



Beaver Run to Logans Ferry 500kV
New Transmission Line
August 25, 2017

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Note: Supporting files (PSS/E IDEV, Case, and Contingency Files) were submitted electronically on August 25, 2017

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1. Executive Summary

Public Service Electric and Gas Company (PSE&G) is pleased to provide this proposal to PJM in response to the PJM's 2017 RTEP Reliability Window. PSE&G seeks Designated Entity Status to construct, own, operate, and maintain the proposed Project.

PSE&G proposes to construct, own, operate, and maintain the "Beaver Run – Logans Ferry" transmission line and substation, the specific components of which are described in Section 3.1 below (the "Project") in Pennsylvania to address Flowgates: GD-S44, GD-S53, GD-S483, GD-S857, GD-S578, GD-S582, GD-S584, GD-S581, GD-S583, GD-S577, GD-S766, GD-S787, GD-S765, and GD-S786. The Project is located within the Duquesne Light Company (Duquesne) and Alleghany Power System (APS) zones. PSE&G requests that this Project, consisting of the components described in Section 3.1 below, be considered only in its entirety.

PSE&G estimates the total Project cost is \$120.3 million,

PSE&G modeled this solution extensively and has optimized it to provide the following Project benefits:

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2. Company Evaluation

2.1. Contact Information

2.1.1. Primary Contact

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Title: Manager of Transmission Development
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Address: 4000 Hadley Road
South Plainfield, New Jersey 07080

2.1.2. Secondary Contact

Name: Glenn Catenacci
Title: Manager Transmission Planning, Electric Delivery
Email Address: glenn.catenacci@pseg.com
Phone: (973) 430-7821
Address: 80 Park Plaza
Newark, New Jersey 07102

2.1.3. Headquarters

PSEG
80 Park Plaza
Newark, New Jersey 07102
(973) 430-7000

2.2. Pre-Qualification

Public Service Electric & Gas Company's (PSE&G) pre-qualification document was submitted June 21, 2013 under PJM ID# 13-07.

2.3. Company Information

PSE&G is pleased to provide this proposal to PJM in response to the 2017 RTEP Proposal Window 1. PSE&G seeks Designated Entity Status to construct, own, operate, and maintain the proposed Project.

PSE&G is among the nation's largest investors in transmission infrastructure in the United States. PSE&G provides electric and gas service to customers in New Jersey in an area consisting of 2,600-square-miles. PSE&G serves 2.2 million electric customers and 1.8 million gas customers in more than 300 urban, suburban, and rural communities, including New Jersey's six largest cities. PSE&G owns and maintains approximately 900-miles of transmission right-of-way with 1,540-miles of transmission lines over 100kV and more than 480-miles of 500kV transmission lines.

Financial Strength

PSE&G maintains investment grade credit ratings and has positive and stable outlooks from the major rating agencies.

Public Service Electric and Gas Company is a direct wholly owned subsidiary of Public Service Enterprise Group Incorporated. PSE&G's strategy is to maintain a focus on operational excellence, financial strength and disciplined investment. Our balance sheet has remained one of the strongest in the industry. Generally, PSE&G uses either secured medium-term notes or first mortgage bonds to raise long-term capital. PSE&G's mortgage bond credit ratings are as follows:

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PSE&G's Credit Ratings	2017	2016	2015
Standard and Poor's	A	A	A
Moody's	Aa3	Aa3	Aa3

Table 1. PSE&G Credit Ratings

For more on PSE&G's financial strength and latest information, see the link for the Investor Relations page at the PSE&G website: <http://investor.pseg.com/>

Outside Industry Recognition—A proven track record of reliability, customer satisfaction, and emergency response and restoration

PSE&G continually earns industry recognition for operational excellence in key operating areas. In 2017, PSE&G ranked in the top 10 of Electric and Gas Utilities on Fortune's World's Most Admired Companies list. PSE&G was also named Electric Light & Power's 2015 Utility of the Year for its high ranking performance in customer satisfaction, leadership in employing state-of-the-art technology, and capital investment programs designed to enhance reliability and system resiliency.

