	\$44,491,597	\$46,791,472
Total Distribution	\$191,108,556	\$185,635,258	\$202,917,805	\$199,104,515	\$221,536,779

		<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>Total</u>
January	2019	\$2,423,494				\$2,423,494
February	2019	\$4,839,765				\$4,839,765
March	2019	\$6,309,467				\$6,309,467
April	2019	\$7,316,878				\$7,316,878
May	2019	\$7,516,878				\$7,516,878
June	2019	\$8,822,378				\$8,822,378
July	2019	\$7,967,378				\$7,967,378
August	2019	\$7,626,878				\$7,626,878
September	2019	\$7,698,128				\$7,698,128
October	2019	\$7,698,128				\$7,698,128
November	2019	\$7,784,563				\$7,784,563
December	2019	\$10,271,689				\$10,271,689
January	2020		\$5,445,479			\$5,445,479
February	2020		\$6,586,373			\$6,586,373
March	2020		\$7,054,453			\$7,054,453
April	2020		\$8,220,362			\$8,220,362
May	2020		\$8,220,362			\$8,220,362
June	2020		\$8,220,362			\$8,220,362
July	2020		\$7,679,362			\$7,679,362
August	2020		\$7,581,362			\$7,581,362
September	2020		\$8,256,362			\$8,256,362
October	2020		\$8,256,362			\$8,256,362
November	2020		\$8,727,362			\$8,727,362
December	2020		\$11,745,100			\$11,745,100
January	2021			\$5,149,089		\$5,149,089
February	2021			\$6,279,459		\$6,279,459
March	2021			\$6,573,453		\$6,573,453
April	2021			\$7,739,362		\$7,739,362
May	2021			\$7,739,362		\$7,739,362
June	2021			\$11,539,362		\$11,539,362
July	2021			\$7,739,362		\$7,739,362
August	2021			\$7,964,362		\$7,964,362
September	2021			\$8,414,362		\$8,414,362
October	2021			\$8,616,362		\$8,616,362
November	2021			\$8,616,362		\$8,616,362
December	2021			\$7,945,100		\$7,945,100

JCP&L Reliability Plus Net Plant In Service 2019-2022

Schedule DP-3

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>Total</u>
January 2022				\$5,244,452	\$5,244,452
February 2022				\$6,617,186	\$6,617,186
March 2022				\$6,766,322	\$6,766,322
April 2022				\$8,081,377	\$8,081,377
May 2022				\$8,081,377	\$8,081,377
June 2022				\$10,266,377	\$10,266,377
July 2022				\$7,631,377	\$7,631,377
August 2022				\$7,631,377	\$7,631,377
September 2022				\$7,631,377	\$7,631,377
October 2022				\$7,631,377	\$7,631,377
November 2022				\$7,631,377	\$7,631,377
December 2022				\$27,013,753	\$27,013,753
Total	\$86,275,622	\$95,993,305	\$94,316,000	\$110,227,732	\$386,812,659

**BEFORE THE
NEW JERSEY BOARD OF PUBLIC UTILITIES**

**In The Matter Of The Verified Petition Of Jersey Central
Power & Light Company For Approval Of An
Infrastructure Investment Program
(JCP&L Reliability Plus)**

BPU Docket No. _____

**Direct Testimony
Of
Mark A. Mader**

**On Behalf Of
Jersey Central Power & Light Company**

July 13, 2018

**DIRECT TESTIMONY OF MARK A. MADER ON BEHALF OF
JERSEY CENTRAL POWER & LIGHT COMPANY**

1 **Q. Please state your name and business address.**

2 A. My name is Mark A. Mader and my business address is 300 Madison Ave, Morristown,
3 NJ 07960.

4 **Q. By whom are you employed and in what capacity?**

5 A. I am employed by FirstEnergy Service Company and my title is Director of Rates &
6 Regulatory Affairs. My principal responsibilities are for electric distribution utility rates
7 and regulatory matters involving the New Jersey Board of Public Utilities (“BPU” or
8 “Board”). The Rates Department, whose activities I direct, performs services for Jersey
9 Central Power & Light Company (the “Company” or “JCP&L”), including, but not
10 limited to the determination of jurisdictional cost of service, rate design, regulatory
11 reporting, base rate case preparation and providing testimony for the Company before the
12 BPU. My qualifications are set forth in detail in Appendix A to my direct testimony.

13 **Q. Have you previously testified in BPU proceedings?**

14 A. Yes. I testified on behalf of JCP&L in its two most recent base rate cases, in BPU Docket
15 Nos. ER16040383 and ER12111052.

16 **Q. Please describe the purpose of your direct testimony.**

17 A. JCP&L proposed an infrastructure investment program, which it calls JCP&L Reliability
18 Plus, in its Petition filed with the Board. In my direct testimony, I will address the
19 revenue requirements calculation for JCP&L Reliability Plus, the associated cost
20 recovery methodology, cost of removal and the requirements of the Board’s rules
21 regarding JCP&L Reliability Plus rate filings, bill impacts, and tariffs. In addition, I will
22 discuss JCP&L’s forecasted depreciation expense and a proposed adjustment to Pension

1 and OPEB expense for purposes of the earnings test. My testimony provides detailed
2 schedules setting forth the proposed project revenue requirements, estimated rates and
3 projected bill impacts over the Program’s proposed four-year life.

4 **Q. Please briefly describe JCP&L’s proposed cost recovery methodology for JCP&L**
5 **Reliability Plus.**

6 A. The Company is proposing to recover the revenue requirements through a separate clause
7 of its tariff, Rider RP- JCP&L Reliability Plus Charge (“Rider RP”) via semi-annual rate
8 filings. This proposal is consistent with the Board’s recently adopted Infrastructure
9 Investment and Recovery (“II&R”) rules, codified at *N.J.A.C. 14:3-2A.1 et seq.* See
10 *N.J.A.C. 14:3-2A.6(a)* and (d). The details of the costs to be recovered, as well as the rate
11 mechanism to recover such costs, are set forth below in this testimony.

12 **Revenue Requirements**

13 **Q. How does JCP&L propose to calculate the revenue requirements?**

14 A. For each rate filing, JCP&L proposes to calculate the revenue requirements associated
15 with the Program costs using the following formula:

$$\begin{aligned} \text{Revenue Requirements} &= [(Pre\text{-}Tax\ Cost\ of\ Capital * Rate\ Base) \\ &+ Depreciation\ and/or\ Amortization] \end{aligned}$$

18 The Company will also apply the appropriate factor to collect applicable sales and use tax
19 (“SUT”).

20 **Q. Please describe the components of JCP&L’s proposed revenue requirement**
21 **calculation.**

22 A. The “Pre-Tax Cost of Capital * Rate Base” component provides recovery of the
23 return *on* the JCP&L Reliability Plus investment. The term “Pre-Tax Cost of Capital”

1 means JCP&L’s pre-tax overall weighted average cost of capital (“WACC”) for the
 2 Program. JCP&L proposes to earn a return on its net investment in JCP&L Reliability
 3 Plus based upon an authorized return on equity (“ROE”) and capital structure including
 4 income tax effects. The Company’s initial WACC for the Program will be based on the
 5 ROE, long-term debt and capital structure approved by the Board on December 12, 2016
 6 in the 2016 JCP&L base rate case, BPU Docket No.ER16040383. JCP&L proposes the
 7 initial pre-tax WACC to be 9.16 percent. See Schedule MAM-1 for the calculation of the
 8 current Pre-Tax and After-Tax WACC. Any change in the WACC authorized by the
 9 Board in a subsequent base rate case will be reflected in the subsequent revenue
 10 requirement calculations and subsequent rate adjustment filings for JCP&L Reliability
 11 Plus. Any changes to current tax rates will be reflected in an adjustment to the WACC.

