

**PJM RTEP – 2014 Project Proposal Window #2 Addendum 2:  
Cumberland Tap 1 Proposal**

**A Proposal to PJM Interconnection, Submitted March 10, 2015**

Submitted by

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# Table of Contents

Table of Contents .....	i
A. Executive Summary .....	1
Introduction .....	1
Transource Energy .....	1
The Proposed Project.....	4
The Value Proposition.....	5
Summary of Project Development and Ownership Plan .....	6
B. Company Evaluation Information .....	9
Transource Energy .....	9
American Electric Power Company.....	9
Selection and Oversight of EPC Resources .....	10
Technical and Engineering Qualifications .....	12
Experience in Developing, Constructing, Operating and Maintaining Similar Facilities.....	14
Experience in Adhering to Standardized Construction and O&M Practices.....	20
Experience in Working in the Geographical Region.....	23
Experience in Acquiring Rights-of-Way in the Geographic Region.....	24
Financing Plan .....	24
Transource’s Managerial Ability to Contain Costs and Adhere to Construction Schedules.....	25
Details Regarding Construction Cost Cap Provisions .....	26
Assumptions.....	26
C. Proposed Project Constructability Information .....	27
APPENDIX A - 2012 AEP Transmission Report.....	28
APPENDIX B - AEP Standards.....	29
APPENDIX C - Quanta Letter.....	30



## A. Executive Summary

### Introduction

Transource Energy, LLC (Transource) submits this proposal (the Proposal) to PJM Interconnection, LLC (PJM) in response to the *PJM RTEP 2014 Project Proposal Window #2 Addendum 2 Proposal Window*. This Proposal details a proposed solution to one or more potential violations on facilities referenced in the *Problem Statement & Requirements Document*, dated February 24, 2015.

Transource seeks to be considered the Designated Entity for the project described within this Proposal, subject to determination regarding components deemed upgrades by PJM.

Transource was specifically formed as a joint venture between subsidiaries of American Electric Power Company (AEP) and Great Plains Energy Incorporated (GPE) to participate in competitive processes for transmission development and to provide benefits to transmission customers through the planning, construction, and ownership of high quality, low cost transmission infrastructure.

Transource has collaborated with POWER Engineers, Inc. (POWER), a nationally recognized leader in infrastructure design and project management, in the development of this Proposal. POWER has worked with Transource to review this cost, schedule, and constructability analysis. PJM can have confidence knowing that POWER reviewed this key information. This firm brings a wealth of knowledge and experience designing and executing transmission projects across the United States.

### Transource Energy

Transource was formed to pursue the development of competitive transmission projects in marketplaces initiated by the implementation of FERC Order No. 1000. AEP owns 86.5 percent of Transource, and GPE owns 13.5 percent. The combined strengths of AEP and GPE in engineering, project management, procurement, project development, construction, operation and maintenance will result in effective and efficient delivery of transmission solutions that benefit transmission customers.

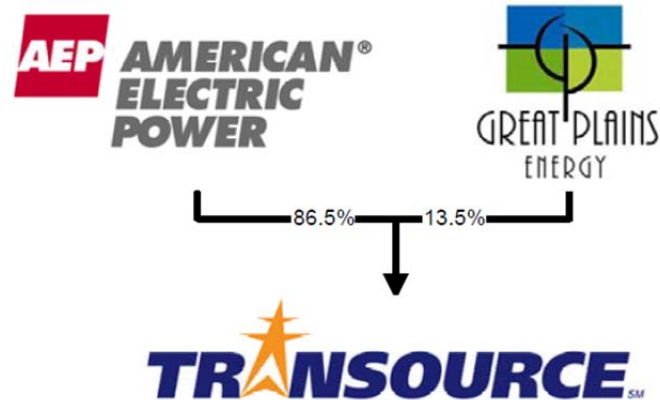


Figure 1 - Summary of Transource Ownership Structure

Transource is currently developing two Southwest Power Pool (SPP) approved transmission projects in the state of Missouri through its subsidiary Transource Missouri LLC (Transource Missouri). The Iatan-Nashua 345 kV transmission project is currently under construction, and the Sibley-Nebraska City 345 kV transmission project is currently in the engineering, design and Rights-of-Way (ROW) acquisition phase. Transource received approval from the Federal Energy Regulatory Commission (FERC) of a formula rate and certain incentives for Transource Missouri in FERC Docket No. ER12-2554. In addition, Transource Missouri received approval from the Missouri Public Service Commission of a settlement filed in File No. EA-2013-0098 for a line Certificate of Convenience and Necessity to finance, construct, own, operate and maintain these two projects.

Transource has been pre-qualified to be a Designated Entity for transmission projects in PJM under section 1.5.8 (a) of the PJM Operating Agreement. The pre-qualification information is contained in the document submitted to PJM on April 29, 2013, entitled *Pre-Qualification Application of American Electric Power and Certain Affiliates*. This document is on record with PJM and posted on the PJM website, with PJM pre-qualification ID of 13-05. PJM confirmed the pre-qualified status of Transource in a letter dated July 7, 2013. As required annually, Transource has reviewed this information and determined that no updates are required.

The figure below provides a snapshot of the states in which Transource’s owners, AEP and GPE, currently own or are developing transmission assets.

