PPL Electric Utilities Corporation

PPL TransLink, Inc.

PJM Developer Qualification Application

December 19, 2016

Name and Address of the Entities:

PPL Electric Utilities Corporation ("PPL EU")
Two North Ninth Street
Allentown, PA 18101

PPL TransLink, Inc. ("PPL TransLink")
Two North Ninth Street
Allentown, PA 18101

The demonstrated experience of the entity or its affiliate, partner, or parent company to develop, construct, maintain, and operate transmission facilities, including a list or other evidence of transmission facilities the entity, its affiliate, partner, or parent company previously developed, constructed, maintained, or operated.

Introduction

PPL EU is a Pennsylvania corporation and a wholly owned subsidiary of PPL Corporation. PPL EU is headquartered in Allentown, Pennsylvania, and is an owner of transmission facilities in PJM Interconnection, L.L.C. ("PJM"). PPL EU distributes electricity to all retail customers within its service territory in central eastern Pennsylvania. PPL EU is a load-serving entity ("LSE") in PJM and a signatory to the PJM Consolidated Transmission Owners Agreement and the Reliability Assurance Agreement ("RAA").

PPL TransLink is also a wholly owned subsidiary of PPL Corporation and an affiliate of PPL EU. PPL TransLink is also headquartered in Allentown, Pennsylvania.

PPL EU is relying on its own experience in developing, constructing, maintaining, and operating transmission facilities. PPL TransLink is relying on the demonstrated experience of its affiliate, PPL EU, to develop, construct, maintain, and operate transmission facilities.

PPL EU is currently engaged in approximately 125 unique transmission projects across its service territory with a five-year annual capital transmission investment of over $3 billion. These projects have encompassed new and upgraded substations, capacitor bank installations, control cubicle and transformer replacements, and new line installations ranging from 69kV to 500kV. Completing these projects requires extensive technical expertise, effective project management capabilities at both the project and portfolio levels, the ability to work with numerous stakeholders and sometimes other transmission owning partners, and effective cost controls over the capital being deployed.

This section contains descriptions of four PPL EU transmission projects that were recently completed. These examples illustrate the types of projects PPL EU encounters and the range of capabilities it can deploy to successfully complete them.

Project Case Study #1 – Susquehanna – Roseland

In 2007, PJM directed the construction of a new 145-mile, 500kV transmission line between the Susquehanna substation in Pennsylvania and the Roseland substation in New Jersey that it identified as essential to the long-term reliability of the Mid-Atlantic electricity grid. The line was energized in May 2015. PJM determined that the line was needed to prevent potential overloads that could occur on several existing transmission lines in the interconnected PJM system. PJM directed PPL EU to construct the portion of the Susquehanna – Roseland (SR) line in Pennsylvania and the Public Service Electric and Gas Company (PSE&G) to construct the portion of the line in New Jersey. The route crosses the Delaware Water Gap National Recreation Area using a utility corridor already occupied by a high-voltage power line. The existing line and the rights to use the corridor are owned by PPL EU and PSE&G. Figure 1 illustrates the portion of the line that PPL EU was responsible for constructing.

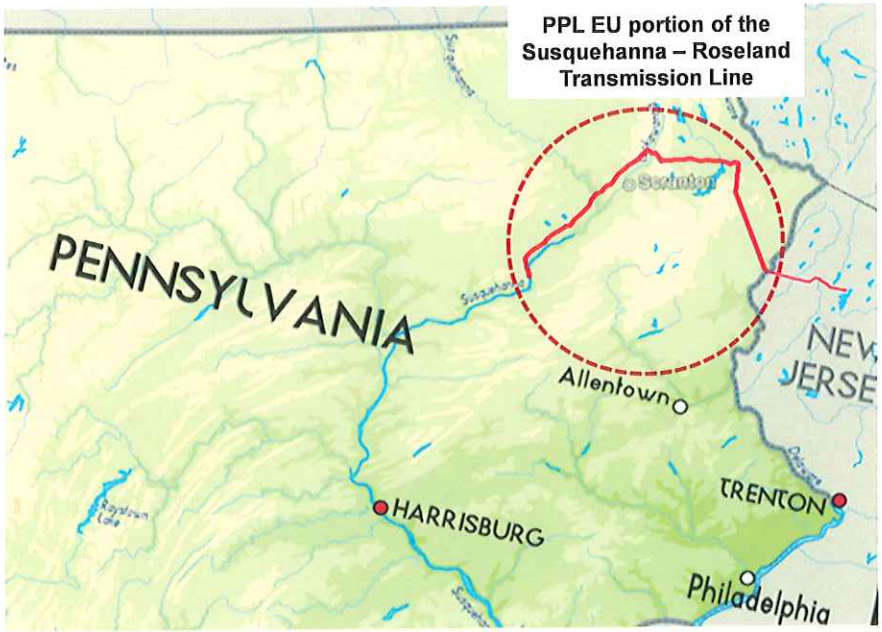


Figure 1: PPL EU Portion of the Susquehanna – Roseland Transmission Line

PPL EU and PSE&G cooperated closely on the design, siting and other aspects of the project, and formed a joint team to accomplish construction of a four-mile segment that passes through three National Park Service units that lie in both Pennsylvania and New Jersey. The line was energized in May 2015, and the large scale of the SR project provided an opportunity to renew and enhance PPL EU's development expertise through invaluable learning experiences that uniquely position PPL EU for success with future development projects.

One of the key success factors for the PPL EU SR project was the structure of the internal PPL EU team, which allowed for flexibility and coordination.

PPL EU chose to place internal SR project management subject matter experts (SMEs) in the various business units rather than solely in a central project team, which improved communication and raised the visibility of the project. In addition, the SMEs were easily able to leverage internal and external stakeholder relationships as needed. In addition to the internal team resources, PPL EU relied on

contractors for most of the project management, engineering and construction work, which is a best-practice for large-scale development projects.

Throughout the course of the planning, engineering and design phases, PPL EU was able to successfully overcome major hurdles, including significant challenges associated with the Environmental Impact Study required under the National Environmental Policy Act performed by the National Park Service. PPL EU was able to leverage state and federal government relationships to keep the process on track and to obtain insight into NPS deliberations. PPL EU also leveraged strong political relationships to work with the Federal Aviation Administration (FAA) to address an FAA concern with tower heights by decommissioning a Doppler radar system.

As a result of the SR project, PPL EU has adopted new processes to improve the efficiency and effectiveness of future transmission development. PPL EU now conducts more extensive constructability reviews at the front-end of development, including line analysis and location and access assessments, which enable better estimates and reduces risk. PPL EU's culture as a learning organization enables the organization to continuously improve its capability to efficiently and effectively manage an expansive portfolio of projects.

Throughout the SR project, PPL EU also demonstrated its experience with extensive public outreach processes to help address public concerns. For this project, PPL EU employed an outreach process that included frequent targeted communications by letter, e-mail, door-to-door visits, public open houses, special websites and dedicated toll-free phone lines. This process also included a two-way component in order to log and track comments as well as company responses to these comments. PPL EU intends to use these industry leading processes and designs in any future transmission development opportunities, which creates a distinct advantage over other organizations.

Project Case Study #2—Northeast/Pocono Reliability Project

In 2016, PPL EU completed a $350 million reliability project in Pennsylvania consisting of a 57-mile, 230-kilovolt power line from the Wilkes-Barre area to an area west of Hawley, and three new electrical substations to serve customers in the region. PPL EU purchased property at the substation locations called West Pocono, North Pocono and Paupack. Each substation is about 4 to 5 acres, enclosed by a fence, with some additional property outside the fence.

To connect these new substations to the existing 69-kilovolt lines they will supply, PPL EU built short segments of 69-kilovolt line – about 6 to 8 miles in total for the three facilities. PPL EU also added a second set of wires to the poles of an existing 10-mile, 69-kilovolt power line that runs from Lakeville to Cherry Ridge.

As part of this project, PPL EU also rebuilt an existing 69-kilovolt line that runs from the Peckville area in Lackawanna County to Honesdale, Wayne County. The line is about 20 miles long. It was 85 years old and no longer adequate to serve customer needs. The wooden poles for this line, which were about 70 feet tall, were replaced with new steel poles that are about 95 feet tall. The right-of-way for this line is 100 feet wide.

Project Case Study #3 – Copperstone 230/69 kV Substation New Build

As part of the 2007 PJM Regional Transmission Expansion Plan (RTEP) process, PJM identified a potential system overload on the 230 kV system as a result of particular N-1-1 contingencies during 2012 summer peak load conditions. PPL EU also identified thermal overloading concerns on specific 230-69 kV transformers and 69 kV lines during certain contingency conditions. As a result, PPL EU initiated a project to alleviate these overload concerns with a new Copperstone 230/69 kV substation and associated 69 kV lines.

During the concept phase, the PPL EU Engineering and Design team evaluated alternative design options, which included multiple new transformer installations and substantially more line mile additions. The PPL EU team found these alternative options to be more costly and complex and the Copperstone 230/69 kV substation was the lowest cost, best-value long-range alternative. Figure 2 shows a photograph of the new Copperstone 230 / 69 kV Substation.

Figure 2: Copperstone 230/69 kV Substation

During the pre-construction phase, PPL EU performed a siting study and acquired approximately 1.3 miles of rights-of-way. The construction phase involved the installation of a new 230/69 kV substation, a new capacitor bank, additional circuit breakers and transformers and new 69 kV lines. Total construction cost for the Copperstone Substation build was approximately $23 million. The Copperstone substation project was completed and put into service in 2012.

Project Case Study #4 – Manor – Graceton 230kV Line Replacement

In 2010, PPL EU initiated a project to replace the existing vintage 1920's transmission conductor on the Manor-Graceton 230kV transmission line. The project was initiated due to deterioration of the conductor core and splices in certain line segments.

The project replaced both the conductor and structures using an improved design capable of future double-circuit 230kV operation. The lines were double-circuited crossing the Susquehanna River outside of the Manor substation and this project provided the capability of a second circuit over the complete length of the line. In addition, PPL EU installed fiber optic overhead ground wire on the line structures, which terminated in the Manor control house and at the last structure of the rebuilt line. The chosen construction technique allowed for a 10-hour return-to-service time in the event of an actual contingency. Total construction costs were approximately $29 million and the line was placed into service in June 2013.

The Manor-Graceton 230 kV line replacement project required close coordination with Baltimore Gas and Electric (BG&E), as the remaining 1.4 miles of the line are owned by BG&E. As part of their own upgrades, BG&E planned to replace the existing power line carrier with fiber based communication for use in the relay scheme between the Manor and Graceton 230 kV substations. To accommodate this communications upgrade, both PPL EU and BG&E, respectively, removed wave traps and associated equipment at the Manor and Graceton control houses. The close coordination between the two utilities was critical to the success of this project.

For a list of PPL EU's 40 largest recently completed transmission capital projects, please see below at page 7.

There are approximately 5,000 miles of transmission lines in PPL EU's service territory. They carry voltages ranging from 69 kilovolts to 500 kilovolts. PPL EU operates more than 1,300 miles of 230- and 500-kilovolt transmission line rights-of-way. These lines are the backbone of the nation's electric grid and are vital to security, safety and commerce.