12 The term “Rate Base” refers to all plant constructed and in-service (“Plant In-
 13 Service”) less the associated accumulated depreciation and/or amortization and less
 14 Accumulated Deferred Income Taxes (“ADIT”). The book recovery of each asset class
 15 and its associated tax depreciation will be based on current depreciation rates.

JERSEY CENTRAL POWER & LIGHT COMPANY		
Calculated Annual Depreciation Accruals Related to Distribution Plant (as of December 31, 2012)		
	Distribution Plant	Annual Accrual Rate (%)
360.12	Distribution Substation Easements	1.31
360.22	Distribution Line Easements	0.73
361.00	Structures and Improvements	0.71
362.00	Substation Equipment	1.25
364.00	Poles, Towers and Fixtures	2.15
365.00	Overhead Conductors and Devices	1.93
365.10	Overhead Conductors and Devices - Clearing	1.56
366.00	Underground Conduit	1.27
367.00	Underground Conductors and Devices	1.61
368.00	Line Transformers	2.42
369.00	Services	1.21
370.00	Meters	4.77
371.00	Installations on Customer Premises	3.71
373.00	Street Lighting and Signal Systems	2.86
Total Distribution Plant		1.94

16

1 ADIT is calculated as Book Depreciation less Tax Depreciation, multiplied by the
2 statutory composite federal and state income tax rate, which is currently 28.11%. Any
3 future changes to the book or tax depreciation rates during the Program construction
4 period and at the time of each rate adjustment, will be reflected in the accumulated
5 depreciation and/or ADIT calculation described above.

6 The “Depreciation and/or Amortization” component provides for recovery *of* the
7 Company’s investment in the JCP&L Reliability Plus assets over the useful book life of
8 each asset class. The book recovery of each asset class will be based on current
9 depreciation rates. (See chart above). For Plant In-Service, the depreciation expense is
10 calculated as the book depreciation expense. Any future changes to the book
11 depreciation or tax rates during the construction period of the Program and at the time of
12 each rate adjustment filing, will be reflected in the depreciation expense calculation
13 described above.

14 Uncollectible expense associated with JCP&L Reliability Plus is not included in
15 the Revenue Requirement because it will be recovered along with other uncollectible
16 expenses in existing Rider UNC.

17 **Q. Please describe the type of expenditures to be included in Rate Base.**

18 A. Rate Base to be recovered includes all capital expenditures associated with the JCP&L
19 Reliability Plus projects, including actual costs of engineering, design, construction, and
20 property acquisition, including actual labor, materials, overhead, and capitalized AFUDC
21 associated with the projects (the “Capital Investment Costs”). Capital Investment Costs
22 will be recorded in an associated CWIP account during construction and then in a Plant
23 In-Service account upon the respective project being deemed used and useful.

1 **Q. Does Rate Base or Depreciation include costs of removal (net of salvage)?**

2 A. No. The Board has previously determined that JCP&L should recover cost of removal
3 (net of salvage, hereinafter “COR”) through a base rate allowance based on an average of
4 five years of COR expense. Therefore, the Company is not able to propose recovery via
5 the accelerated cost recovery mechanism for the cost of removal associated with JCP&L
6 Reliability Plus. I discuss the Company’s proposal for recovery of JCP&L Reliability
7 Plus-related cost of removal in my testimony below.

8 **Q. Will any of the JCP&L Reliability Plus expenditures be eligible for AFUDC?**

9 A. Yes, they will. The Board’s II&R rule at *N.J.A.C. 14:3A-2A.4(e)* recognizes AFUDC as a
10 component of construction costs representing the net cost of borrowed funds and an
11 equity return rate used during the period of construction. AFUDC will be applied to
12 capitalized costs for any and all projects that that have been started, but not placed in
13 service within the same calendar month.

14 **Q. How will AFUDC be calculated on eligible projects?**

15 A. The Company accrues AFUDC on eligible projects utilizing the “full FERC method” as
16 set forth in FERC Order 561. AFUDC is accrued monthly and capitalized to CWIP until
17 the project is placed in service.

18 **Q. Will the Company utilize AFUDC once the projects are placed in service?**

19 A. No. The Company will not accrue any AFUDC on projects that have already been placed
20 in service. This is consistent with the Board’s II&R rules at *N.J.A.C. 14:3A-2A.4(e)*.

21 **Q. Will any CWIP balances be included in the revenue requirement calculation?**

22 A. No. Consistent with *N.J.A.C. 14:3-2A.6(a)*, and as discussed above, only Plant In Service
23 is included in Rate Base in the revenue requirement calculation, meaning plant that is

1 functioning for its intended purpose, is in use (i.e., not under construction), and useful
2 (i.e., actively helping the Company provide efficient service). Thus, the Company's
3 semi-annual filings will seek recovery only for projects identified in JCP&L Reliability
4 Plus that have been placed in Plant In Service.

5 **Q. Is there a witness sponsoring the capital expenditures that you use to calculate**
6 **revenue requirements?**

7 A. Yes. The projected expenditures for the Program projects are provided by Company
8 witness Pavagadhi in Schedule PD-3 to his direct testimony (Exhibit JC-2).

9 **Q. Does the revenue requirements calculation reflect the pertinent provisions of the**
10 **Tax Cut and Jobs Act?**

11 A. Yes. The revenue requirement reflects the new federal corporate tax rate of 21%. Tax
12 depreciation uses Modified Accelerated Recovery Systems ("MACRS") depreciation
13 rules without bonus depreciation.

14 **Q. Have you provided a schedule showing the calculation of the revenue requirements?**

15 A. Yes. Schedule MAM-2 to this direct testimony sets forth an illustrative calculation of the
16 JCP&L Reliability Plus revenue requirements for semi-annual periods, which I have
17 calculated based on the forecasted capital costs and in-service dates provided by Mr.
18 Pavagadhi in Schedule DP- 3 to his direct testimony (Exhibit JC-2).

19 **Q. Does the Company propose annual baseline capital spending levels over the**
20 **duration of JCP&L Reliability Plus (see N.J.A.C. 14:3-2A.3(a) and (b) and 14:3-**
21 **2A.5(b)6))?**

22 A. Yes. The Company proposes annual baseline capital spending levels for its JCP&L
23 Reliability Plus Program over its duration as set forth in Schedule DP-1 to Mr.

1 Pavagadhi's testimony. While the Company plans to meet the baseline capital spending
2 level on a program-year basis, the Company nonetheless will meet the requirements in
3 the regulations regarding baseline capital spending levels; provided its baseline capital
4 spending meets or exceeds the establish baseline capital spending level, on average, over
5 the four-year duration of JCP&L Reliability Plus.

6 **Q. What is the basis for the Company's proposed annual baseline capital spending**
7 **levels?**

8 **A.** The establishment of annual baseline spending levels is a regulatory condition on the
9 approval of an infrastructure investment program, such as Reliability Plus. As set forth in
10 the II&R Rules, the annual baseline spending levels are the level of capital investment
11 that must be maintained throughout the term of JCP&L Reliability Plus that can only be
12 recovered via base rates. *N.J.A.C. 14:3-2A.3(a)*. During the term of JCP&L Reliability
13 Plus, the Company proposes base capital expenditures of \$141 as its annual baseline. The
14 baseline was established using a 5-year historical average of base capital expenditures, as
15 set forth in Schedule DP-1 to the testimony of Mr. Pavagadhi. The base capital excludes
16 certain capital expenditures, such as customer requested work, storm costs and damage
17 claims, which are uncontrollable costs for services provided on demand and/or request
18 and consequently are not appropriate to include in the baseline.

