

BEGIN CONFIDENTIALITY

Project Title: AEP ADMS and DERMS Initiative

FOA Area of Interest: DE-FOA-0002740 BIL – Grid Resilience and Innovation Partnerships (GRIP)

FOA Topic Area: Topic Area 2 - Smart Grid Grants (BIL section 40107)

Technical and business point(s) of contact: Scott S. Osterholt, Dir. Broadband & TCom Bus Dev

Project overview and team member organizations: American Electric Power Service Corporation, a wholly owned subsidiary of American Electric Power Company, Inc. and its operating subsidiaries (“OpCos”) that cover portions of Arkansas, Indiana, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia (collectively, “AEP” or the “Company”) intends to implement an Advanced Distribution Management System (“ADMS”) with an Operational Distributed Energy Resource Management System (“DERMS”) module and a Distribution System Network (“DSN”) that can deliver improved grid utilization, better storm response and resilience, and benefits in capital productivity and safety for AEP’s employees and customers. Moreover, it could benefit customers through reliability improvements and deliver the benefit of emission reductions to the society (the “Project”).

Names of senior/key personnel:

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Jason Baker	VP Region Ops - APCO	Stephen Swick	Chief Security Officer
Dave Ball	VP Energy Delivery Operations		

Project location(s): Predominantly disadvantaged communities (“DACs”) and rural areas within Arkansas, Indiana, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia (“Project Locations”).

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Project Overview

Background

AEP, a public utility holding company, has taken great pride in serving its customers since 1906. AEP developed new ways to produce and deliver the safe, reliable, and affordable energy that powers millions of homes and businesses. Today, AEP services approximately 5.6 million homes throughout 10 states, covering approximately 200,000 square service miles¹. A geographic information system (“GIS”) review of the Company’s seven OpCos concluded that DACs comprise 3.1 million customers or 54% of AEP’s entire customer base.² AEP’s service territory demographics indicate about 77% of customers have an annual income of less than \$75,000, significantly lower than the average United States household income of over \$102,000 per year.³ AEP’s service territory, while including some urban areas, includes many large areas outside of dense population centers.

Together with its customers, AEP is redefining the future of energy by investing in a modern and efficient grid, staying ahead of the curve as technology advances, reducing carbon emissions and giving communities the cleaner power they want. The Company is passionate about being involved in the communities where its employees live and work. From disaster relief to work with non-profits, AEP’s approximately 16,700 diverse and talented employees continue to transform the energy business for the better.

As one of the largest electricity providers in the United States, AEP is committed to delivering clean, flexible, resilient, and reliable service through methods of continued improvements and modernization, such as the implementation of ADMS and DERMS technologies. AEP’s goal is to progressively pursue and become a net-zero carbon emission company by 2045⁴.

AEP has past and continued success in increasing the flexibility, efficiency, reliability, and resilience of the electric power system. With engineering excellence and creative strategies, AEP has continued to strengthen its strategic advantage in power transmission. AEP became the first company to install high-voltage transmission lines, continuing its string of industry firsts. In 2006, AEP installed the country’s first six-conductor phase bundles for 765-kilovolt lines in Appalachia; introduced groundbreaking high-temperature super-conducting triaxial cables at the Bixby Station in Ohio; and started using virtual digital fault recorders, which record incidents at substations. In 2011, AEP installed the first prefabricated drop-in control module at West Millersport Station in Ohio. Using a full online monitoring package, the control module detected a problem and prevented a catastrophic failure of an extra-high-voltage transformer. This advance marked a new frontier in online system management and overall efficiency.

¹ <https://www.aep.com/about/facts>.

² AEP internal analysis based on OPCO Customers by Disadvantaged Area.

³ See Income in the United States: 2021 (census.gov) PDF Page 22 Table A-2, 2021 Mean household income.

⁴ [AEP's Clean Energy Future](#).

AEP also established Grid Assurance in partnership with other utilities to create a nationally based logistics company to provide spare large power equipment to electric utilities across the country to support the reliability and resiliency of the grid.⁵ When subscribing to Grid Assurance, transmission owners have direct access to long-lead-time equipment ready to be deployed. With a dynamic workforce and strong communication with its communities, AEP is poised to continue its streak of innovation well into the next century.

AEP intends to complete implementation of ADMS in conjunction with DERMS to improve grid performance, flexibility, and reliability through increased visibility and management of the Company's distribution capabilities. AEP has experience with developing and undertaking large-scale projects, similar in scope and size to the Project. AEP has completed initial implementation and ongoing updates to its current Outage Management System ("OMS"), Distribution Management System ("DMS"), and GIS in recent years. In addition, AEP has successfully implemented a customer relationship management ("CRM") system, that like the Project, impacts customers and stakeholders at all of AEP's OpCos. These previous successful implementations demonstrate that the Company has the necessary expertise and possesses the necessary capabilities to effectively execute the Project. In addition, AEP has invested significant capital and resources into developing the required infrastructure and testing procedures to ensure a successful implementation and rollout of ADMS and DERMS. This includes implementation of the design and testing stages of the initiative, including configuration of the DSN and display maintenance and buildout.

Project Goal

The Project would increase grid visibility and management of the Company's distribution grid. Accomplishing this goal would have the benefits of enhancing system capabilities, better managing the capacity of distribution facilities, isolating faults and other system disturbances, and integrating renewable energy resources at the distribution level. Additionally, the Project would provide clearer indication of the weather impacted fault locations, allowing crews to target attention to the problem areas more efficiently. Further, as a result of the Project when paired with other anticipated technologies, some of the potential indirect future benefits could include reduction of carbon emissions, increased reliability due to reduction in outage duration, and customer affordability through system efficiency.

The Project may improve AEP's System Average Interruption Duration Index ("SAIDI") by up to 5% resulting in significant community/public benefits.⁶ While this does fluctuate across AEP's OpCos and service territory, AEP estimates that avoided productivity loss through enhanced outage management resulting from the Project's proposed SAIDI improvements could potentially generate as much as \$1.9 billion in savings to its customers over a 20-year period.⁷ Further,

⁵ <https://gridassurance.com/about-us/>.

⁶ AEP internal analysis of ADMS High Level Business Case.

⁷ *Id.*

additional potential savings from volt/voltampere reactive optimization (“VVO”) centralization could be available to AEP’s customers across participating OpCos, 54% of which are in DACs.⁸

This Project also paves the way for further technology deployments and future opportunities to modernize the grid. Generation and load profiles, which have been predictable in the past, can now vary instantaneously and are subject to the behavior of consumers where Distributed Energy Resources (“DERs”) are present. This new situation requires improved visibility into resources not owned by utilities, the ability to control and coordinate an increasing number of assets and endpoints, and grid systems that can readily adapt to conditions within sub-second timeframes.⁹ Implementing the ADMS DERMS Project would provide AEP with the visibility and adaptability to connect more DERs to the grid. Additional future auxiliary technologies that supplement ADMS and DERMS provide forward-thinking advancing possibilities for more reliable energy, especially in rural areas and DACs with historically high occurrence and duration of outages.

DOE Impact

AEP is seeking \$27,849,762.50 in United States Department of Energy (“DOE”) funding towards the total Project cost of \$55,699,525. Financial support from the United States DOE is critical to the acceleration of the remaining phases of the ADMS and DERMS roll out for AEP. AEP anticipates that the ADMS and DERMS work would bring significant benefits to AEP and its customers; however, available resources and the impact of the current economy on AEP customers could slow the Company’s goal of rapid deployment. DOE funding would help de-risk the investment from outside economic pressures and ensure that the Project can be successfully completed to deliver significant benefits to AEP’s customers and communities it serves.

