BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF PENNSYLVANIA ELECTRIC COMPANY FOR APPROVAL TO LOCATE AND CONSTRUCT THE BEDFORD NORTH-CENTRAL CITY WEST 115 KILOVOLT TRANSMISSION LINE PROJECT IN CENTRAL CITY BOROUGH AND SHADE TOWNSHIP, SOMERSET COUNTY, AND NAPIER, EAST ST. CLAIR, AND BEDFORD TOWNSHIPS, BEDFORD COUNTY, PENNSYLVANIA	:	**Docket No.**

DIRECT TESTIMONY OF

DAVID W. PARKS

ON BEHALF OF

PENNSYLVANIA ELECTRIC COMPANY

STATEMENT NO. 1

Re: Overview and Routing the Proposed Bedford North-Central City West HV Transmission Line Project

Dated: September 1, 2016

INTRODUCTION AND PURPOSE OF TESTIMONY

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is David W. Parks and my business address is 901 Wilson Street, Martinsburg, WV 25401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by FirstEnergy Service Company, and my title is Engineer IV, Transmission Siting. FirstEnergy Service Company is a subsidiary of FirstEnergy Corp. that provides legal, financial and other corporate support services to FirstEnergy Corp. and its regulated operating subsidiaries, one of which is Pennsylvania Electric Company ("Penelec"). In my position of Engineer IV, I support FirstEnergy's efforts to site new transmission line facilities for its affiliates, including Penelec, by developing route siting studies and associated regulatory filings. This involves working with internal and external resources, which include FirstEnergy's Legal, Real Estate, Transmission Engineering, Substation Engineering, Customer Support, External Affairs Managers, Environmental Permitting and Compliance, Vegetative Management, Operations Support and Project Management Departments and the regional operating companies.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE AND EDUCATIONAL BACKGROUND.

A. I have been employed as an Engineer at FirstEnergy since May 2010 in the Transmission Siting department. I graduated from Virginia Polytechnic Institute and State University with a Bachelor of Science in Civil Engineering in 1970.

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am providing this testimony on behalf of Penelec for approval to locate and construct the Bedford North-Central City West 115 kV Transmission Line ("Project").

Q. WHAT IS YOUR ROLE ON THE PROJECT?

A. I am responsible for coordinating the Applicant's efforts to obtain the Pennsylvania Public Utility Commission's ("Commission") authorization to construct the proposed Project. This includes the Route Selection Study (Exhibit No. 8 in the Application), the preparation of the Application, filing of the Application and acting as the Applicant's lead technical representative to the Commission throughout the Commission's regulatory process.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is two-fold. First, I will identify and introduce the other witnesses who are providing direct testimony on behalf of Penelec in this proceeding and identify the subject matter of their testimony. Second, I will provide an overview of the evidence submitted by Penelec in support of its Application for authorization to locate and construct a high-voltage transmission line.

INTRODUCTION OF WITNESSES

Q. Who are the other witnesses submitting direct testimony on behalf of Penelec in this proceeding?

A. A total of four (4) witnesses are submitting direct testimony on behalf of Penelec in this proceeding, as follows:

David W. Parks	Penelec Statement No. 1
Grant Marchewka	Penelec Statement No. 2
Barry Baker	Penelec Statement No. 3
Lawrence P. Mattei	Penelec Statement No. 4

Q. WHAT AREA WILL EACH OF THE OTHER WITNESSES ADDRESS?

A. The areas each of the witnesses will address are as follows:

Grant Marchewka: Mr. Marchewka is an Engineer for Energy Delivery Planning and Protection group for FirstEnergy Service Company. Mr. Marchewka will testify on the need for the Project and describes project alternatives for the Project that were considered before the proposed Project was selected.

Barry Baker: Mr. Baker is a Senior Project Manager and Department Manager with AECOM. AECOM is a national engineering and environmental consulting firm that FirstEnergy Service Company has retained to prepare a comprehensive study of the projected environmental impacts of the project and to assess alternative routes. The results of the study AECOM conducted are set forth in the report titled "Transmission Line Route Selection Study" which was provided as Exhibit No. 8 to Penelec's Application. Mr. Baker sponsors and will testify about Exhibit No 8, the alternative routes, and the basis for selecting the preferred route for the Project.

Lawrence P. Mattei: Mr. Mattei is an Engineer V in the Transmission Design Group with FirstEnergy Service Company. Mr. Mattei will testify about the design, engineering and construction aspects of the Project and plans for operating and maintaining the line after it is constructed, including vegetation removal and control.

PENELEC'S EVIDENCE SUPPORTING APPROVAL OF THE SITING AND CONSTRUCTION OF THE PROJECT

Q. WHAT REQUIREMENTS ARE NECESSARY FOR THE COMMISSION TO GRANT APPROVAL TO SITE AND CONSTRUCT A HIGH-VOLTAGE ("HV") TRANSMISSION LINE?

A. The Commission's regulations at 52 Pa. Code §57.71 require prior approval for a public utility to construct a HV (i.e., greater than 100 kV) transmission line. The information a public utility is required to submit with an application for sitting approval is delineated in 52 Pa. Code §57.72(c), the form and content of the application, and 52 Pa. Code §§ 69.3102 - 69.3107, interim guidelines for the filing of electric transmission line siting applications. Under 52 Pa. Code §57.76(a), the Commission must make four findings to support its decision to approve a proposed high voltage transmission line, as follows:

(1) That there is need for the line;

(2) That the line will not create an unreasonable risk of danger to the health and safety of the public;

(3) That the line is in compliance with applicable statutes and regulations providing for the protection of the natural resources of the Commonwealth; and

(4) That the line will have minimum adverse environmental impact, considering the electric power needs of the public, the state of available technology and the available alternatives.

Though the Application and accompanying exhibits and the testimony that I have identified above, Penelec is presenting evidence that satisfies the Commission's regulations in 52 Pa. Code §57.72(c) and its interim guidelines in 52 Pa. Code §§ 69.3102 - 69.3107 and shows that the proposed Project satisfies all of the criteria for Commission siting approval under 52 Pa. Code §57.76(a).

Q. PLEASE BRIEFLY SUMMARIZE THE EVIDENCE THAT PENELEC IS PRESENTING AND HOW IT DEMONSTRATES THAT THE CRITERIA FOR SITING APPROVAL ARE MET BY THE PROJECT?

A. Penelec's evidence will establish the proposed siting and construction of the Project is necessary to ensure reliable electrical service under industry standards to Somerset County and the surrounding areas and to ensure long-term electric service to customers within PJM.

Penelec's evidence will also establish that the proposed route for the Project was selected after a detailed assessment which included a comprehensive environmental inventory, identification and analysis of alternative routes, and selection of the preferred route based on appropriate evaluation criteria.

Penelec's evidence will also show the Project will be constructed, operated and maintained in accordance with all applicable federal and state laws, regulations, and permits. It will

meet with or better than the standard 115 kV transmission lines established by the Nation Electric Safety Code.

Q. ARE YOU SPONSORING AN EXHIBIT?

A. Yes, I am sponsoring the Application with all of its attachments and exhibits, although some individuals are co-sponsoring certain exhibits and sections of the application. Specifically, I am co-sponsoring Exhibit 8 and sponsoring Exhibit 7, and Exhibits 12 through 19. Copies of the Application have previously been distributed to the parties.

Q. DOES THIS COMPLETE YOU DIRECT TESTIMONY?

A. Yes it does. However, I would like to reserve the right to supplement my direct testimony if anything changes with respect to the status of the application.

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DIRECT TESTIMONY OF

GRANT MARCHEWKA

ON BEHALF OF

PENNSYLVANIA ELECTRIC COMPANY

STATEMENT NO. 2

Re: Electrical Need for the Project
and the Project Planning Process

Dated: September 1, 2016

RESPONSIBILITIES, EXPERIENCE AND EDUCATION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Grant Marchewka and my business address is 800 Cabin Hill Drive, Greensburg, Pennsylvania 15601.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by FirstEnergy Service Company as an Engineer IV assigned to the Energy Delivery Planning and Protection group. In this proceeding, I am testifying on behalf of Pennsylvania Electric Company ("Penelec" or "Company").

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE AND EDUCATIONAL BACKGROUND.

A. I received a Bachelor of Science degree in Electrical Engineering from The Pennsylvania State University. I am a registered Professional Engineer in the Commonwealth of Pennsylvania. I have been employed by FirstEnergy Service Company and, prior to the merger of FirstEnergy Corp. and Allegheny Energy, Inc., by Allegheny Energy Service Corporation, for a combined total of over six years. My current position is Engineer IV in the Transmission Planning group where I am responsible for planning of the transmission system, including the transmission system within Penelec's service territory, to ensure the system operates reliably over a wide range of conditions.