19 The Company's approach is consistent with *N.J.A.C. 14:3-2A.3(b)*, which
20 requires the utility to provide appropriate data to justify its proposed annual baseline
21 spending levels, which may include historical capital expenditure budgets, projected
22 capital expenditure budgets, depreciation expense, and/or any other data relevant to the
23 utility's proposed baseline spending level. *N.J.A.C. 14:3-2A.3(c)* provides that the Board

1 may consider such data, including depreciation expenses, in establishing annual baseline
2 spending levels.

3 **Q. Does the Company plan to make capital expenditures, within its baseline capital**
4 **expenditures, on projects similar to those included in JCP&L Reliability Plus that**
5 **will not be recovered via the accelerated rate recovery mechanism?**

6 A. Yes, the Company plans to maintain capital expenditures of at least 10% of the approved
7 JCP&L Reliability Plus expenditures on projects similar to those proposed in JCP&L
8 Reliability Plus. These capital expenditures will be made in the normal course of
9 business and recovered in future base rate proceedings. Such capital expenditures will not
10 be recovered via the accelerated rate recovery mechanism described in this direct
11 testimony, which is consistent with the II&R rules, *N.J.A.C. 14:3-2A.2(c)*. This is
12 demonstrated in Schedule DP-1B to Mr. Pavagadhi's direct testimony (Exhibit JC-2).

13 **Cost of Removal**

14 **Q. How does JCP&L currently recover COR?**

15 A. JCP&L currently recovers cost of removal through an annual base rate allowance that is
16 based on a lagging 5-year average of COR expense. This methodology was an outcome
17 of its 2002 base rate case (BPU Docket No. ER02080506, dated May 17, 2004).
18 Previously, JCP&L collected cost of removal through its depreciation rates. Further, in
19 this May 17, 2004 order, the BPU identified \$150,191,114 as "excess cost of removal"
20 associated with transmission and distribution plant. As a result, JCP&L established a
21 regulatory liability for customer refunds that it is amortizing over 34.3 years (the average
22 remaining life of its distribution assets) and included in its most recent test year is an

1 annual refund to customers of \$3,124,157. The balance of the distribution-related excess
2 cost of removal liability was \$96,155,295 at May 31, 2018.

3 **Q. Does JCP&L’s current method of recovery of COR provide adequate recovery for**
4 **the projects that are considered for accelerated investment under JCP&L**
5 **Reliability Plus?**

6 A. No. Current recovery of COR through base rates on a historic 5-year average
7 (determined at the time of the last base rate case) should provide for recovery of COR
8 associated with baseline expenditures, but does not provide recovery of the COR related
9 to accelerated JCP&L Reliability Plus investments. The result is contrary to the stated
10 intent of the II&R rules, which “is to provide a rate recovery mechanism that encourages
11 and supports necessary accelerated construction, installation, and rehabilitation of certain
12 utility plants and equipment.” (N.J.A.C. 14:3-2A.1(b))

13 **Q. Can JCP&L sufficiently recover its JCP&L Reliability Plus-related COR during the**
14 **pendency of the program by filing a base rate case?**

15 A. No, filing a base rate case would not be sufficient to correct this issue. Even if JCP&L
16 were to file a base rate case after the first year of JCP&L Reliability Plus to adjust the
17 level of COR in base rates, JCP&L would only realize one-fifth of the annual increase in
18 its COR expense, due to the 5-year average methodology. To realize the full annual
19 increase in COR expense in base rates, JCP&L first would have to experience 5-years of
20 increased COR expense before filing a base rate case.

1 **Q. Is this an issue for other electric utilities?**

2 A. For utilities that recover COR through depreciation rates, this is not an issue. COR
3 expenses are credits to the depreciation reserve (balance sheet) and only impact expense
4 through future changes in depreciation rates.

5 **Q. Has the BPU provided special consideration for COR in other utility infrastructure**
6 **filings?**

7 A. Yes. In some cases, the BPU has approved a return on the COR investment in the
8 revenue requirement for the infrastructure program, which return was included in the
9 calculation of the JCP&L Reliability Plus revenue requirement.

10 **Q. Is the Company requesting a return on its JCP&L Reliability Plus-related COR?**

11 A. No. Because JCP&L does not recover COR through depreciation rates, COR is not
12 included in the depreciation reserve and, therefore, is not included in rate base where a
13 return would be applied.

14 **Q. What recovery is the Company proposing for JCP&L Reliability Plus-related COR?**

15 A. JCP&L is proposing to debit the excess cost of removal liability for the JCP&L
16 Reliability Plus-related cost of removal. As discussed above, as of May 31, 2018,
17 JCP&L has approximately \$96 million dollars in excess cost of removal liability that is
18 being returned to customers over time. This amount could be used to offset COR
19 associated with JCP&L Reliability Plus, since the funds in this liability were previously
20 collected from customers for future removal costs. Therefore, applying these amounts
21 against JCP&L Reliability Plus-related COR would use these amounts for the intended
22 purpose and encourage investment in projects to produce reliability, resiliency and safety

1 benefits consistent with the II&R rules without impacting customer rates during the
2 period of the Program.

3 **Q. Would JCP&L otherwise continue to amortize the credit in base rates?**

4 A. Yes. JCP&L's estimated COR associated with JCP&L Reliability Plus and the
5 amortization of the COR in base rates will not exhaust the liability before its next base
6 rate case. At the time of its next base rate case, JCP&L will adjust the amortization of the
7 remaining balance, as necessary.

8 **Q. How might the Company's proposed JCP&L Reliability Plus program be impacted
9 if the as-filed Program or COR proposal is subject to modification proposals?**

10 A. The Company reserves the right to modify or withdraw JCP&L Reliability Plus.

11 **Rate Filings**

12 **Q. How does the Company propose to recover the revenue requirements as described
13 above?**

14 A. The Company proposes to recover the revenue requirements associated with the Program
15 through a rate adjustment filing no more frequently than a semi-annual basis, consistent
16 with the BPU II&R Rules, *N.J.A.C. 14:3-2A.6(a)*. As stated in Mr. Pavagadhi's direct
17 testimony, the Company plans to begin work on or about January 1, 2019. The Company
18 anticipates that its first semi-annual rate filing will provide for recovery of revenue
19 requirements for plant placed into service through July 31, 2019, with rates taking effect
20 on November 1, 2019.

21 Based on the forecasted capital expenditures and in-service dates, the target
22 schedule for semi-annual rate filings is listed below. The Company reserves the right to
23 deviate from this schedule, based on unforeseen circumstances, such as material and/or

1 construction delays and major storms; provided however, it meets the filing requirements
 2 of the regulations.

JCP&L Reliability Plus Target Rate Filing Schedule				
Filing	Initial Filing	Investment as of	Update for Actuals	Rates Effective
1	May 15, 2019	July 31, 2019	August 15, 2019	November 1, 2019
2	November 15, 2019	January 31, 2020	February 15, 2020	May 1, 2020
3	May 15, 2020	July 31, 2020	August 15, 2020	November 1, 2020
4	November 15, 2020	January 31, 2021	February 15, 2021	May 1, 2021
5	May 15, 2021	July 31, 2021	August 15, 2021	November 1, 2021
6	November 15, 2021	January 31, 2022	February 15, 2022	May 1, 2022
7	May 15, 2022	July, 31, 2022	August 15, 2022	November 1, 2022
8	November 15, 2022	January 31, 2023	February 15, 2023	May 1, 2023

3
 4 Consistent with *N.J.A.C. 14:3-2A.6(d)*, the Company proposes to recover its costs for
 5 JCP&L Reliability Plus through a separate rate clause of its tariff, Rider RP. Under the
 6 proposed schedule, changes to the rates in Rider RP would occur no more frequently than
 7 each November 1 and May 1, following the above-identified filings with the Board.