The DOE funding would also support the related work required to improve source data and cybersecurity. A key example of this work is to source data improvements, which are needed to support the unified network model in ADMS. Tasks include addressing data inaccuracies, correction of missing data, and digitization of workflows. Additionally, cybersecurity must be strengthened to ensure that the grid is secure from growing threats as part of the DSN work.

AEP recognizes the immense value DOE funding brings to electricity customers by easing the financial burden of distribution grid infrastructure upgrades, system modernization and technology improvements and thus reducing the customer cost. DOE funding would reduce any potential costs AEP customers could bear for ADMS and DERMS implementation related expenditures by up to 50%. Grant funding, will increase the likelihood of AEP’s ability to deploy this Project by reducing its cost to customers.

Community Benefits Plan: Job Quality and Equity

The Project would allow AEP to invest \$55,699,525 in ADMS and DERMS to support approximately 3.1 million customers in DACs. AEP’s service territory, while including urban areas, includes many large areas outside of dense population centers. The implementation of ADMS

⁸ *Id.* The VVO customer savings fluctuate across the OpCos based on the maturity of existing VVO programs and scale of deployments.

⁹ United States Department of Energy, *Smart Grid System Report* (November 2018) at 5.

and DERMS in these areas would allow the Company to limit the impact of power disruption, including reducing restoration time of outages, in these traditionally disadvantaged and hard to reach areas.

Diversifying the Company's suppliers within its supply chain is a strategic focus at AEP and the Company's diverse sourcing initiatives would be applied to the Project. This policy establishes the minimum requirements for the acquisition of goods and services, including bid solicitations from small, minority-owned, women-owned, and veteran-owned suppliers.

AEP would also work to engage a diverse network of suppliers in implementing this project, which results in additional community benefits, some of which would flow to DACs. AEP OpCo's robust co-op and internship programs for high school and college students, and its alliances with community colleges, universities, and vocational and technical schools across AEP's service territory support the development of a well-qualified talent pipeline.¹⁰ AEP works with these institutions to develop academic programs that prepare students for new jobs and career opportunities in its industry. For current employees, AEP invests in the upskilling of its employees by providing internal continuing education opportunities, sponsoring recertification and tuition reimbursement.

AEP supports strong labor standards, actively encouraging its employees' rights to free and fair opportunity to join unions. Currently nearly 25% of AEP OpCo's workforce (excluding AEP Texas) is represented by five labor unions. Additionally, AEP's investment into these technologies, especially within DACs, could allow these communities adequate capacity to support expansion and attraction of new industrial and commercial projects and help keep and attract new economic activity within these communities.

Strategy for Sharing and Maximizing Project Benefits across DACs

AEP believes effective community engagement is critical to ensure all stakeholders are aware of, and have the opportunity to provide feedback on, the Company's plans related to existing and planned facilities, programs, services, and technologies. This offers impacted communities an opportunity to understand the Company's proposed activities and discuss their concerns so that AEP fully considers the impacts of its decisions. Please see the Community Housing Partner's letter of support included as part of this application for an example of community support for the Project and community understanding of anticipated benefits and opportunities the Project would create.

The Company plans to utilize its established best practices framework that has been successfully implemented for past projects. As part of the Company's standard engagement approach, AEP identifies local, state, and federal stakeholders with whom it will engage, including chambers of commerce, school districts, county and city officials, economic development corporations, fire and police departments, and property owners. The Company has already fostered strong

¹⁰ [Student Opportunities at AEP.](#)

relationships with many of these key stakeholder groups in the communities in which it serves through previous projects and activities.

While this general framework has been successful, the Company also recognizes that each community is unique and may require targeted communications and strategies to meet community needs and satisfy local requirements. AEP has identified multiple additional strategies to allow traditionally excluded communities an opportunity to learn about a project and provide feedback. For example, if AEP determines that there is a high percentage of non-native English speakers in project communities, the Company provides translators at public meetings and documentation in the appropriate language.

Climate Resilience Strategy

The implementation of the ADMS and DERMS technologies combat extreme weather and climate events and is intended to decrease the number of weather-related outages and reduce restoration time customers face through stronger monitoring and electrical control. One way this is accomplished is increasing grid visibility, pinpointing the damaged area in an expedited manner. ADMS and DERMS provide clearer indication of the fault location affected by a weather-event and allow crews to target attention to the problem areas more efficiently. Customers affected by weather-related outages may have reduced Customer Minutes of Interruption (“CMI”) given the restoration improvements of ADMS and DERMS.

Technical Description, Innovation, and Impact

Relevance and Outcomes

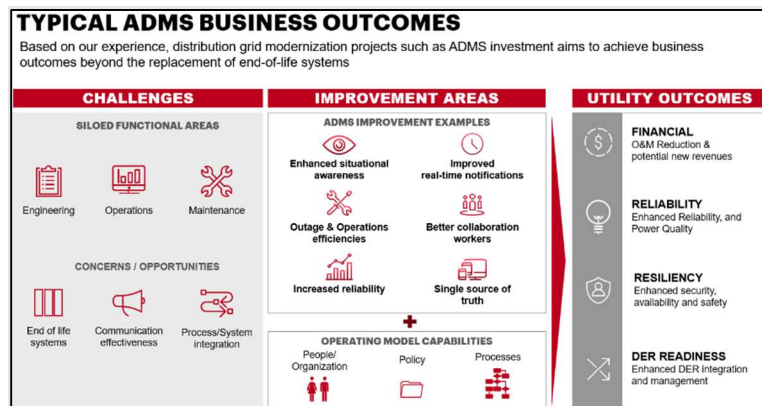
AEP is in the stages of design, testing, and implementation of ADMS and DERMS as a smart grid initiative to provide modern utility technology to its many customers across the Company’s large geographic footprint. The Project would include training, testing, and deployment of ADMS and DERMS as one initiative that would benefit all AEP’s service territory. AEP is implementing ADMS and DERMS to increase grid visibility, resiliency, and reliability, benefiting all AEP customers, 54% of which are DACs.

The Project would provide operators with a real-time view into the current state of the grid. It would allow monitoring of key metrics to ensure the grid is performing at an optimal level. The ADMS/DERMS technology enables the integration of distribution data across AEP’s enterprise, enabling new functionality and capabilities, while allowing for the safe and reliable operation of distribution grids at a lower cost.

ADMS is a software platform that supports distribution management and the optimization of the electric grid. The ADMS platform is inclusive of functions that monitor for and expedite outage restoration and optimizes the performance of the distribution grid. ADMS includes significant integrated capabilities that provide a wide range of benefits from determining fault location, isolation, and restoration (“FLISR”), VVO conservation through voltage reduction, peak demand management, to support for microgrids. ADMS is also capable of including a state-of-the-art Distributions Operations Training Simulators (“DOTS”) that are used to train control room

operators and engineers to manage restoration efforts after severe storms in a life-like testing experience.

ADMS would enhance storm preparedness, management, resilience, and response through the use of FLISR and DOTS. FLISR can quickly identify fault locations, isolate the affected area and reroute power so that the least possible number of customers are affected. Using DOTS, AEP can train its system operators for dark sky events using life-like scenarios that prepare them for the high-stress situations in a way that is not possible using AEP's current technology. This technology could deliver optimized grid utilization and benefits in capital productivity and safety for the utility and its customers even outside of inclement weather situations. Additionally, it could benefit customers through reliability improvements and contribute to efforts to reduce emissions through voltage reduction and a reduced number of response trucks on the road. The below chart depicts a collective of high-level benefit areas for ADMS.