Q. HAVE YOU TESTIFIED PREVIOUSLY BEFORE THIS COMMISSION OR OTHER REGULATORY AGENCIES?

A. Yes. I provided testimony before the Pennsylvania Public Utility Commission in support of Penelec's proceeding at Commission Docket No. A-2016-2529650 for the East Towanda – South Troy 230/115 kV project located in Bradford County, Pennsylvania. I have not testified before other regulatory agencies.

PURPOSE OF TESTIMONY

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR TESTIMONY.

A. The purpose of my testimony is to support the Application of Penelec for Project location and construction, as follows

- describe in general terms the facilities Penelec proposes to construct;
- describe the need for the proposed new transmission line facilities; and
- describe alternatives considered from the perspective of electric planning.

EXHIBITS

Q. PLEASE IDENTIFY AND DESCRIBE THE EXHIBITS YOU WILL REFER TO IN YOUR TESTIMONY.

A. Exhibits 4, 5A, and 5B, previously submitted as part of the Application, are Penelec system maps showing the locations and voltages of Penelec transmission facilities (i.e. lines and substations) within Penelec's service territory. Exhibit 4 contains critical infrastructure information that should not be publically available and, therefore, the Company has requested that the Commission place this exhibit in a non-public folder. Exhibit 21, also previously submitted as part of the Application,

contains an excerpt from PJM Interconnection, L.L.C ("PJM") Transmission Expansion Advisory Committee's ("TEAC") January 9, 2014 presentation which discusses the Project.

ELECTRICAL PERSPECTIVE OF THE PROJECT

Q. DESCRIBE THE PROJECT FROM AN ELECTRICAL PERSPECTIVE.

A. Penelec proposes to extend the existing Statler Hill – Central City West 115 kilovolt ("kV") transmission line to the existing Bedford North Substation. The proposed high voltage ("HV") transmission line is referred to as the "Bedford North – Central City West 115 kV HV Transmission Line Project" (hereinafter, the "Project"). The proposed Project will be approximately 17.6 miles in length. A new 115 kV transmission will be constructed from the Central City West substation to a point on the existing Bedford North – New Baltimore 115 kV line, a distance of approximately 10.4 miles. From this point to the Bedford North substation, a distance of approximately 7.2 miles, the existing Bedford North – New Baltimore 115 kV line will be reconstructed as a double circuit line. One circuit will be the existing Bedford North – New Baltimore 115 kV circuit; the second circuit will be the continuation of the new Bedford North – Central City West 115 kV circuit.

ELECTRICAL NEED

Q. PLEASE DESCRIBE THE ELECTRICAL NEED FOR THE PROJECT?

A. The Project is needed to mitigate both thermal and voltage reliability criteria violations of both FirstEnergy and PJM Planning Criteria that were identified as

part of PJM's Regional Transmission Expansion Plan ("RTEP") analysis. Specifically, the project is needed to address thermal and voltage violations identified under North American Electric Reliability Corporation ("NERC") Category C conditions and to provide adequate transmission capacity to meet current and expected customer needs for electric service in Bedford County, Pennsylvania, and the surrounding areas.

Q. IS PENELEC REQUIRED TO PLAN THE TRANSMISSION SYSTEM TO MEET MANDATORY RELIABILITY STANDARDS?

A. Yes, pursuant to Section 215 of the Federal Power Act, the Federal Energy Regulatory Commission ("FERC") has certified NERC as the electric reliability organization to develop and enforce mandatory reliability standards, subject to FERC review and approval. The FERC-approved NERC reliability standards are mandatory.

PJM, a FERC-approved Regional Transmission Organization ("RTO"), is responsible for ensuring the reliability of the electric transmission system under its functional control and coordinating the movement of wholesale electricity in all or parts of 13 states, including Pennsylvania. PJM is responsible for assuring compliance with NERC standards for the bulk electric system within its control area. NERC reliability standards require that the bulk electric system be designed to operate within applicable thermal and voltage criteria limits, defined in

FirstEnergy and PJM Planning Criteria, under various system loading conditions and in consideration of credible outages of elements on the bulk electric system.

Q. PLEASE DESCRIBE THE PLANNING CRITERIA USED IN ASSESSMENTS PERFORMED BY PENELEC.

A. FirstEnergy's Transmission Planning Criteria, using NERC standards and PJM manuals as guides, state that the following criteria must be met on the bulk electric system. The conditions and associated criteria are defined in NERC standards as follow:

- NERC Category A, system performance under normal (no contingency) conditions, provides that the planning authority (in this instance, PJM) and transmission planner (in this instance, PJM) shall each demonstrate through a valid assessment that their portion of the interconnected transmission system is planned with all transmission facilities in service and with normal operation to supply projected customer demands and projected firm transmission services at all demand levels over the range of forecasted system demands. This is the normal day-to-day condition and configuration of the bulk electric system.
- NERC Category B states that the loss of any single generating unit, transmission line, transformer, circuit breaker, capacitor, or single pole of a bipolar DC line will not cause bulk electric system facility loading to exceed the seasonal emergency rating of any facility, violate the maximum deviation, or violate the emergency minimum or maximum voltage criteria.

This is also known as N-1, where N is the total number of transmission components in the network under study. Penelec uses a voltage magnitude minimum limit of 0.92 per unit and a maximum limit of 1.05 per unit for facilities within the bulk electric system, except facilities operating at a nominal voltage of 500 kV. A minimum voltage limit of 0.97 per unit and a maximum voltage limit of 1.10 per unit is used for 500 kV facilities. Additionally, voltage deviation following the outage is limited to plus-or-minus 10 percent for bulk electric system facilities with a nominal voltage less than 200 kV, plus-or-minus eight percent for bulk electric system facilities with a nominal voltage of 230 or 345 kV, and plus-or-minus five percent for bulk electric system facilities with a nominal voltage of 500 kV.

- NERC Category C requires that the loss of any double circuit bulk electric system transmission line, bipolar DC line, faulted circuit breaker, bus section, the combination of facilities resulting from a line fault coupled with a stuck breaker, or the loss of any single generating unit, transmission line, transformer, circuit breaker, capacitor, or single pole of a bipolar DC line followed by the loss of any single generating unit, transmission line, transformer, circuit breaker, capacitor, or single pole of a bipolar DC line (i.e. N-1-1) shall not cause loadings to exceed the seasonal emergency rating of any facility, violate the maximum deviation, or violate the emergency minimum or maximum voltage criteria. Penelec uses the same deviation

and emergency voltage limits as NERC Category B contingencies for facilities within the bulk electric system.

Q. WERE PLANNING CRITERIA VIOLATIONS IDENTIFIED WHEN PERFORMING PLANNING ASSESSMENTS?

A. Yes, FirstEnergy and PJM Transmission Planning have identified Planning Criteria violations. As part of the PJM 2013 RTEP, PJM identified thermal loading Planning Criteria violations on Penelec's Allegheny – Somerset 115 kV transmission line. For the N-1-1 loss of the Hilltop – Krayn – Rachel Hill 115 kV transmission line and the Cambria Slope - Summit 115 kV transmission line the Allegheny – Somerset 115 kV transmission line loads to approximately 102% of its emergency rating. Additionally, voltage on the 115 kV buses at Bedford North and Snake Springs substation is less than the Planning Criteria emergency limit of 0.92 per unit. These violations were identified in a model of expected system conditions for summer 2018. Similar loading on the Allegheny – Somerset 115 kV line occurs with the loss of the Cambria Slope – Summit 115 kV transmission line in combination with the Claysburg – Krayn 115 kV transmission line. Voltage on 115 kV buses at Bedford North, Claysburg, Curryville, Osterburg East, Saxton, and Snake Springs substations is below the Planning Criteria emergency limit for this combination of line outages.

Furthermore, in the 2012 RTEP analysis, following a fault on the Hilltop – Krayn – Rachel Hill 115 kV transmission line in conjunction with a stuck 115 kV circuit

breaker at Krayn substation, which also results in the outage of the Claysburg – Krayn 115 kV lines and the wind generation connected to Krayn substation, loading on the Bedford North – New Baltimore 115 kV transmission line increases to approximately 107% of its summer emergency rating. Loading on the Bedford North – New Baltimore 115 kV transmission line also exceeds its emergency rating following a fault on the Cambria Slope – Jackson Road 115 kV transmission line with a stuck 115 kV circuit breaker at Cambria Slope substation, which also results in the outage of the Cambria Slope – Johnstown and Cambria Slope – Summit 115 kV lines, the Cambria Slope 115/46 kV transformer, and the generation connected to the Cambria Slope 115 kV bus; a faulted 115 kV bus tie circuit breaker at Rachel Hill substation, which outages the Hooversville – Rachel Hill and Claysburg – Krayn – Rachel Hill 115 kV lines and both 115/23 kV transformers at Rachel Hill; or fault on the Cambria Slope 115 kV bus, which outages the Claysburg – Krayn – Rachel Hill, Cambria Slope – Jackson Road, and Cambria Slope – Johnstown 115 kV lines, the Cambria Slope 115/46 kV transformer, and the generation connected to the Cambria Slope 115 kV bus. All of these violations were identified in PJM's generation deliverability test.[1] The Project will replace baseline RTEP project b1607 which would have reconductored/rebuilt the Bedford North – New Baltimore 115 kV transmission line.