PPL EU maintains 35,000 miles of overhead distribution lines across its system, delivering power to customers.

In order to operate and maintain the transmission grid reliably, PPL EU manages a Transmission Control Center 365 days, 24 hours a day in the Lehigh Valley. The control center is completely secure and has redundant data and communication at both the Operations Center and the Disaster Recovery Site that are independent of each other and meet all ReliabilityFirst Corporation (RFC) and North American Electric Reliability Corporation (NERC) criteria.

PPL EU's electricity delivery system includes roughly 900,000 utility poles that carry conductors, cross-arms, insulators, transformers, circuit breakers, lightning arrestors, and other equipment. Additionally, PPL EU delivers power along 6,500 miles of underground lines, mainly in cities. These lines run through hundreds of manholes and underground vaults, which are inspected, tested and repaired on condition and/or time-based cycle as part of a comprehensive maintenance plan.

Inspections of distribution lines and poles are also done periodically based on a schedule and circuit performance to identify equipment problems that may affect system performance or service to customers. Overhead line inspections identify the weak links in the system so that damaged or deteriorated equipment can be repaired or replaced. Each year PPL EU performs thermography inspections on about 6,000 miles of distribution circuits, where it uses infrared cameras to identify problems before an outage occurs.

Routine helicopter patrols of all transmission lines are conducted every year, as well as more comprehensive aerial inspections on a four-year cycle. From helicopter patrols, PPL EU uses LiDAR to measure the distances between transmission power lines and any obstructions, such as trees.

PPL EU performs ground patrols of about 2,350 miles of transmission lines annually. PPL EU is installing animal guards at substations to prevent birds, squirrels and other animals from entering the electrical facilities and causing outages.

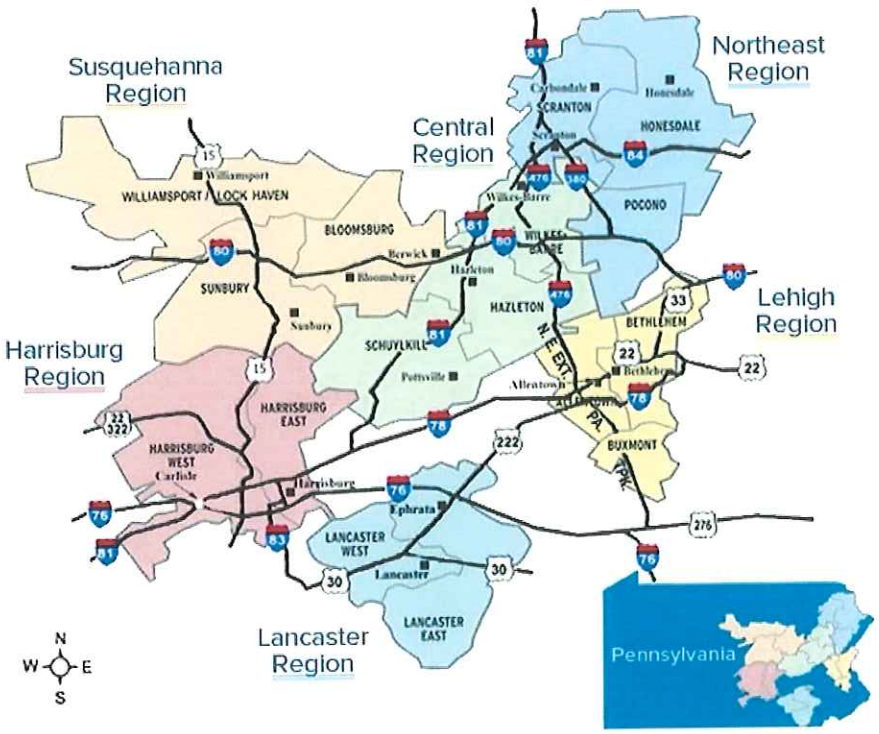


Figure 3: PPL EU Service Territory

The previous record of the entity or its affiliate, partner, or parent company regarding construction, maintenance, or operation of transmission facilities both inside and outside of the PJM Region.

The following list contains the 40 largest transmission capital budget projects placed in-service since 2008 by PPL EU:

1. Completed a 57 mile 230kV reliability project from Wilkes-Barre to Hawley area.
2. Converted Jenkins 230 kV yard to a double-breaker double-bus arrangement.
3. Procured and store at a suitable location a spare 500/230kV Transformer at the Juniata 500/230kV Substation.
4. At West Shore 230kV substation, installed a 130 MVAR Capacitor Bank on the 230kV bus with a 230kV Circuit Breaker and the associated disconnect switches.
5. Replaced the existing Elimsport Control Cubicle with a new control cubicle.
6. Built a new S. Akron-S. Reading new 230 kV line.
7. Demolished the existing Berks-S Akron #1 69kV line and rebuilt for double circuit 230kV construction on existing 150' right-of-way.
8. Constructed new 500 kV line from Susquehanna 500 kV substation to Roseland Substation in New Jersey as required by PJM RTEP.
9. At Sunbury substation, replaced the existing 75MVA transformers T22 and T23 with 170MVA (at 55 C) rated units.
10. Rebuilt the Eldred-Pine Grove 69kV line from the Broad Mountain Tap to Pine Grove Substation, approximately 7.2 miles.

11. Re-conductored the Danville-Milton 69kV line from pole 25621N30057 to pole 31421N29092 with 3-336.4KCMil 26/7 ACSR conductors (Approx. 11.4 miles).
12. Constructed approximately 10.0 miles of new 69 kV line between PPL's Derry and Millville Substations in the Susquehanna Region.
13. Reconstructed approx. 2.0 miles of the existing Lackawanna-E. Carbondale s/c 69kV line into a d/c 138kV design (69kV initial operation of both circuits).
14. Reconductored/rebuilt six line segments to 69kV design standards, replaced existing conductor smaller than 397 ACSR with 556 ACSR, or equivalent:
    A. STAN-PROV #1 ckt between Morgan Tap @ grid block 563-N-472 & PROV sub, (Approx. 2.11 mi).
    B. STAN-PROV #2.
15. Added a fourth 75 MVA, 230/69 kV transformer (T4) at Stanton 230/69 kV substation.
16. Expanded Harwood 230 kV yard into a breaker-and-half design, modifying Bays 1, 2, and building Bay 3.
17. At Harwood 230kV yard, installed third 230/69kV transformer (#T6), 150 MVA nominal, onto the Harwood-East Palmerton 230kV circuit. In the 230kV yard, installed four motor operators on the four disconnect switches in Bay 2 (around breakers 2N and 2S).
18. Rebuilt the HARW-JENK #2 circuit segment from Harwood to the Valmont taps with d/c 69/138kV construction, operated at 69kV initially, 556.5 ACSR conductor, or equivalent.
19. Rebuilt approximately 6.7 miles of double circuit Siegfried-Quarry #1 & #2 69 kV line from Siegfried 230/69 kV Substation to North Bethlehem 69/12 kV Substation using 556 ACSR or equivalent conductor.
20. Tapped both the new Siegfried-Jackson #1 & #2 138 kV transmission lines through two LSABs to a common point and extended a single circuit 138 kV transmission tap for approximately 5.6 miles to a new substation in the vicinity of grid block 625-N-308.
21. At Wescosville 500/138/69 kV Substation, installed a new 150 MVA, 138/69 kV Transformer.
22. ER 161441:
    Reconductored 3 spans of 2/0 Cu on the Quarry 1-Coopersburg Tap from the tap point at pole 65970S46609 to Seidersville Tap 1 using 795 ACSR. Reconductored two spans of 2/0 Cu on the Seidersville Tap 1 using 556 ACSR.
23. At the new Breinigsville Substation site, constructed a 500 kV yard with bus ratings of 4586A (SN) and 5693A (SE) and 500 KV bay equipment with ratings of 3000A (SN) and 3450A (SE).
24. Tapped the Blooming Grove-Jackson and Peckville-Jackson 138/69 kV D/C lines in grid block 662-N-349 and extend approximately 1.5 miles of 138/69 kV double circuit UG cable along Routes 314 and 611 to a Sanofi Pasteur-owned substation using 500 KCM CU cable.
25. Tapped the new Siegfried-Jackson #1138 kV transmission line and extend a single circuit 138 kV transmission tap for approximately 2.2 miles to a new substation in the vicinity of grid block 657-N-310.
26. Replaced MACR T21, 230/69 kV, 75-MVA transformer, with a 230/69 kV, 150-MVA, auto TCUL transformer. Replaced MACR T21, 230 kV MOAB.
27. Installed 5-138 kV breakers, breaker bays, and breaker-and-one-half bus arrangement in the Jackson 138 kV substation.
28. Installed 1-138 kV breaker and breaker bay facilities in Bay 12R of the Siegfried 230/138 kV substation.
29. Installed a 230/69kV substation (named Copperstone) with 2-150 MVA 230/69kV transformers by sectionalizing the Middletown Junction-North Lebanon 230kV-line in the vicinity of grid coordinates 28200S34900.

30. Replaced the existing 1.6 miles of double circuit oil filled paper insulated 750 Kcmil Cu conductor 69kV lead shielded Cables between the Harrisburg and Walnut substations.
31. Installed approximately 1.3 miles of double circuit 138/69kV line from W. Shore substation to Whitehill taps junction point and connected this new double circuit line to Harrisburg #1 and 2 69kV lines.
32. Reconductored ~ 3.7 miles of Cumberland - Wertzville section of the double circuit Cumberland - W. Shore 69kV line from 336.4 Kcmil ACSR to 795 Kcmil ACSR conductors.
33. Rebuilt the Sunbury -Dauphin 69kV line from Sunbury to the Dalmatia Tap (13.7 miles) and from the Dalmatia Tap to Fishery Road (additional 1.8 miles, near grid 24218N16835) to provide line ratings of 815A S/N, 1041A S/E and 926A W/N, 1163A W/E.
34. Phase 1 (ER 161723) - On the South Akron-South Manheim #1 & #2 69 kV lines from a transmission structure outside South Akron to a transmission structure outside Neffsville sub, replaced the existing insulation and reinsulated for a 550 kV BIL level.
35. Rebuilt the existing SMAN - WHEM #3 69kV line and a portion of the Donegal Tap off the West Hempfield-McGovernville #2 69 kV line to double circuit 69 kV (approximately 10 miles). Designed and constructed the 69kV double circuit transmission line using 556 k.
36. Replaced AOS-230kV Circuit Breakers.
37. Replaced AOS-500 kV Circuit Breakers.
38. Purchased regional 230-69kV transformers.
39. Replaced (designed, purchased, and installed) 500-230, 500-138, 230-138, and 230-69 kV bulk power and regional supply transmission transformers that are nearing or have exceeded expected end-of-life, or that are assessed as in poor health.
40. Purchased 230kV AOS CB.

The technical and engineering qualifications of the entity or its affiliate, partner, or parent company.

PPL EU is relying on its own experience and qualifications to provide technical and engineering expertise. PPL TransLink is relying on the experience and qualifications of its affiliate, PPL EU, to provide technical and engineering expertise.