AEP has selected the AspenTech/Open Systems International ("OSI") Monarch application as the ADMS platform of choice. The technology is focused on the distribution space at AEP. The integrated OSI Monarch product allows for the following capabilities: Electra Outage Management System ("OMS"); Spectra DMS including advanced applications; Supervisory Control and Data Acquisition ("SCADA"); and DERMS.

As part of the larger ADMS program, AEP seeks to develop a new Distribution System Network DSN, which would provide a sustainable, resilient, and highly secure distribution environment that protects against modern threats and complies with industry standards for cybersecurity. The DSN is a foundational component to ADMS since most of the ADMS-related hardware and equipment sits behind the DSN.

In conjunction with ADMS, the Company is seeking to implement DERMS. Operationally, DERMS provides administrative capabilities such as establishing distributed energy resource records, maintaining data, visualization and management of DERs, and improved operations. DERMS is a distributed hardware module to administer, monitor, and control DERs in a manner that maintains or improves the reliability, efficiency, and overall performance of the electric distribution system. DERMS provides insights, controls, and relationship management for DERs.






DERMS provides the following functions: groups individual DERs from single assets to grid-wide system resources that enable simplified control, monitoring, and management; provides simplified data presentation of the granular details of DER assets, such as settings and performance, and presents DER capabilities as grid-related services; automates individual and aggregated DERs by managing and coordinating settings and enacting DER response algorithms; provides operational information for individual or aggregated DER assets; provides operational forecasts of DERs; and integrates with other systems to enhance situational awareness.

AEP's DERMS architecture would take a modular approach, where the DERMS function is distributed across multiple core applications that serve multiple organizations within AEP. The first step in creating and maintaining isolation is to develop an AEP DERMS architecture that is flexible in nature to allow various internal and external entities to send and receive pertinent information needed for each function or purpose. This architecture must provide a high degree of security and isolation to protect operations systems from anything that may threaten the real-time network model. Operational DERMS functions would be isolated from non-operational DERMS functions via a secure DSN. The DSN would protect all systems and data used for real-time operational decision-making. However, there would be specific security restrictions to pass key data into the DSN.

Feasibility

AEP has extensive experience implementing large-scale projects similar in size and scope to ADMS and has a robust process in place for project planning, execution, and maintenance to ensure the Project's success. AEP has completed initial implementation and ongoing upgrades to the Company's current OMS, DMS, and GIS systems in recent years. In addition, AEP has successfully implemented a CRM system that like ADMS affects customers and stakeholders at all of AEP's OpCos.

As part of project feasibility, AEP typically evaluates various measures to support a successful project implementation. The below table provides an outline of each measure.

Metric	Definition	Methodology
 Project Scope	<ul style="list-style-type: none">Evaluate whether roles and responsibilities are clear and whether project scope and objectives are being met with no gaps	<ul style="list-style-type: none">Defined RACI matrix for each workstream to promote scope alignmentScope review when new partners come on the project
 Budget	<ul style="list-style-type: none">Monitor whether project is delivered within the allocated budget	<ul style="list-style-type: none">Dedicated project control approach to help manage project financialsForecast vendors and internal resources on a monthly basisFollow established CI budget process and tracking practices
 Resource Utilization	<ul style="list-style-type: none">Track that resources on the project are utilized optimally and are assigned to the correct roles	<ul style="list-style-type: none">Follow a resource plan developed before project kickoffOrganize into Scrum teams for Agile sprintsLeverage existing AEP organizations and teams (e.g., TCOE, ICOE)Follow philosophy to "move work to people, not people to the work"
 Schedule	<ul style="list-style-type: none">Evaluate whether the project tasks/activities are carried out on the planned timeline	<ul style="list-style-type: none">Follow hybrid-agile methodology to incorporate fast feedbackPerform work in one-month sprints
 Quality of Work	<ul style="list-style-type: none">Ensure quality of the sprints, milestones, and deliverables meets expectations and needs of the project	<ul style="list-style-type: none">Require vendor Quality Assurance and Quality Control processesConduct quality checks through AEP Delivery Leads & ManagersRequire testing phases for Sprints and SIT, SAT, UAT

In addition, since March 2021, AEP has invested and is currently investing significant capital and resources into developing and testing the required infrastructure and procedures to ensure a successful implementation and rollout of ADMS and DERMS. Aside from project planning and management, infrastructure development efforts that will be completed prior to 2024 will include technical architecture, DMS and DERMS configuration, network model building, and OMS configuration.

AEP has access to the necessary infrastructure required for the Project. The primary network assets would be implemented at AEP's two undisclosed transmission control centers and has access to a skilled workforce through its vendor relationships.¹¹

In addition, AEP's partner, Accenture plc ("Accenture"), is a leading Systems Integrator ("SI") and consulting company in the ADMS space. Accenture has executed ADMS SI projects similar to the Project in size and complexity for several peer utility clients. Some of the projects had a similar integration application footprint to AEP's with GIS systems.

Similarly, AspenTech/OSI has been a long-standing partner for AEP. AEP uses an AspenTech/OSI Generation Management System and is completing the implementation of an Energy Management System ("EMS"). The EMS provides similar capabilities for Transmission as the ADMS does for Distribution.

Innovation and Impacts

ADMS and DERMS technologies enhance system capabilities, enhance management of distribution facility capacity, reduces restoration time of outages, and enhance AEP's capability to integrate renewable energy resources through DER visibility. The primary network assets would be implemented at two AEP transmission control centers, with the technology to be used by every OpCo Distribution Dispatch Center ("DDC") to benefit all AEP customers, predominately in DACs.

ADMS provides automated, real-time data which effectively alerts all necessary stakeholders of the exact location of outages, significantly reducing their duration. Overall, ADMS would bring more insight to all of AEP's operational segments compared to current practices.

AEP is currently faced with the challenge of operating using obsolete technologies that limit operators' visibility and management of distribution operations. Currently AEP uses a number of applications that lack the features that a true integrated solution provides. Utilities today are experiencing an influx of demands and expectations from their stakeholders and regulatory and public officials to move in a direction that improves safety, reliability, and efficiency of distribution grid. Implementing a proprietary, fully integrated ADMS platform enables AEP to integrate several applications into one platform effectively handing the Company the capability of meeting such demands and expectations. ADMS would give AEP the ability to monitor and control the distribution system, respond to potential overloading and under-voltage situations before they become critical, manage outage response, and keep stakeholders well informed

¹¹ Exact locations are not provided due to grid security concerns.

about the restoration efforts, identify faults and determine the steps required to isolate the faulted equipment, forecast, and predict loads. All of which can be done remotely from the transmission control and distribution dispatch centers by trained operators.

As the world moves towards more green and renewable generation, AEP is faced with challenges that DERMS could help overcome. The top DER related challenges that AEP faces are the rapid localized proliferation of DERs and multi-source power flows. Many DERs will create two-way power flows on AEP's distribution system, which was designed to flow only one way (downstream). This change in power flow will create challenges around system protection and control schemes, system planning, communication, and security required to maintain safety to customers and employees and grid reliability. Presently, AEP has no systems in place to address this added complexity, but the Project would help the Company address this need.

Overall, the investment in DERMS smart technology provides enhanced situational awareness regarding the state of the distribution grid. Specifically, it would broaden the focus of distribution operations from a one-way flow of power to a system that can accommodate ever-increasing number of edge-connected devices, including generation and storage. DERMS would span multiple areas of the Company including, but not limited to Operations, Distribution Planning, Customer Programs, Administration, and Market Operations.

