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TECHNICAL VOLUME**Automation and Topology Advancements in America's Most Forested State****Funding Opportunity Announcement: DE-FOA-0002740**
Topic Area 2: Smart Grid Grants (BIL section 40107)

Submitted to:

Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)
BIL – Grid Resilience and Innovation Partnerships (GRIP)**Prime Applicant**

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Business Point of Contact

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Project Team Members	Key Personnel	Project Location(s)
Electricore, Inc.	Redacted	Valencia, CA



PROJECT OVERVIEW

Background: Central Maine Power Company (CMP) is an electric grid operator, transmission owner/operator and distribution provider, servicing approximately 11,000 square miles in central, southern and western Maine and serving a population of over one million people. CMP provides electricity service to 14 counties, 346 cities, towns, townships, and plantations delivering 9,297 GWh of electricity in the past year. Service is provided across 2,919 miles of transmission lines, 23,734 miles of distribution lines and across 205 substations. CMP service territory is divided into twelve districts with headquarters in Alfred, Augusta, Belfast, Bridgton, Brunswick, Dover, Fairfield, Farmington, Lewiston, Portland, Rockland, and Skowhegan. 83% of DOE disadvantaged communities (DACs) in the state of Maine are within CMP service territory. This includes 28 DACs in twelve counties. A domestic entity, CMP is incorporated in the state of Maine and maintains a physical headquarters in Augusta, ME. Maine's historical reliability is shown in the tables below.

Project Goal: CMP will directly address DE-FOA-0002740 Topic Area 2; Smart Grid Grants eligible uses by deploying and catalyzing technology solutions that increase the flexibility, efficiency, reliability, and resilience of the electric power system. The proposed project will implement Smart Grid technologies including Advanced Grid Restoration (AGR) and Sequential Reclosing (SR), designed to reduce the frequency and impact of outages to the communities served and maximize benefits to DACs as defined by the U.S. Department of Energy, the White House and/or the State of Maine. The grid enhancing technologies planned have potential to modernize the grid, increase capacity, reduce clean energy curtailment, unlock additional clean energy generation, and enable more resilient grid operation. Targeted improvements to the baseline infrastructure include smart grid upgrades to approximately eighty (80) circuits. The scope of the program includes approximately 400 new SCADA recloser/switch installations. Specific to this project, CMP will proceed with the following tasks that are critical success factors:

- Contain and reduce outages resulting from extreme events;
- Advance the ability to reduce restoration times from such outages;
- Enhance planning activities by increasing load sensing capabilities;
- Reduce risks to health and safety of the affected community; and
- Facilitate the safe operation, extend generation uptime, and increase penetration of Distributed Energy Resources (DERs).

These important objectives align with State and Local policies and initiatives and allow CMP to adapt to climate change, mitigating the impact to critical infrastructure facilities and communities. The project will result in a strong, positive benefit for residents, limiting the scope and impact of outages when they occur and increasing the Company's ability to quickly restore power after an outage. The project is in line with DOE and regulatory goals and objectives.

The proposed project locations and related infrastructure are focused on DACs, yielding significant community benefits exceeding the goals of the Department of Energy's (DOE) Justice40 Initiative. The project will extend CMP's smart grid initiatives to customer territories of Portland, Rockland/Belfast, Farmington, Augusta, Lewiston, Bridgton, Dover, Fairfield and Skowhegan. The effort will enhance resiliency for critical regional assets including emergency shelters, hospitals, manufacturing sites, public safety infrastructure sites, and public schools.

A skilled workforce will contribute to the success of the overall project with CMP's own workforce drawn from IBEW 1837 and a selection of contractors. Contractors with workforces traditionally drawn from labor unions will also be encouraged to use Minority-Owned Business Enterprise (MBE) programs and other resources that employ local workers from DACs.

DOE Impact: CMP prioritizes projects based on whole system and asset needs. Currently proposed projects are not included in the company's pending rate case (See Climate Resiliency Strategy section below). Projects proposed are intended to focus on providing enhancements to projects within the long-term plan focusing on DACs. *The funding received for this program will enable improvements that would not be feasible without DOE funding.*

Additionally, funding from this proposal will be implemented utilizing Davis Bacon Wage Rates, providing good paying job opportunities to 100's of local workers in various skilled trades and engineering disciplines. Secondly, funding will flow to communities through local restaurants and stores. CMP partners with the local union has traditionally partnered with apprenticeship programs to give opportunities to all individuals to learn trades and enter the skilled workforce.

Without the DOE funding, these advancements will not be implemented in the targeted communities for many years to come. This funding can bring technology to DAC areas years earlier and reduce the rate impact to customers by half.