8 **Q. Is each JCP&L Reliability Plus rate filing conditioned on a minimum level of**
 9 **investment?**

10 A. Yes. Each rate filing will include a minimum investment level of ten percent (10%) of
 11 the total Program capital investment consistent with the BPU II&R rules, *N.J.A.C. 14:3-*
 12 *2A.6(b)*. The Program investment is defined as all capital expenditures, excluding
 13 AFUDC. Based on the proposed expenditure forecast for JCP&L Reliability Plus,
 14 JCP&L’s initial filing is planned for May 15, 2019 for rates effective November 1, 2019.

1 **Q. Will the rate requests to recover additional JCP&L Reliability Plus investments be**
2 **subject to an earnings test?**

3 A. Yes, the Company will include an appropriate earnings test in each rate filing to adjust
4 Rider RP rates. If the Company exceeds the allowed ROE from the utility's last base rate
5 case by fifty (50) basis points or more for the most recent twelve (12) month period, the
6 pending full rate adjustment shall not be allowed for the applicable filing period.

7 **Q. Should JCP&L's ROE exceed the earnings test threshold (i.e., its most recent**
8 **authorized ROE plus 50 basis points), when would JCP&L be permitted to recover**
9 **on the incremental capital investment?**

10 A. Should JCP&L's ROE exceed the earnings test threshold, JCP&L would continue to
11 recover on its capital investments associated with JCP&L Reliability Plus that have
12 already been included in Rider RP; however, it would only be permitted to recover
13 additional capital investments under JCP&L Reliability Plus in Rider RP once its ROE
14 was equal to or below the earnings test threshold or at the conclusion of its next base rate
15 case, whichever comes first.

16 **Q. How does the Company propose to calculate this earnings test?**

17 A. The earnings test shall be determined based on the actual net income of the utility for the
18 most recent twelve (12) month period divided by the average of the beginning and ending
19 common equity balances for the corresponding period, subject to certain adjustments.
20 See *N.J.A.C. 14:3-2A.6(h)*. The Company will utilize FERC accounting data from the
21 twelve (12) month period. In a manner similar to capital expenditures, the Company will
22 provide nine (9) months of actual data and three (3) months of forecast data at the time of
23 its initial filing. The three (3) months of forecasted data will be updated with actual

1 information at the same time the Company updates investment for actual periods as set
2 forth in the schedule above.

3 **Q. What adjustment does the Company propose to incorporate in the earnings test?**

4 A. At this time, JCP&L is proposing to include an adjustment in the earnings test for JCP&L
5 Reliability Plus. The adjustment is to pension and OPEB expense.

6 **Q. Why is it necessary to include an adjustment to the pension and OPEB expense in
7 the earnings test?**

8 A. JCP&L's book pension and OPEB expense is now determined using an entirely different
9 accounting method than is used to determine the pension and OPEB expense for
10 ratemaking purposes. In 2011, FirstEnergy and its subsidiaries (including JCP&L), under
11 Statement of Financial Accounting Standards No. 87, "Employer's Accounting for
12 Pensions" ("SFAS 87"), elected to change the method by which it accounted for pension
13 and OPEB expense whereby actuarial gains and losses – representing the change in value
14 of plan assets or obligations - are recognized immediately in earnings (referred to as
15 "mark-to-market accounting", or "immediate recognition") as opposed to its previous
16 method, which amortized those costs into earnings over a future period (referred to as
17 "delayed recognition"). For ratemaking purposes, JCP&L uses the delayed recognition
18 methodology; the accounting methodology by which it accounted for pension and OPEB
19 expense prior to the accounting change and which is consistent with the
20 recommendations of the ALJ and the BPU determinations in the Company's 2012 base
21 rate case and as filed in its 2016 base rate case.

22 . Using the immediate recognition methodology would be problematic with regards
23 to the earnings test because, unlike the ratemaking method endorsed by the BPU, it

1 results in the full amount of actuarial gains and losses being recognized in earnings
2 immediately. These gains or losses can be tens of millions of dollars in a single year.
3 However, using delayed recognition, actuarial gains and losses would be amortized over
4 a future period, which levelizes the annual impact to operating expense. Delayed
5 recognition results in less volatile pension/OPEB expense and, therefore earnings,
6 producing a more representative, steady-state view of the annual earnings from the
7 Company's operations for the earnings test.

8 **Q. Please describe the proposed adjustment related to Pension and OPEB expense.**

9 A. I propose the following steps for the proposed adjustment: (1) remove the pension and
10 OPEB mark-to-market gains/losses, recorded by JCP&L; and (2) include, for JCP&L
11 Reliability Plus earnings test purposes, the recalculated amount of the test-year pension
12 and OPEB expense by amortizing the net accumulated actuarial loss over future periods
13 using the delayed recognition method.

14 **Q. Why should this adjustment be incorporated in the earnings test for JCP&L**
15 **Reliability Plus?**

16 A. JCP&L considers the proposed adjustment to be an accounting adjustment, replacing one
17 accepted method of GAAP accounting with another, based on the same costs for
18 pension/OPEB expense. This accounting adjustment is proper in the context of the
19 JCP&L Reliability Plus earnings test to correlate the accounting treatment for
20 pension/OPEB expense with the accounting treatment used by the Board for ratemaking.

1 **Q. Will the BPU, Board Staff and/or Rate Counsel have an opportunity to review the**
2 **actual expenditures of the Program?**

3 A. Yes. As addressed above, following BPU approval of the Program, JCP&L will make
4 semi-annual filings in a process providing actual expenditures as they exist at the time of
5 the initial filing and in the update filing. BPU Staff and Rate Counsel may review each
6 rate filing to ensure that the revenue requirements and proposed rates are being calculated
7 in accordance with the BPU Order approving the Program. Further, in accordance with
8 *N.J.A.C. 14:3-2A.6(e)*, the rate adjustments established in the semi-annual JCP&L
9 Reliability Plus rate filings are provisional. The prudence of the Company's JCP&L
10 Reliability Plus expenditures will be reviewed by Staff and Rate Counsel as part of
11 JCP&L's subsequent base rate cases following the filings. The rate changes via the semi-
12 annual filings are subject to refund until final determination by the Board that JCP&L
13 prudently incurred these capital expenditures. In a subsequent base rate case, plant
14 investment being recovered through the Rider RP will be included base rates and would
15 no longer be subject to refund.

16 **Q. Does the Company plan to file a base rate case in connection with JCP&L**
17 **Reliability Plus?**

18 A. Yes. The Company proposes that it will file its next rate case not later than five (5) years
19 after the start date of JCP&L Reliability Plus (e.g., if implemented January 1, 2019, the
20 next base rate filing would be made not later than January 1, 2024). Should the Company
21 elect to file a base rate case before the conclusion of JCP&L Reliability Plus, thus
22 meeting the base rate case filing requirement of the II&R regulations, the Company
23 would maintain Rider RP subsequent to the conclusion of JCP&L Reliability Plus until

1 the time of the conclusion of its next base rate case, when all JCP&L Reliability Plus
2 investments would be recovered through base rates.

3 **Q. What is the projected revenue requirement for the initial rate recovery period?**

4 A. The revenue requirement for the forecasted initial rate change will be for Plant In-Service
5 from Board approval of JCP&L Reliability Plus through July 31, 2019 and is currently
6 forecasted to be \$2,494,302 for the period November 1, 2019 through April 30, 2020.
7 See Schedule MAM-3.