The Company has selected the OSI Monarch application, a highly scalable automation software platform, for the intended Project implementation. The integrated OSI Monarch ADMS/DERMS product would incorporate all the capabilities of Electra OMS, Spectra DMS, including advanced applications such as FLISR and VVO, SCADA, and DERMS. Other options such as a "best of breed" solution that combined separate OMS, DMS, SCADA, and DERMS solution were ruled out due to the inefficiencies of a non-integrated system.

The OSI Monarch architecture supports multiple choices in terms of hardware, operating system, virtualization, and database platforms, and is expandable, upgradeable, and maintainable to the highest degree possible. Key features supported by the OSI Monarch platform include: physical or virtualized hardware configurations, on-premise; secure segmented architecture with multiple points of defense and a security shield; distributed (IP-based) front-end communications interface to field devices; advanced data visualization and user interface; advanced situational awareness capability; extensive Business Rules Engine and dashboards for Real-time Business Intelligence; seamless integration with external enterprise applications; large capacity and throughput for processing large volumes of events and data changes; and big Data technologies for massive time-series data storage and analytics.

Project Support of State, Local, Tribal, Regional and National Resilience, Decarbonization, or Other Energy goals, Strategies and Plans

The Project is strategically aligned with the state and regional energy plans and decarbonization goals across AEP's service territory. The technology greatly improves grid resiliency and mitigation of sustained customer power outages and is aligned to support and further goals outlined within current national, state and regional energy plans. For example:

- National: ADMS would provide AEP with the capability of plan development, automation, response, and DOTS within its distribution systems similar to the national transmission systems. On February 16, 2023, the FERC approved two new extreme cold weather reliability standards containing new and revised requirements to advance reliability of the grid during extreme cold weather temperatures. They include implementation of generator freeze protection measures, enhanced cold weather preparedness plans, identification of freeze-sensitive equipment in generators, corrective actions for when equipment freeze issues occur, annual training for generator maintenance and operations personnel, and procedures to improve the coordination of load reduction measures during a grid emergency¹².
- Arkansas: Arkansas has shown strong interest in furthering the smart grid in the State, with State's most recent Energy Assurance Plan calling for the exploration of further penetration of DERs, including energy efficiency resources, demand response, renewables, storage, and EVs. ¹³ DERMS provides increased DER visibility and real time situational awareness and management capabilities, allowing further penetration of DERs.
- Louisiana: Strategy #2 within the "Clean Energy Transition" Pillar of Louisiana's recently released Climate Action Plan calls to "Increase access to and deployment of distributed energy resources."¹⁴ The Project would increase the capacity of AEP's distribution facilities, increasing access to and deployment of DERs.
- Oklahoma: Oklahoma's 2021 State Energy & Environment Plan includes a future energy goal to "Foster a climate where new technologies and alternative fuels can drive environmental change."¹⁵ ADMS and DERMS are new and innovative technologies that drive environmental change by reducing Co2 emissions.
- Ohio: The Public Utilities Commission of Ohio's ("PUCO's") PowerForward initiative articulates a vision for a strong "distribution grid that is reliable and resilient, optimized and efficient and planned in a manner that recognizes the necessity of a changing architectural paradigm" and a "modern grid that serves as a secure open access platform...that allows for varied and constantly evolving applications to seamlessly interface with the platform."¹⁶ ADMS and DERMS technologies are proven to improve grid reliability, optimization, and efficiency through enhanced outage management. Additionally, the OSI Monarch application platform that would be used to implement ADMS software with a DERMS module, is a truly open system that provides seamless integration and is highly expandable and upgradeable.
- Texas: The Electric Reliability Council of Texas issued a Roadmap to Improving Grid Reliability that outlines many objectives that the Project aligns with. The Project delivers

¹² [FERC Staff Issues Electric Reliability Primer.](#)

¹³ [Sustainable Energy Resources Action Guide \(scstatehouse.gov\).](#)

¹⁴ [Climate Action Plan FINAL 3.pdf \(louisiana.gov\).](#)

¹⁵ [FUL-FEP Final-Draft6-1.pdf \(ok.gov\).](#)

¹⁶ [PUCO+Roadmap.pdf \(ohio.gov\).](#)

on the following roadmap objectives: to review energy delivery procedure for controlled outages in emergency situations, to improve and expand toolsets to manage short-supply situations through procurement of resources with capabilities to operate during extreme weather conditions, and eliminate barrier to distributed generation, energy storage, and demand response.¹⁷

Potential Impact of Project to Reduce Perceived Risk for Project Deployment

Currently, the perceived risks for completing the Project include: internal competition for capital funding, and security concerns. AEP has had historical success with large-scale technology implementations and has developed a robust internal team for project development, maintenance, and project integration to help mitigate and address these risks. In addition, DOE funding would allow the Project to compete for capital approval.

AEP utilizes a controlled approach to risk, through both a technical and process-oriented point of view. The Company tracks technical controls and how the system being developed meets the functional and technical requirements. AEP also tracks process controls through the mapping of business processes. The business process map will define how end users will use ADMS. A four member AEP audit team will be assigned to advise the project team on the best approach for controls and will be embedded in the work.

Also, AEP has rigorous cyber and physical security requirements and guidelines employed across its critical cyber assets, such as data centers, transmission operations centers, and business networks using multiple layers of cyber security controls and authentication procedures to address security concerns before, during, and after project implementation. AEP's extensive experience in previous installations of similar technologies means that the Company has handled similar issues numerous times in the past, prevailed, and may apply lessons learned to ensure successful deployment of the Project.

Additionally, AEP's investment into grid reliability, especially within DACs, would allow these communities adequate capacity to support expansion and attraction of new industrial and commercial projects and help keep and attract new economic activity within these communities.

Facilitating Development of SMART GRID Functions

The Project would have a very significant effect in encouraging and facilitating the development of smart grid functions. ADMS and DERMS technologies would allow AEP's DDCs to monitor and control the distribution grid to maintain a safe and reliable network, exemplified by enhanced network security and identifying and isolating faults that may otherwise lead to system disturbances through improved visibility. Improved visibility is also expected to advance storm preparedness, response, and resilience.

¹⁷ [ERCOT Roadmap October 15 2021 Update.pdf](#)

Enhancing System Flexibility to Meet Program Objectives

ADMS's suite of tools supports outage restoration, grid optimization, fault location and isolation, switching analysis, multi-source power flow, and operational DERMS. ADMS's tool suite would enhance system flexibility to meet the program objectives in the following ways:

- Ensuring reliable grid operations and enhancing overall grid resiliency. AEP expects that because of ADMS, dispatch time process for switch orders could be reduced via automation and improved workflow. Historically, AEP and its subsidiaries average up to 67,000 switch orders annually.¹⁸
- Contributing to the decarbonization of the electric and broader energy systems. DERMS visualization and management of DERs would enable greater DER grid penetration. Additionally, DERMS supports flexible aggregation for DER into groups so that they are consistent with the network components.
- Expediting dispatch times and FLISR capabilities would decrease the amount of hours and miles that restoration vehicles are on the road.

Workplan

Project Objectives

AEP intends to complete implementation of ADMS in conjunction with DERMS to improve grid performance, flexibility, and reliability through increased visibility and management of the Company's distribution capabilities. The Project would provide benefits to AEP's entire customer base, 54% of which is in DACs¹⁹, and could allow AEP to achieve SAIDI improvements of up to 5%. While this does fluctuate across AEP's OpCos and service territory, AEP estimates that avoided productivity loss through enhanced outage management resulting from the Project's proposed SAIDI improvements could potentially generate as much as \$1.9 billion in savings to its customers over a 20-year period. Further, additional potential savings from VVO centralization could be available to AEP's customers across participating OpCos.²⁰

Technical Scope Summary

AEP would execute the Project using a hybrid-agile methodology. The hybrid agile approach would allow the Company to deliver the functionality for ADMS in agile sprints for OMS, DMS, and DERMS. This allows for more frequent interactions resulting in multiple validated learnings and opportunities for feedback from stakeholders. Most testing, aside from agile testing, would be delivered in a traditional waterfall approach.