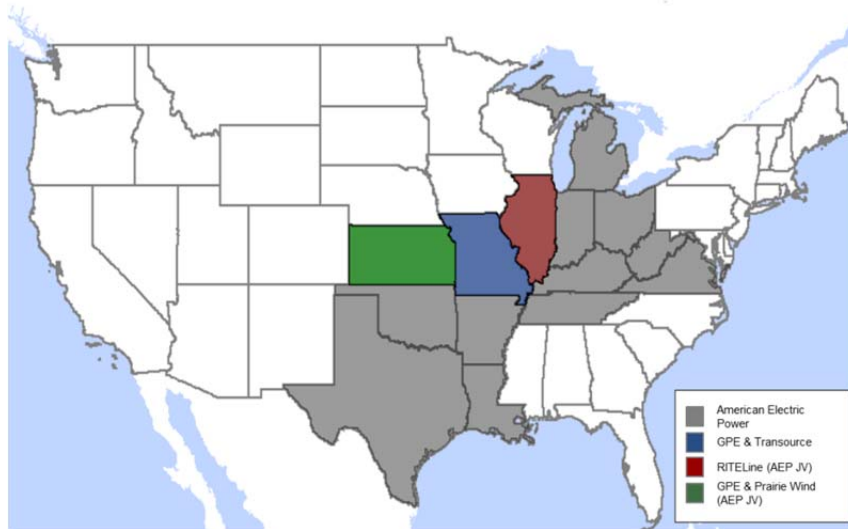


Figure 2 - Combined Transmission Presence

## The Proposed Project

Transource submits the following proposal to address various planning criteria N-1-1 voltage drop violations, listed below:

FG #	Bus #	Name	KV	Area	ContVolt	BaseVolt	Vdrop(%)	Contingency 1	Contingency 2
N2-VD2	204520	27ALLEN	115	227	0.8659	1.0142	14.83	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD3	204526	27DILLSBRG	115	227	0.867	1.0152	14.82	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD4	204528	27GARDNERS	115	227	0.8722	1.0165	14.43	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD5	204546	27MOUNTAIN	115	227	0.8676	1.0145	14.69	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD6	204552	27P.P.G.I.	115	227	0.867	1.0141	14.71	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD7	204556	27ROUND TP	115	227	0.8675	1.0167	14.92	B_ME115-SX-#28	B_ME115-SX-#6
N2-VD9	204520	27ALLEN	115	227	0.8652	0.9907	12.55	B_ME115-SX-#6	B_ME115-SX-#28
N2-VD10	204526	27DILLSBRG	115	227	0.8664	0.9911	12.47	B_ME115-SX-#6	B_ME115-SX-#28
N2-VD11	204528	27GARDNERS	115	227	0.8716	0.9914	11.98	B_ME115-SX-#6	B_ME115-SX-#28
N2-VD12	204546	27MOUNTAIN	115	227	0.867	0.9912	12.42	B_ME115-SX-#6	B_ME115-SX-#28
N2-VD13	204552	27P.P.G.I.	115	227	0.8664	0.9908	12.44	B_ME115-SX-#6	B_ME115-SX-#28
N2-VD14	204556	27ROUND TP	115	227	0.8668	0.9931	12.63	B_ME115-SX-#6	B_ME115-SX-#28

**Table 1 - Addressed Contingencies Identified by PJM**

Transource proposes to build the “Cumberland Tap 1 Project” (or, “the Project”) in southern Pennsylvania to address these planning criteria violations. The voltage drop issues that PJM identified occur when two of the three 115 kV sources in the area are lost, one following another. The Project introduces an additional 230/115 kV source to the affected area that will prevent these violations from occurring when the other 115 kV sources are not available.

The Project includes the following facilities:

- A new 230/115 kV substation containing three new 230 kV breakers, two new 115 kV breakers and a new 230/115 kV 300 MVA transformer
- Approximately two miles of new double circuit 115 kV line to cut into the existing Allen – Roundtop 115 kV line just outside of Allen station
- One to three spans of new 230 kV line to cut into the existing Cumberland – West Shore 230 kV line that is located very close to the proposed new station

As an additional benefit, the location of the proposed substation provides for future expansion. The Three Mile Island – Juniata 500 kV line runs near the proposed station location, allowing for a 500 kV source to be introduced to the area if future needs arise. Furthermore, Transource performed analysis of existing and new contingencies that the Project may create and found no planning criteria violations.

Transource has collaborated with POWER to complete the necessary preliminary project development work to determine project constructability, preliminary cost estimates, and a construction schedule. Experienced AEP engineering personnel were the primary resources for this work, which POWER reviewed. The preliminary estimated capital cost of the Project is approximately \$16.1 million. This estimated cost includes all components of the Project, including components that PJM may consider as upgrades. The Project is projected to be placed in service in the first quarter of 2018.

A project study area map and conceptual one-line diagram for the Project are provided below. Please note that this proposal contains multiple graphics that are available in high-resolution format upon request.

[REDACTED]

**Figure 3 - Project Study Area**

[REDACTED]

**Figure 4 - Project One-Line**

Attachment 1 of this Proposal includes the required analytical files as set forth in the *PJM RTEP – 2014 Project Proposal Window #2 Addendum 2 Problem Statement & Requirements Document*.

Attachment 2 of this Proposal includes the required *2014 RTEP Proposal Window Template*.