[1] As per PJM Manual 14B, Attachment C, section C.6, this test "is applied to ensure that capacity is not 'bottled' from a reliability perspective. This would require that each electrical area be able to export its capacity, at a minimum, during periods of peak load." PJM Manual 14B, Attachment C, section C.6 details the PJM Generation Deliverability test procedure:
http://www.pjm.com/~/media/documents/manuals/m14b.ashx

Results of the PJM studies have been shared with PJM Stakeholders and the general public. The Project was presented to the PJM TEAC on January 9, 2014. An excerpt from this presentation that discusses the Project is shown in Exhibit No. 21 of the Application and can be found on PJM's website.[2] PJM assigned baseline upgrade number "b2450" to the Project.

Q. CAN YOU DESCRIBE THE ELECTRICAL ALTERNATIVES CONSIDERED?

A. Yes, FirstEnergy considered replacing the existing Bedford North – New Baltimore and Allegheny – Somerset 115 kV transmission lines with higher-capacity conductor. Replacing the conductors on these transmission lines would allow the lines to carry more load without exceeding their design capacity. However, this solution would only mitigate the thermal loading Planning Criteria violations, but would not address the voltage violations. Constructing the Project will create a fourth source into the Bedford North region and will mitigate both the loading and voltage violations. Additionally, the Project will allow the bulk electric system to operate reliably, provide capacity to serve future anticipated load growth, and adhere to established NERC standards.

[2] http://www.pjm.com/committees-and-groups/committees/teac.aspx

Q. BASED ON YOUR REVIEWS AND ASSESSMENTS, HAVE YOU FORMED AN OPINION REGARDING THE NEED FOR THE PROJECT?

A. Yes. The Project is needed to mitigate potential thermal and voltage violations on the transmission system for various NERC Category C contingencies.

THE PLANNING PROCESS

Q. COULD YOU PLEASE DESCRIBE PJM'S ROLE IN PLANNING FOR THE PROJECT?

A. Yes. PJM is the regional transmission planning authority and transmission planner for the Penelec Transmission Zone, which encompasses the geographic area served by Penelec. In this capacity, PJM applies an analytical approach to identify the need and timing for transmission system upgrades to preserve the reliability of the electricity grid. The PJM RTEP process is a comprehensive series of detailed analyses to ensure reliability under the applicable NERC, PJM, and Transmission Owner (i.e., Penelec) reliability criteria. Details of the PJM RTEP process are documented in PJM Manual 14B.

Q. HAS PJM INCLUDED THE PROJECT IN ITS RTEP?

A. Yes. PJM presented the Project to the PJM TEAC on January 9, 2014. Exhibit No. 21 to the Application contains an excerpt of this presentation that discusses the Project; this presentation can be found on PJM's website.[3]

[3] http://www.pjm.com/committees-and-groups/committees/teac.aspx

Q. DOES THE PJM ASSESSMENT ADDRESS THE ALLOCATION OF COST FOR THE PROJECT?

A. Yes. The PJM cost allocation for the Project, baseline RTEP project b2450, can be found on PJM's website.[4] The entire cost of the Project was allocated to the Penelec zone.

Q. WOULD THE CONSTRUCTION OF IDENTIFIED PJM RTEP OR GENERATION PROJECTS EITHER BEFORE OR AFTER THE COMPLETION OF THE PROJECT IMPACT THE NEED FOR THE PROJECT?

A. No. There are no proposed RTEP or generation projects that would eliminate the need for the Project.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does. However, I reserve the right to file such additional testimony as may be necessary or appropriate.

[4] http://www.pjm.com/planning/rtep-upgrades-status/cost-allocation-view.aspx

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DIRECT TESTIMONY OF

BARRY A. BAKER

ON BEHALF OF

PENNSYLVANIA ELECTRIC COMPANY

STATEMENT NO. 3

Re: Concerning Line Route Study
And Environmental Assessment

Dated: September 1, 2016

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Barry Alan Baker. My business address is 625 West Ridge Pike, Suite E-100, Conshohocken, PA 19428

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by AECOM Corporation as an Associate Vice-President and Department Manager for the Impact Assessment & Permitting Department and also serve as a Technical Lead in the AECOM U.S. Transmission & Distribution practice for the Power, Energy and Industrial Business Line.

Q. WHAT ARE YOUR PRINCIPAL RESPONSIBILITIES IN THESE POSITIONS?

A. In these roles I am a Certified Project Manager and manage projects for siting and permitting of new transmission lines, power plants, and other facilities. I manage a Department of approximately fifty (50) individuals responsible for environmental and information technology services. Additionally I service as a Technical Lead for Transmission and Distribution services on the east coast of the U.S.

Q. PLEASE PROVIDE A SUMMARY OF YOUR EDUCATION AND PROFESSIONAL WORK EXPERIENCE.

A. I received a Bachelor of Science with Honors degree in Environmental Science from the University of East Anglia in Norwich, England in 1996. A key focus was on the use of GIS and computer applications for environmental problem solving. My additional

continuing education relevant to my current position includes the following courses and programs:

- Approximately 50 Project Management Classes necessary for formal certification.
- Creating and Integrating Data for Natural Resource Applications (ESRI).
- Geoprocessing with ArcGIS Desktop (ESRI).
- Spatial Hydrology Using ArcView (ESRI).
- Introduction to ArcIMS (ESRI).
- System Architecture Design for GIS (ESRI).

I have been employed by AECOM for the last eleven years in the roles previously discussed. In these positions I have been responsible for siting studies both as a Project Manager and as a technical lead for transmission line siting as well as new power development throughout the northeast region of the U.S., including: PA, NJ, MD, NY, CT, OH, IL, VA, DE, and MA. I also manage the Pennsylvania Area Impact Assessment & Permitting Department where I am responsible for a team of biologists, ecologists, and GIS specialists. Additionally, I am an AECOM Technical Lead designated for supporting and developing major transmission opportunities on the U.S. East Coast with a focus in the northeast. Prior to joining AECOM, I held GIS and environmental development positions for other environmental and government consultants.

Q. HAVE YOU PREVIOUSLY TESTIFIED IN PUBLIC UTILITY COMMISSION PROCEEDINGS?

A. Yes, I have provided siting testimony before the Pennsylvania Public Utility Commission ("Commission") for

- PPL Electric Utilities - Northeast Pocono Project.
- PPL Electric Utilities - Blooming Grove Jackson Project
- PPL Electric Utilities - Effort Mountain Project
- PPL Electric Utilities - Appenzell Project

Q. HAVE YOU TESTIFIED IN PROCEEDINGS BEFORE OTHER UTILITY REGULATORY COMMISSIONS?

A. Yes, I have provided siting testimony before the New Jersey Board of Public Utilities ("BPU") for:

- PSE&G - North Central Reliability Project
- New Jersey Natural Gas – Southern Reliability Link Project

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. My testimony explains the selection of the route for the Bedford North - Central City West transmission line ("Project").

Q. WERE ANY PORTIONS OF THE SITING APPLICATION PREPARED BY YOU OR UNDER YOUR SUPERVISION?

A. Yes. I am sponsoring certain attachments to Penelec's Siting Application for this project filing. Specifically, I am responsible for portions of the following attachments to the Siting Application:

- Exhibit 1 PUC Cross-Reference

- Exhibit 2 Project Location Map
- Exhibit 3 Property Ownership Map
- Exhibit 8 Route Selection Study
- Exhibit 9 List of Agency Permit Requirements

I was integrally involved in preparing these attachments to the Siting Application or otherwise provided oversight to AECOM technical staff who prepared them. I also provided review for the complete Siting Application prior to assembly and submission to the Commission.

Q. WHAT ARE YOUR RESPONSIBILITIES IN CONNECTION WITH THE BEDFORD NORTH - CENTRAL CITY WEST TRANSMISSION LINE?

A. I serve as AECOM's Project Manager, on behalf of Penelec, for the siting and permitting components of the Bedford North - Central City West transmission line. My responsibilities on the Project began in July 2014 and have involved oversight of the AECOM routing efforts that identified six potential routes, including five alternative routes (Routes 1, 3, 4, 5, and 6) and the Proposed Route (Route 2) and that is presented for Commission approval. I oversee the scientists, biologists, planners, cultural resource specialists, Geographic Information Systems ("GIS") analysts, and other technical specialists that have helped define the routes considered for the proposed transmission line. I also attend numerous teleconferences that take place concerning project-related routing, permitting, and public outreach efforts.