Once the sprints are complete, the software must pass Factory Acceptance Testing ("FAT"). The Project cannot move forward if it does not pass FAT. Once complete, the DMS, DERMS, OMS, and Switch Order Management ("SOM") applications must be configured to work with existing AEP software platforms, and full end-to-end integrations must be complete. Then, the entire system must undergo Site Acceptance Testing ("SAT").

¹⁸ AEP internal analysis of ADMS High Level Business Case.

¹⁹ AEP internal analysis based on OPCO Customers by Disadvantaged Area.

²⁰ AEP internal analysis of ADMS High Level Business Case. The VVO customer savings fluctuate across the OpCos based on the maturity of existing VVO programs and scale of deployments.

In parallel with planned sprinting activities, multiple ADMS software environments such as Test, Quality Assurance, and Production will be built across two AEP Transmission Control Centers for high-availability. These robust environments will leverage Windows and Linux Red Hat operating systems, Microsoft SQL Server and Oracle databases, both physical and virtual infrastructure, and a new Kafka based message exchange to allow secure data exchange between the ADMS and non-operational systems.

In the performance testing/deployment phase, the new system would run in parallel to AEP's current system as well as undergo User Acceptance Testing ("UAT"). This would allow the Company to test how the new system responds to extreme events, and in turn to begin "go live" planning. In this final phase, AEP would consider any problems that arose during that parallel operations period using both objective and subjective criteria, and ultimately decide whether the Project is able to go live.

Please see the Community Benefits Plan included as part of this application for an example of how AEP would engage with the community in connection with the proposed Project schedule as outlined below.

Buy American Requirements for Infrastructure Projects

In accordance with the GRIP FOA, Buy America Act ("BAA") requirements of the BIL do not apply to DOE projects in which the prime recipient is a for-profit entity.²¹ AEP is a for-profit entity; therefore, would not be subject to BAA under this grant. However, AEP has controls in place for BAA compliance and prioritizes domestic preference in sourcing.

Work Breakdown Structure and Task Description

Project tasks to complete ongoing ADMS and DERMS initiative is outlined in the chart below.

Task #	Key Task	Task Description/Subtasks
1	Project Management and Planning	Provide project management plan, NEPA compliance documentation, and cybersecurity plan; update DOE on an annual basis regarding plans, progress and results of the technical effort.
2	System Integration Coordination	Complete ADMS architecture design database design and configuration, functional design and build. Prepare and continuously maintain integrated project plan; schedule with release plan, dependencies and input from ADMS vendors.
3	Complete DMS/DERMS Buildout	Configure DERMS module, build RT-OPF functionality, prepare ADMS, UI, OMS, DMS/Operational DERMS and SCADA for operational use, build FLISR and SOM applications functionality, build VVO application functionality, configure DERMS module to function alongside pre-existing AEP software platforms.
4	Training Simulator Build	Build training simulator such that it passes FAT, develop and test training simulator and end-to-end training scenarios, prepare user roles, data preparation.
5	OMS Build	Develop, configure and test OMS integration, conduct sprint for notify and communicate functions, conduct sprint for FAT, conduct configuration and testing sprint for event completion.
6	SCADA	Build and maintain SCADA displays, conduct sprint for calc, Area of Responsibility

²¹ Office of Management and Budget Memorandum M-22-11, Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure.

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	Integration	("AORS"), tagging and FAT, coordinate execution of the SCADA display build and maintenance approach, prepare monthly status reports.
7	Network Model Build	Detailed model build, perform initial network model load for sprinting activities perform full network model load for waterfall activities/product go-live.
8	Complete Systemwide End-to-End Integrations	Conduct sprint for DERMS, DMS, OMS and SCADA applications for SAT; conduct configuration and testing sprint for event completion.
9	Training Delivery	Identify trainers and trainees and conduct technical training of IT and OT support teams; determine logistics including scheduling, securing locations, and tracking attendance; determine goals, objectives and measurement of training and the plan, format and schedule to deliver; develop training materials for end users, IT and OT; conduct end user training preparation for training staff and run AEP trainers through developed materials specific to AEP; conduct administrative and project team training; deliver training to end users.
10	Performance Testing	User acceptance testing and performance testing (includes script writing, execution and results documentation).
11	Deployment	Coordination, deployment plan and cutover plan for Go-Live; finalize database scripts and assign network resources to DNS to become Go-Live ready; deployment and Go-Live; prepare weekly status reports with PMO reports; hypercare.

Milestone Summary

The milestones in the Project surround FAT and SAT. The first milestone is that beta versions of each application must be built such that they pass FAT. Then, end to end integrations must be completed such that the system is able to successfully undergo SAT. When these milestones are achieved, the performance testing phase would begin, in which the new and old system would operate in parallel for a period of time determined to be appropriate during the Project. After the parallel operations period, AEP would consider issues that arise based on both subjective and objective criteria. If the Company considers testing to be successful, the new system would go live, marking the completion of the Project. Key milestones for the Project would involve the following:

1. Complete network model build inclusive of all relevant applications and perform FAT
 - a. AEP would complete the buildout of beta versions of DERMS, DMS, OMS and SCADA applications such that they meet current industry standards.
 - b. Go/No-Go decision point: Evaluate FAT results for applications to determine if Project may proceed. Re-evaluation of workstreams and timing required if applications do not successfully pass FAT.
2. Complete end-to-end integrations and applications configuration to function with AEP's current software platforms and perform SAT
 - a. AEP would conduct performance testing, end-to-end testing, and user acceptance testing.
 - b. Go/No-Go decision point: Evaluate SAT results for applications to determine if Project may proceed. Re-evaluation or workstreams and timing required if applications do not successfully pass SAT.
3. Launch new system in parallel operation with AEP's current system

- a. AEP would monitor the new system and determine if the system is ready to go live prior to expected removal of system being replaced (“Parallel Operations Period”).
- b. Go/No-Go decision point: Key project personnel at AEP (e.g., project engineers, stakeholders, etc.) would examine subjective and objective criteria such as successful completion of UAT to determine if and when the Project goes live. Once UAT is successful, the Parallel Operations Period would expire and the Project would be operating independently.

Go/No-Go Decision Points

AEP project management team and key stakeholders have developed a plan to lead various tasks, achieve milestones and deliverables, meet critical decision points, and hand-off tasks as they move through the Project. AEP project management team and key stakeholders would consider the following Go/No-Go decision points as part of AEP’s implementation approval process:

Budget Period 1: January 2024 – December 2024

- Evaluate FAT results for DERMS, DMS, OMS and SCADA in Q1 2024

Budget Period 2: January 2025 – June 2025

- Evaluate SAT results for DERMS, DMS, OMS and SCADA applications in Q1 2025
- Evaluate system performance based on objective and subjective criteria to determine go-live date in Q2 2025

End of Project Goal

The ultimate goal of the project is to successfully implement ADMS and DERMS so that AEP has better visibility into the state of the grid and has significantly enhanced capabilities in terms of managing the grid. The implementation of the technology would enable AEP to connect more DERs to the grid, and in turn would drive investment in AEP’s service territory. Project targets include improving SAIDI by up to 5% providing significant benefits to the community/public.²²

Project Schedule

AEP has already completed the planning phase of the AMDS and DERMS implementation, and has begun its “sprint” phase, in which teams develop product implements in short period of time. The Project would allow AEP to complete to move forward with the final sprint phase and the deployment phase. Please see the table below for the outline of the Project phases.