## **The Value Proposition**

The Cumberland Tap 1 Project will provide significant value to electric customers in the service area based on the following factors:



- **The Project addresses 12 planning criteria violations with a cost-effective solution.** The Project prevents these voltage drop/magnitude violations from occurring when the existing 115 kV sources are not available.
- **The Project is constructable.** The Project's design is straightforward and similar to many projects that have been successfully executed within AEP's territory. It is located in an area that is best characterized as rural farmland.
- **Transource brings the necessary regulatory, technical, financial and operational capabilities to execute the Project.**
- **Transource presents a clear plan for all aspects of making the Project successful from the time of designation by PJM through the useful life of the facilities.** Drawing on the vast AEP experience and resources, Transource will use proven tools and practices to meet the cost and schedule objectives of the Project.

As an additional benefit to the Project, Transource's analysis suggests that the cost of PPL's supplemental project (S0859) could be reduced based on the construction of the new substation described in this Proposal. PPL could terminate the Cumberland - West Shore 69 kV lines at the new station proposed by Transource, rather than building a new station to terminate these lines. This would reduce the length of the new 69 kV lines from 18 miles to approximately 11 miles. In addition, only a single new substation would be required to accommodate both projects. This combined project would resolve both the planning criteria violations referenced above and address load growth in the Cumberland and West Shores areas at the lowest cost.

## **Summary of Project Development and Ownership Plan**

Transource will execute the Cumberland Tap 1 Project using AEP's proven resources and standardized practices to develop, own, operate and maintain transmission assets. AEP has successfully executed projects within its territory that have similar terrain, environmental risks, and siting issues.

The most unique aspect of the development plan is securing federal and state regulatory approvals for Transource, a new transmission-only entity in Pennsylvania, to finance, construct, own, operate and maintain the new transmission facilities. Transource will draw on AEP's extensive

experience and successful track record of securing federal and state regulatory approvals for transmission-only entities in states both within and outside of its traditional utility footprint. AEP has received approvals for new transmission-only utility companies in ten states within the last several years. Of particular significance is AEP's recent success in securing regulatory approvals for the initiation of the operations as a public utility of AEP's Transco companies. These approvals are similar to approvals that will be required for Transource. PJM can also be confident in the ability of Transource to secure these approvals because Transource has demonstrated success to date with its utility subsidiary in Missouri.

Transource anticipates executing the remainder of the project development plan in collaboration with a qualified, competitive Engineering, Procurement and Construction (EPC) service provider (EPC Service Provider). Transource will select an EPC Provider that has significant experience in executing projects in the geographic area of Eastern PJM. AEP has contractual relationships and deep experience with several firms with these capabilities. This engagement will have the flexibility to leverage AEP's engineering, procurement and project management resources. This flexibility will provide advantages based on AEP's experience and significant scale to achieve a low cost of materials and successfully develop the Project, to the benefit of wholesale transmission customers. In addition, Transource expects to work with the selected EPC Service Provider, or other qualified service providers, on other critical services necessary to deliver the Project on time and on budget, including permitting, siting, environmental, and ROW acquisition.

AEP has been successful in jointly implementing many projects using third-party resources; for example, AEP is currently using a similar EPC approach to implement its complex Competitive Renewable Energy Zones (CREZ) projects in Texas for its Electric Transmission Texas, LLC (ETT) subsidiary. The ETT portion of CREZ consists of the siting and construction of over 465 miles of 345 kV lines and 16 associated stations with a total project cost of approximately \$1.5 billion. In addition, AEP has used a third-party approach to implement numerous line and station projects across its 11-state service territory with complex schedule and coordination requirements. Currently, AEP uses third-party engineering services to engineer about half of its capital project portfolio on an annual basis. As part of

its business practices, AEP oversees third-party contractors to ensure that projects are implemented safely, on time, and within budget.

Upon placing the Project into service, Transource will own, operate and maintain the new facilities. This Proposal contains a clear approach for operations and maintenance of the Project using either the considerable resources of AEP, carefully-selected external resources, or a combination thereof. AEP has longstanding relationships with many reliable companies that perform operations and maintenance services within PJM. Upon PJM's designation of the Project, Transource will develop contractual agreements with these or other suitable maintenance providers to maintain and operate the transmission line and substation facilities.

This plan is also reinforced by a letter from Quanta Services, included as Appendix C, expressing interest and capabilities in providing routine maintenance and first-responder services to Transource for the Project.

## B. Company Evaluation Information

### **Transource Energy**

Transource was formed to pursue the development of competitive transmission projects in marketplaces initiated by the implementation of FERC Order No. 1000. AEP owns 86.5 percent of Transource, and GPE owns 13.5 percent. Transource will use all of the applicable resources of AEP and GPE to successfully develop competitive transmission projects. The combined strengths of AEP and GPE in engineering, project management, procurement, project development, construction, operation and maintenance will result in effective and efficient delivery of transmission solutions that benefit transmission customers. For this Project, Transource will use AEP's extensive resources in the PJM region. Therefore, this 'Company Evaluation Information' section focuses on the resources, capabilities, and proven track record of AEP.

### **American Electric Power Company**

AEP is one of the largest electric utility holding companies in the United States. AEP is headquartered in Columbus, Ohio. AEP delivers electricity to more than five million customers in 11 states. AEP operating utilities provide service to retail and wholesale customers in Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia. AEP directly or indirectly serves about 10 percent of the electricity demand in the Eastern Interconnection and approximately 11 percent of the electricity demand in the Electric Reliability Council of Texas (ERCOT) region.