PPL EU Operational and Maintenance Experience Information

Engineering

PPL EU's engineering organization is responsible for the project design and engineering of both transmission lines and substation design and protection. The engineering group provides detailed design services for projects and technical input into project cost estimates. Specifically, engineering develops design packages, cost estimates, specifications for engineered equipment and minor material and specification of design and construction standards. The engineering departments also provide technical support to the operations, construction, maintenance and testing organizations. Overviews of PPL EU's transmission and substation and protection engineering capabilities are shown below in Figures 4 and 5, respectively.

Figure 4: Transmission Engineering Overview

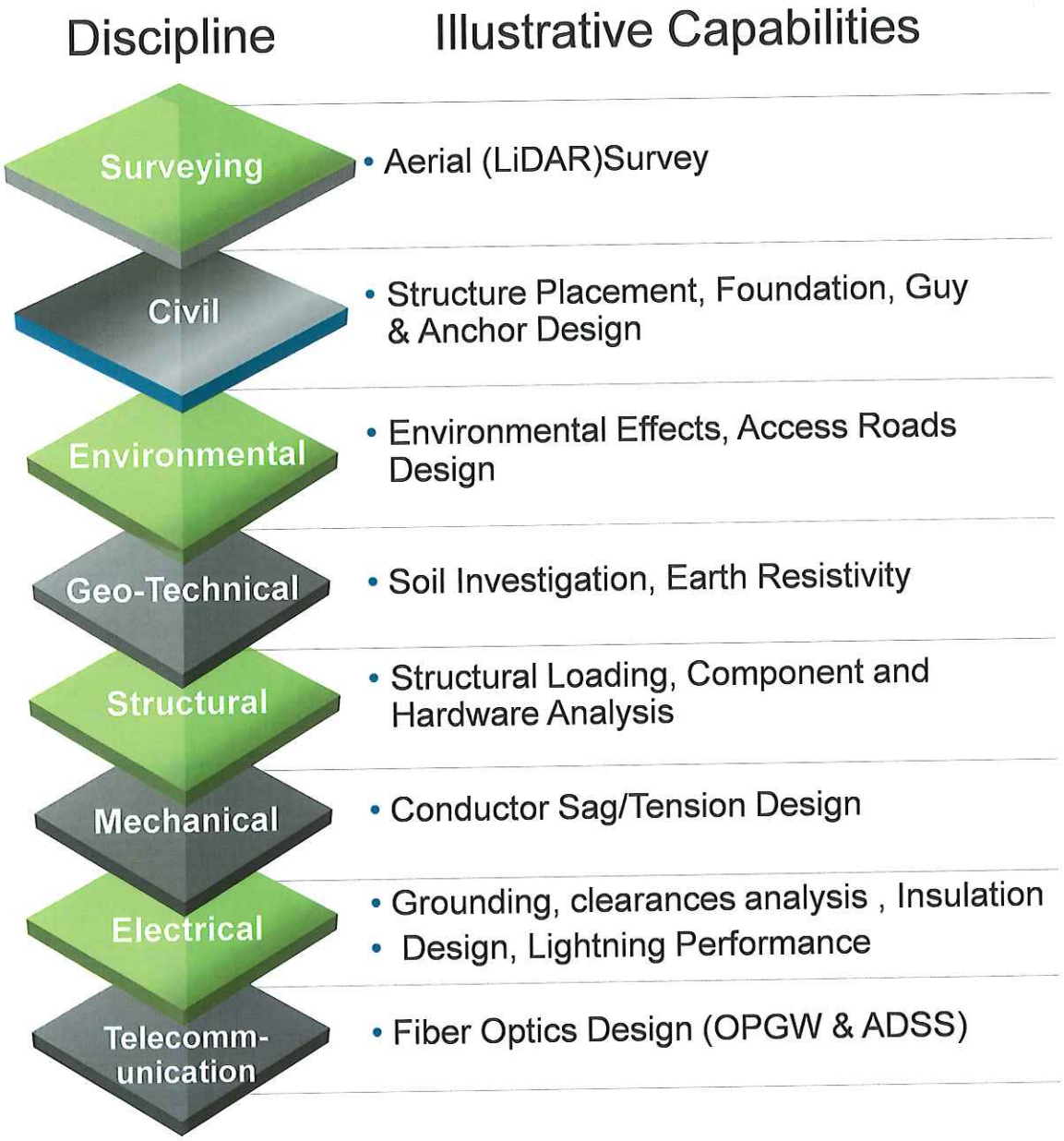


Figure 5: Substation and Protection Engineering Overview

Increased Transmission Investments

As a result of PPL EU's commitment to increase infrastructure investments, the engineering department has gained a broad mix of recent design experience including both new capacity additions and upgrades to the existing system for both transmission lines and substations. Through this increase in project volume, the engineering team has improved its constructability criteria, undergone robust process refinement, upgraded standards to achieve high level performance and adopted stronger QA/QC standards. Another byproduct of the recent PPL EU investments that sets our engineering organization apart from peers is the exposure and experience gained as a result of the varied electrical system,

weather and geographic topography in the PPL EU footprint. This experience will be an extremely valuable skill when developing future transmission projects.

Contractor Management

PPL EU's engineering group has experience with in-house designing as well as managing contracted engineered services. The engineering department has deep expertise with the contracting and bidding process as well as the management and performance improvement of contractors.

Design Standards

The PPL EU engineering team has recently implemented much more rigorous standards, which improves engineering, construction, operation and maintenance efficiency. Some examples on the transmission system include incorporation of best in class lightning protection through improvements in shield wire angle and grounding design. PPL EU's standard substation design uses an easy to construct and maintain design while also using the latest generation of Supervisory Control and Data Acquisition (SCADA) systems and other technology to maximize visibility and control and grid security. This new state-of-the-art design incorporates standards for buses, transformers, breakers, structures and capacitor banks, which allow for more efficiency in design and manufacturing, streamline the selection of components, increase repeatability and facilitate NERC requirement testing. PPL EU has also deployed a fully digital drawing and standard management tool, which can be used to quickly deploy designs to the field while also ensuring a seamless process when working with standard drawings from incumbent utilities.

Technology Enhancements

The transmission engineering group has seen major efficiencies and improvements as a result of a new state-of-the-art Power Line Computer Aided tool called PLS – CADD. The tool enables the group to develop "seed" files that retain data and update directly from LIDAR surveys. The PLS – CADD program, and the "seed" files specifically, provides for a more reliable and high quality process that enables quick field response. The substation engineering group is piloting a Synergis 3-D design tool program that uses the latest and most simple designs to interface with 2-D designs.

Permitting and Environmental

PPL EU permitting department has a track record of successfully obtaining the necessary local, state and federal government permits and licenses for proposed transmission projects. PPL EU is cognizant of the need to constantly adapt and strategically plan for the placement of its T&S infrastructure as land becomes more fragmented and populations increase. The PPL EU Permitting department is successful because of strong agency relationships and tools to increase accountability, which are discussed below:

Maintain Strong Agency Relationships

PPL EU's strong agency relationships, political engagement and vigorous outreach to landowners is critical to the permit and license acquisition strategy. PPL EU's strong relationships and coordinating experience with a number of local, state and federal agencies provides key advantages in transmission project development. See Figure 6 for a listing of relevant regulatory agencies and the types of permits and licenses that they provide.

Figure 6: Regulatory Agencies and Permit/ License Types

	Agency	License or Permit Type
Local	Local County Conservation Districts	Erosion & Sediment Control Plan, Post Construction Stormwater Management Plan, NPDES Application, BMP Compliance
State	Pennsylvania Department of Environmental Protection	GP-5, GP-7, GP-8, GP-11, NPDES, Erosion & Sediment Control Plan, Post Construction Stormwater Management Plan
	Pennsylvania Game Commission	License for ROW, Special Use Permit, Post Construction Stormwater Management Plan
	Pennsylvania Fish & Boat Commission	License for Land Use, PNDI clearance letter for fish, reptiles, amphibians
	Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry & Bureau of State Parks	License for ROW, Letter of Authorization, Road Use Agreements, Certificate of Survey
	Pennsylvania Turnpike	Line Crossing Agreements / Alterations, Access Road and Restoration Agreements
	Pennsylvania Department of Transportation	Minimum Use Driveway, Limited Access, HOP, Aviation Obstruction Review
	Pennsylvania Historical and Museum Commission	Consultation for Phase I, II, II studies, Section 106 viewshed evaluation and report, clearance letter
Federal	U.S. Fish & Wildlife Service	Incidental Take Permits, Rare, Threatened & Endangered Species, Avian Protection Plan
	U.S. Army Corps of Engineers	Water Obstruction and Encroachment Permits, Section 404 Permits
	Federal Aviation Administration (FAA)	Notifications
	National Parks Service	Special Use Permits, NEPA Compliance

Real-Time Communication

One of the key drivers of PPL EU's strong external relationships is our "real-time communication commitment," which includes same-day inquiry responses and one-on-one meetings with stakeholders. The project development timeline relies on the success of the permitting department, so this commitment to direct communication adds significant value to PPL EU.

Permitting and Licensing Tools

Other tools that PPL EU utilizes for successful acquisition of permits and licenses include a robust licensing and permitting accountability model, permitting plans, metrics for tracking successes and risks, and permitting play sheet guides. The PPL EU Permitting department has recently undergone a significant process improvement effort which has resulted in more transparency and accountability for the organization.

The PPL EU organization houses both permitting and licensing in one standalone group. In peer utilities, the permitting and licensing function often rests in other groups such as siting or engineering. PPL EU chose to separate the organization from other functions to promote its visibility, increase checks and balances and allow for enhanced budget and schedule accountability. In addition, PPL EU chose to combine permitting and licensing in one organization, which provides advantages such as increased credibility of the organization and enhanced relationships with external stakeholders, as many of the external agencies involved are petitioned for both permits and licenses.