8 **Q. What rate design is the Company proposing to use for this rate adjustment?**

9 A. The Company proposes to apply the following rate design to all rate classes to recover
10 JCP&L Reliability Plus expenditures. For Service Classifications RS, RT/RGT and GS
11 (which are residential and smaller commercial rate classes), the rate will be a per kWh
12 rate by each rate class. For Service Classifications GST, GP and GT (which are larger
13 commercial and industrial rate classes), the rate will be per kW rate by each rate class.
14 For all lighting classes, the rate will be a per fixture rate. This proposed rate design by
15 rate class resembles the current distribution rate design for these customers, which is also
16 the basis for the allocation of the JCP&L Reliability Plus revenue requirement recovery
17 for each filing period. The detailed calculations supporting the rate for the first forecasted
18 filing is shown in Schedule MAM-3. In addition, Schedule MAM-3 provides a summary
19 of the proposed rates for all forecasted rate filings.

20 **Bill Impacts**

21 **Q. Please address the current level of JCP&L's rates.**

22
23 A. JCP&L's rates (delivery and total including basic generation service ("BGS")), are
24 generally the lowest for residential customers among the State's four electric distribution

1 companies. “Delivery” refers to the distribution rate plus the non-bypassable rate charges
2 and taxes; “total” refers to the delivery rate plus BGS charges.

3 **Q. What are the annual JCP&L Reliability Plus rate impacts to the typical residential**
4 **customer?**

5 A. Based upon the forecasted rates shown in Schedule MAM-3, the bill impacts for a typical
6 residential customer as well as rate class average customers for each rate period over the
7 duration of JCP&L Reliability Plus are set forth in Schedule MAM-4. Based on the
8 estimated revenue requirements provided in Schedule MAM-2, the initial bill impact of
9 the proposed rates for the initial rate filing period to the typical residential customer who
10 uses 768 kWh per month is an increase of 0.2% or approximately \$0.26 per month above
11 rates effective July 1, 2018.

12 A summary of the bill impact on a typical residential customer for each year of
13 JCP&L Reliability Plus compared to the current average monthly bill is shown in the
14 following chart.

Reliability Plus - Average Residential Rate Impact								
Recovery Period	1	2	3	4	5	6	7	8
Effective Date	11/1/2019	5/1/2020	11/1/2020	5/1/2021	11/1/2021	5/1/2022	11/1/2022	5/1/2023
Monthly Increase	\$0.26	\$0.43	\$0.79	\$0.87	\$1.33	\$1.30	\$1.85	\$1.89
% Monthly Bill	0.2%	0.4%	0.7%	0.8%	1.2%	1.2%	1.7%	1.8%

15
16 The maximum cumulative bill impact from JCP&L Reliability Plus on a residential
17 customer over the entire duration of JCP&L Reliability Plus is a modest increase of
18 approximately \$1.89 or about 1.8% of the current average monthly bill. However, the
19 average incremental bill impact from any individual rate adjustment over the course of
20 the Program will be a small fraction of that cumulative impact.

Tariff Rider

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Q. Does the Company propose a modification to its tariff as part of this filing?

A. Yes. Consistent with *N.J.A.C. 14:3-2A.6(d)*, the Company proposes to recover its costs for JCP&L Reliability Plus through rates set forth in a separate clause of its tariff. Specifically, the Company is proposing a new tariff rider, Rider RP, attached hereto as Schedule MAM-5.

Q. Does the Company propose to hold public comment hearings on Reliability Plus?

A. Yes. The Company proposes to hold public comment hearings in accordance with the BPU II&R rules, *N.J.A.C. 14:3-2A.5(d)*. A proposed form of public notice of filing and public hearing, including the proposed rates and bill impacts attributable to the proposed implementation of the Program, will be provided to Board Staff and Rate Counsel shortly following the JCP&L Reliability Plus filing.

Q. Please list the schedules attached to this direct testimony.

- A. Schedule MAM-1 - Weighted Average Cost of Capital (WACC)
- Schedule MAM-2– Revenue Requirements For JCP&L Reliability Plus Rate Filings
- Schedule MAM-3 – Rate Derivation and Proof of Revenues
- Schedule MAM-4 - Bill Impact Summary
- Schedule MAM-5- Proposed Tariff Sheet for Rider RP

Q. Does this conclude your pre-filed direct testimony at this time?

A. Yes, it does.

Experience and Education

My name is Mark A. Mader and my business address is 300 Madison Avenue, Morristown, NJ. I am employed by FirstEnergy Service Company as Director, Rates and Regulatory Affairs. My current duties and responsibilities include oversight of all aspects of electric rate case preparation, revenue requirement development, regulatory finance, cost allocation, regulated pricing and tariff services, rate design and relationship management with the BPU Staff. These responsibilities encompass the distribution and transmission segments of JCP&L.

I graduated from West Virginia University in 1986, where I earned a Bachelor of Science in Mechanical Engineering.

I was employed by Allegheny Energy for approximately 25 years. There, I held the positions of: Director, Energy Procurement; Director, Asset Management; and Director, Load Management. Upon completion of the acquisition of Allegheny Energy, Inc. by FirstEnergy Corp., I relocated to New Jersey. And in January, 2012, I was promoted to my current position.

	<u>Ratio</u>	<u>Rate</u>	<u>Pre-Tax</u>	<u>Post-Tax</u>
Debt	55%	5.73%	3.15%	3.15%
Equity	45%	9.60%	6.01%	4.32%
WACC			9.16%	7.47%
Tax Rate	28.11%			
Tax Factor	1.39			

Revenue Requirements for Reliability Plus Rate Filings

Schedule MAM-2

		Rate Base Calculation					Monthly Revenue Requirement		
		Cumulative	Cumulative						
		PIS	Reserve	NBV	ADIT	Rate Base	Depreciation	Return	Total
January	2019	\$2,423,494	(\$3,918)	\$2,419,576	(\$1,028)	\$2,418,548	\$3,918	\$18,465	\$22,383
February	2019	\$7,263,258	(\$15,660)	\$7,247,598	(\$4,107)	\$7,243,491	\$11,742	\$55,303	\$67,045
March	2019	\$13,572,725	(\$37,602)	\$13,535,123	(\$9,862)	\$13,525,261	\$21,942	\$103,263	\$125,205
April	2019	\$20,889,603	(\$71,373)	\$20,818,230	(\$18,719)	\$20,799,511	\$33,771	\$158,800	\$192,571
May	2019	\$28,406,481	(\$117,296)	\$28,289,185	(\$30,764)	\$28,258,421	\$45,923	\$215,748	\$261,671
June	2019	\$37,228,859	(\$177,482)	\$37,051,377	(\$46,549)	\$37,004,828	\$60,186	\$282,525	\$342,711
July	2019	\$45,196,237	(\$250,549)	\$44,945,688	(\$65,711)	\$44,879,976	\$73,067	\$342,650	\$415,717
August	2019	\$52,823,115	(\$335,946)	\$52,487,169	(\$88,108)	\$52,399,061	\$85,397	\$400,057	\$485,454
September	2019	\$60,521,243	(\$433,788)	\$60,087,455	(\$113,769)	\$59,973,686	\$97,842	\$457,888	\$555,730
October	2019	\$68,219,371	(\$544,075)	\$67,675,296	(\$142,694)	\$67,532,602	\$110,287	\$515,599	\$625,886
November	2019	\$76,003,933	(\$666,947)	\$75,336,986	(\$174,919)	\$75,162,067	\$122,872	\$573,849	\$696,721
December	2019	\$86,275,622	(\$806,425)	\$85,469,197	(\$211,500)	\$85,257,698	\$139,478	\$650,927	\$790,405
January	2020	\$91,721,101	(\$954,707)	\$90,766,394	(\$252,358)	\$90,514,036	\$148,282	\$691,058	\$839,340
February	2020	\$98,307,474	(\$1,113,637)	\$97,193,837	(\$299,942)	\$96,893,895	\$158,930	\$739,767	\$898,697
March	2020	\$105,361,927	(\$1,283,972)	\$104,077,955	(\$355,644)	\$103,722,311	\$170,335	\$791,901	\$962,236
April	2020	\$113,582,290	(\$1,467,597)	\$112,114,693	(\$420,777)	\$111,693,916	\$183,625	\$852,763	\$1,036,388
May	2020	\$121,802,652	(\$1,664,512)	\$120,138,140	(\$495,504)	\$119,642,636	\$196,915	\$913,450	\$1,110,365
June	2020	\$130,023,015	(\$1,874,717)	\$128,148,298	(\$580,885)	\$127,567,413	\$210,205	\$973,954	\$1,184,159
July	2020	\$137,702,377	(\$2,097,337)	\$135,605,040	(\$675,997)	\$134,929,044	\$222,620	\$1,030,159	\$1,252,779
August	2020	\$145,283,740	(\$2,332,214)	\$142,951,526	(\$780,520)	\$142,171,005	\$234,877	\$1,085,450	\$1,320,327
September	2020	\$153,540,102	(\$2,580,439)	\$150,959,663	(\$894,800)	\$150,064,863	\$248,225	\$1,145,718	\$1,393,943
October	2020	\$161,796,464	(\$2,842,012)	\$158,954,452	(\$1,018,836)	\$157,935,617	\$261,573	\$1,205,810	\$1,467,383
November	2020	\$170,523,827	(\$3,117,694)	\$167,406,133	(\$1,152,898)	\$166,253,235	\$275,682	\$1,269,313	\$1,544,995
December	2020	\$182,268,927	(\$3,412,364)	\$178,856,563	(\$1,300,287)	\$177,556,276	\$294,670	\$1,355,610	\$1,650,280