AEP owns, operates and maintains the largest transmission system in the United States, across the widest spectrum of voltage classes, with \$8.6 billion in transmission assets in 2012. This is forecasted to grow to more than \$11 billion by 2015. This 39,000-mile network includes more 765 kV Extra-High Voltage (EHV) transmission lines than all other U.S. transmission systems combined. Currently, AEP has more than 600 baseline projects, supplemental projects, and network upgrades in the Regional Transmission Expansion Plan in various stages of planning and construction. AEP has

transferred functional control of its transmission facilities to PJM, SPP, and ERCOT within their respective regions. Please see the *2012 AEP Transmission Outlook Summary Report* included in this proposal as Appendix A for additional information about AEP's transmission business.

The entire AEP transmission system is planned and operated on an integrated basis through the coordinated efforts of the AEP Transmission Department (AEP Transmission), a business unit of American Electric Power Service Corporation. AEP Transmission coordinates all development and operational aspects, including engineering, project management, design, development, ROW acquisition, construction, operation and maintenance of AEP's transmission business on behalf of its utility operating companies and transmission companies.

AEP has pioneered new approaches for the development of large transmission projects, both inside and outside its traditional service territory, and achieved the necessary regulatory approvals to make these new approaches a reality. AEP has successfully partnered with numerous other transmission owners on various joint ventures, including MidAmerican, Westar, Exelon, and Duke. In addition, AEP has formed and gained state regulatory approval of new transmission-only companies (Transcos) in several states. These companies complement AEP's vertically integrated utility subsidiaries by owning and operating large, new projects on AEP's transmission system. Transource and its wholesale transmission customers will benefit from AEP's proven expertise in securing regulatory approvals at both the FERC and state levels in the development of competitive transmission projects.

## **Selection and Oversight of EPC Resources**

As discussed above, Transource expects to contract with an EPC Service Provider for elements of the execution plan for the Project and, potentially, another third party for routine maintenance, first-responder, and emergency restoration activities. Of particular importance, Transource will select an EPC Provider that has significant experience in executing projects in the geographic area of Eastern PJM. In each case, Transource will employ the contractor selection, oversight practices, and resources of AEP Transmission.

Transource anticipates using only contractors on AEP's current list of approved contractors. To qualify, all contractors are assessed on their commitment to safety and health following a thorough

review of their safety program, past experiences, policies, and procedures. In addition, contractors must register with AEP Transmission and provide operational and financial data, three years of OSHA Records, and their Experience Modification Rate (EMR). AEP requires a contractor to sustain an OSHA Recordable Rate of 3.0 or lower and 1.0 or lower on their EMR.

An extensive review of the contractor's safety program, ability to provide necessary equipment, and ability to do the work is performed by AEP Transmission safety, engineering, project management, and construction professionals. The depth of the review is based on the type of work to be performed, often requiring 8 to 12 hours of comprehensive, face-to-face meetings. The following types of work require this comprehensive, on-site review at the contractor's headquarters:

- Electrical construction and maintenance
- Crane required work
- Excavating
- Working from heights
- Land clearing and tree trimming

AEP Transmission generally approves new vendors on their suitability in the following areas:

- Ability to provide sufficient resources (qualified personnel, knowledge, equipment, and special procedures)
- Overall cost-effectiveness
- Existing relationships with other vendors and suppliers
- Conformance to AEP Transmission safety culture

All approved vendors must be qualified according to the above criteria and demonstrate conformance to the AEP Transmission safety culture.

In addition, Transource will draw on AEP Transmission's extensive knowledge and experience in Extra-High Voltage transmission projects in the oversight and management of the EPC Service Provider.

Specifically:

- Transource will assign an internal AEP project manager to oversee the overall project execution. This project manager will serve as the liaison between the EPC Service Provider and AEP internal engineering, procurement, siting and environmental, construction management, and safety resources which will support the Project. The assigned project manager will be responsible for managing overall project costs, schedules, and adherence to internal AEP process and practices.
- AEP Transmission Engineering will coordinate with the EPC Service Provider and conduct a review of engineering deliverables related to transmission line, transmission substation and transmission protection and control. This will include initial and prearranged review of engineering and design drawing packages throughout the engineering life cycle, review of equipment and material specifications, and participation in witness and acceptance testing. In addition, AEP Transmission Engineering personnel will lend assistance to the EPC Service Provider as required for construction support. AEP Transmission will maintain an assigned engineering team to provide the services stated above and any engineering support as required through project completion.

## **Technical and Engineering Qualifications**

Transource will use internal AEP resources to provide oversight of the engineering and technical services provided by the EPC Service Provider. AEP currently employs nearly 450 professionals in its line, station, and protection and control engineering organizations. In-house engineering expertise allows AEP to consistently deliver high-quality results and advanced technical innovations that both improve the transmission system and add value for customers. These skills have been developed over a history of more than 100 years that involved siting, designing, constructing, and operating over 39,000 miles of transmission lines and over 4,000 substations.

In addition, AEP has pioneered Extra-High Voltage (EHV) power transmission; designing and building the strongest most extensive EHV network in the world with more miles of 765,000-volt transmission lines in service than all other U.S. electric utilities combined—2,022 miles.