Equipment and Material Procurement

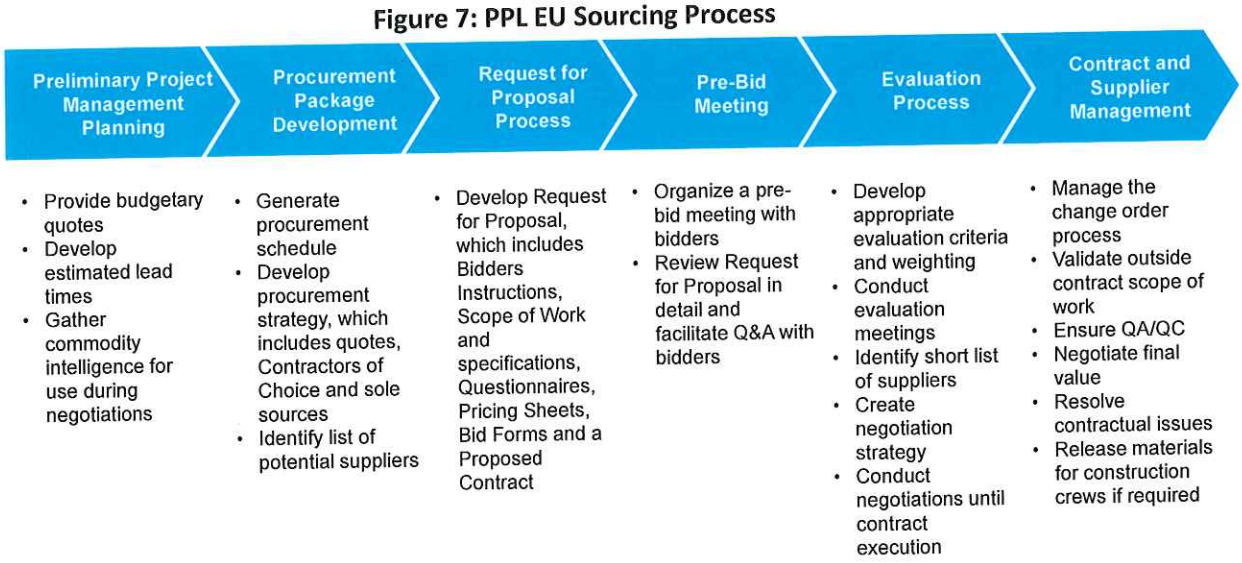
Supply Chain Management is centralized within PPL and works closely with PPL EU's Transmission Project Management to secure materials and services utilizing competitive processes that ensure a fair and competitive outcome, while minimizing company risk and delivering materials and equipment according to project schedule. The Supply Chain organization is set up to deliver materials and services successfully for future transmission projects through its organizational and operating structure, established relationships and recent large-scale project experience:

Supply Chain Structure

While a centralized supply chain organization provides the benefits of scale and process efficiency, the Transmission organization benefits from Transmission Project Specialists that have long-standing relationships with many key suppliers. The Supply Chain organization is split into sourcing and logistics functions, which both interact directly with PPL EU project managers.

See Figure 7 for a visual representation of the Sourcing process that PPL EU follows.

Figure 7: PPL EU Sourcing Process



Established Relationships with Key Vendors

The sourcing department has relationships with vendors nationwide, creating a strong network across the PPL EU footprint. The Sourcing organization has developed an extensive Request for Proposals (RFP) process that comprehensively reviews potential contractors for safety, performance, quality, EMR, DART Rates and safety incidents. The process also involves interviews of personnel and relevant clients to confirm compatibility and the ability to deliver. PPL EU is confident, due to the significant volume of projects it executes and the emphasis it places on supplier relationships and sourcing effectiveness, that it receives preferred customer prices that are equal to or better than its peers, and can also secure supply when others in the industry are unable to find needed resources and/or materials.

Susquehanna – Roseland Project Experience

PPL EU has significant recent sourcing and logistics experience as evidenced by the Susquehanna – Roseland 500 kV project. PPL EU found that embedding a sourcing manager into the Susquehanna – Roseland project team enabled the Susquehanna – Roseland sourcing manager to better communicate with other internal project stakeholders, which resulted in more successful sourcing negotiations. The sourcing department was responsible for the procurement of all materials and services for the project, except for $6 million of small-scale items like connectors and fuses.

Contract Management

The Contract Management organization develops the overall contract strategy and is responsible to initiate, develop, negotiate, administer, and manage the performance of contracts involving the use of contractors for all PPL EU construction, design, engineering, and miscellaneous services work in accordance with PPL's Supply Chain policies.

Contractor Relationships

The contract management department is responsible to identify and evaluate potential contractors, maintaining contractor relationships, understanding contractor capabilities, managing RFPs and contracting processes, and matching contractor capabilities with business requirements. PPL EU has established a preferred set of contractors, Contractors of Choice, through an extensive, formal RFP process. The contract management team has established relationships with contractors nationwide, which creates a strong ability to effectively source the best contractor(s) for each piece of work required by PPL EU. This contracting process delivers a best practice contracting approach that generally complies with the National Contract Management Association standards and processes. The team also looks to champion continuous improvement and innovation and employ balanced negotiation practices to improve business results.

Contracting Strategy

The contract management organization is responsible for developing, managing and administering the Contracting Strategy for PPL EU. The team serves as the single point of contact for obtaining contracting reviews and approvals for the use of contractors for work across PPL EU system. Contract management works with other teams to develop a final scope for contracting all types of miscellaneous physical work as well as engineering and construction work. The contract management team contracts PPL EU work related to transmission, distribution, substation, and vegetation management services.

Communication with External Contractors

The contract management department maintains and requires frequent communication with external contractors throughout the project lifecycle. The PPL EU team holds regular quarterly meetings with all contractors to share and receive feedback, with more frequent meetings held as necessary. PPL EU also holds monthly Environmental, Health and Safety meetings with all contractors to educate contractors on new requirements and regulations, share concerns, discuss best practices and gather feedback. Our contract management team believes that this open, two-way communication loop improves the work of both the contractors and our internal contract management team and is extremely beneficial for current and future projects.

Project Management

The PPL EU project management department manages projects from approval to closeout using industry-accepted project management methodologies and standards. The PPL EU Project Controls team works closely with the project management team, which provides for more effective execution and follow-up of projects.

Project Management Team

The PPL EU project management team ensures that project activities are completed to scope, schedule and budget in order to facilitate the business objectives and requirements that are outlined in the project plan using best-in-class Project Management Institute (PMI) practices. The project management team remains connected to projects throughout the entire development lifecycle, which starts with a specific project manager being assigned to a project in the early stages of project planning and design. The project management team has experience managing a wide variety of projects across PPL EU's service territory. Depending on the size and scope of a particular project, project managers are responsible for managing and overseeing anywhere from one to fifteen projects at the same time. For the largest and most complex projects PPL EU will assign its most experienced project managers to ensure that the project is handled in the most efficient and effective manner.

Relationships with External Stakeholders

The team interacts directly with key stakeholders to facilitate completion of project activities and provide timely communication. The project management department utilizes key performance metrics and indicators to measure progress and outcomes as they relate to project and key stakeholder goals as well as to align project execution with strategy. Although, for the vast majority of projects, PPL EU handles all project management activities internally; however, PPL EU also has experience managing external project management resources when work volumes exceed its internal capacity. PPL EU's experience vetting and engaging external resources allows it to quickly and efficiently accommodate significant increases in project activity.

Project Controls

PPL EU's project controls group is tightly integrated with the project management department within a single organization, which facilitates communication and enhances efficiency. The project controls group provides financial and scheduling support throughout the life cycle of PPL EU's transmission projects utilizing guidelines established by the PMI. This includes developing project baseline budgets, maintaining project schedules, tracking resource usage and project progress, identifying potential problems and using advanced analytical tools such as earned value metrics and reporting. Additionally, this position prepares overall capital project forecasts and cash flows for the PPL EU business plan.

Cost Analyses

The project controls group works alongside project managers and project teams to assess and address resource and cost-related risks during the project life cycle, including the analysis of costs related to open contract items such as claims for out-of-scope work billed by contractors. The project controls group supports project managers in performing specialized analyses of corrective action plans to determine the most effective means of addressing potential problems. For example, the project controls

group would be responsible for assessing the cost of schedule slippage versus a variety of alternatives including the cost of hiring additional contractors and/or using internal resources at overtime rates.

Performance Management

The project controls department is responsible for monitoring project progress to compare actual versus baseline resource usage and analyze project variances utilizing statistical techniques such as earned value metrics and reporting to identify trends, develop forecasts, and expose potential problems. The project controls department also implements process controls, monitors and audits projects to control project risks, ensures adherence to Generally Accepted Accounting Principles ("GAAP") guidelines, and compliance to Federal Energy Regulatory Commission ("FERC") and Sarbanes-Oxley Act of 2002 ("SOX") regulations. Our goal is to provide exceptional customer satisfaction and ensure projects meet their intended goals while adhering to schedule and budget projections.

The project controls department is headed by a manager of project controls and supported by project control specialists, project accountants, business analysts, and information technology ("IT") business solution specialists.

Construction

The PPL EU construction management department is directly responsible for ensuring that contracted work for PPL EU is completed on time, within budget, and to specified quality levels and that PPL EU policies and procedures are understood and followed by contractors.

Field Representatives

The PPL EU construction management team acts as the field representative on project teams. Due to the recent increase in transmission investments, and subsequent rise in construction work volume, the PPL EU construction management team has gained valuable experience that sets it apart from peer utilities. The team is responsible for participating in constructability assessments and the development of project plans, which include project risk assessments. Once construction has begun, the team continues to manage construction throughout the lifecycle of the project until construction completion.

Construction Liaison

The construction management team is responsible for ensuring that contractors review the necessary work plans, understand the scope and requirements for performing the work and understand the general safety procedure requirements. The construction management team ensures timely receipt of materials and has experience coordinating construction resources when multiple contractors or PPL EU crews are involved with a project, outage, specialty equipment, and / or material staging / lay down areas. At the beginning of construction, the construction management team sets priorities across the project construction timeline to ensure timely task completion and clear accountability. Throughout the construction process, the construction management team directly manages the change order process for contract claims, particularly for work that is not in scope. As a result, the team has experience participating in claims dispute resolution sessions as well as negotiating changes to the project scope. The team is responsible for ensuring quality workmanship before accepting the finished product and verifies all contractor invoices.

Adherence to Project Costs and Budgets

The construction management team develops and implements policies and procedures for budget/cost tracking, corrective actions, and schedule changes as cost deviations are detected. Construction Management provides regular project status reports to the project managers and project controls group including corrective actions taken to keep projects on track. This high level of coordination and communication between Project Management and Construction provides a distinct advantage to PPL EU in transmission project development and execution.

Commissioning of New Facilities

PPL EU has an established Acceptance of Facility process for newly installed equipment to ensure that all equipment performs as intended when subjected to real-world operating conditions. Standardized equipment is specified and equipment and relay tests are specified and conducted, reviewed and approved by T&S Maintenance Engineering prior to energizing the equipment. Real world system voltage is also methodically tested against all equipment before applying customer load.

Pre-Commissioning activities such as programming relay settings, relay testing, trip testing, wiring validation and testing for shorts and grounds are performed by relay technicians, substation design engineers and contractors to ensure projects are ready for demonstration testing at the time of commissioning. Test results are then recorded on Acceptance of Facility forms and approved by T&S Maintenance Engineering prior to being placed in service.

New or Emerging Technologies

The transmission engineering group has seen major efficiencies and improvements as a result of a new state-of-the-art Power Line Computer Aided tool called PLS – CADD. The tool enables the group to develop "seed" files that retain data and update directly from LIDAR surveys. The PLS – CADD program, and the "seed" files specifically, provides for a more reliable and high quality process that enables quick field response. The substation engineering group is piloting a Synergis 3-D design tool program that uses the latest and most simple designs to interface with 2-D designs.

A description of the experience of the entity or its affiliate, partner, or parent company in acquiring rights of way

PPL EU is relying on its own experience in acquiring rights of way. PPL TransLink is relying on the experience of its affiliate, PPL EU, in acquiring rights of way.

Routing and Surveying

PPL EU's Siting and Right-of-Way department is an integral part of the transmission project lifecycle for both the Bulk Electric System (BES) and the non-Bulk Electric System. The Siting team becomes involved during the early stages of the project development lifecycle during the concept phase and manages key functions such as route determination, Pennsylvania Public Utility Commission (PA PUC) application development assistance and community outreach.