Revenue Requirements for Reliability Plus Rate Filings

Schedule MAM-2

		Rate Base Calculation					Monthly Revenue Requirement		
		Cumulative	Cumulative						
		PIS	Reserve	NBV	ADIT	Rate Base	Depreciation	Return	Total
January	2021	\$187,418,016	(\$3,715,358)	\$183,702,658	(\$1,453,976)	\$182,248,682	\$302,994	\$1,391,435	\$1,694,429
February	2021	\$193,697,474	(\$4,028,504)	\$189,668,970	(\$1,615,066)	\$188,053,905	\$313,146	\$1,435,757	\$1,748,903
March	2021	\$200,270,927	(\$4,352,277)	\$195,918,650	(\$1,783,874)	\$194,134,777	\$323,773	\$1,482,184	\$1,805,957
April	2021	\$208,010,290	(\$4,688,562)	\$203,321,728	(\$1,961,714)	\$201,360,013	\$336,285	\$1,537,347	\$1,873,632
May	2021	\$215,749,652	(\$5,037,359)	\$210,712,293	(\$2,148,562)	\$208,563,731	\$348,797	\$1,592,346	\$1,941,143
June	2021	\$227,289,015	(\$5,404,811)	\$221,884,204	(\$2,345,862)	\$219,538,341	\$367,452	\$1,676,135	\$2,043,587
July	2021	\$235,028,377	(\$5,784,775)	\$229,243,602	(\$2,551,673)	\$226,691,930	\$379,964	\$1,730,751	\$2,110,715
August	2021	\$242,992,740	(\$6,177,615)	\$236,815,125	(\$2,766,052)	\$234,049,072	\$392,840	\$1,786,922	\$2,179,762
September	2021	\$251,407,102	(\$6,584,058)	\$244,823,044	(\$2,989,731)	\$241,833,313	\$406,443	\$1,846,353	\$2,252,796
October	2021	\$260,023,464	(\$7,004,431)	\$253,019,033	(\$3,222,795)	\$249,796,238	\$420,373	\$1,907,149	\$2,327,522
November	2021	\$268,639,827	(\$7,438,734)	\$261,201,093	(\$3,465,616)	\$257,735,476	\$434,303	\$1,967,763	\$2,402,066
December	2021	\$276,584,927	(\$7,885,882)	\$268,699,045	(\$3,720,046)	\$264,978,999	\$447,148	\$2,023,066	\$2,470,214
January	2022	\$281,829,379	(\$8,341,509)	\$273,487,870	(\$3,979,908)	\$269,507,962	\$455,627	\$2,057,644	\$2,513,271
February	2022	\$288,446,565	(\$8,807,834)	\$279,638,731	(\$4,246,275)	\$275,392,456	\$466,325	\$2,102,571	\$2,568,896
March	2022	\$295,212,887	(\$9,285,098)	\$285,927,789	(\$4,519,218)	\$281,408,571	\$477,264	\$2,148,503	\$2,625,767
April	2022	\$303,294,265	(\$9,775,427)	\$293,518,838	(\$4,799,977)	\$288,718,861	\$490,329	\$2,204,316	\$2,694,645
May	2022	\$311,375,642	(\$10,278,821)	\$301,096,821	(\$5,088,526)	\$296,008,295	\$503,394	\$2,259,969	\$2,763,363
June	2022	\$321,642,019	(\$10,798,812)	\$310,843,207	(\$5,388,729)	\$305,454,478	\$519,991	\$2,332,089	\$2,852,080
July	2022	\$329,273,396	(\$11,331,140)	\$317,942,256	(\$5,696,548)	\$312,245,708	\$532,328	\$2,383,939	\$2,916,267
August	2022	\$336,904,774	(\$11,875,805)	\$325,028,969	(\$6,012,219)	\$319,016,750	\$544,665	\$2,435,635	\$2,980,300
September	2022	\$344,536,151	(\$12,432,807)	\$332,103,344	(\$6,336,014)	\$325,767,330	\$557,002	\$2,487,174	\$3,044,176
October	2022	\$352,167,528	(\$13,002,146)	\$339,165,382	(\$6,668,096)	\$332,497,286	\$569,339	\$2,538,556	\$3,107,895
November	2022	\$359,798,905	(\$13,583,822)	\$346,215,083	(\$7,008,396)	\$339,206,688	\$581,676	\$2,589,781	\$3,171,457
December	2022	\$386,812,659	(\$14,209,170)	\$372,603,489	(\$7,363,911)	\$365,239,578	\$625,348	\$2,788,537	\$3,413,885
January	2023	\$386,812,659	(\$14,834,518)	\$371,978,141	(\$7,722,133)	\$364,256,007	\$625,348	\$2,781,028	\$3,406,376

RP Rate Derivation and Proof of Revenues**Proposed Rider RP for Recovery Period 1 (Effective 11/1/2019)**

RP Revenue Requirement - Monthly **\$415,717**
 RP Revenue Requirement for 6 Months **\$2,494,302**

RP Allocation (1)**Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW								
Total # of Fixture					685,645	1,710,870	2,076,549	1,343,934
RP Rate (\$/kWh)	100.0%	50.8%	1.2%	35.2%	2.5%	5.5%	3.6%	1.1%
RP Rate (\$/kWh with SUT)	\$2,494,302	\$1,266,296	\$30,757	\$878,806	\$63,262	\$136,973	\$90,595	\$27,615
RP Rate (\$/kW)								
RP Rate (\$/kW with SUT)					\$0.09	\$0.08	\$0.04	
RP Rate (\$/Fixture)					\$0.10	\$0.09	\$0.04	\$0.02
RP Rate (\$/Fixture with SUT)								\$0.02

Proof of Revenues

RP Revenue Recovered through RP Rates	\$2,481,976	\$1,264,715	\$30,797	\$877,945	\$61,708	\$136,870	\$83,062	\$26,879
Difference from RP Revenue Requirements	-\$12,326	-\$1,580	\$40	-\$860	-\$1,553	-\$103	-\$7,533	-\$736
\$/kWh, \$/kW or \$/Fixture		-\$0.0000004	\$0.0000003	-\$0.0000003	-\$0.002	\$0.000	-\$0.004	-\$0.001