PSE&G has won several awards for reliability which were driven by its design, operation and maintenance practices. In 2016, PSE&G was recognized as the most reliable utility in the Mid-Atlantic region for the 15th year in a row by PA Consulting, a national industry benchmarking group. PSE&G also received the Outstanding Outage Response Time award for restoring power to customers 30 percent faster than any other large investor-owned utility. In addition, PSE&G received the Outstanding Customer Engagement award for its proactive approach to communications—using Twitter, Facebook, LinkedIn, customer emails, corporate website, and blog, among other channels, to keep customers, regulators, government officials and the media informed during both blue-sky days and major outage events. PSE&G was also named by PA Consulting as America's Most Reliable Electric Utility five out of past 10 years and ranks highly in business customer satisfaction for electric service and natural gas service in the East Region, according to J.D. Power.

In late 2016, PSE&G was named to the Dow Jones Sustainability North America Index for the 9th consecutive year. The Dow Jones Sustainability Indices (DJSI) recognize forward thinking companies based on an appraisal of the company's strategy, management and its performance in dealing with opportunities and risks deriving from economic, environmental and social developments.

PSE&G was named to the 2014 FORTUNE List of Most Admired Companies, ranking fourth among electric and gas companies in the United States.

PSE&G earned the Edison Electric Institute Award for outstanding restoration efforts after Superstorm Sandy in 2012 and Hurricane Irene in 2011 for restoring power and for outstanding storm management practices, including effective communications with the public.

In the case of Superstorm Sandy, PSE&G emergency preparations and responses included the following:

- Available personnel ready to respond
- Contractors, including tree crews to assist the utility's own skilled workforce
- Additional supplies, such as poles, transformers and other pole-top equipment were on hand
- Vehicles were fueled and ready to go
- Tested generators at utility locations
- Checked locations for potential flooding and took precautions such as using sandbags to help divert water from substation equipment

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- Coordinated with county Office of Emergency Management for updates on outages and restoration efforts.
- Communicated with the public regarding anticipated storm conditions
- Both the Primary and Back-Up transmission control centers were fully staffed starting a day before the storm arrived and the Primary control center was staffed with extra personnel
- PSE&G requested more than 1,300 linemen and 600 tree contractors from utilities in other states to assist our highly skilled crews
- PSE&G's call center was fully staffed to handle calls from customers. Other employees assisted with assessing storm damage, keeping the public away from any downed power lines and other functions that supported restoration efforts

Immediately after a storm or outage event has passed, PSE&G deploys its crews to restore the system as quickly as possible. Over the years, PSE&G operations and maintenance personnel have had substantial experience in restoring the system after major events.

Experienced and Qualified Teams Providing Lifecycle Services

PSE&G has developed a team of experienced professionals to support the entire project life cycle of a transmission project. That life cycle includes: environmental and permitting, project engineering, project management, project controls, procurement, construction, public affairs and community outreach, commissioning, operations and maintenance, and regulatory compliance. PSE&G has over 1,400 in-house personnel engaged in transmission line project implementation and/or transmission facility operations and maintenance.

PSE&G's transmission engineering team has the experience and capabilities to design transmission line projects from 69kV to 765kV of various line configurations. Configurations include: wood, tubular steel, lattice tower, laminated wood H-frame or single pole structures. The engineering team's design approach anticipates and mitigates project risks. The engineering team's experience in the latest industry recognized line design software tools includes work with - PLS-CADD, PLS-Pole, PLS-Tower, EPRI TL Workstation, STAAD, LPILE, FAD Tools, and others. The engineering staff actively attends external and internal training sessions to stay current on industry standards and to expand their technical skill set.

PSE&G's Comprehensive Services

Project Management

Environmental

Permitting

Engineering

Project Controls

Procurement

Construction

Public Affairs

Community Outreach

Commissioning

Operations and

Maintenance

Regulatory Compliance

Consistent Project Delivery

As an infrastructure company, PSE&G has an outstanding record of consistently delivering challenging projects on schedule and on budget. We have the experience to develop the technical scope, detailed cost, and achievable schedules for new transmission and substation projects. PSE&G successfully manages and executes every project within PSE&G's established performance metrics and goals.