The main responsibilities of the Siting team are outlined below:

Land Use and Planning Studies

In the early phases of the project lifecycle, the siting team conducts comprehensive land use and environmental planning studies necessary to make informed facility siting decisions. The organization utilizes robust processes to analyze land use, environmental conditions and alternative routes. The siting team evaluates the social, environmental, constructability and cost impacts for each alternative route to determine the optimal route for facilities.

Proactive Community Outreach

While a line is being sited, the team actively involves community stakeholders, government agencies and the media in order to gather input for siting decisions. PPL EU believes that early and proactive outreach during the siting process is extremely helpful to achieving successful siting proceeding outcomes. In addition, the siting team will incorporate community feedback into route development whenever practical.

Preferred Route Development

After a preferred route has been chosen based on impacts analyses, public input and input from the internal team, the Siting team coordinates the initial environmental surveys, including wetlands, threatened and endangered species and cultural resources for the preferred route. In addition, the Siting team also begins to communicate and coordinate with the Right-of-Way team about mapping and initial property surveys. Early coordination with the Right-of-Way team sets PPL EU apart from other utilities and creates cohesion in the early stages of project development.

Historically, although the internal siting team has conducted most site and route selection work in-house, but PPL EU has established relationships with several siting and environmental firms which allows for easy scaling based on the volume, size and complexities of projects being undertaken. The external contractors are also able to provide supplemental environmental assessment reports on plants, wildlife, threatened and endangered species, cultural / historical resources and land use impacts.

Right-of-Way, Eminent Domain, and Real Estate Acquisition

PPL EU's Right-of-Way team is heavily integrated with the siting team, which provides benefits such as increased community outreach and greater consensus on route development. The Right-of-Way team is involved in a variety of functions that largely involve external stakeholders, which can be seen below:

Route Selection Assistance

The Right-of-Way team assists in route siting and selection, largely through extensive community outreach. The Siting team utilizes input from the Right-of-way team to determine community preferences, which can ultimately impact route determination.

Market Studies

Once the preferred route has been identified, the Right-of-Way team conducts a market study, which can be completed internally or by an external appraisal firm, to determine property values, estimate

Right-of-Way costs and determine the appropriate timing for acquisition. The team will also attend open houses in order to facilitate the Right-of-Way process.

Relationships with Government Agencies

At an early stage, the Right-of-Way team identifies relevant governmental agencies involved in the project like State Game Lands, Department of Conservation and Natural Resources and the National Park Service. Although PPL EU has strong relationships with many governmental agencies, negotiations can have significant impacts to project timelines, as seen with the National Park Service in the Susquehanna – Roseland project, so early contact and collaborative negotiation is a priority for PPL EU.

Landowner Relationships

The PPL EU Right-of-Way team is responsible for ordering title abstracts and preparing 15-Day Packets, which explain topics such as PPL EU's fair negotiation tactics, background on eminent domain and relevant vegetation management information. Figure 8 is an example of a PPL EU cover letter for the 15-Day Packet that PPL EU delivers to landowners.

Figure 8: PPL EU 15-Dav Packet

RE: [redacted] Rebuild Notification

Dear [redacted]

PPL Electric Utilities Corporation (PPL) is planning to rebuild the [redacted] 69KV electric transmission line in [redacted] This project will significantly improve the reliability of electric service in your area, particularly during and after major storms. I am writing to notify you of the proposed project as required by the Pennsylvania Public Utility Commission.

PPL plans to negotiate with the applicable landowners to expand the current right-of-way to [redacted] feet in width to accommodate the rebuilt transmission line.

Since the proposed right-of-way needs of this project may involve your property, enclosed are notices required by the Pennsylvania Public Utility Commission that provide important information regarding eminent domain, right-of-way maintenance practices, and land agents conduct. Also enclosed is PPL's Internal Practices for Dealing with the Public on Power Line Projects. The Pennsylvania Public Utility Commission's regulations require that PPL provide you with this information at least 15 days in advance of our discussions. For your convenience, I also have enclosed information on electromagnetic fields and a brochure on vegetation management, as well as a glossary of real estate terms.

If you have any questions on any of the enclosed information, please contact me at [redacted]

I kindly request that you sign in the space provided below to indicate that you have received this information.

Very truly yours,

[redacted]

Right of Way Agent
PPL Electric Utilities Corporation

The Right-of-Way team has representatives spread across the six PPL EU regions to support greater direct communication and access to landowners, providing a key advantage for PPL EU. Because of the geographic dispersion of resources, the team is able to hand deliver and attain landowner signature for acknowledgement of receipt as well as deliver or mail non-negotiating packets to adjacent landowners. The team negotiates with landowners for easement acquisitions, fee purchases when required, substation sites, access roads, pull-pad sites and off-right-of-way access. The right-of-way department follows landowner relationships all the way to completion by obtaining Highway Occupancy Permits and access road agreements, reviewing survey drawings, scheduling closings, delivering payments and acting as a liaison during construction.

"Property Owner Perspective"

PPL EU prides itself on taking a "property owner perspective" when acquiring rights-of-way, for example, rather than splitting a small parcel, PPL EU will seek to buy the land outright and accommodate landowner requests when practical. Acquiring rights-of-way is a complex process that requires the coordination of many stakeholders, but the PPL EU Right-of-Way team has demonstrated success through a limited number of condemnations.

Liaison to Landowners during Construction Process

A key element that sets the right-of-way team apart from peer utilities is the level of involvement PPL EU maintains with internal and external stakeholders throughout the entire development and construction process. During planning and construction, the right-of-way team coordinates with landowners and external agencies for input collection and negotiation. After construction is complete, the team remains engaged to assist with, and ensure, project clean up, including crop damage payments, where appropriate.

Internal and Contractor Safety Program, Including Safety Performance Record and Program Execution

Safety is a core value at PPL EU, and the company is committed to providing a safe work environment and to send each and every employee home injury-free each and every day.

Safety is a commitment that actively involves everyone in PPL's organization. PPL EU's safety rules and procedures are a compilation of hazard controls and barriers identified through proactive work methods and past experiences – either by PPL EU or regulatory agencies. Only by consciously identifying the hazards of the job, knowing the safety rules and procedures, and applying them can PPL EU develop a safer work culture.

It is every employee's obligation to ensure that safety rules and safety procedures are incorporated into the planning and performance of each task. The scope of responsibility for a safe work environment includes a variety of duties by each PPL EU employee.

According to the PPL EU safety procedures, there are differing requirements for each level of responsibility at PPL EU. According to the safety procedures, all levels of management are responsible to:

- Educate employees under their direct supervision on safety rules
- Plan the work to include applicability of safety rules
- Monitor the work to ensure applicable safety rules are being followed
- When warranted, enforce safety rules through appropriate behavior modification, to include discipline ranging from reprimand up to termination
- Communicate with Environmental Health & Safety on interpretation and applicability of safety rules.

Each employee is responsible to:

- Become knowledgeable of safety rules and their application
- Identify safety rules, work methods, and safety procedures applicable to the task(s) performed
- Adhere to all safety rules applicable to the task(s) at all times
- If there are questions on applicability, employees must seek interpretations of safety rules prior to performing the task.

Through its safety program, PPL EU strives to minimize Occupational Safety and Health Administration (OSHA) designated "Recordable Events." A Recordable Event consists of any occupational illness or injury that requires medical attention above and beyond simple first aid. As seen in Figure 9, PPL EU has low incidence rates.

Figure 9: PPL EU OSHA Recordable Events, 2009-2015

	2009	2010	2011	2012	2013	2014	2015
Number of OSHA Recordable Events that occurred in PPL EU	47	83	59	46	54	53	39
Incidence Rate as related to the number of OSHA Recordable Events	2.38	4.25	2.61	2.02	2.51	2.07	1.70

Control Center Operations

PPL EU's Transmission Control Center (TCC) is tasked with the responsibility to monitor and operate a reliable transmission grid as defined by PJM, RFC and NERC.

Transmission Control Center

In order to operate and maintain the transmission grid reliably, PPL EU manages a Transmission Control Center 365 days, 24 hours a day in the Lehigh Valley. The control center is completely secure and has redundant data and communication at both the Operations Center and the Disaster Recovery Site that are independent of each other and meet all RFC and NERC criteria. The control center adheres to the guiding principles and priorities of safety, reliability and production in that order. Due to a proactive approach and use of Human Performance tools the TCC has lessened the severity (or impact) and amount of Electric System Events (ESE's) occurrences and continues to strive for zero ESE's.

Transmission Control Center Operations

Core responsibilities of the TCC include monitoring and operating the BES and 69kV systems in the PPL EU footprint using an AREVA EMS system, directing the application of the PPL EU Permit and Tag process and procedures, constructing and maintaining the EU Outage plan, using EMS - load flow and study programs and contingency analysis to identify and mitigate overloads on a pre-contingency basis. The Operations engineering section resolves operational discrepancies with PJM when load flow models provide inconsistent results and requests stability studies from either Transmission Planning or PJM to assure system reliability is maintained within predefined limits. A key differentiating attribute of the TCC that sets PPL EU apart from other utilities is its tight linkage and coordination with the Susquehanna nuclear plant, including interface documents and maintenance and outage coordination meetings. This interface demonstrates PPL EU's ability to manage significant and complex interfaces safely and reliably.

The TCC is comprised of employees who are certified PJM, NERC and PPL EU operators. The Supervisor of the TC C is also PJM and NERC Certified.

NERC Compliance Process and Compliance History

PPL EU's compliance organization is closely integrated within the overall PPL compliance organization.

NERC Compliance Program

The purpose of PPL's NERC Compliance Program is to achieve and maintain compliance with applicable NERC Reliability Standards approved by FERC for regions in which one or more PPL subsidiaries are a Registered Entity. The scope of this program governs the NERC compliance activities of certain PPL

Corporation subsidiaries, including but not limited to PPL EU and PPL Services Corporation, which supports the compliance efforts of PPL EU, primarily for the Critical Infrastructure Protection Reliability Standards.

As part of a healthy compliance culture, PPL EU follows a well-defined process for exposing, analyzing, documenting and resolving non-conforming conditions related to PPL's NERC Compliance program. This process is defined by the PPL NERC Compliance Condition Report Process (PPL-NERC-CO-500).

Proven Compliance Track Record

PPL EU is well regarded by regulators, both within NERC and the RFC regional organization. PPL EU takes pride in its compliance track record and external stakeholders recognize it for its compliance expertise. For example, Tim Gallagher – CEO of Reliability First Corporation stated, *"We hold PPL in very high regard based on our past dealings, understanding of your compliance programs and reliability record. Observing the culture and attitude you have developed and implemented only served to reinforce our opinion....when Reliability First encounters a company that is struggling with its compliance programs, PPL is the first company suggested as a contact to help them improve."*

RFC conducts regular audits of PPL EU on behalf of NERC. The audits have generally resulted in positive findings. The few violations found have been minor. Part of PPL EU's compliance success results from its early adoption of a compliance condition report process to identify and document nonconforming situations, perform an internal assessment that looks at generic implications that go beyond the specific event and ensures that the appropriate measures are taken to prevent recurrence. This process identifies potential problems early and allows for timely and comprehensive corrective actions. As a result of PPL EU's strong internal compliance program, PPL is among the very few who are allowed to self-log any potential violations that present minimal risk.