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 2 (Effective 5/1/2020)

RP Revenue Requirement - Monthly **\$839,340**RP Revenue Requirement for 6 Months **\$5,036,040****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW					742,855	1,989,722	2,178,873	
Total # of Fixture								1,344,356
RP Rate (\$/kWh)		\$0.000525	\$0.000596	\$0.000524				
RP Rate (\$/kWh with SUT)		\$0.000560	\$0.000635	\$0.000559				
RP Rate (\$/kW)					\$0.17	\$0.14	\$0.08	
RP Rate (\$/kW with SUT)					\$0.18	\$0.15	\$0.09	
RP Rate (\$/Fixture)								\$0.04
RP Rate (\$/Fixture with SUT)								\$0.04

Proof of Revenues

RP Revenue Recovered through RP Rates	\$5,029,282	\$2,558,839	\$62,140	\$1,775,372	\$126,285	\$278,561	\$174,310	\$53,774
Difference from RP Revenue Requirements	-\$6,758	\$2,166	\$41	\$1,048	-\$1,441	\$2,011	-\$8,603	-\$1,981
\$/kWh, \$/kW or \$/Fixture		\$0.0000004	\$0.0000004	\$0.0000003	-\$0.002	\$0.001	-\$0.004	-\$0.001

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 3 (Effective 11/1/2020)

RP Revenue Requirement - Monthly **\$1,252,779**RP Revenue Requirement for 6 Months **\$7,516,674****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW								
Total # of Fixture					674,989	1,675,177	2,033,408	1,344,808
RP Rate (\$/kWh)	100.0%	50.8%	1.2%	35.2%	2.5%	5.5%	3.6%	1.1%
RP Rate (\$/kWh with SUT)	\$7,516,674	\$3,816,030	\$92,687	\$2,648,314	\$190,641	\$412,772	\$273,011	\$83,219
RP Rate (\$/kW)		\$0.000962	\$0.000679	\$0.000853				
RP Rate (\$/kW with SUT)		\$0.001026	\$0.000724	\$0.000910				
RP Rate (\$/Fixture)					\$0.28	\$0.25	\$0.13	\$0.06
RP Rate (\$/Fixture with SUT)					\$0.30	\$0.27	\$0.14	\$0.06

Proof of Revenues

RP Revenue Recovered through RP Rates	\$7,510,295	\$3,817,401	\$92,690	\$2,647,381	\$188,997	\$418,794	\$264,343	\$80,688
Difference from RP Revenue Requirements	-\$6,379	\$1,371	\$3	-\$934	-\$1,644	\$6,022	-\$8,668	-\$2,530
\$/kWh, \$/kW or \$/Fixture		\$0.0000003	\$0.0000000	-\$0.0000003	-\$0.002	\$0.004	-\$0.004	-\$0.002

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 4 (Effective 5/1/2021)

RP Revenue Requirement - Monthly **\$1,694,429**RP Revenue Requirement for 6 Months **\$10,166,574****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW		4,818,527,018	103,041,124	3,341,749,180	731,318	1,949,623	2,134,416	
Total # of Fixture								1,345,288
RP Rate (\$/kWh)		\$0.001071	\$0.001217	\$0.001072				
RP Rate (\$/kWh with SUT)		\$0.001142	\$0.001298	\$0.001143				
RP Rate (\$/kW)					\$0.35	\$0.29	\$0.17	
RP Rate (\$/kW with SUT)					\$0.37	\$0.31	\$0.18	
RP Rate (\$/Fixture)								\$0.08
RP Rate (\$/Fixture with SUT)								\$0.09

Proof of Revenues

RP Revenue Recovered through RP Rates	\$10,160,224	\$5,160,642	\$125,401	\$3,582,355	\$255,961	\$565,391	\$362,851	\$107,623
Difference from RP Revenue Requirements	-\$6,350	-\$676	\$38	\$414	-\$1,888	\$7,102	-\$6,407	-\$4,933
\$/kWh, \$/kW or \$/Fixture		-\$0.0000001	\$0.0000004	\$0.0000001	-\$0.003	\$0.004	-\$0.003	-\$0.004

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 5 (Effective 11/1/2021)

RP Revenue Requirement - Monthly **\$2,110,715**RP Revenue Requirement for 6 Months **\$12,664,290****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW								
Total # of Fixture					669,309	1,657,095	2,012,231	1,345,796
RP Rate (\$/kWh)	100.0%	50.8%	1.2%	35.2%	2.5%	5.5%	3.6%	1.1%
RP Rate (\$/kWh with SUT)	\$12,664,290	\$6,429,348	\$156,162	\$4,461,950	\$321,197	\$695,449	\$459,976	\$140,209
RP Rate (\$/kW)								
RP Rate (\$/kW with SUT)					\$0.48	\$0.42	\$0.23	
RP Rate (\$/Fixture)					\$0.51	\$0.45	\$0.25	\$0.10
RP Rate (\$/Fixture with SUT)								\$0.11

Proof of Revenues

RP Revenue Recovered through RP Rates	\$12,661,615	\$6,428,016	\$156,122	\$4,462,837	\$321,268	\$695,980	\$462,813	\$134,580
Difference from RP Revenue Requirements	-\$2,675	-\$1,331	-\$40	\$887	\$71	\$531	\$2,837	-\$5,629
\$/kWh, \$/kW or \$/Fixture		-\$0.0000003	-\$0.0000003	\$0.0000003	\$0.000	\$0.000	\$0.001	-\$0.004

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 6 (Effective 5/1/2022)

RP Revenue Requirement - Monthly **\$2,513,271**RP Revenue Requirement for 6 Months **\$15,079,626****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW					731,318	1,949,623	2,134,416	
Total # of Fixture								1,346,333
RP Rate (\$/kWh)		\$0.001589	\$0.001805	\$0.001590				
RP Rate (\$/kWh with SUT)		\$0.001694	\$0.001925	\$0.001695				
RP Rate (\$/kW)					\$0.52	\$0.42	\$0.26	
RP Rate (\$/kW with SUT)					\$0.55	\$0.45	\$0.28	
RP Rate (\$/Fixture)								\$0.12
RP Rate (\$/Fixture with SUT)								\$0.13

Proof of Revenues

RP Revenue Recovered through RP Rates	\$15,071,645	\$7,656,639	\$185,989	\$5,313,381	\$380,285	\$818,842	\$554,948	\$161,560
Difference from RP Revenue Requirements	-\$7,981	\$1,085	\$44	\$448	-\$2,170	-\$9,243	\$7,245	-\$5,390
\$/kWh, \$/kW or \$/Fixture		\$0.0000002	\$0.0000004	\$0.0000001	-\$0.003	-\$0.005	\$0.003	-\$0.004

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 7 (Effective 11/1/2022)

RP Revenue Requirement - Monthly **\$2,916,267**RP Revenue Requirement for 6 Months **\$17,497,602****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 6 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW					662,646	1,639,032	1,988,317	
Total # of Fixture								1,346,613
RP Rate (\$/kWh)		\$0.002263	\$0.001597	\$0.002021				
RP Rate (\$/kWh with SUT)		\$0.002413	\$0.001703	\$0.002155				
RP Rate (\$/kW)					\$0.67	\$0.59	\$0.32	
RP Rate (\$/kW with SUT)					\$0.71	\$0.63	\$0.34	
RP Rate (\$/Fixture)								\$0.14
RP Rate (\$/Fixture with SUT)								\$0.15