The following list represents the major activities that AEP performs and supports:

- Federal, state, local, county environmental and non-environmental Project permitting and licensing.
- Routing, siting and Right-of-Way leases and acquisition.
- Transmission substation and line detailed engineering and design, including drawings for plan and profile, location plan, one line, foundations, structures, elementary, and wiring, electrical assembly, cable and grounding, protection and control, panel and cabinets, metering, and instrumentation and phasing diagrams.
- Material and equipment specification and procurement.
- Construction labor packages that include construction and equipment drawings, technical specifications, bill of materials, relay instrumentation and metering notes and operating procedures.
- Technical support during construction.
- Equipment checkout, system commissioning, and energization procedures and support.
- Development of operations, monitoring and control procedures.



## Experience in Developing, Constructing, Operating and Maintaining Similar Facilities

AEP, as the parent company of Transource with extensive operators in PJM, will be responsible for the development, construction, operations, and maintenance (O&M) of the Cumberland Tap 1 Project. AEP is the largest transmission owner in the United States. As shown in the table below, AEP solely or jointly owns over 39,000 miles of transmission line.

Miles of Transmission Line Owned	Solely Owned (AEP)	Jointly Owned (AEP)
In the United States of America:	35499	4751
Globally (U.S. and international):	35499	4751
AC Lines (<100 kV <sup>1</sup> ):	24016	341
AC Lines (100 kV < 200 kV <sup>1</sup> ):	16162	480
AC Lines (230 kV <sup>1</sup> ):	45	195
AC Lines (345 kV <sup>1</sup> ):	4356	3453
AC Lines (500 kV <sup>1</sup> ):	0	190
AC Lines (765 kV <sup>1</sup> ):	2047	91
HVDC Lines:	0	0

**Table 2 - Miles of Transmission Line Owned**

In addition, as shown in the table below, AEP solely or jointly owns over 4,000 substations.

Number of Substations Owned	Solely Owned (AEP)	Jointly Owned (AEP)
In the United States of America:	4117	98
Globally (U.S. and international):	4117	98
VAC (<100 kV <sup>2</sup> ):	2389	23
AC (100 kV < 200 kV <sup>2</sup> ):	1541	42
AC (230 kV <sup>2</sup> ):	5	1
AC (345 kV <sup>2</sup> ):	140	31
AC (500 kV <sup>2</sup> ):	4	0
AC (765 kV <sup>2</sup> ):	38	1
HVDC Converters:	3	0

**Table 3 - Number of Substations Owned**

<sup>1</sup> kV level of transmission lines represents design voltage

<sup>2</sup> kV level of substations represents the high-side terminal design voltage

As shown in the table below, AEP has over 2,300 employees that engage in various aspects of transmission development, construction, operations and maintenance. These employees bring over 18,700 total man-years experience in project implementation and over 14,700 total man-years in operations and maintenance.

<b>In-House Staff &amp; Support Resources (AEP)</b>	<b>Solely Owned</b>
Total number of existing in-house personnel engaged in transmission project implementation and/or transmission facility operations & maintenance <sup>3</sup> :	2,304
Total man-years of experience in project implementation:	18,705
Total man-years of experience in operations and maintenance:	14,703

**Table 4 - Resources**

The information above demonstrates AEP’s extensive overall experience in developing, constructing, operating and maintaining transmission facilities, including facilities similar to the Cumberland Tap 1 Project. The following sections highlight AEP’s capabilities and resources in several key areas that are not described in other sections of this Proposal.

**Equipment and Material Procurement**

As one of the largest electric utilities in the country, AEP is able to leverage its size with material suppliers and labor contractors. AEP’s presence in the marketplace allows realization of the lowest total evaluated cost for materials. AEP has developed strong relationships with multiple suppliers and leverages an approximately \$1.8 billion annual capital spend in transmission, which enables AEP to negotiate industry-leading terms for pricing, delivery, and other contract provisions.

AEP’s purchasing power gives it the unique ability to reserve shop space in advance of actual purchase to meet project needs. AEP has relationships and contracts with several major vendors that meet its exacting engineering and manufacturing standards. Strategic master agreements with many of the largest global and domestic equipment manufacturers are used as necessary and offer AEP a

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<sup>3</sup> In-house staff includes full-time staff, part-time staff, and permanent contractors.

decided advantage, particularly when responding to emergencies such as storm damage or equipment failures.

Established relationships with equipment and material suppliers facilitate the development of quality project cost estimates. AEP has established equipment and material blankets, with competitive pricing for such items as circuit breakers, transformers, reactors, and steel for station and line structures. AEP's relationships with construction contractors provide certainty when estimating project costs.

### **Construction**

The AEP Transmission Construction Management group includes 200 experienced construction professionals, making it among the largest and most experienced in the country, equaling or exceeding the capabilities of most industry firms. This group is further enhanced by an extensive field construction organization consisting of almost 700 professionals from AEP's Transmission Field Operations organization. These individuals are based throughout AEP's 11-state service territory. AEP typically constructs more than 100 large projects (more than \$1 million) with a combined value of over \$1 billion annually. This amount is expected to increase in the coming years.

AEP construction crews are equally capable in terrain that varies from flat fields to the Appalachian Mountains to the corrosive environments of Texas coastline. Construction managers and engineers collaborate on projects to achieve successful outcomes. Large and difficult projects, such as the construction of over 280 miles of 765 kV line in mountainous terrain, have led to many construction innovations, including use of partially-assembled structures delivered and installed via helicopter, development of specialized foundations for replacement structures in inaccessible areas, and new anchor technologies. The versatility and coordination of AEP and contract construction teams enabled crews to simultaneously construct several sections of the CREZ project in Texas in 2013 to complete a very large and complicated project on time.