PSE&G has substantial experience owning and constructing transmission projects. PSE&G's ability to manage projects effectively and to deliver consistent, high quality services lies in its standardized procedures and balanced scorecard. PSE&G currently has 20 project management procedures addressing topics from scope management through contractor safety, which all closely model the Project Management Body of Knowledge, published by the Project Management Institute. PSE&G also keeps 14 reference manuals (playbooks) for critical project functions including project manager, and project control engineer (cost and schedule) that we reference throughout a project. Key metrics measured in the

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balanced scorecard include key project milestones, forecasting accuracy, and project cost and schedule performance index.

PSE&G's ability to manage projects effectively and deliver consistent, high quality services lies in its standardized procedures. Our project teams recommend work sequences that make sense, manage procurement so that needed materials arrive on time, and flexibly deploy resources when and where they are needed to increase efficiency, cost effectiveness, and reliability. As a transmission infrastructure company—we do it every day.

PSE&G has a comprehensive Lessons Learned and Continuous Improvement process where we transfer and build upon the knowledge obtained from each project. Once an installation is complete, we effectively manage and operate the infrastructure. As previously mentioned, our system is recognized as highly reliable and well maintained to meet the customer needs for the long-term.

PSE&G is currently executing a \$7.1 billion transmission capital investment program through 2020. Included in that scope is the \$1.2 billion 345kV Bergen-Linden Corridor Project, and the recently completed four (230kV and above). Those two projects, which total over \$2 billion in cost, are being executed ahead of schedule and under budget.



Bergen-Linden Corridor Project

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Mickleton-Gloucester-Camden Project



Susquehanna Roseland Project



Burlington-Camden Upgrade



North Central Reliability Project

Clockwise from top left: Stringing conductor on the Mickleton-Gloucester-Camden Project; using the air crane to set tower sections on the Susquehanna Roseland Project; Overview of the North Central Reliability towers and right-of-way; and Overlooking the new Burlington station from the Burlington-Camden Project.

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Below is a list of representative projects that PSE&G owns, is constructing/has been constructed, maintains, and operates.

Project	Circuit Miles	Voltage (kV)	Cost	Scope	In-Service Date
Metuchen-Trenton-Burlington	55	345	\$745M	17 station upgrades; new overhead lines	June 2022
Bergen-Linden Corridor Upgrade Project	30	345	Up to: \$1.2B	1 new station; 9 station upgrades; new overhead and underground lines	Phase 3: 2018 Target Completion Phase 2: 2017 Phase 1: May 2016
Underground Transmission Upgrade Program	113	138/230/345	\$440M	Upgrade underground transmission lines in 5 counties in New Jersey	December 2016
Sewaren-Metuchen 230kV Conversion Project	14	230	\$125M	Convert existing lines to 230kV; 4 station upgrades	August 2016
Northeast Grid Reliability Project	69	138/230	\$975M	11 stations, upgrade overhead transmission line (50 miles) and underground transmission lines (19 miles)	July 2016
Mickleton-Gloucester-Camden	16	230	\$435M	Two new 230kV overhead lines; three new 230kV underground lines, upgrade 5 stations	2015
Susquehanna-Roseland	45	500	\$790M (PSE&G's portion)	New 500kV overhead lines, construct new 500kV GIS station and expand an existing station	2014 (PSE&G's portion); Energized 2015
North-Central Reliability Project	55	230	\$390M	Upgrade existing 138kV transmission line to 230kV; convert 7 existing stations to 230kV	2014
Burlington-Camden Network Reinforcement Project	37	230	\$399M	Reconfigure overhead transmission lines and upgrade	2014
Bayonne 3 rd Source	5.5	230	\$123M	New underground transmission line from Bayonne to Marion stations	2013

Table 2. PSE&G's Representative Project Experience

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A Strong Commitment to Health and Safety

PSE&G's vision is to be increasingly recognized as "a leader for People providing Safe, Reliable, Economic and Green Energy." People come first—and so does their health and safety.

"Our Commitment to Health and Safety" statement unites PSE&G employees, company leaders, and our contractors in achieving an accident free environment where no one gets hurt.