For project environmental consultation, I reviewed and helped coordinate the initial agency consultation and survey efforts on behalf of Penelec. These include

submission of a Pennsylvania Natural Diversity Inventory ("PNDI") large project review to the U.S. Fish and Wildlife Service ("USFWS"), Pennsylvania Department of Conservation and Natural Resources ("DCNR"), Pennsylvania Game Commission ("PGC"), and Pennsylvania Fish and Boat Commission ("PFBC"); and wetland delineation activities along the Proposed Route right-of-way.

II. ROUTE SELECTION STUDY

Q. PLEASE EXPLAIN HOW THE STUDY AREA WAS DETERMINED AND THE DEVELOPMENT OF POTENTIAL AND ALTERNATIVE ROUTES.

A. The Penelec Routing Team conducted a detailed siting analysis to determine a location for the Bedford North - Central City West transmission line that best balances social, environmental, engineering and economic considerations. This analysis included the determination of a Study Area, the compilation of an environmental inventory, identification and analysis of alternative line routes and, finally, selection of a proposed route.

The Study Area is the region in which transmission line route alternatives could be sited to practicably meet the Project's functional requirements and, at the same time, minimize potential environmental impacts and Project costs. The study area was selected based on professional judgment and the geographic characteristics of the region, as well as the physical endpoints of the Project (i.e., substation locations). In this case, the boundaries of the study area were developed based on a review of United States Geological Survey (USGS) maps, state and county road maps, and aerial photographs.

Constraints such as major water bodies, urban/developed areas, transportation routes, existing utility corridors, and the locations of the end points played key roles in determining the boundaries of the study area and route candidate selections.

Given these considerations, the Routing Team identified a Study Area encompassing approximately 110,080 acres or 172 square miles within Bedford and Somerset Counties, Pennsylvania. The Project Study Area is bounded generally by Gallitzin State Forest to the north; the Bedford North Substation to the east; the existing Bedford North-New Baltimore 115 kV line to the south; and the Central City West Substation to the west. Using this established Study Area, the Routing Team began its efforts to determine Potential Routes for the line.

Q. WHAT GUIDELINES WERE USED TO ANALYZE POTENTIAL ALTERNATIVE ROUTES?

A. The Routing Team developed basic route selection criteria that would be used to select and analyze potential Alternative Routes. These guidelines included the following criteria:

- Maximize the use of any existing transmission line rights-of-way and seek rebuild options, e.g. the Bedford North-New Baltimore 115 kV line right-of-way ("ROW");
- Avoid or limit circuitous routes and special design requirements;
- Maximize the distance from and/or minimize impact on dwellings, schools, daycare facilities, hospitals, and other community facilities;

- Avoid or minimize visibility from scenic roadways or viewpoints;
- Avoid crossing or minimize impacts to designated public resource lands such as national and state forests and parks, recreational lands, nature preserves, designated historic resources and sites, and conservation areas;
- Minimize environmental impact and construction/maintenance cost by selecting shorter, direct routes; and route corridors through terrain where economical construction and environmental best management practices can be employed, and where line operational/maintenance is most feasible (e.g., use existing access roads where practicable); and
- Avoid or minimize new crossings of large lakes, rivers and large wetland complexes, critical habitat, and other unique or distinct natural resources.

Using these established routing guidelines, the Routing Team identified opportunity and constraint features within the Study Area that would take advantage of existing corridors to the extent practicable and minimize potential impacts to the natural and human (or built) environment. The option to use and/or rebuild portions of the existing Bedford North-New Baltimore 115 kV line was a primary consideration in the routing assessment as using existing ROWs would likely result in fewer environmental impacts and reduce total project costs. This existing transmission ROW has sufficient space to rebuild the existing line as a double-circuit 115 kV line. The Routing Team used this information to develop alternative routes following the general routing and technical guidelines described above. Details of the opportunity and constraints used to develop the alternative routes are included in the Project Route Selection Study, which is attached as Exhibit 8 of the Application.

Q. CAN YOU DESCRIBE HOW THE ROUTING TEAM DEVELOPED ALTERNATIVE ROUTES?

A. Candidate Segments are an early iteration of the routing process that involves developing conceptually based routes and general consideration of these routes with respect to opportunity and constraints features in the Study Area. During the routing process, the Candidate Segments were further refined and compared by the Routing Team, and a selection of the most suitable links were assembled into Alternative Routes. Alternative Routes are routes that begin and end at similar locations for direct comparison. Potential impacts are assessed and compared with respect to land use, natural and cultural resources, and engineering and construction concerns. Ultimately, through a quantitative and qualitative analysis and comparison of Alternative Routes, a Proposed Route is identified for submittal to the Commission.

Alternative Routes were first developed to use portions of the existing Bedford North-New Baltimore 115 kV line, which can be built to a double-circuit configuration. Options connecting to the existing 115 kV ROW involved cross-county routes that avoided concentrated development and used open agricultural fields and road alignments where practicable. Other potential Routes located north of the existing 115 kV line were developed based on similar avoidance measures, including the potential use of another existing transmission line, Bedford North-Osterburg East 115 kV, which extends north along the eastern edge of the Study Area. After the initial Alternative Routes were identified, the Routing Team conducted field investigations of the routes in spring 2015. These investigations involved the visual examination of the Alternative Routes from

public roads and other points of public access to identify residences, outbuildings, commercial buildings, and other potentially sensitive receptors (e.g., cemeteries, churches, and schools).

Based on the results of the field investigations, the Routing Team conducted further evaluation and several adjustments were made to the alignments of the Alternative Routes. The Routing Team developed six Alternative Routes (Routes 1 to 6) from the identified segments.

Q. PLEASE BRIEFLY DESCRIBE THE ALTERNATIVE ROUTES.

A. The six Alternative Routes are as follows:

Alternative Route 1 (Yellow)

Alternative Route 1 is approximately 21.3 miles in length. From the Bedford North Substation, Route 1 would extend 1.7 miles north as a second circuit on the existing Bedford North-Osterburg East 115 kV line that would be rebuilt as a double circuit transmission line. The route would parallel the east side of Interstate-99 (I-99) and State Route 56 (SR 56). After exiting the Bedford North-Osterburg East 115 kV line, Route 1 crosses I-99 and extends for 7.8 miles predominantly through steep forested lands with few areas of agricultural use and some moderately dense residential properties. Near SR 96, the route extends over a section of an active orchard, which ends near Chestnut Ridge Road. The slope of the land steadily climbs for the next 3.7 miles from an elevation of 1,300' near SR 96 to 2,000' at Buckeye Road. Most of this section would be located within forested lands with few open agricultural areas. At Buckeye Road, the route would turn to the southwest, start a steep 700-foot climb up the Allegheny Front, and extend for 5.5 miles to Central City. Turning to the west, Route 1 would cross into Somerset

County, extend over an isolated local road, and then traverse through undeveloped forested lands. The western portion of this section borders lands associated with an active quarry and landfill near Central City. Route 1 continues for 2.6 mile to the northwest and then southwest around the north side of Central City to the Central City West Substation.

Alternative Route 2 (Purple) (Proposed Route)

Alternative Route 2 is approximately 17.6 miles in length. From the Bedford North Substation, Route 2 would extend west for 7.2 miles on the existing Bedford North-New Baltimore 115 kV line that would be rebuilt as a double circuit transmission line. The route would extend over agricultural fields and then span SR 56. After crossing this roadway, the route climbs the steep, forested slopes of the Pigeon Hills and passes over several roads bordered by low density residential development such as Sloan Hollow Road, Point Road, and Harrison Road. After Harrison Road, Route 2 passes over a short (0.1 mile) section of Shawnee State Park, extends through a mix of forested and agricultural lands, and crosses a moderate density residential-lined portion of SR 96 just north of the town of Schellsburg. West of SR 96, the existing Bedford North-New Baltimore 115 kV line turns to the southwest and Route 2 would continue west as new construction in new ROW until the end of the route. For the initial 1.4 miles Route 2 traverses across forested and agricultural lands, spans the Shawnee Branch and crosses three low density residential-lined roads. After crossing Hoover Road, Route 2 continues west for 3.0 miles to Lambert Mountain Road located at the base of the Allegheny Front. The route extends across active farm lands, through several forested areas, and crosses several low density residential-lined roads such as Anderson Road, Malamphy Road, Miller Road, and Helixville Road. The slope of the land in this section steadily climbs from an elevation of 1,400’ near Hoover Road to 2,200’ at the intersection of Helixville Road and Lambert Mountain Road.