In addition to internal construction management employees, AEP relies on an extensive network of approved construction contractors to build large projects. AEP has established relationships with

numerous construction contractors who can provide the qualified labor to build station and line projects; many of these firms are regional or national firms that operate in multiple states.

All contractors go through a rigorous prequalification process and must adhere to AEP's standards for quality and safety. Specifically, AEP currently uses over 1,200 construction personnel from over 35 construction firms.

The combination of in-house engineering, construction management expertise, and experienced, trained internal and contract construction crews with specialized construction equipment allows AEP to deliver consistent, high-quality results together with advanced technical innovations that improve the transmission system and add value for customers.

### **Control Center Operations**

AEP has over 250 employees dedicated to operating its five Transmission Dispatch Centers (TDCs) and System Control Centers (SCCs) on a 24x7x365 basis. The TDCs are staffed with NERC-certified personnel who direct and manage all transmission dispatching and switching functions across the AEP system. They successfully complete 250,000 annual switching steps with an accuracy rate in excess of 99.99 percent. The TDCs coordinate with other Transmission Operators as appropriate.

Operators in the SCC use a variety of tools to operate the AEP system including state estimation, real-time contingency, and visualization and situational awareness tools. Contingency analyses are run every four minutes for several hundred potential contingencies. AEP has a robust, NERC-compliant operator training and development program that ensures operators can address any condition on the system.

AEP TDCs will issue all switching orders in coordination with other regional authorities as required. Switching and tagging procedures are well-documented in the AEP Transmission and Distribution Switching and Tagging Policy document. The AEP Transmission and Dispatch organizations issues this document , which gives AEP the ability to produce reliable, efficient, and uniform day-to-day operation of the company's electrical facilities without compromising safety.

### **Transmission Facility and Equipment Maintenance**

AEP has been operating and maintaining transmission facilities for over 100 years. AEP's EHV system, which was put in-service between the late 1950s and the mid-1970s, is still operating reliably – providing evidence of AEP's successful maintenance practices.

AEP's Transmission Field Services organization handles all planned field maintenance and emergency repairs. AEP has a staff of over 700 Transmission Field Operations personnel.

All internal personnel are trained to AEP standards, follow approved procedures, and are among the most highly trained and skilled in the industry. AEP maintains a state-of-the-art transmission training facility staffed with experienced training coordinators to provide the required technical training for all transmission line, station, and Protection and Control (P&C) maintenance personnel. The A. Ray King Transmission Training Center in Pataskala, Ohio is the only dedicated transmission training center in the eastern United States with a functioning low-voltage indoor transmission substation training facility. The center features an outdoor transmission line training area where classes train on the same structures found on the live AEP system. Safety and Health training and testing are also an essential part of the program.

AEP has a robust asset lifecycle maintenance program that includes a complete set of inspection and maintenance policies, procedures, guidelines, and plans that reflect its extensive experience and strong compliance culture. This program incorporates a multitude of factors including asset age, performance, real-time monitoring results, periodic test results, and operating conditions into a multi-year plan to properly inspect and maintain all equipment. Real-time monitoring of critical network components coupled with regular inspections to evaluate the physical and operational condition of transmission lines, ROW clearances, and station equipment provide valuable information that informs preventive, predictive, and corrective maintenance activities.

AEP's structured preventive maintenance plans result in AEP completing maintenance on approximately 80 EHV circuit breakers, 75 EHV transformers, and over 300 EHV protective relay schemes annually. AEP also inspects over 8,000 miles of EHV lines and performs the requisite maintenance as determined by the inspections. AEP's structured EHV ROW vegetation management has resulted in only

one tree contact with an EHV line from inside the ROW since 2008 and no tree-related outages during storms since 2008. Inspections can also reveal certain trends, such as increasing structure deterioration or excessive compressor run times. This data allows for future planning, budgeting, and scheduling of resources to forestall critical situations.

AEP's predictive maintenance takes advantage of non-intrusive methods of testing, such as infrared or dissolved gas analysis, to measure the condition of associated equipment. This program has been identified by several utilities as an important step to assist in the implementation of a condition-based maintenance program and has demonstrated the ability to avoid future costly O&M and capital expenditures through the early detection of problems by using a predictive maintenance program.

AEP also has multiple oil labs for performing timely, detailed dissolved gas analysis and total concentrated gas analysis to supplement field tests.

Transmission Line inspection procedures are documented in the *Transmission Line Inspection Guide*. It covers components including wood poles, wood cross arms, guys, anchors, lattice structures, steel poles, concrete poles, insulators, aerial crossing markings, FAA warning systems, conductors and shield wires, and clearances to vegetation and grounding systems.

### **Compliance, Physical Security and Cyber Security**

Transource will follow AEP's comprehensive approach to compliance, physical security, and cyber security. The AEP Reliability Compliance Program provides the framework to assure compliance with NERC and regional entity reliability standards. AEP complies with all reporting and disclosure requirements, local laws and regulations, OSHA and other safety and health regulations, and emergency regulatory activity. AEP has completed and passed many NERC Regional Entity audits and performs annual self-certifications.

AEP addresses physical security by requiring company facilities to have restricted access appropriate for job level, task-appropriate surveillance, log-in and log-out procedures, and routine patrols by security staff. Key facilities are constructed to meet NERC CIP standards for site hardness and redundancy of critical operating systems. Operations facilities are fully redundant and located in separate areas of AEP's territory. Job sites are generally in the care of a responsible contractor, who has

agreed to abide by AEP security standards regarding safety, access and responsibility for materials. AEP standards are also being revised to address security issues, such as sabotage.