Proof of Revenues

RP Revenue Recovered through RP Rates	\$17,500,886	\$8,884,715	\$215,781	\$6,164,601	\$443,973	\$967,029	\$636,261	\$188,526
Difference from RP Revenue Requirements	\$3,284	\$1,614	\$20	-\$246	\$192	\$6,163	\$736	-\$5,194
\$/kWh, \$/kW or \$/Fixture		\$0.0000004	\$0.0000001	-\$0.0000001	\$0.000	\$0.004	\$0.000	-\$0.004

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

RP Rate Derivation and Proof of Revenues

Proposed Rider RP for Recovery Period 8 (Effective 5/1/2023)

RP Revenue Requirement - Monthly **\$3,406,376**RP Revenue Requirement for 8 Months **\$27,251,008****RP Allocation (1)****Non Customer-related Distribution Revenues****% of Non Customer-related Revenues****RP Revenue Requirements Allocation****Projected 8 Months Units for Recovery**

	TOTAL	RS	RT/RGT	GS	GST	GP	GT	LTG
Total kWh	\$ 517,256,161	\$ 262,598,194	\$ 6,378,234	\$ 182,242,425	\$ 13,118,862	\$ 28,404,688	\$ 18,787,113	\$ 5,726,645
Total kW		5,984,973,315	137,235,466	4,264,979,250	932,323	2,450,864	2,756,945	
Total # of Fixture								1,795,360
RP Rate (\$/kWh)		\$0.002312	\$0.002449	\$0.002251				
RP Rate (\$/kWh with SUT)		\$0.002465	\$0.002611	\$0.002400				
RP Rate (\$/kW)					\$0.74	\$0.61	\$0.36	
RP Rate (\$/kW with SUT)					\$0.79	\$0.65	\$0.38	
RP Rate (\$/Fixture)								\$0.17
RP Rate (\$/Fixture with SUT)								\$0.18

Proof of Revenues

RP Revenue Recovered through RP Rates	\$27,256,473	\$13,837,258	\$336,090	\$9,600,468	\$689,919	\$1,495,027	\$992,500	\$305,211
Difference from RP Revenue Requirements	\$5,465	\$2,594	\$60	-\$751	-\$1,232	-\$1,439	\$2,724	\$3,510
\$/kWh, \$/kW or \$/Fixture		\$0.0000004	\$0.0000004	-\$0.0000002	-\$0.001	-\$0.001	\$0.001	\$0.002

Note:

(1) Based on JCP&L "2016 Base Rate Filing" in Docket No. ER16040383 Order dated December 12, 2016

Schedule MAM - 4

Summary of Bill Impact

	Current	<u>Proposed Cumulative Monthly Increase (Overall Class Average per Customer/Fixture)</u>							
	Monthly	<u>Bill</u>	<u>Period 1</u>	<u>Preriod 2</u>	<u>Period 3</u>	<u>Period 4</u>	<u>Period 5</u>	<u>Period 6</u>	<u>Period 7</u>
Effective Date:	7/1/2018	11/1/2019	5/1/2020	11/1/2020	5/1/2021	11/1/2021	5/1/2022	11/1/2022	5/1/2023
<u>Rate Class</u>									
Residential (RS)	\$107.07	\$0.26	\$0.43	\$0.79	\$0.87	\$1.33	\$1.30	\$1.85	\$1.89
Residential Time of Day (RT/RGT)	\$154.26	\$0.26	\$0.70	\$0.79	\$1.42	\$1.34	\$2.10	\$1.86	\$2.84
General Service – Secondary (GS)	\$577.27	\$1.32	\$2.49	\$4.05	\$5.09	\$6.88	\$7.54	\$9.59	\$10.68
General Service - Secondary Time of Day (GST)	\$30,451.48	\$64.19	\$121.24	\$199.69	\$249.62	\$342.33	\$370.86	\$477.84	\$527.76
General Service – Primary (GP)	\$35,211.46	\$73.30	\$128.28	\$229.07	\$265.72	\$384.83	\$384.83	\$540.60	\$558.92
General Service – Transmission (GT)	\$92,550.40	\$124.10	\$248.20	\$403.32	\$527.41	\$713.56	\$806.63	\$992.78	\$1,116.87
Lighting (Average Per Fixture)	\$10.78	\$0.03	\$0.05	\$0.07	\$0.09	\$0.11	\$0.13	\$0.15	\$0.19

Proposed Cumulative Monthly Increase in %

	<u>Period 1</u>	<u>Preriod 2</u>	<u>Period 3</u>	<u>Period 4</u>	<u>Period 5</u>	<u>Period 6</u>	<u>Period 7</u>	<u>Period 8</u>
	11/1/2019	5/1/2020	11/1/2020	5/1/2021	11/1/2021	5/1/2022	11/1/2022	5/1/2023
Effective Date:								
<u>Rate Class</u>								
Residential (RS)	0.2%	0.4%	0.7%	0.8%	1.2%	1.2%	1.7%	1.8%
Residential Time of Day (RT/RGT)	0.2%	0.5%	0.5%	0.9%	0.9%	1.4%	1.2%	1.8%
General Service – Secondary (GS)	0.2%	0.4%	0.7%	0.9%	1.2%	1.3%	1.7%	1.9%
General Service - Secondary Time of Day (GST)	0.2%	0.4%	0.7%	0.8%	1.1%	1.2%	1.6%	1.7%
General Service – Primary (GP)	0.2%	0.4%	0.7%	0.8%	1.1%	1.1%	1.5%	1.6%
General Service – Transmission (GT)	0.1%	0.3%	0.4%	0.6%	0.8%	0.9%	1.1%	1.2%
Lighting (Average Per Fixture)	0.3%	0.5%	0.6%	0.8%	1.0%	1.2%	1.4%	1.8%

JERSEY CENTRAL POWER & LIGHT COMPANY

BPU No. 12 ELECTRIC - PART III

Original Sheet No. 60

Rider RP JCP&L Reliability Plus Charge

APPLICABILITY: Rider RP provides for full and timely recovery of revenue requirements associated with reliability infrastructure investment projects subject to the Infrastructure Investment and Recovery regulations pursuant to N.J.A.C. 14:3-2A.1 *et seq.* and as approved by the BPU Order dated _____ in Docket No. _____

The JCP&L Reliability Plus (RP) Charge is applicable to Service Classifications RS (Residential Service), RT (Residential Time-of-Day), RGT (Residential Geothermal & Heat Pump), GS (General Service Secondary), GST (General Service Secondary Time-of-Day), GP (General Service Primary), GT (General Service Transmission), OL (Outdoor Lighting), SVL (Sodium Vapor Street Lighting), MVL (Mercury Vapor Street Lighting), ISL (Incandescent Street Lighting) and LED (LED Street Lighting) and for all usage (KWH, KW or per Fixture) of any Full Service Customer or Delivery Service Customer, as follows:

<u>Service Classification</u>	<u>RP Charge (Including SUT)</u>	
RS	\$x.xxxxxx	per KWH
RT/RGT	\$x.xxxxxx	per KWH
GS	\$x.xxxxxx	per KWH
GST	\$x.xx	per KW
GP	\$x.xx	per KW
GT	\$x.xx	per KW
Lighting (OL, SVL, MVL, SVL and LED)	\$x.xx	per Fixture

The Company will make periodic filings to reset the RP Charges. The initial recovery period with actual in-service date from January 2019 through July 2019 will be filed no later than August 15, 2019 for an effective date of November 1, 2019. All subsequent filings will be made according to the Company's recovery periods as provided in the above referenced N.J.A.C. regulations and BPU Order.

Issued:
Effective:

Filed pursuant to Order of Board of Public Utilities
Docket No. dated

Issued by James V. Fakult, President
300 Madison Avenue, Morristown, NJ 07962-1911