From Lambert Mountain Road, Route 2 extends northwest for 1.4 miles to the State Game Lands #228 boundary. At Lambert Mountain Road, the route traverses straight up the 500-foot forested face of the Allegheny Front, extends west across forested lands into Somerset County, and then crosses an isolated section of Fleegle Road. Turning to the northwest, the route traverses through a mix of forested and agricultural lands before intersecting with the State Game Land boundary. At this point, Route 2 would extend northwest for 1.4 miles across State Game Land property. The route would initially traverse through forested lands before intersecting with the south side of Lambert Mountain Road. Route 2 is conceptually expected to parallel the south-side of Lambert Mountain Road to reduce the number of angles and limit the length of alignment across these protected lands. There are several residential properties on the south side of Lambert Mountain Road at the western edge of State Game Lands #228 that would require the alignment to cross to the north side of the road in this area. From the western edge of State Game Lands #228, Route 2 would extend 1.5 miles through forested lands to the potential alternative route crisscross area located on the eastern edge of Central City. The route would cross to the south side of Lambert Mountain Road near an existing utility line ROW and then parallel the road west past the intersection with Shaffer Mountain Road. Route 2 continues for 1.7 miles to the west through central portions of Central City Borough to the Central City West Substation. The route would cross to the north side of Shaffer Mountain Road, span over an undeveloped section of Main Street, span Dark Shade Creek (CWF), and then cross a disturbed area that borders the active Norfolk Southern Railroad. Crossing to the west side of the railroad, Route 2 would parallel the railroad into the town of Central City and across the commercial bordered SR 160 (Sunshine Avenue). West of SR 160, the route would be collocated with an existing electrical distribution line that is located in close proximity to several residential

properties that border the railroad ROW. Past this point, the route would follow the electrical distribution line and parallel the railroad as they turn to the north. Just beyond the Central City Borough line, the route would turn sharply to the west following the distribution line over a disturbed abandoned railroad ROW and across sparsely residential-lined School Road. Turning to the northwest, Route 2 crosses a mixed meadow/forest area before extending into the Central City West Substation.

Alternative Route 3 (Blue)

Alternative Route 3 is approximately 19.7 miles in length. Route 3 is a hybrid combination of portions of Route 1 and Route 2 with a 4.3 mile connection between these two alternatives. The route follows the initial 8.8 miles of Route 2 from the Bedford North Substation to Hoover Road near Schellsburg. At this point, Route 3 would be a continuation of new construction in the new right-of-way and turns to the north for 2.0 miles to Shaffer Mountain Road. After crossing a tributary to Shawnee Branch, the route makes a series of three sharp turns to follow the boundary of an active farm property. The route then spans over a low density residential-lined section of Helixville Road and continues north across a mix of agricultural and forested lands to a low density residential-lined section of Shaffer Mountain Road. Turning to the northwest, Route 3 extends to intersect with Route 1 on top of the Allegheny Front. The route would traverse through a mix of forested and agricultural lands and pass over several roads bordered by low density residential development such as Kanouff Road, McCreary Road, and Bethel Hollow Road. From this point, Route 3 would follow the Route 1 alignment for 6.6 miles around the north side of Central City and into the Central City West Substation**.**

Alternative Route 4 (Red)

Alternative Route 4 is approximately 19.2 miles in length. Route 4 uses portions of Route 2 to connect to portions of Route 1. This alternative was developed based on the potential that crossing State Game Lands #228 would be acceptable to the Pennsylvania Game Commission, but use of the railroad ROW through the center of Central City would not be acceptable to Norfolk Southern. This alternative follows Route 2 for 15.7 miles from the Bedford North Substation to the east side of Central City. At this point, Route 4 would be a continuation of new construction in the new right-of-way that extends to the northwest for 0.9 miles to connect to Route 1. This portion of the alignment crosses to the north side of Shaffer Mountain Road in an undeveloped area, spans a tributary to Dark Shade Creek, and then traverses a section of undeveloped forest to intersect with Route 1. From this point, Route 4 would follow the Route 1 alignment for 2.6 miles around the north side of Central City and into the Central City West Substation.

Alternative Route 5 (Green)

Alternative Route 5 is approximately 20.6 miles in length. Route 5 uses portions of Route 1 to connect to portions of Route 2. This alternative was developed based on the potential that crossing State Game Lands #228 would not be acceptable to the Pennsylvania Game Commission, but use of the railroad ROW through the center of Central City would be acceptable to Norfolk Southern. This alternative follows Route 1 for 18.3 miles from the Bedford North Substation to the east side of Central City. At this point, Route 5 would be a continuation of new construction in the new right-of-way and extends southwest for 0.7 miles to connect to Route 2. This portion of the alignment traverses a section of undeveloped forest, spans a tributary to Dark Shade Creek, and crosses to the south side of Shaffer Mountain Road in an undeveloped area to intersect with Route 2. From this point, Route 5 would follow the Route

2 alignment for 1.6 miles through the center of Central City and into the Central City West Substation.

Alternative Route 6 (Orange)

Alternative Route 6 is approximately 19.0 miles in length. Route 6 uses portions of Route 3 to connect to portions of Route 2. This alternative was developed based on the potential that using the existing Bedford North-New Baltimore 115 kV ROW would be feasible from an engineering perspective, that crossing State Game Lands #228 would not be acceptable to the Pennsylvania Game Commission, but use of the railroad ROW through the center of Central City would be acceptable to Norfolk Southern. This alternative follows Route 3 for 16.7 miles from the Bedford North Substation to the east side of Central City. At this point, Route 6 would be a continuation of new construction in the new right-of-way and extends southwest for 0.7 miles to connect to Route 2. From this point, Route 6 would follow the Route 2 alignment for 1.6 miles through the center of Central City and into the Central City West Substation.

Q. WAS OUTREACH PART OF THE ROUTING PROCESS?

A. Yes. Penelec conducted extensive public outreach throughout the siting process, including initial regulatory agency consultation, public notification and open house meetings, and meetings with property owners.

On January 28 and 29, 2015, Penelec held three public open house meetings in the Project Area to present the Alternative Routes and provide information about the Bedford North – Central City West Project. The first open house meeting was held at the Shade-Central City High School in Cairnbrook from 6PM to 8PM. The second and third open house meetings were held at the Travelodge in Bedford from 1PM to 3PM and 6PM to 8PM. At the meeting, attendees received a project factsheet, information on the PUC

process, and comment cards. The public information meetings provided an opportunity for residents and other interested parties to review project information displays and discuss the Project with Penelec and AECOM representatives. The factsheet contained a brief statement on project need and benefits, a description of the siting process, information about easements and permitting, and a preliminary project timeline. The open houses consisted of several stations that identified the Project processes. Forty-five people attended the Cairnbrook open house and fifty-four people attended the two Bedford open houses. Comment cards were completed during the meetings. Comments generally referred to concerns around specific line locations on individual properties, local ecosystems, and endangered or threatened species populations. Several landowners worked with the Routing Team to define better alignments across their properties. Primary concerns about the project focused on areas around Shaffer Mountain Ridge and along the Alternate Routes 1 and 3.

Once the alternative routes were narrowed to the Proposed Route, a PNDI request was submitted to the USFWS, DCNR, PGC, and PFBC on April 1, 2015 requesting information pertaining to the presence of any federally endangered, threatened, or rare species and habitat along the proposed alignment. Due to a halt in the routing process, Penelec has delayed the initial consultation letter to the PHMC until a final alignment is negotiated. Results of the PNDI consultation are discussed in subsequent sections of this testimony.

III. ENVIRONMENTAL ASSESSMENT

Q. DID THE ROUTING TEAM EVALUATE THE IMPACTS OF THE ALTERNATIVE ROUTES ON THE BUILT ENVIRONMENT?

A. Yes. The Routing Team evaluated the potential impact of the six Alternative Routes on existing residential, commercial and industrial development; land uses; archaeological and historical areas; recreational and scenic resources; and terrain and landscape. With the exception of the developed areas surrounding the Bedford and Central City Substations, nearly the entire length of the Alternative Routes crossed forested or agricultural areas. The Project is not anticipated to impact any scenic, geologic or wilderness areas.

The closest airport is the Bedford County Airport, which is located just northeast of the Bedford Substation along US 220. The Bedford County runway is 5,000 feet long and is approximately 2,600 feet from Route 1 and 4,750 feet from the Bedford North Substation and all of the other alternatives extending from this point. Therefore, Penelec will likely need to file the appropriate documentation with both the Federal Aviation Administration and the PennDOT Bureau of Aviation to ensure the proposed line will not be a hazard to the airport's flight operations. No other smaller airports or heliports were identified within 2 miles of the Study Area.