AEP is a member of organizations that provide assistance to restore damaged transmission facilities in the event of a terrorist attack.

Cyber Security Engineering and Standards ensure that AEP's systems have information security controls and appropriate mitigations to protect business functions, operating functions and critical cyber systems. Systems are continuously monitored by cyber security professionals. Personnel receive security training at regular intervals. Cyber Security Operations and Analysis partners with the Department of Homeland Security and the Department of Energy in developing public and private information sharing models that will further enhance AEP's cyber security capabilities.

## **Experience in Adhering to Standardized Construction and O&M Practices**

AEP has a long history of adhering to industry standards in building transmission facilities. Throughout its history of over 100 years, AEP has developed an extensive list of standards that cover all aspects of transmission engineering, design, operations, maintenance, and compliance. As outlined in Appendix B, AEP has over 500 standards that it uses every day across the life cycle of transmission assets to plan, design, construct, and operate a reliable transmission system. AEP employs these standards on every project to provide cost-effective solutions in an efficient and effective manner. AEP also requires its contractors to adhere to these same standards, thus ensuring that facilities are built to the same exacting standards regardless of the resources completing the work.

AEP has a strong track record of providing fast, high-quality emergency response based upon structured restoration processes and extensive skills and experience over a wide range of voltages and terrains. AEP has pioneered innovative techniques like the extensive use of helicopters to facilitate the rapid restoration of facilities that are located in difficult terrain. AEP has directly and effectively responded effectively to a wide range of emergencies involving line and station equipment at voltage levels from 69 kV to 765 kV.

Key capabilities in this area include:

- Structured emergency and recovery procedures, plans, and resources
- In-house expert engineering, project management, procurement, and field services staff to support any size restoration effort
- Established contracts with approved third-party contractors (engineering, construction, forestry, and ROW) firms that have the equipment, manpower and skill sets to complete work efficiently and with high quality
- Five transmission dispatch centers for efficient and effective response, planning, coordination between Transmission Operators, creation of switching orders and clearances
- Spare parts strategically located throughout the AEP service area
- Working relationships with neighboring utilities for assistance and materials if needed
- Member Midwest Mutual Assistance Group (MMAG)
- Part of EEI's Spare Transformer Equipment Program (STEP)

The AEP Transmission Emergency Operating Plan (EOP) provides the planned policies and procedures to guide the response to any emergency affecting a transmission asset. The focus of the EOP is on preventing major power outages of wide extent involving generating plants, transmission lines and bulk power substations that collectively furnish the power to major points of distribution. The EOP addresses several issues as required by NERC and the various Reliability Entities in which AEP operates, including, but not limited to, transmission emergency procedures (e.g., real time loadability issues), major storm restoration and system restoration (e.g., black start).

Transource can draw upon AEP's ample supply of temporary and emergency structures, such as portable substations, transformers, and circuit breakers, for use in emergency situations, to minimize service interruptions where alternate transmission facilities are unavailable. This inventory will be available to any Transource asset and can readily be deployed across a wide geographic area. AEP maintains strategic agreements with suppliers like Valmont and Fort Worth Tower to provide expedited fabrication of steel structures should they be needed. AEP also has agreements with suppliers to stock



wooden poles at strategic locations, and inventories are adjusted annually. AEP is also part of the EEI's STEP and can obtain replacement transformers from across the nation in the event of terrorist attack.

Transource can also use the AEP system material inventory, which is a significant benefit when performing major storm restoration. The diversity of AEP operating areas typically limits system-wide exposure to major storms, so when a storm impacts one region, materials and supplies can be accessed from other regions, which can improve the speed in which restoration occurs.

For example, on June 29, 2012, AEP's eastern operating companies experienced a derecho storm (a widespread, long-lived, straight-line windstorm with winds that can exceed 100 miles per hour). This storm impacted over 260 transmission circuits, over 420 transmission stations, and more than 500 transmission poles, causing almost 1.5 million customer outages. Because of ongoing AEP transmission construction and maintenance activities, construction materials already in inventory were used during the restoration. Without the availability of the existing inventory, outside material suppliers would have been challenged to supply the needed materials as quickly. The existing inventory, combined with outstanding relationships with AEP material suppliers, prevented material issues from hindering the restoration of this unprecedented storm.

AEP also initiated the implementation of an Incident Command System (ICS) in 2014. The ICS will enhance AEP's emergency response capabilities by providing additional tools to implement a structured approach to handling emergency responses on the AEP system. Its structure will be similar to those that military, emergency response organizations, local and state organizations, and other utilities use. ICS will enhance AEP's capabilities in the following areas:

- Establishes consistent roles and responsibilities
- Separates and defines key restoration roles (operations, planning, logistics, finance and safety)
- Limits spans of control
- Clearly defines and limits the focus of employees' responsibilities during restoration/emergency response
- Provides standardized terminology that will allow for effective and efficient communication internally and with external stakeholders

- Helps AEP staff support each other efficiently and effectively regardless of the incident or size of the storm event
- Helps AEP to easily transition employees throughout our system during events

ICS is part of a larger Emergency Response Plan (ERP) that is expected to be activated in 2015 and completed in 2016.