DERMS Build		Delivery Date
Milestone(s)	<ul style="list-style-type: none">• Build DERMS module such that it passes FAT	Q1 2024
Key Tasks	<ul style="list-style-type: none">• Configure DERMS module to integrate planning functions and deliver power grid services• Integrate weather load, DER forecasting and economic analysis• Build Real-Time Optimal Power Flow algorithm (“RT-OPF”) functionality in AEP environment• Build FLISR and SOM applications functionality in the AEP environment• Build VVO application functionality in the AEP environment	

²² AEP internal analysis of ADMS High Level Business Case.

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	<ul style="list-style-type: none"> Configure the DERMS module to function alongside pre-existing AEP software platforms <ul style="list-style-type: none"> The work in this phase will comprise of six sprints; each sprint would produce an incremental product comprised of integrated DERs, RT-OPF, FLISR, SOM, and VVO 	
Training Simulator Build		
Milestone(s)	<ul style="list-style-type: none"> Build training simulator such that it passes FAT Complete end to end integrations such that the training simulator passes SAT 	Q2 2024 Q3 2024
Key Tasks	<ul style="list-style-type: none"> User roles and data prep End-to-end scenarios testing 	
OMS Build		
Milestone(s)	<ul style="list-style-type: none"> Build OMS capability such that it passes FAT 	Q2 2024
Key Tasks	<ul style="list-style-type: none"> Develop, configure and test OMS integrations: <ul style="list-style-type: none"> Trouble Entry Reporting Customer Information Crew management AMI Conduct sprint for notify and communicate functions Conduct sprint for FAT Conduct configuration and testing sprint for event completion 	
SCADA Integration Sprint		
Milestone(s)	<ul style="list-style-type: none"> Convert, migrate and validate SCADA database such that it passes FAT 	Q1 2024
Key Tasks	<ul style="list-style-type: none"> Conduct sprint for Calc, AORS, Tagging and FAT testing 	
Network Model Build		
Milestone(s)	Complete Network Model Build	Q2 2024
Key Tasks	<ul style="list-style-type: none"> Develop network model build process Perform initial network model load for sprinting activities Perform full network model load for waterfall activities/product go-live. 	

Once DERMS and OMS are integrated, the team has conducted successful validations on the SCADA database, and both the SCADA database and OMS have conducted successful FATs, the Company would begin the training delivery and performance testing phase of the project. If FATs are unsuccessful, the Project would not move forward until the errors are remedied.

Complete Systemwide End-to-End Integrations		
Milestone(s)	<ul style="list-style-type: none"> Complete end-to-end integrations Conduct successful system SAT test 	Q4 2024 Q1 2025
Key Tasks	<ul style="list-style-type: none"> Conduct test, production and Quality Assurance Computing ("QAS") Environment SAT Conduct end-to-end scenarios testing in test and production 	
Training Delivery		
Milestone(s)	<ul style="list-style-type: none"> Training Delivery 	Q1 2025
Key Tasks	<ul style="list-style-type: none"> Identify trainers and trainees, technical training of IT and OT support teams, transition and turnover of design and support procedures Training logistics including scheduling, security locations, loading courses in Learning Management System, track training attendance 	

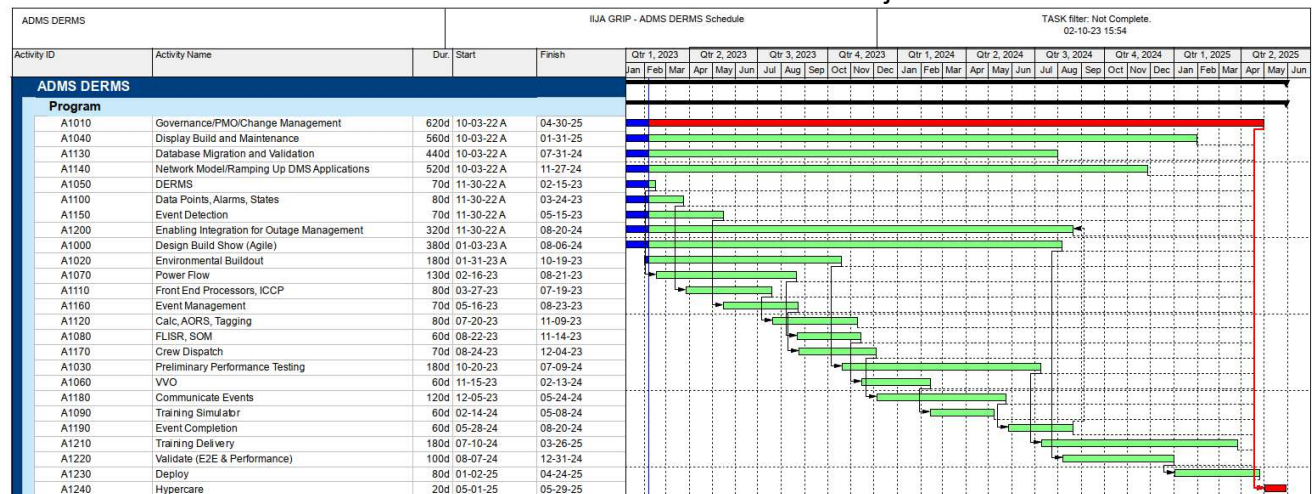
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	<ul style="list-style-type: none"> Determine the goals, objectives, measurement of training and the plan, format, and schedule to deliver Develop training materials for end-users, IT and OT; includes various modality of training Conduct end user training preparation for training staff; run AEP trainers through developed materials specific to AEP Conduct administrative and project team training Deliver training to end users 	
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At the end of this stage, all end-to-end integrations must be complete, and SAT must be conducted successfully. Significant tasks toward training delivery must also be accomplished.

Performance Testing		
Milestone(s)	<ul style="list-style-type: none"> User Acceptance Testing Execution and Sign Off 	Q1 2025
Key Tasks	<ul style="list-style-type: none"> Performance Testing (Scripts, Data, Execution) User acceptance testing 	
Deployment		
Milestone(s)	<ul style="list-style-type: none"> Complete display build and maintenance Deploy 	Q1 2025 Q2 2025
Key tasks	<ul style="list-style-type: none"> Coordination, deployment plan and cutover plan for Go-Live Go-Live Ready (Finalize database scripts, assign network resources to DNS) Deployment and Go-Live, prepare weekly status reports. Hypercare (follow up with any error or bug fixes) 	

Please see the below Gannt chart for the detailed outline of the Project schedule.



Project Management

Managing Work

AEP uses a dynamic Project Lifecycle Management Process (“PLMP”) software program to manage transmission projects and ensure its standards and requirements are met, reviewed, and approved during the project lifecycle. The PLMP includes project steps and gates, along with descriptions, milestones, and required criteria necessary for advancement of a project. Gating requirements include items such as meeting specific prerequisites and standards, project scope and budget review, review during an engagement meeting, and management approval. The

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PLMP is a framework consisting of six gates that provides structure for all end-to-end users. To that effect, standardization of the processes results in greater efficiencies and eliminates redundancies in processes thereby achieving a cost optimal result for projects.