External Stakeholder Engagement

To ensure that PPL EU and its affiliates remain current on reliability and compliance- related activities, PPL is active in the industry and well represented on many of the industry forums and committees available through EEI, NATF, PJM, RFC and NERC. In addition, PPL EU frequently engages in peer-sharing events with other utilities to share best practices.

Compliance Training

PPL Corporation recognizes that the identification, development and delivery of "local" training is essential to long-term compliance with NERC Standards. PPL Corporation provides approximately 39 NERC-related training courses for applicable PPL employees and contractors, some of which are mandatory. Some of these courses are designed for one time implementation and others are designed for periodic implementation.

Registration or Ability to Register for Compliance with Applicable NERC Reliability Standards

PPL EU Compliance Resources

PPL Corporation and its relevant subsidiaries have dedicated resources, including staff and budget, to meet the requirements of PPL's NERC Compliance Program. Subject matter experts in PPL EU utilize their expertise to achieve, document and sustain compliance with the NERC Standards on a part-time basis. The full-time resources noted above coordinate the efforts of these SMEs to ensure that compliance-related tasks are properly implemented. The Office of General Counsel, Corporate Security, Information Solutions and Corporate Auditing also apply internal resources to the NERC Compliance Program.

Storm/ Outage Response and Restoration Plan

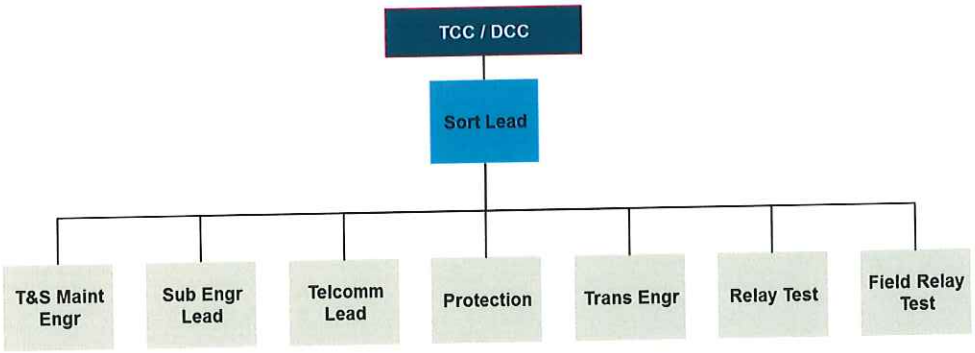
Outage Requests

In addition to real time operations, the department is charged with the construction and maintenance of the PPL EU outage plan. TCC Planning and the Outage Control Center process and bundle requests to upgrade transmission facilities and then translate these requests to equipment outages/restrictions using the PJM outage criteria time lines. The TCC effectively plans all outage requests, limits risks to the electric system and PPL EU customer base and responds to any unplanned events. Transmission outage planning, including risk and conflict analysis, is key to promoting safety, preserving the reliability of the Bulk Electric System (BES), eliminating volatility in the work portfolio and ultimately completing all projects in the capital and maintenance budgets.

Significant Operating Response Team

The significant operating response team is a joint effort between the transmission operations organization and the engineering organization, which includes substation and relay engineering, protection analysis, transmission engineering, T&S maintenance engineering, relay test and fiber / telecommunications. This group of engineers is on-call to address any electric system event that may occur. The team is also responsible for conducting root cause investigations. The significant operating response team and subsequent driver analysis allows PPL EU to successfully translate lessons learned into success for future transmission projects. Figure 10 illustrates the engineering collaboration on the significant operating response team.

Figure 10: PPL EU Significant Operating Response Team



Emergency Preparedness

PPL EU has an emergency preparedness group. The emergency preparedness group's mission is to develop and maintain comprehensive emergency response plans for all of PPL EU through documented policies, procedures and processes that incorporate lessons learned and industry best practices. The group also supports the effective execution of the plans through training and the conduct of periodic drills and exercises to test the plan under various restoration scenarios.

Emergency Response Plan

PPL EU has an emergency response plan that provides for a coordinated and comprehensive response for the rapid restoration of electrical service in the event of a natural disaster, man-made event or other emergency by ensuring that all required corporate resources are used in the most efficient manner. The plan outlines the process for the electric delivery system restoration under four emergency event levels. It describes the PPL EU emergency response organization and the roles and responsibilities of those responding to an emergency. The plan defines the thresholds for expanding the emergency response organization based on the size and complexity of the event. Figure 11 details the emergency event levels in the PPL EU emergency response plan.

Figure 11: Emergency Event Levels

	Area Storm	Area Storm	Regional Storm	System Storm
Category	Level 1	Level 2	Level 3	Level 4
# of Customers Interrupted	< 2.5 %	2.5-5%	5-15%	>15%
Cases	< 35,000	35K – 70K	70K – 210K	>210,000
Regions Involved (Area, Region, System)	Restore 24 hrs	Restore 48 hrs	Restore 48-96 hrs	Restore >96 hrs
Manpower	1 -2	2 to 4	>4 regions	System
Overall Assessment	All available within region	All available within regions	Outside help needed	Outside help needed
Foreign Help	Minor	Moderate	Heavy	Severe
	No	Most likely	Yes	Yes

- Minor - transformer fuses, services down, minor tree problems
- Moderate - transformer fuses, burnt-up transformers, primary down, tap fuses, moderate tree damage
- Heavy - OCRs, broken poles, heavy tree work, substations affected
- Severe - Distribution and Transmission lines down, extensive damage

Emergency Response Activation

PPL EU uses a contract weather service that provides daily forecasts, tailored to each of the six operating regions, real-time weather alerts, telephone consultation with an on-call meteorologist and lightning data. Hourly feeds of the daily weather forecast are uploaded into the PPL EU storm model that is used to predict the number of cases of trouble anticipated on the system. Based on the forecast and the storm model predictions a pre-event conference call may be conducted by the on-call storm team.

PPL EU Employee Involvement

Each PPL EU employee is assigned to one of eighty-six storm support roles, which are tracked through the PPL's human resources database. Position specific procedures and job aids have been developed to provide guidance and outline the roles and responsibilities of the positions. All information and tools necessary for the implementation of the plan are stored and maintained on a SharePoint site that is accessible to all PPL EU employees. PPL EU and PPL Services Corporation have personnel on call, 24 hours a day, 7 days a week, to fill the critical functions needed to support and staff the emergency command center and each of the six regional command centers throughout PPL EU's service territory.

Smaller isolated storm events impacting one of PPL EU's six regions are managed by the impacted region's on-call regional emergency manager. When multiple regions are impacted, the emergency command center at the Lehigh Service Center is staffed and an incident commander for the event is responsible for the overall restoration of PPL EU's transmission and distribution systems.

Monthly regional storm drills are conducted to maintain the regional command center staff proficiency. Semi-annual full scale drills are conducted to assess summer and winter readiness. The emergency preparedness group also facilitates a bi-monthly "Storm Improvement Initiatives" meetings where changes to storm processes are communicated to the leadership teams in the regional and emergency command centers.

Key External Relationships

PPL EU is a member of two regional mutual assistance groups, the Mid-Atlantic Mutual Assistance group and the Southeastern Electric Exchange. PPL EU also has access to additional resources through the Contractors of Choice working on PPL EU's transmission and distribution systems and from utility crews at its affiliates, Louisville Gas and Electric Company and Kentucky Utilities Company.

Recent History and Key Lessons Learned

In PPL EU's recent history, four major storm events have significantly impacted its operating area, which are detailed in Figure 12 below.

Figure 12: Major Recent Storm Events

Event Type	Min of Event Start Time	Max of Event Stop Time	Max Duration (Hours)	Sum of # Customers (Permanent)	Sum of # Cases of Trouble (Permanent)	Sum of # Customers Out More than 24 Hours	% Restored in 24 Hours	Peak # Resources on Property
PUC Major Hurricane Sandy	10/29/12 6:00 AM	11/7/12 12:00 AM	210.02	547,728	4,049	282,647	48%	4,456
PUC Major Hurricane Irene	8/27/11 6:30 PM	9/3/11 5:30 PM	165.02	453,829	3,214	103,020	77%	3,752
PUC Major October Snow	10/29/11 10:00 AM	11/4/11 10:00 PM	155.02	403,991	3,033	139,287	66%	3,170
PUC Major May High Winds	5/26/11 6:30 PM	5/31/11 12:00 AM	101.52	185,001	1,388	31,440	83%	2,235

A comprehensive review of PPL EU's restoration performance was conducted following each of these events to allow for continuous adjustments and improvements to the emergency response plan. Insights and feedback were obtained from PPL EU's emergency response organization and external

stakeholders such as the PA PUC and state and local government emergency operation centers. Surveys of customers impacted by these storms were also conducted.

Lessons learned from Hurricane Irene and the October 2011 snow storm were identified and corrective actions were in place to support PPL EU's response to Hurricane Sandy. Completed actions included:

- Expanded inbound telephone capacity with 92 additional phone lines for customer service
- Enhanced ability to provide back-up customer service capacity for inbound and outbound calls utilizing a third party vendor
- Created a public officials daily briefing conference call for major storm events.
- Created process to bring back PPL EU retirees for additional support through a third party vendor
- Created robust regional command centers in each of the six operating regions
- Improved the damage assessment process and organizational structure to the support process
- Hired a third party vendor to design and establish staging areas
- Improved core functionality of the Outage Management System and eliminated loads on system
- Created a process to place a utility liaison in county emergency operations centers when needed
- Improved onboarding material for foreign crews.

Key successes of our response to Hurricane Sandy:

- Ability to set up two self-sustaining staging areas that could each accommodate up to 500 full-time employees in areas hit hardest during the storm
- Having foreign crews on property days prior to the impact of Hurricane Sandy
- Proactive notification to public officials, key accounts and over one million PPL EU customers in advance of the storm
- Increased use of social media
- Utility liaisons deployed to hardest hit, or most impacted, counties.

Awards and Recognition

PPL EU received the following awards for storm response and industry support:

- 2013 North East PA Manufacturers and Employers Association Process Improvement Award for improvements related to storm response processes.
- J.D. Power and Associates conducted a national survey of consumers to rate performance of utilities and local, state and federal government actions prior to and following Hurricane Sandy. J.D. Power recognized PPL EU as one of only three utilities that performed "Particularly well."
- EEI Awards for:
    - 2012 EEI Emergency Recovery Award for Hurricane Sandy.
    - 2012 EEI Emergency Assistance Award, for tremendous support in the recovery from Hurricanes Isaac and Sandy.