### **Experience in Working in the Geographical Region**

AEP has extensive experience in successfully executing projects similar to the Cumberland Tap 1 Project throughout its 11-state territories. The expansive nature of AEP's territory provides experience working in a wide variety of terrains, local and state regulatory environments, siting and environmental conditions, permitting agencies and ROW acquisition issues. These experiences are easily transferrable and directly applicable to the issues that will be encountered on the Cumberland Tap 1 Project.

In addition, Transource will use highly qualified third parties that have experience in this geographic region for key aspects of the development and ownership plan. AEP has established contractual relationships with multiple service providers with this capability.

## **Experience in Acquiring Rights-of-Way in the Geographic Region**

Transource will use AEP's extensive experience in directing and performing all land and Rights of Way (ROW) functions across its 11-state service territory for this project. These functions include route consultation, title searches, right-of-entry, appraisal, negotiations, condemnation support, construction consultation, and damage settlement. AEP uses a combination of internal ROW agents, as well as numerous external regional and national firms, to provide these services for all AEP projects. This extensive network of resources provides relevant experience coupled with deep local knowledge that is vital for success to projects across the nation. AEP will use an external firm for this project that has years of experience providing ROW and land acquisition services in Pennsylvania to a wide variety of industries. AEP has established relationships with four firms - [REDACTED] – that have extensive experience providing ROW and land acquisition services to a wide variety of industry and organizations in Pennsylvania. These companies operate in multiple states, have experienced and knowledgeable staff, and have proven track records to cost-effectively provide these services with a high level of quality.

## **Financing Plan**

Transource and its subsidiaries are backed by the significant financial strength and experience of its investment-grade owners, AEP and GPE, which have combined assets totaling approximately \$66 billion and well-established relationships with more than 40 banks specializing in the financing needs of the energy generation and delivery industry. In particular, AEP has been highly active in the capital markets, successfully raising approximately \$8.2 billion in debt since the start of 2011. Specifically, Transource successfully established a \$350 million construction financing in the fall of 2013 for its two projects under construction in Missouri.

Transource will leverage this vast network of resources to optimize the cost of capital and reduce the impact on the customer. A probable scenario is that Transource will enter into an agreement with a group of lenders that will be used for the Project during the construction period. Once the Project is complete, Transource will likely seek to refinance the construction debt with traditional long-

term debt in the capital markets. During the construction period, the equity capital for Transource will come from internally generated cash flows and from equity contribution from its owners, AEP and GPE.

Transource will target investment grade credit quality for Transource and its subsidiaries. This approach is done to support steady access to capital markets that is necessary to raise the significant amount of debt that will be needed for the Project at cost-effective rates. The investment grade quality would also result in lower cost borrowing costs compared to non-investment grade credit quality.

### **Transource's Managerial Ability to Contain Costs and Adhere to Construction Schedules**

In terms of providing oversight to manage the overall project, Transource plans on engaging internal AEP project management resources. AEP employs more than 100 professionals in its Transmission Project and Construction Management organizations. These organizations annually manage more than 100 large projects with a combined value of over \$1 billion. AEP's substation and line project managers are capable of executing projects of varying complexity from small projects, such as the addition of circuit breakers, to large projects, including the construction of over 280 miles of 765 kV line in mountainous terrain.

Using realistic project management processes and guidelines for executing, monitoring and controlling projects, AEP project managers have demonstrated the ability to consistently deliver projects on time and within budget. Project managers follow AEP Transmission's structured Project Lifecycle Management Process (PLMP). It includes Project Management Plans to effectively manage the Project's scope, cost and schedule performance. Key Project Performance Indicators (KPIs) are used, along with resource loaded schedules, to provide the tools necessary for the project and construction managers to successfully complete their projects in accordance with approved timelines and budgets.

A few examples of AEP's recent projects delivered on-schedule and within budget include:

- AEP managed the construction of approximately 465 miles of double-circuit 345 kV lines and 16 substations and the acquisition of ROWs across 578 tracts of land, coordinating efforts between multiple ROW agencies, construction companies and suppliers for the Competitive Renewable Energy Zone (CREZ) projects in Texas. AEP simultaneously

constructed the line in sections while managing it as one project to ensure completion of this exceptional project within the project schedule. AEP Transmission's \$1.5 billion investment in the CREZ program makes it the largest transmission project in AEP history.

- AEP worked with engineers, government entities, ROW agents, construction contractors, city, state, and local authorities to oversee the reconductoring of approximately 216 energized miles of 345 kV transmission lines in south Texas.
- AEP managed the construction of a new transmission substation near Sunbury, Ohio. The 765/345/138 kV Vassell Station is a major transmission reinforcement effort to help AEP maintain transmission reliability in central Ohio.

## **Details Regarding Construction Cost Cap Provisions**

[REDACTED]

## **Assumptions**

Transource assumes that the new transmission line segments needed to cut into the two existing lines will be designated to the owner of those lines. Transource also assumes that all work required at the remote end substations will be designated to the owner of those substations.

## C. Proposed Project Constructability Information

[REDACTED]

**APPENDIX A - 2012 AEP  
TRANSMISSION  
REPORT**

Available Upon Request

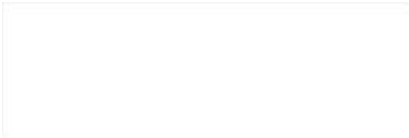
**APPENDIX B - AEP  
STANDARDS**

[REDACTED]



**APPENDIX C - QUANTA  
LETTER**

[REDACTED]



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