After analyzing and comparing the six Alternative Routes against potential impacts on the built environment, Route 2 is preferred over other alternatives. Approximately forty (40) percent of Route 2 can be constructed within an existing 115 kV ROW and it is the shortest, most direct route of all of the alternatives. Other options would require a significantly longer distance of new ROW. Although Route 2 crosses within 300 feet of more residences than other options, these residences are located within

300 feet of the existing 115 kV line or in the developed areas along the railroad corridor paralleled through Central City. Therefore, Route 2 is expected to result in minimal incremental impacts to land use, cultural resources and the existing viewshed.

Q. DID THE ROUTING TEAM CONSIDER IMPACTS OF CONSTRUCTING THE TRANSMISSION LINE ON EACH ALTERNATIVE ROUTE ON THE NATURAL ENVIRONMENT?

A. Yes. Natural environment impacts include potential impacts to vegetation and habitat, surface waters, and conservation and recreation lands. Potential impacts are evaluated based on publically available maps and data as well as consultation with federal and state agencies.

All six Alternative Routes would extend across the forested slopes of the Allegheny Front. One high quality stream would crossed by several of the Alternative Routes including Route 2. However, Route 2 would result in fewer stream and forest impacts due to the generally direct route of this alternative. The length of wetland crossings would be moderate in comparison to the other alternatives, but would involve several emergent wetlands that would be spanned by the route.

Most of the vegetation crossed by the Alternative Routes consists of forest cover. In these areas, a 100-foot-wide ROW will be cleared and maintained in accordance with Penelec's Vegetation Management Program. Approximately seven miles of Route 2 would be constructed within an existing 100-foot-wide ROW that is presently cleared. Therefore, only 10 miles of new ROW would need to be cleared to construct this option.

Based on a review of aerial imagery and field reviews, other options would require significantly more forest clearing than Route 2.

The USFWS' response to Penelec's PNDI letter request for Route 2 indicated that the Project is located within a known maternity and swarming area of a federally-listed Indiana bat (*Myotis sodalis*) hibernacula and within the range for the northern long-eared bat (*Myotis septentrionalis*). The USFWS recommends restricting tree cutting activities from October 1 to March 31 to avoid potential impacts to these protected bat species. Penelec is aware of these restrictions and will either adhere to them or submit an *Indiana Bat Conservation Plan* to the USFWS that may involve the need for mitigation due to the potential impacts to the habitat area.

DCNR noted that two plant species (mountain bellwort (*Uvularia pudica*) and yellow-fringed orchid (*Platanthera ciliaris*)) may be located in the area. Botanical surveys for these species will be conducted at the appropriate time of year for these two plants.

The PFBC and PGC response indicated no adverse impact is anticipated to threatened and endangered species and/or special concern species and habitat.

After analyzing and comparing the six routes against potential impacts to the natural environment, the Routing Team concluded that Route 2 is preferred over the other alternatives. Route 2 would result in significantly less forest clearing compared to other options. Forest clearing can result in numerous impacts including forest fragmentation and creation of new edge habitat, wetland function modification, soil erosion and increased stormwater runoff. Route 2 would also minimize the number of new aerial crossings of streams and the amount of 100-year floodplain crossed. Field wetland

delineations will be conducted for the Proposed Route and engineered access roads to determine the exact location of any wetlands or waterways. Penelec anticipates that project engineering can minimize wetland and stream impacts through spanning and avoidance. Regardless, Penelec will obtain and adhere to all required state and federal permits.

IV. ROUTE SELECTION STUDY CONCLUSION

Q. DID THE ROUTING TEAM DECIDE WHICH ALTERNATIVE IS THE PROPOSED ROUTE?

A. Yes. Based on a quantitative and qualitative review of information obtained from GIS data, field reconnaissance, agency consultation, and engineering and constructability considerations for this Project, the Routing Team selected **Alternative Route 2** as the Proposed Route. The Routing Team believes that the cumulative social, environmental, and financial impacts associated with constructing Alternative Route 2 will be less than any other Alternative Route. Specific reasons include the following:

- Route 2 is shorter and requires fewer angled structures compared to the other Alternative Routes. Route 2 will also require significantly fewer acres of forest clearing and minimizes the number of new stream crossings.
- Penelec would use a significant portion of existing 115 kV ROW to build a new double-circuit system. Using the existing right-of-way will greatly minimize the amount of new easements required to build the project and would significantly

reduce the amount of vegetation clearance required, thereby reducing the overall Project cost and environmental impact.

- While any route selected would result in changes to the existing viewshed, Route 2 would rebuild existing transmission infrastructure for a significant length, which minimizes changes to the existing viewshed compared to constructing an all new transmission line in areas without an existing transmission line.
- Route 2 would also be the least costly of the Alternative Routes. Penelec evaluated the Alternative Routes from a cost perspective based on estimates from siting, real estate, engineering, procurement, and construction.

Q. DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes, it does. I reserve the right to supplement my testimony as additional issues arise during the course of this proceeding.

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

APPLICATION OF PENNSYLVANIA ELECTRIC COMPANY FOR APPROVAL TO LOCATE AND CONSTRUCT THE BEDFORD NORTH-CENTRAL CITY WEST 115 KILOVOLT TRANSMISSION LINE PROJECT IN CENTRAL CITY BOROUGH AND SHADE TOWNSHIP, SOMERSET COUNTY, AND NAPIER, EAST ST. CLAIR, AND BEDFORD TOWNSHIPS, BEDFORD COUNTY, PENNSYLVANIA	:	**Docket No.**

DIRECT TESTIMONY OF

LAWRENCE P. MATTEI

ON BEHALF OF

PENNSYLVANIA ELECTRIC COMPANY

STATEMENT NO. 4

Re: The Design, Engineering, Construction, Operation and Maintenance of the Project

Dated: September 1, 2016

I. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Lawrence P. Mattei. My business address is FirstEnergy Service Company, 800 Cabin Hill Drive, Greensburg, PA. 15601.

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

A. I am employed by FirstEnergy Service Company as a transmission design engineer.

Q. Please describe your educational background and professional experience.

A. I am a 1980 graduate of the University of Pittsburgh with a Bachelor of Science degree in Civil Engineering. I am a registered Professional Engineer in Pennsylvania. After graduation from the University of Pittsburgh I worked for the Municipal Authority of Westmoreland County, Pennsylvania, designing public water supply projects. In 1981 I began employment with Allegheny Power Service Corporation in the Surveys and Rights-of-Way Section. My primary responsibilities included engineering support for right-of-way acquisition of Company transmission lines. I also teamed with environmental specialists to establish new transmission line routes and obtain approval of regulators at the local, state, and federal levels. In 1995, I was assigned to the Allegheny Power's Transmission Engineering Department. My responsibility was to design new transmission lines as issued by Company planners and to re-design existing transmission lines for planned upgrades. I also was responsible for civil

engineering design activities associated with new substations and the expansion of existing substations. With the 2011 merger of Allegheny Energy, Inc., with FirstEnergy Corp., I was assigned to the FirstEnergy Service Company Transmission Design Department and keeping the same job responsibilities. In July 2015 I was assigned to the Company's External Design Engineering Department. My current responsibilities focus on the oversight of the Company's external transmission engineering consultants.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to describe the design and construction methodology of Pennsylvania Electric Company ("Penelec") for the proposed Bedford North-Central City West 115 kV HV Transmission Line Project. Penelec is a FirstEnergy company. I will also provide information on the operations and maintenance of this line.

Q. Briefly outline your testimony.

A. My testimony will cover the following aspects of the proposed 115 kV line:

- Proposed transmission line configuration
- Right-of-way requirements
- Design criteria
- Construction activities
- Maintenance activities

Q. Does your testimony address the filing requirements of 52 Pa. Code § 57.1 and §§ 57.1 – 57.77 concerning the siting and construction of high voltage ("HV") transmission lines?

A. Yes. My direct testimony, together with the siting Application filed by Penelec provides information to respond to the requirements of 52 Pa. Code § 57.72(c)(6) (safety considerations to be incorporated into the design, construction and maintenance of the proposed HV line); (c)(13)(ii) (an engineering and design-based description of the proposed line); and (c)(13)(iii) (a simple drawing of a cross section of the proposed right-of-way of the HV line showing the placement of supporting structures at typical locations, with structure sizes, right-of-way widths, and the lateral distances between the conductors and the edge of the right-of-way indicated).

II. EXHIBITS

Q. Please identify and describe the exhibits that you will refer to in your testimony.

A. I am sponsoring exhibits 6A, 6B, 10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I, 10J, 11A, 11B, 11C, and 20.