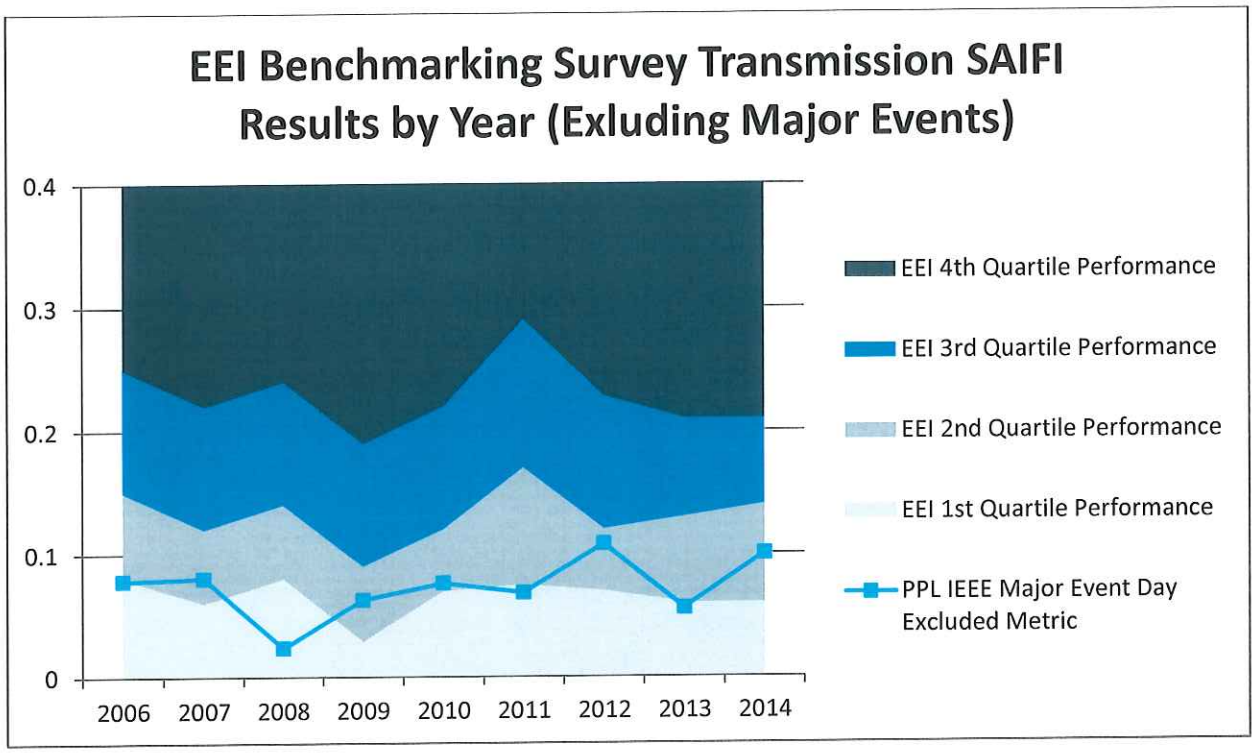
Record of Past Reliability Performance

PPL EU is committed to achieving leading operations reliability and system performance for its transmission system. Stringent maintenance programs have been developed that prioritize maintenance activities based on established reliability standards, asset management driven programs, and overall equipment criticality. It is PPL EU's philosophy to perform internally as much substation maintenance as possible.

The experience of the PPL EU transmission team is essential to success in operating and maintaining the system's transmission assets. A wide variety of training is available and provided for engineers, technicians and crews, including programs for journeyman, switchman, substation engineering, and relay technicians. Human performance tools training has also been developed to reduce human errors and programs required for NERC/CIP compliance, such as NERC compliance overviews, substation simulations, critical cyber asset recovery drills, system protection programs, facility rating methodology instruction and guidance for proper handling and protection of transmission information. Although training programs are predominantly developed and administered internally, external vendors provide training in some cases, especially on newly acquired equipment and tools.

This commitment to system performance through effective, preventive and real-time operations and maintenance programs is borne out in the reliability of system assets. As shown in Figure 13 below, System Average Interruption Frequency Index for transmission (T-SAIFI) performance has been at or near top-quartile performance for the past six years (excluding major events).

Figure 13: PPL EU T-SAIFI Historical Trend (In Interruptions)



Statement of Which Entity will be Operating Completed Transmission Facilities

Completed transmission facilities will be operated by PPL EU.

Staffing

The TCC employees seek continuous improvement in technologies and processes, are trained in all relevant operator tasks, and embrace compliance as a measure of our effectiveness. The PPL EU transmission control center follows best-in-class training practices, which increases the effectiveness of the organization and creates a distinct advantage when dealing with adverse conditions. All transmission control center employees are trained within the TCC and they receive NERC, PJM Transmission Operator, PJM Generation and PPL EU training certifications. In addition, PPL EU owns an internal simulator that is used for training. The transmission control center operators have broad experiences across multiple areas of the control center and are well- versed on the uses of security-analysis/state estimation tools. As a result of the training, the operators are able to take action when necessary and can perform basic trouble shooting on advanced systems. All team members at the TCC participate in black start drills and act as liaisons between PPL EU and PJM for information dissemination. All operators are coached and trained in black start requirements to ensure not only job knowledge but also consistency from drill to drill.

Equipment

Supply Chain Management is centralized within PPL and works closely with PPL EU's transmission project management to secure materials and services utilizing competitive processes that ensure a fair and competitive outcome, while minimizing company risk and delivering materials and equipment according to project schedule.

While a centralized supply chain organization provides the benefits of scale and process efficiency, the transmission organization benefits from transmission project specialists that have long-standing relationships with many key suppliers. The supply chain organization is split into sourcing and logistics functions, which both interact directly with PPL EU project managers.

The sourcing department has relationships with vendors nationwide, creating a strong network across the PPL EU footprint. The sourcing organization has developed an extensive RFP process that comprehensively screens potential contractors for safety, performance, quality, EMR, DART rates and safety incidents.

Crew Training

The ability to respond to unexpected events, such as major electric-system outages, is a critical skill for control center personnel, and the related training programs and emergency drills conducted help to prepare for unexpected events. PPL EU's control center has a training coordinator responsible for developing quality training programs, engaging operators, verifying learning and refreshing the program over time. A large part of the training program consists of providing trainees with the necessary hands-on experience to deal with challenging situations. Control room simulation provides experienced operators and trainees realistic and real-time experience in dealing effectively with events that are unlikely, but potentially catastrophic. A virtual control room provides trainees and staff with a variety of realistic, simulated scenarios, such as equipment failures, outages or other problems. The Dispatcher Training Simulator is part of the energy management system and mirrors the real-time system to enable operators to create diverse scenarios that might be encountered.

Staffing and Crew Training

PPL EU currently has field employees dispersed across its operating territory solely responsible for the 24/7/365 operation and maintenance of substation facilities and equipment. The majority of physical operations and maintenance for substation facilities is performed by this team internally to ensure immediate and guaranteed service. The varied skill set of the department includes emergency response and restoration, operational switching, substation inspections, operational functionality testing, system protection functionality testing and general troubleshooting and maintenance in the substation environment. This team is also responsible for executing diagnostic testing, preventative maintenance and corrective maintenance for all substation equipment, including NERC required maintenance of relay zones of protection and voltage and current metering devices. This team is fully equipped with the latest test equipment, SF-6 gas and insulating oil-handling and processing equipment for maintenance and diagnostic testing of power transformers, circuit breakers, potential transformers, current transformers, protective relaying and switchgear.

The substation electricians are trained in a Department of Labor sanctioned four-year apprenticeship that requires 144 hours of formal training for each year of the apprenticeship and a comprehensive written and oral examination at the end of the apprenticeship before advancing to Substation Journeyman Electrician. System protection relay technicians are two-year degreed technicians with various levels of experience and skills. Substation field engineers are all degreed electrical engineers with various levels of experience in substation operation and maintenance.

Maintenance crews are assigned substation responsibilities, which drive a sense of ownership and community between the team assigned to that facility. In the unlikely event of an equipment failure due to human error, there is no lack of clarity regarding responsibility. All of the crews perform individualized, local switching, diagnostic testing, inspections, preventative maintenance, corrective maintenance and emergency response. These crews are assigned work throughout the year using an accepted work management tool (Cascade). Crews also coordinate work that could impact both ends of a line outage or outage availability. Completion progress is tracked, monitored and reported on monthly.

The operations and maintenance team also provides input into new project development as to optimal design and construction in terms of ease and cost of maintaining the assets.

PPL EU's maintenance organization is responsible for providing direction and oversight of the electric utility's transmission and substation maintenance engineering functions. The team promotes the safe, reliable, efficient and economical operation of the PPL EU substation and transmission line assets in order to optimize customer reliability and service.

Work Management

The maintenance organization uses the Cascade maintenance program to schedule tasks and monitor an inventory database, which can be used for failure analysis and root cause investigations. The group is continually developing and refining a preventative maintenance program which includes processes, technical support and training to reflect best-in-class maintenance practices. The maintenance organization regularly interacts with the transmission operations organization to coordinate repair priorities, based on established reliability standards, and equipment criticality.

Maintenance Resources

The Maintenance organization has engineers stationed throughout all six regions of the PPL EU footprint to provide technical support and quick responses to issues that may arise. The engineers are highly trained, and their experience is essential to successfully maintaining the system's transmission assets. The organization requires that its employees attend seminars and manufacturer trainings. The PPL EU maintenance organization has strong relationships with our Contractors of Choice in all of the regions in PPL EU's footprint.

Transmission Facility and Equipment Maintenance and Record of Past Maintenance Performance

PPL EU has established an asset management strategy to manage reliability at target levels and minimize system risk, all within sustainable spending levels. Maintaining a consistently reliable and cost-effective transmission system requires a robust and methodical strategy for efficient maintenance, which incorporates a number of strategies to enhance system performance, including:

- Deliberate capital investment to ensure sustainability and drive down on-going and unplanned maintenance
- Cost-effective maintenance programs designed around asset condition and desired operating outcomes
- Reducing variability by mitigating high-consequence events and establishing and enforcing robust standards
- Leveraging technology to increase system visibility and improve operability
- Developing systems, tools and processes to enhance asset management decision making and generate value
- Collecting comprehensive asset information to facilitate accurate analyses and informed decision making

This sustainability concept combines deliberate, proactive equipment replacement, targeted asset maintenance programs, improved decision data and deployment of the right monitoring and control technologies. Design and materials standards have been established that optimize life-cycle costs and oversee effective commissioning to enable operation of a high quality system. These concepts are essential to developing a strategy to sustain the system at a reasonable cost.

The transmission maintenance group conducts both routine and emergency maintenance using a variety of methods and technologies including: helicopter patrols (comprehensive, routine and emergency), special patrols resulting from risk mitigating studies, foot patrols, routine air break inspections, thermo vision, acceptance of facilities, pole inspections and right-of-way encroachment reviews.

Substation Maintenance

The substation maintenance group is responsible for the maintenance and reliability of substation equipment including: batteries, battery chargers, oil circuit breakers, gas circuit breakers, air break switches, disconnects, ground switches, lightning arrestors, power fuses, CCVTs, potential transformers, power transformers, tertiary cables, capacitor bank vacuum switches and station service transformers.

Advanced Technologies

The PPL EU maintenance organization uses advanced technologies when it provides demonstrable technical, operational or economic value to projects or operations. For example, the organization has implemented Forward Looking Infrared and LIDAR technologies, as they have proven to provide essential advantages to the maintenance organization.