Health & Safety Councils are the backbone of the PSE&G Health and Safety System. Today, a system of employee-led councils at the local, business and company level dedicate their time, effort and expertise to achieving a culture built on:

Trust—We respect and trust each other's opinions and decisions and follow through on all health and safety concerns

Care—We approach each day with the determination to care for ourselves, co-workers, contractors, and the communities we serve

Knowledge—We have the knowledge and skills to be healthy and safe

Communication—We communicate in a clear, open and honest manner

At PSE&G, we believe that safety is a way of life both on and off the job. PSE&G is fully committed to protecting the health and safety of our employees, contractors, and the communities we serve. We believe that operational excellence—with safety first— is the key to long-term success.

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3. Constructability Information

3.1. Scope of Project

The proposed Project consists of the following components:

- New Beaver Run 500 kV station with three (3) 500 kV circuit breakers arranged in a ring bus configuration. PSE&G seeks Designated Entity Status to construct, own, operate, and maintain this proposed component.
- New 500 kV circuit from the new 500 kV Beaver Run to existing Logans Ferry station: Approximately 14 miles of new single circuit 500 kV overhead transmission line between the new Beaver Run station and the existing Logans Ferry station.
- Expansion of Logans Ferry station to accommodate the new 500 kV circuit.
- Reconductor or rebuild of the existing Highland to Arsenal segment of the Logans Ferry to Arsenal 345 kV circuit,

The scope of the proposed Project, and the associated cost estimates and schedule, were developed by a team of experienced PSE&G subject matter experts in project management, routing, siting, permitting, engineering, land acquisition, and public outreach. The PSE&G Project team prepared conceptual routing of the new 500kV circuit based on desktop review of publically available data. Additionally, PSE&G engaged representatives of a local land services firm and local outreach specialists to evaluate the feasibility of the Project and identify potential risks. The development of conceptual routing was conducted with the intent of preparing cost estimates and Project schedules for this proposal.

3.2. Cross-Border Issues

PSE&G doesn't anticipate the Project to have any Cross-Border impacts.

3.3. Proposal Elements

3.3.1. General Description

The proposal includes the installation of a greenfield substation and 14 miles of overhead transmission lines from the proposed Beaver Run substation to the existing Logans Ferry substation. The proposal also includes an incumbent reconductoring of the existing 345kV underground line from Highland to Arsenal.

3.3.2. Geographic Description

3.3.3. Route Description

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3.3.3.1. Environmental Impacts

3.3.3.2. Right-of-way and Land Acquisition Plan and Approach

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3.3.3.3. Permitting Plan and Approach

3.3.3.4. Potential Public Opposition

3.3.4. Physical Characteristics

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3.3.6. Interconnection Location

The proposal includes the construction of a new substation tapping into the existing 500kV APS line from South Bend to Yukon. A 500kV line will run from the greenfield substation (Beaver Run) into the Logans Ferry station. The proposal includes the addition of three 500/345kV transformers and associated equipment at Logans Ferry.

3.3.7. Outage Requirements

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3.3.8. Cost

The total estimated Project cost is \$120.3 million.

3.3.9. Construction Responsibility

PSE&G will construct the greenfield station (Beaver Run) in addition to the 500kV transmission line from Beaver Run to Logans Ferry. Modifications to the 500kV Yukon to South Bend APS line will be performed by the incumbent. Modifications to the Logan Ferry station as well as the reconductoring of the Highland to Arsenal portion of the Logans Ferry to Arsenal 345kV circuit are assumed to be constructed by the incumbent transmission owner and the final costs for these portions of the Project will be determined by the incumbent transmission owner. It is assumed that there is sufficient space at the Logans Ferry and Arsenal stations to accommodate the incumbent upgrades.

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4. Analytical Assessment

4.1. Analysis

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4.2. Equipment Parameters and Assumptions

4.3. PSS/E IDEV Files

PSS/E IDEV files were submitted electronically on August 25th, 2017.

4.4. Supporting Information

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4.5. Proposal Template Spreadsheet

The final RTEP Proposal Template spreadsheet (in Excel format) is provided electronically as a separate file.

4.6. Market Efficiency

This section is not applicable to this proposal.

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5. Cost

5.1. Cost Estimate

6. Schedule

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7. Operations/Maintenance

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7.1.2. Intentions for Control Center

PSE&G may negotiate agreements to support Control Center operations.

7.1.3. Maintenance Contracts

PSE&G may negotiate agreements to support maintenance.

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