I will refer to the exhibits that accompanied Penelec's Application. The exhibits were developed by me or under my supervision. Exhibits 6A and 6B show the minor relocation of the Central City West – Statler Hill 115 kV Line at Central City Substation. Exhibit Nos. 10A through Exhibit No. 10J to Penelec's Application show the types of structures that will be used in the project. Exhibit 11A through 11C to the Application depict typical right-of-way widths for the transmission line. Exhibit No. 20 is a copy of the Company's Tree Trimming and Comprehensive Vegetation Management Plan.

III. LINE CONFIGURATION

Q. Has a general description of the project been provided?

A. Yes, a description of the proposed transmission line project has been provided in Penelec's Application. Additionally, other Penelec witnesses will provide a general description of the need for the line, the proposed route and other basic information about this project. My discussion of the engineering, construction, and maintenance of the project which follows is consistent with those descriptions.

Q. Please describe the general transmission line configuration planned for the project.

A. The project calls for a double circuit 115 kV Line to be constructed between Bedford North Substation and Central City West Substation. The line length is

approximately 17.5 miles. Based on preliminary engineering the Project requires installation of approximately 144 structures ranging from 50 feet to 145 feet in height above ground level. The average span length is approximately 650 feet. It will share a common right of way with the existing Bedford North-New Baltimore 115 kV Line on the westerly side of the line corridor for approximately 7.2 miles. This project will also require that the existing Central City West-Statler Hill 115 kV Line be relocated where it enters Central City Substation. This relocation is about 1,000 feet. The Bedford North-Central City West 115 kV Line will then occupy the existing Central City West-Statler Hill 115 kV Line termination structure at Central City Substation. The Central City West-Statler Hill 115 kV Line will use an open termination at Central City West Substation. Reasons for this will be further discussed below. Also, this line termination change is depicted on exhibits 6A and 6B.

There are numerous structure designs under consideration to best fit topography, land use, and constructability constraints for this project. As such, we anticipate single and double pole structures using both wood and steel. Initially only one circuit will be installed. The proposed transmission line conductors will be installed on one side of the structure in a vertical configuration for all structures except the substation termination structures which will be configured horizontally. The other side of the structure will be used for future transmission line conductors with similar geometry. Some structures are actually two independent single circuit structures installed adjacent to each other for a double circuit configuration. In

these situations, only the Bedford North-Central City West 115 kV circuit will be constructed. The other structure will be constructed when the second circuit is needed. However, a section of this new line will rebuild the existing Bedford North-New Baltimore 115 kV Line for about 7.2 miles. As such, both circuits will be installed on this section of the line. Refer to Exhibit Nos. 10A through 10J of Penelec's Application, which depict the various types of structures that will be used on the project. Exhibit No. 10A shows a typical double circuit tangent wood pole structure. This structure will be used on straight line sections. Exhibit 10B shows a typical double circuit light angle wood pole structure. This structure requires guying to stabilize unbalance loads due to line direction changes. Exhibit 10C shows a typical double circuit angle dead end wood pole structure. This structure requires in-line guying to stabilize unbalance loads due to line direction changes also. Exhibit 10D shows a typical double circuit steel tangent structure. These structures could be used where wood poles are structurally inadequate to support the line. Also, there are locations where the line route will overbuild sections of Penelec's distribution lines. At these locations, the existing distribution lines will be attached below the transmission line as needed. These structures are typically direct imbedded into the ground or can be supported on concrete foundations if soil conditions require it. Exhibit 10E shows a typical double circuit steel dead end or tangent structure. The difference between the two is primarily on the insulator assembly attachment to the pole. Dead end structures are typically used where line direction changes occur and tangent structures are

typically used where there are no line angles. This structure will use concrete foundations and are typical where structure loads are high and require increased foundation support. Exhibit 10F shows another typical double circuit dead end structure on a concrete foundation. This type of structure will be used on shorter spans that could require distribution underbuild. As mentioned, there are some sections of the proposed route where we will combine the existing distribution lines with the Bedford North-Central City West 115 kV Line. This joint use occupancy of transmission and distribution lines is in the Central City area where it's advantageous to share existing right-of-way to minimize land use by this proposed project. Exhibit 10G shows a typical substation termination structure. These will only be used at the Bedford North Substation and Central City West Substation. They will be inside the substation fences. Exhibit 10H shows a typical single circuit angle dead end steel pole structure. This structure will be used to re-route the existing Central City West-Statler Hill 115 kV Line in and around Central City West Substation. It is used as direct embedded when the supporting soil conditions warrant. Otherwise, it could be installed on concrete foundations. As mentioned in the Siting Application and above, this existing line will move its termination location to accommodate the Bedford North-Central City West 115 kV Line termination. This will keep the line exits at Central City Substation from immediately crossing each other and increase reliability of both lines. Exhibit 10I also shows a typical single circuit angle dead end structure. This structure will be used to re-route the existing Central City West-Statler Hill 115 kV Line in and

around Central City West Substation. It will be used on concrete foundations when the supporting soil conditions cannot support the structure. Exhibit 10J shows a typical single circuit wood light angle structure with guying. This structure will be used where wood poles are structurally adequate on the existing Central City West-Statler Hill 115 kV Line. This structure could also be used where the two circuits separate to enter the Bedford North Substation. As shown on the exhibits, structure heights will vary between 50 feet and 145 feet above ground level.

Q. Do you anticipate the need for any other types of structures for the project?

A. No. We do not anticipate the need for any other types of structures other than those shown in Exhibit Nos. 10A through 10J to Penelec's Application. However, if the situation arises where the wood pole structures shown on Exhibits 10A, 10B, 10C, and 10J are not structurally adequate we would use steel pole versions of similar dimensions as the wood poles for needed strength requirements**.**

Q. What width of right-of-way is planned for the project?

A. As shown in Exhibits 11A, 11B, and 11C of the Application the project will be constructed on varying right-of-way of 100 feet and 130 feet. However, if during detailed design engineering, it becomes necessary to develop longer span lengths, for example, to span environmentally sensitive areas, the Company would require wider right-of-way to accommodate the greater side-to-side conductor movement with longer span lengths. Additionally, in areas where the proposed line would

parallel, and be located just outside of a public road's right-of-way, a narrower transmission line right-of-way can be used in combination with the road right-of-way.

Q Will the proposed transmission line overlap any existing transmission line right-of-way?

A. Yes. The proposed transmission line will use the centerline of the existing Bedford North-New Baltimore 115 kV Line 115 kV transmission line for about 40 percent of its length. In this overlap section the existing right-of-way is 100 feet in width in some places and 120 feet in width in other places. These right-of-way widths are shown on exhibits 11A and 11B. No new right-of-way is anticipated for this section of the line.

Q. Will the existing Bedford North-New Baltimore 115 kV transmission line remain in service following the completion of the proposed project?

A. Yes. The Bedford North-New Baltimore 115 kV line will be re-energized and share the same structures as described above.

Q. Will the supporting structures carry any wires other than transmission conductors?

A. Yes. The structures will have two static wires that will be located above the transmission conductors. The purpose of the static wire is to protect the

conductors from lighting strikes. One of these static wires will also serve as communications via fiber optics.

Q. Does the project meet FirstEnergy's existing engineering and design standards?

A. Yes, the structures depicted in Exhibits Nos. 10A through 10J of the Application are based upon and meet FirstEnergy's applicable existing engineering and design standards for 115 kV transmission lines.

IV. DESIGN CRITERIA

Q. Please describe the "vertical configuration" of the three conductor phases shown on Exhibit Nos. 10A through10J and explain why this configuration was selected.

A. The vertical configuration is FirstEnergy's typical configuration for a 115 kV double circuit transmission line. The configuration minimizes the width of the right-of-way.

Q. Please describe the voltage, temperature and other electrical parameters at which the conductors will operate and how these parameters will conform to the National Electric Safety Code ("NESC").

A. The 115 kV transmission line will be designed to operate at a maximum design temperature of 212 degree Fahrenheit. The line will meet all requirements of the current NESC under all operating conditions.

Q. Please describe the minimum conductor-to-ground clearances under maximum operating conditions the design will meet.

A. The transmission line will be designed to meet or exceed the NESC minimum requirements of 21 feet (rounded up to nearest foot) under all operating conditions.

Q. Please describe the type and size of conductor planned for the conductors and shield wire.

A. The three (3) conductors are 795 thousand circular mills ("kcmil") 26/7 aluminum conductor, steel reinforced ("ACSR"). The 26/7 designation indicates the stranding of the conductor, with the 26 representing the outer 26 aluminum wires and the 7 representing the inner 7 steel wires. The shield wires will be one 7#8 alumoweld and one fiber optic.

Q. Please describe the relationship of the proposed right-of-way width to the design and NESC requirements for the project.

A. The right-of-way width was selected to provide necessary conductor clearances when considering structure type, span length between supporting structures, conductor motion, line voltage, and NESC defined weather conditions.