Roles of Team Members

Several team members would be working simultaneously to complete the implementation requiring coordination among teams and stakeholders. To achieve implementation of ADMS/DERMS, teams would be composed of the following resources:

Role	Responsibility
Delivery Executive	Serve as the engagement lead and a liaison to AEP executives
Technical Delivery Lead	Responsible for project delivery
Delivery Lead	Serve as single point of accountability for day-to-day work
PMO Analyst	Support the project management function in reporting and governance
Business Architect	Examine DDC Evolution-developed business processes
Business Process Analyst	Document additional AEP business processes needed for configuration
Change Subject Matter Advisor	Provide input and guidance on the change management activities, beginning with shaping the overall change and approach
Change Lead	Manage the execution of change activities including stakeholder engagement, change measurement, and communications
Change Practitioner	Lead change activities including stakeholder engagement, change measurement, communications, and training
Deployment Lead	Responsible for the cut-over and deployment of ADMS/DERMS product in line with the ADMS Project Schedule
Deployment Analyst	Support the Deployment Lead in developing cutover and deployment
DMS/DERMS/Network Model Lead	Responsible for leading the DMS applications, Network Modeling and Operational DERMS workstreams
DERMS/Network Model Engineer	Responsible for the scope of work in the network modeling workstream
DMS/DERMS Engineer	Responsible for the configuration of functions in DMS applications/DERMS based on requirements from team
OMS Lead	Lead the application configuration for OMS
OMS Configuration	Responsible for the configuration of functions in OMS based on requirements from Client team
SCADA Lead	Lead the work of the SCADA tower and manage all aspects of SCADA: data, database, and displays
SCADA DB Conversion Lead	Focuses on the work of data migration and conversion activities in scope
SCADA Display Lead	Responsible for the SCADA display build scope of work
SCADA DB Conversion Validations	Validated the DB conversion activities completed in the project
Technical Architect Lead	Review and integrate the technical architecture requirements for the development, execution, and operations environments
Technical Architect	Coordinate decisions regarding, hardware, network products, system software, and security
Test Lead	Lead the scope of work in test management and test execution
Test Analyst	Support documentation of the testing approach, plan, and results

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Policies and procedures, shared values, clearly defined reporting relationships, and supervisory responsibilities would be written, communicated, and taken to heart by the team from top level management to the critical production workers.

Critical Handoffs/Interdependencies among Team Members

Project teams would be comprised of cross-functional resources including project management, technical leads, engineers, designers, procurement, and contractors. AEP considers each member important and key to achieving project objectives. The PLMP gates and prerequisites must be met before a project may advance to the next step or milestone. The roles described above are not only responsible for mitigation of risk, but also completing tasks as detailed in the PLMP. Team members work collaboratively across teams and function towards successful project completion.

Technical and Management Aspects of Management Plan

The following is an outline of AEP's management procedures outlined within PLMP:

To Gate 0.5: Planning – The planner or sponsor holds meetings to discuss project proposals and whether projects can be combined in a master project or become their own master projects. Funding is discussed for the projects. Once approved projects are allowed to proceed to Gate 0.5 and the Project Manager ("PM") takes over responsibility.

Gate 0.5 to 1.0: Functional Scoping – The PM holds several meetings to determine the scope of the project. Tasks include developing the risk register, developing a phasing plan, and developing pre-engineering tasks.

Gate 1.0 to 2.0: Execution – PM approves deliverables from previous gate and develops a stakeholder communication plan. An execution schedule is developed through Gate 6.0. Funding authorization and approval takes place.

Gate 2.0 to 3.0: Engineering – The PM coordinates with engineers to complete designated deliverables. Deliverables include major equipment needs, vendor quotes, stakeholder review of equipment needs and quotes, environmental studies, engineer drawings, site acquisitions and visits.

Gate 3.0 to 4.0: Procurement – The PM completes a review at gate 3.0 to ensure that engineering deliverables have been completed. The PM requests and reviews the outage management plan with the Transmission Construction Representative ("TCR"). Purchase orders are released to the vendor and the vendor delivers the equipment.

Gate 4.0 to 5.0: Construction – Work authorization is communicated so that field site work can begin. The PM continues to monitor overall project scope, budget and schedule. Engineering provides support. The Business Process Analyst conducts the closeout meeting with the stakeholders.

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Gate 5.0 to 6.0: Closeout – The PM reviews and ensures all activities have been completed for Gate 5.0. The TCR enters the project in service date in the TCR database which automatically generates an e-mail to the Project Coordinator (“PC”) that the project is ready to be placed in service. The PC reconciles contracts and a project debrief takes place discussing risks and issues, assessment of project performance, lessons learned throughout the PLMP lifecycle and recommendations all documented in the closeout database.

Project Risk Management

The Company takes a five-step process to Risk Management:

1. Risk Identification – Identification of risk and consultation with SMEs to identify and further evaluate risk. Utilize risk identification resources including Brainstorm with SMEs, Siting Risk Assessment Report, Constructability Review, and Risk Library. Introduction of new risks from approved risk responses.
2. Qualitative/Severity Analysis – Probability and Impact typically provided by the SME or previous project experience. Severity is determined by Probability multiplied by Impact.
3. Quantitative Analysis – Cost impact for the worst reasonable case regarding the risk should the risk occur. Identify Critical path schedule impact should the risk occur and Expected Monetary Value (“EMV”) of the risk.
4. Risk Response – Responses to identified risk include Accept, Avoid, Contingent, Mitigate, Transfer and/or Investigate. Description of what is required to respond, the response cost, and probability of success regarding the risk response.
5. Risk Monitor & Control – review and identify all risk throughout project lifecycle and update risk status for each step of PLMP as necessary.

Tracking of a project’s risk management is dependent on the project categorization within the Project Management Center of Excellence (“PMCoE”) Standard. If the project is categorized as complex, then the EcoSys Risk Module is required to be used to track the risk of the project. Projects below the complex categorization manage risk via the Excel based risk register. The risk register records the five risk inputs noted above in a preformatted spreadsheet. The graphic below outlines the roles and responsibilities of the project team, specifically the project risk manager (“PC-R”), Subject Matter Expert (“SME”), Project Management Team (“PMT”), and PM.

Risks and issues related to AEP’s ADMS and DERMS initiative are currently monitored on a weekly basis and would continue to be monitored weekly throughout the Project. Workstream leads are empowered to add risks directly to the project’s Risk Register which is maintained. Risks are discussed among the team and decisions are made on action items, monitoring plan, etc.

Project Changes

Project changes are handled by first identifying the change sponsors and developing a changes management strategy and approach. Next, a change impact assessment is performed which identifies the change impacts and recommends impact mitigation strategies. A business readiness assessment is then performed to determine the impact of the change on the budget and other key metrics.

AEP intends to be fully transparent with its stakeholders about project status and adjustments needed to achieve commitments. AEP is committed to investing time, resources, and capital to make this a success. These changes, when they arise, would be shared, discussed, and authorized through the formalized governance process as shown above.

Approach to Quality Assurance/Control

To maintain quality assurance/control, AEP has established the Master Project Procurement Plan to identify and document the strategy to purchase material, equipment, engineering, labor, land rights, and various other professional services. AEP utilizes preformatted templates to document the purchase of purchase material, equipment, engineering, labor, land rights, and various other professional services. The information required is standardized, and significant decisions must be called out within the template. Teams must also provide other documentation like purchase orders, contracts, contract releases, change orders, leases, and service agreements when completing templates. Finally, AEP policy dictates that procurement for these areas would be subject to a competitively bid requirement if the contract is greater than \$1,000,000.