Relay Test

Relay Test is PPL EU's relay field engineering and testing organization, responsible for the operability of all transmission and distribution protection systems, SCADA equipment, protection system high speed communications systems, and disturbance analysis sub-systems.

Work Management

The Relay Test organization utilizes work management processes and systems that provide integrated planning and work scheduling (via work orders), multi-work group scheduling, cost accounting, metrics, and electronic asset registry updating. All work orders are generated in the state-of-the-art Asset Suite program, which can handle five different types of work orders. The Asset Suite program allows the Relay Test organization to know the work that will be performed up to one year in advance. Relay Test management actively participates in protection system maintenance program governance and compliance audits and process reviews.

The focus of Relay Test's work rests in capital projects, corrective maintenance projects and NERC required testing. Relay Test's work objectives and resource allocation focuses on the following:

Protection System Maintenance

The Relay Test organization performs preventative maintenance activities (relay calibrations, functional trip testing, communication testing) for all transmission and distribution assets, including PPL nuclear plant relaying systems. Relay Test assures PPL EU's compliance to the NERC PRC-005 protective relay reliability standard, NERC-PRC-008 "under frequency load shedding", and for NERC PRC-017 "special protections systems".

"SCADA"

The Relay Test organization is responsible for the commissioning, maintenance, configuration programming, and overall operability of all remote terminal units, programmable logic controllers, and other data concentrators / data collections systems within the PPL EU's substations.

Communication Systems

The Relay Test organization is responsible for the commissioning, maintenance, configuration programming and overall operability of all high-speed protective system pilot communication systems including fiber optics (both sonnet and direct), power line carrier, audio tone and third party leased digital and POT communication.

Disturbance Monitoring Equipment

The Relay Test organization is responsible for the commissioning, maintenance, configuration programming and overall operability of PPL EU's fault analysis systems, including digital fault recorders, relay-based oscillography, and phasor measurement units. Relay Test assures PPL EU's compliance with the NERC PRC-018 reliability standard.

Corrective Maintenance

The Relay Test organization is tasked with the timely response, investigation, and remediation for all protection system anomalies. Relay Test staff is on call 24x7 to perform investigative studies and troubleshooting, support PPL EU's operations to rapidly diagnose issues and return equipment back to service.

Capital Projects

The Relay Test organization is responsible for the commissioning activities of all new transmission and distribution substation protections systems, SCADA, and communication systems. Relay Test performs the field engineering function of design and drawing review, wire checks, energization, phasing, and final assurance that all substation equipment is protected and functional. Additionally, Relay Test contracts adjunct testing staff to provide additional resources when needed for extensive capital projects.

All of PPLEU's protection system maintenance is performed by the PPL EU internal Relay Test organization. All protective relaying work with respect to capital projects is either performed by PPL EU's internal Relay Test organization or augmented by testing contractors who work under the guidance or direction of PPL EU's relay test organization. The PPL EU Relay Test team has extensive experience managing contractors and ensuring that they are familiar with PPL EU systems and technologies. In addition, the internal PPL EU team is responsible for ensuring receipt of work and incorporating it into asset management.

Vegetation Management

PPL EU's Vegetation Management (VM) organization works to ensure the safe, efficient and technically compliant execution of our vegetation management program across the PPL EU service territory.

NERC has adopted a vegetation management reliability standard with detailed requirements for vegetation management and inspection (FAC-003).

PPL EU's VM group manages all aspects of this overall enterprise program with the goal of keeping transmission facilities clear of all incompatible trees, brush, and other vegetation through routine maintenance activities such as tree felling, pruning, mowing and herbicide application.

PPL EU solicits competitive bids for contractor services to ensure quality and safety, while minimizing the cost to customers. VM contractor expectations are defined in a VM guidelines document and work completed by contractors is evaluated and audited against these expectations. At the highest level, the goal is to ensure public and worker safety, comply with regulatory and legal requirements, provide reliable electric service that allows for flexible operations, and act as a good steward of the environment.

PPL EU VM has a long-term, managed business relationship with two of the largest VM contractors in North America, and a comprehensive contractor evaluation system is used to quantify overall contractor value to the company. Evaluation components include line-miles completed, budget management, quality, safety, electric service reliability performance and a variety of micro indicators that measure contractor project management abilities. In addition, the VM contractors play an active role in the VM formal daily management structure.

PPL EU has leveraged geospatial and remote sensing technologies to better manage the vegetation threats to transmission facilities at a reduced cost. Light Detection and Ranging (LiDAR) is a remote sensing technology that allows for geospatially referenced three-dimensional point clouds to be created to ensure adequate clearance between vegetation and conductors, identify danger and hazard trees and create wildfire protection prescriptions for crews in the field. LiDAR was first used by PPL EU in 2008 and the favorable results confirmed that this process and approach for vegetation management is beneficial.

Advanced vegetation management practices have proven effective with high reliability performance and lower cost.

Transmission Vegetation Management Program

The PPL EU Transmission Vegetation Management Program (TVMP) seeks to improve the reliability of the electric transmission systems by preventing outages from vegetation located on transmission rights-of-way, minimizing outages from vegetation located adjacent to rights-of-way, maintaining clearances between transmission lines and vegetation on and along transmission rights-of-way, and reporting vegetation-related outages of the transmission systems to the respective Regional Reliability Organizations and NERC.

The purpose of the TVMP is to memorialize PPL EU's required practices intended to prevent vegetation-related transmission outages within the rights-of-way and to minimize vegetation outages outside the rights-of-way on all 200 kV and above transmission lines as well as any other lower voltage transmission lines that are designated as critical to reliability.

Proven Track Record

PPL EU places great emphasis on the value of vegetation management because it recognizes the importance of proactive line management. PPL EU has completed a "Wire Zone - Border Zone" program for the BES in October 2012 - ahead of schedule. The completion of this three-year program significantly reduced operating costs. In addition to "Wire Zone - Border Zone," the team uses LiDAR and helicopter observations to monitor vegetation along the entire system. As a testament to the thoroughness of the vegetation management program, all work that is completed is 100% inspected. PPL EU is committed to continued vegetation management investment, which can be seen in Figure 14.

Figure 14: Specific Vegetation Management Work

Type of Work	Units	2015	2016	2017	2018	2019
69kV	Miles	974	816	816	816	816
138kV	Miles	336	95	95	95	95
230-500kV	Miles	625	390	390	390	390
Total	Miles	1,935	1,301	1,301	1,301	1,301
Cycle		*3 Year (actual)*	*4 Year (average)*	*4 Year (average)*	*4 Year (average)*	*4 Year (average)*

Proactive and Extensive Community Outreach

The PPL EU VM program prides itself on early outreach and communication with affected stakeholders. The team distributes a communication plan, comprised of a letter and a brochure, four weeks prior to maintenance, which provides information about the work to be done as well as contact information. The VM group is committed to responding to all phone calls within 24 hours of receipt, which speaks to the dedication of the organization.

Qualified Employees

The VM organization is unique because of the superior qualifications of its employees. All employees are either degreed foresters or certified arborists, which provides a high level of technical expertise. All employees are initially trained on processes, procedures, and the specifications of the TVMP and receive updates and new training based on new equipment, herbicides, application methods, or other significant changes in vegetation management trends and processes.

Ability to comply with or demonstration of how the Applicant plans to be able to comply with NERC Reliability Standards

As an operating member of PJM since 1997, PPL EU has consistently performed to the highest NERC Reliability Standards. This is accomplished through a strong compliance group, as well as having a top-notch transmission control center. In order to operate and maintain transmission grid reliability, PPL EU operates a Transmission Control Center 365 days, 24 hours a day in the Lehigh Valley. The control center is completely secure and has redundant data and communication at both the operations center and the disaster recovery site that are independent of each other and meet all RFC and NERC criteria. The control center adheres to the guiding priorities and principles of safety, reliability and production. Due to this proactive approach and use of Human Performance tools, the TCC has lessened the severity (or impact) and number of Electric System Events (ESE's) and continues to strive for zero ESE's.

The financial statements of the entity or its affiliate, partner, or parent company for the most recent fiscal quarter, as well as the most recent three fiscal years, or the period of existence of the entity, if shorter, or such other evidence demonstrating an entity's or its affiliate's, partner's, or parent company's current and expected financial capability acceptable to the Office of the Interconnection.

PPL TransLink will rely on the financial expertise of and receive financial support from its parent, PPL Corporation ("PPL"), as well as certain subsidiaries of PPL. PPL, through its subsidiary, PPL Capital Funding, Inc. ("PPL Capital Funding"), maintains $1.15 billion of revolving credit facilities, including a $1 billion commercial paper program, and has access to both debt and equity capital markets to raise capital. PPL is able to lend and contribute capital to PPL TransLink to support its financing needs.

PPL EU has a strong financial foundation that enables the development, operation and maintenance of transmission facilities. To manage financing costs and access to credit markets, a key objective of PPL's strategy is to maintain a strong credit profile and strong liquidity position.

PPL, through its subsidiary PPL EU, recently executed long-term debt financings to procure capital for the construction of the $630 million Susquehanna-Roseland project and the $335 million Northeast Pocono Reliability project, which are two large-scale transmission projects in Pennsylvania.

Annual audited financial statements for the most recent three calendar years for PPL and PPL EU are included in the links below in Form 10-Ks filed by PPL and PPL EU with the Securities and Exchange Commission (SEC):

2015 Form 10-K:

https://www.sec.gov/Archives/edgar/data/55387/000092222416000130/form10k.htm

2014 Form 10-K:

https://www.sec.gov/Archives/edgar/data/55387/000092222415000016/form10k.htm

2013 Form 10-K:

https://www.sec.gov/Archives/edgar/data/55387/000092222414000024/form10k.htm

PPL's and PPL EU's most recent quarterly financial statements are included in the link below in the Form 10-Q filed with the SEC for the quarterly period ended September 30, 2016:

2016 Third Quarter 10-Q

https://www.sec.gov/Archives/edgar/data/55387/000092222416000201/ppl-9302016x10q.htm

PPL TransLink is not rated by S&P and Moody's. The table below reflects the ratings of PPL, PPL Capital Funding and PPL EU.

Issuer	Rating	Moody's	S&P
PPL Corporation	Issuer Rating	Baa2	A-
PPL Capital Funding, Inc.	Senior Unsecured Debt	Baa2	BBB+
PPL Electric Utilities Corporation	Senior Secured Debt	A1	A
PPL TransLink, Inc.		Not Rated	Not Rated

A commitment by the entity to execute the Consolidated Transmission Owners Agreement, if the entity becomes a Designated Entity.

PPL EU is already a signatory to the Consolidated Transmission Owners Agreement.

PPL TransLink commits to execute the Consolidated Transmission Owners Agreement if PPL TransLink becomes a Designated Entity.

Signature: _____ Date: 12/19/2016

David Gladey
PPL Electric Utilities Corporation
Director of Asset Management

Signature: _____ Date: 12/20/2016

Brian Zickefoose
PPL TransLink, Inc.
Manager, Transmission Development