V. CONSTRUCTION ACTIVITIES

Q. Please describe, in general terms, the construction process.

A. The project will be constructed according to a well-defined procedure that utilizes standard construction practices to perform all work safely and in compliance with the Occupational Safety and Health Administration ("OSHA") Rules and Regulations, while keeping environmental impact to a minimum. Project activities will include the installation and maintenance of soil erosion and sedimentation control measures, temporary access route construction, right-of-way clearing, foundation, structure and wire installations, and the rehabilitation of all areas disturbed during construction.

Q. Will a construction project contractor and/or manager be utilized?

A. Penelec plans to construct the line with contractor construction labor and supervision, with FirstEnergy Service Company personnel oversight.

Q. How will Penelec oversee and monitor the construction cost and progress of the project?

A. Penelec uses the services of FirstEnergy Service Company, a FirstEnergy affiliate, for oversight of engineering, construction, and other services. FirstEnergy Service Company will assign a project manager to monitor and oversee the project construction activities.

Q. What is the estimated cost to site and construct the project?

A. The cost of the project is currently estimated to be $48 million.

Q. When will the project be constructed?

A. Pending approval for the Project from the Pennsylvania Public Utility Commission, construction is scheduled to occur from February 2018 thru December 2018.

Q. What steps are planned for minimizing the effects of construction on areas within and outside of the right-of-way, including such things as traffic and other local community issues?

A. Physical work on the Project will not begin until the necessary permits for work have been issued. All work will be conducted in accordance with state, local, and federal permits, property releases, and approved special conditions. Penelec will, at all times, minimize to the greatest extent practical the impacts of construction activities on local communities.

VI. RIGHT-OF-WAY CLEARING AND PREPARATION

Q. What methods will be used to clear and prepare the right-of-way for construction?

A. The construction specifications adopted for the project are designed to keep environmental impact to a minimum. In addition to the implementation of best management practices for erosion control ("BMPs"), Penelec's efforts to minimize environmental impact during the right-of-way preparation phase of construction will include the following:

1. A copy of the Soil Erosion and Sedimentation Control Plan, along with the appropriate permit forms, will be submitted to the Pennsylvania Department of Environmental Protection and, as necessary, the County Conservation District for approval.

2. BMP for soil erosion measures and sedimentation control will be put in place prior to any earth disturbance.

3. Construction access routes will be installed in accordance with the Soil Erosion and Sedimentation Control Plan. Existing roads, private farm lanes, private forest roads and other similar existing access will be utilized to the extent practical. Where new access routes are needed for vegetation removal and/or construction, it is preferred that the access remain for future maintenance activities. Any new access roads that are to remain

will be stabilized by seeding and installation of water diversion measures. Where it is necessary to remove new access roads after construction, the roads will be re-graded to pre-construction contours and re-vegetated with an appropriate seed mix.

4. Disturbed work areas will be re-vegetated in accordance with the approved Soil Erosion and Sediment Control Plan.

5. Penelec will clear the corridor to the specific width in accordance with the FirstEnergy Initial Clearing of Transmission Lines Specification and the FirstEnergy Detailed Property and Provision List. Trees located outside the ROW that are deemed Priority Trees shall be removed. Priority Trees are defined as trees located adjacent to transmission corridors that are dead, dying, diseased, structurally defective, leaning or significantly encroaching, where the transmission conductor would be a target when a tree fails and will fall or be within close proximity of the transmission conductor to potentially flash-over, strike or grow into the conductor. In order to remove trees and vegetation both on and off ROW, Penelec will first obtain the necessary rights from the applicable property owners.

When required, Penelec's standard specifications will be modified and/or amended for construction of the project to comply with all terms of the governing permits required and applicable to construct the project.

Q. What steps will be taken to upgrade, seed, or otherwise restore disturbed right-of-way once construction is complete?

A. After construction is completed, the transmission line right-of-way will be restored to conditions as good as or better than what existed prior to construction. Such work includes restoring drainage ditches, fencing, and field drainage tiles. Non-cultivated areas that are disturbed by construction activities will be fertilized, seeded, and mulched. Temporary soil erosion and sedimentation control measures will be removed after vegetative cover has been established.

Q. Please describe the steps that will be taken to control erosion and the siltation of streams where the ground is disturbed during construction activities along the right-of-way.

A. FirstEnergy will follow all applicable guidelines from the Commonwealth of Pennsylvania, Department of Environmental Protection Office of Water Management's Erosion and Sediment Pollution Control Program Manual (Chapter 102).

VII. RIGHT-OF-WAY MAINTENANCE

Q. Please describe the procedures that will be employed to maintain the right-of-way free of incompatible vegetation following the completion of construction and the commencement of operations.

A. The approach that Penelec employs is the control or removal of all incompatible vegetation that has the potential to interfere with the safe and efficient operation of the transmission system. This is accomplished through either removal by mechanical means or the application of herbicides. The goal is to promote a low growing plant community of grasses, herbs, and low growing compatibles. Along the transmission corridor, where the transmission conductor is a target, priority trees that are dead, dying, diseased, structurally defective, leaning or significantly encroaching are identified and removed. Work activities are performed under established cycles considering the inter-relations between vegetation growth rates, vegetation control methods and inspection frequency. These cycles have been developed based on consideration of vegetation conditions and species, movement of line conductors under their rating and all rated electrical operating conditions, as well as terrain, state regulatory requirements, easement restrictions and environmental concerns.

Q. Describe the general parameters under which Penelec will maintain the project right-of-way?

A. Penelec's methods used to manage and control vegetation include manual control methods using hand-operated tools, mechanical control using aerial and equipment-mounted saws, mowers or other devices, and various herbicide application techniques

such as, selective basal, stem foliage and cut stubble. Exhibit 20 provides additional information on Penelec's vegetation management program.

Penelec will maintain the Project in accordance with best management practices and the Company's Transmission Vegetation Management Program.

The objective of the Penelec transmission vegetation management program is to ensure the continued and safe operation of transmission circuits through the removal and control of all incompatible vegetation that has the potential to interfere with the safe and efficient operation of the transmission system. Penelec's vegetation management practices are designed to prevent vegetation related outages by creating and sustaining a stable and compatible vegetated community within and along the transmission corridor using integrated vegetation management techniques. Penelec's overarching goal is to prevent all vegetation-caused service interruptions at the lowest possible cost by removing potentially threatening vegetation at the most advantageous time.

Q. Will Penelec's vegetation control procedures observe specific legal or regulatory standards?

A. Yes. The vegetation management procedures described above are designed to ensure that Penelec complies with all required federal, state, and local vegetation management standards. For example, the North American Electric Reliability Service Company ("NERC") Reliability Standard FAC-003-3 contains, the following requirements among others:

- Standard R3 requires Penelec to have documented maintenance strategies or procedures or process or specifications it uses to prevent the encroachment of vegetation into the Minimum Vegetation Clearance Distances (MVCD) provided in FAC-003-3 Table 2.

- Standard R1 and R2 requires Penelec to manage vegetation to prevent encroachments into the MVCD. Penelec's Transmission Vegetation Management Strategies and Procedures are designed to maintain a reliable electric transmission system by using a defense-in-depth strategy to manage vegetation located on and adjacent to transmission rights-of-way (ROW). The objective of these strategies and procedures is to ensure that vegetation with the potential to encroach into Penelec's vegetation clearances is identified and mitigated and that vegetation clearances are achieved at the time of maintenance to prevent encroachments into the MVCD and to ensure safe and reliable operation of the electric transmission system.

- Standard R6 and R7 requires Penelec to perform and complete vegetation inspections. Maintenance inspections are scheduled annually for those corridors that are scheduled for vegetation maintenance based on their established vegetation management cycle. Aerial and/or associated ground inspections are scheduled on 100% of FirstEnergy applicable transmission

lines Aerial and/or ground inspections generally are performed at least once per calendar year and with no more than 18 calendar months between inspections on the same ROW

- Standard R7 requires Penelec to complete 100% of its annual vegetation work plan of applicable lines to ensure no vegetation encroachments occur within the MVCD. The purpose of creating and implementing the annual work plan for vegetation management work is to ensure no vegetation encroachments occur within the MVCD. The creation of the work plan involves scheduling transmission corridors every year for vegetation management based on the next cycle date. The work plan is flexible enough to adjust to changing conditions, taking into consideration anticipated growth of vegetation, and all other environmental factors that may impact the reliability of the transmission system.

Q. Please describe the expected right-of-way maintenance cycle for this project.

A. The FirstEnergy transmission vegetation management program within the Penelec service territory is currently on a five-year maintenance schedule for all transmission voltages.

Q. Does this conclude your direct testimony?

A. Yes, it does. However, I would like to reserve the right to file such additional testimony or exhibits as may be necessary or appropriate.