Cybersecurity

AEP is subject to extensive and rigorous mandatory cyber and physical security requirements to protect grid security and reliability. Further, AEP's Enterprise Security program includes cyber and physical security and uses the National Institute of Standards and Technology Cybersecurity Framework as a guideline. The Company employs these guidelines across its critical cyber assets, such as data centers, power plants, transmission operations centers and business networks using multiple layers of cyber security controls and authentication. AEP's cyber security team operates a 24/7 Cyber Security Intelligence and Response Center responsible for monitoring the AEP System for cyber risks and threats. AEP's Chief Security & Privacy Officer is also its National American Electric Reliability Corporation Critical Infrastructure Protection Senior Manager, ensuring alignment of compliance with the Enterprise Security program.²³

Maintaining Communications among Project Team Members

AEP standards dictate to maintain effective communication throughout the Project phases, project team members would utilize a variety of resources and tools, most notably Team Member. Team Member is an internal system designed specifically for documenting and reporting the status of Project activities, allowing all project team members to monitor the Project's schedule. By the last calendar date of the month, each project team member responsible for an activity on the Project is required by the Company policy to report in Team Member the activity's progress and percent complete. When an activity is complete, the individual responsible would also be required to report that fact immediately in the system. The project controls analyst ("PCA") is responsible for creating and, if necessary, updating Project assignments and schedule. The PCA is also responsible for verifying all project team members are adequately trained to use the Team Member system, ensuring Project activities are accurately and timely documented and reported in the system.

²³ AEP 2021 10K – [0000004904-21-000010 \(d18rn0p25nwr6d.cloudfront.net\)](https://d18rn0p25nwr6d.cloudfront.net/0000004904-21-000010).

The ADMS/DERMS project team has developed additional protocols to maintain communication among team members throughout the project. Workstream leadership meets daily to discuss the design and implementation of the Project. Program leadership meets on a weekly basis to discuss issues, risk and resource management. The executive sponsors responsible for program management meet on a bi-weekly basis and the “Top to Top” group meets monthly. AEP includes key business partners on the Project in these groups: AEP, AspenTech/OSI and Accenture PMO.

Technical Qualifications and Resources

Project Team’s Qualification and Expertise

AEP has been successful in executing IT infrastructure projects that are similar in scope and scale to the Project such as the legacy OMS, DMS, GIS and CRM programs that AEP currently operates. IT projects of this nature are managed, designed, and engineered by a variety of experienced resources such as:

- Project Manager – Four-year degree in Engineering, Business, or related field and/or electric utility experience.
- OT/IT System Architect – Four-year degree in computer science/engineering or other related technical field and related field experience.
- OT/IT System Analyst – Two-year or four-year degree with related experience of at least two to four years.
- OT Analyst /SCADA Analyst - Two-year or four-year degree with related experience of at least two to four years.
- Engineering – Four-year degree in an engineering field.
- Engineering Technician/Technologist – Two-year or four-year degree in related field and/or electric utility experience.

AEP’s approach to project implementation support begins with its executive leadership team. The strategic project planning, development, and implementation is supported by workstream leadership. The project key personnel members are outlined on the Cover Page of the Technical Volume. Being that this is an IT project, collaboration between the project lead and project manager from AEPs operations department as well as its IT department is essential to ensure alignment. The Project team members experience and qualifications include:

- Experience leading and supporting multi-year, multi-million-dollar large scale system deployment and upgrade projects;
- Experience overseeing the current efforts with AEP to transition from existing systems to ADMS and other technologies;
- Experience coordinating across multiple organizations to ensure completion of project tasks and compliance with of project milestone timelines;
- Involvement in managing large complex technical efforts across multiple organizations and stakeholders;
- Current responsibilities of annual upgrades of operational technology software used to manage the distribution utility grid;
- Knowledge of current industry standards and best practices; and

Existing Equipment and Infrastructure

The Project requires primary use of new technology related assets such as application servers and network switches. AEP has access to the necessary infrastructure required for the Project. The primary network assets would be implemented at two AEP transmission control centers and has access to a skilled workforce through its vendor relationships.

AEP has a strong project management team and overall ADMS governance. Given that the Project touches both operations and IT, there is a project lead and project manager from both parts of the AEP organization to ensure alignment. In addition, there is a clear governance structure in place with dedicated meetings from the daily workstreams to the executive level.

Relevant Previous Work Efforts and Demonstrated Innovation

Previous planning and sprint efforts for the project workstreams would help AEP achieve successful completion of the Project. During the previous phase teams worked simultaneously leveraging the hybrid agile approach which allowed the Company to complete milestones within in the PMO, Change Management, Tech Architecture, SCADA, OMS, DMS-DERMS, and Network Model workstreams. The chart below outlines the deliverables in each workstream from 2022 to 2023.

Workstreams	Deliverables
PMO	Integrated Project Plan, Integrated Resource Plan, Project Organization, Scrum Organization Charts, and Sprint Schedules
Change Mgmt.	Stakeholder Analysis of end users, managers, and decision makers Business Readiness Assessment
Tech Architecture	Environment Strategy, Final Technical Architecture (server counts, ports, subnets), Operations architecture, Bill of Materials (BOM) to support an order, and Infrastructure Plan to deploy servers, firewalls, switches
SCADA	SCADA database, Front End Processor configuration and testing for Remote Terminal Unit (RTU) interface, ICCC configuration and testing, and End user substation one-line displays
DMS-DERMS	Configuration and testing for a pilot area of substations and feeders related to the following: DPF, FLISR, SOM, and real-time monitoring of DER assets
Network Model	Complete network model for pilot area of substations and feeders required to support DMS-DERMS and OMS workstreams, Complete network model to support day-1 functionality at deployment of ADMS, and Process to create & maintain network model from multiple data sources
OMS	Configuration and testing for the following: Event Detection, Event Management, Crew Dispatch Development, configuration and testing OMS integrations for: Trouble Entry Reporting, Customer information, Crew Management, and AMI

The ability to scale requires the AEP team to succeed in the final testing phase via the implementation of pilot programs, which would occur in the remaining phase, and applying that experience to scale. Further, deployment cannot occur without the team successfully

implementing additional hardware in both existing and new facilities. AEP has both an existing and, currently under construction, \$100 million state of the art control centers along with existing dispatch centers. These facilities would house new equipment (application servers, network switches, etc.) while also providing secure access for operations' end users to monitor and control the grid.

Time commitment of the key team members to support the project

The key team members would be able to commit their time to the success of implementing this Project. This commitment would vary by team members and the stage of the Project. Following the establishment of the ADMS/DERMS implementation, AEP would form a leadership team that would build substantive support roles to manage each aspect of the Project. These roles and departments would commit 100% of their time to reinforce the ongoing success of the Project. The chart below outlines key team member time throughout 2024 and 2025:

Key Member	Workstream	Role	2024 Time	2025 Time
Anvesh Pendyala	Various	OT Solutions Architect	2,008 Hours	280 Hours
Bob Mayhan	SCADA	Product Manager	2,008 Hours	280 Hours
Chris Schafer	PMO	Director DRTO	260 Hours	70 Hours
Cyrus Kandawalla	PMO	IT Delivery Manager	2,008 Hours	280 Hours
Jim Greene	Various	IT Solution Arch	2,008 Hours	280 Hours
Kevin Blazewick	DMS	DERMS Product Owner	1,820 Hours	245 Hours
Lee Daniels	OMS	Product Manager	1,820 Hours	245 Hours
Michael Klingler	PMO	OT Delivery Manager	2,008 Hours	280 Hours
Paul C Cost	DMS/Network Model	Product Manager	2,008 Hours	280 Hours
Pugal Jenardhana	PMO	Director Technology	1,040 Hours	280 Hours
Selwyn Dias	Governance	Director	2,008 Hours	280 Hours

Technical services to be provided by DOE

No technical services are expected to be provided by DOE for this Project.

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