Community Benefits Plan: Job Quality and Equity: As the incumbent utility, CMP has extensive relationships in the region. This Community Benefits Plan (CBP) under development will incorporate outreach efforts to relevant organizations and request their feedback and inclusion on the project goals, objectives, and execution. Individual organizations are identified in the narrative below and more are planned before final submission of a full application. CMP's CBP is to engage regularly with collaborators, leveraging existing relationships and building new relationships with community organizations as appropriate. Goals include significant efforts to:

- Encourage meaningful conversation and participation around project progress, concerns and opportunities by bringing multiple perspectives to the table and identifying issues early;
- Develop and distribute tools and information that will be updated frequently and disseminated through organized processes to ensure a broad and diverse audience is continually informed;
- Create awareness and understanding of project benefits, relevance and opportunities to participate through an education and outreach campaign that makes information available and accessible to all stakeholders in the project area;
- Develop insight into economic development and job opportunities associated with the planned project.

The proposed project locations and related infrastructure are focused on DACs, yielding significant community benefits exceeding the goals of the Department of Energy's (DOE's) Justice40 Initiative. The planned effort will enhance resiliency for critical regional assets including: airports, emergency shelters, hospitals, manufacturing sites, Public Safety Infrastructure sites and Schools. In addition, the region supplies significant amounts of blueberries, fish, and lobster processing to the domestic food supply.

A skilled workforce will contribute to the success of the overall project with CMP's own workforce drawn from IBEW 1837 and a selection of contractors with emphasis on those with DAC or Minority-Owned Business Enterprise (MBE) programs. All labor for this project will be conducted in the United States. CMP is committed to providing high quality jobs and has a demonstrated track record supporting programs that are training the next generation to join the energy workforce.

Workforce and Community Agreements: CMP has relationships with unions, trade groups, universities/colleges and many supply chain providers. These important organizations will be engaged to assist in addressing job quality and workforce continuity. Building on existing strong relationships with Unions, CMP will strive to maximize the use of union labor and project labor agreements. IBEW 1837 members working at CMP comprise the largest bargaining unit, with more than 650 members represented. The contract covers field and support workers in the line departments, meter departments, substations departments, customer service representatives, area and systems dispatchers, engineers, programmers, communications center and field offices, GIS and CADD technicians, offices services personnel, technical services representatives, and a variety of other support personnel. Collectively, these union members design, build, operate, repair and maintain the electric grid serving the largest customer base of any electric utility in Maine, and provide customer service assistance to residents and businesses in most of southern, central and western Maine. They also control the balance and flow of electricity across the grid beyond their own customer base into other parts of Maine and New England. CMP and IBEW 1837 entered into a four-year agreement in 2021 that includes wages, incentives, and other policies for employees. Other Trade Unions that CMP engages with include but are not limited to: IBEW 104, Maine State Building & Construction Trades Council and the AFL-CIO.

Partnerships: CMP will also call upon a strong group of qualified contractors to perform the work. CMP has already surveyed contractors for their planned contribution to CBP and catalogued responses. Request for procurement will include requirements to prioritize selection of firms that prioritize DEIA principles, sound worker compensation standards and hiring employees from local communities. Relevant responses to date have highlighted many notable contributions to local communities and DEIA and workforce initiatives, including but not limited to membership in Minority Supplier Development Councils, Military and Veteran Recruiting (Warriors4Wireless – Training for the Telecommunications Industry - Soldier for Life Partnership – Lineman Electrical Apprentice Preparatory Program), donations to local organizations and developing scholarship funds.

Developing the workforce pipeline: CMP sponsors a local Electrical Lineworker Technology apprenticeship program through Kennebec Valley Community College. This one-year certificate program provides students with the technical background and the manual skills necessary for careers in the installation and maintenance of electrical power, telephone, and cable television systems. The program is highly successful with more than 570 students completing the program since its inception in 1990. Following graduation, 91.3% of students are employed within six months, earning an average salary of \$60,908. Jobs for Maine Graduates (JMG) is another organization CMP draws upon. JMG partners with public education and private businesses to

offer results driven solutions to ensure all Maine students graduate, attain post-secondary credentials, and pursue meaningful careers.

CMP is a collaborator with the Maine Development Foundation (MDF), a non-partisan, statewide driver of sustainable economic growth in Maine. MDF connects people, decision-makers, and communities through trusted research, leadership development, and creative partnerships to stimulate new ideas, solve problems, and improve the lives of all Mainers. MDF operates the Maine Spark project, which has committed to the common goal that by 2025, 60% of Mainers will hold education and workforce credentials that position Maine and its families to succeed. The coalition takes a coordinated approach to connect people with the education, training, jobs, programs and resources needed to thrive in Maine's robust and changing economy.

CMP will leverage its strong relationship with the Maine State Chamber of Commerce. Local chapters of the Chamber of Commerce will be asked to assist in communicating opportunities for economic development associated with the program and to highlight resiliency needs of underserved communities.

Reaching Historically Underserved Populations: CMP plans to engage a well-respected and accomplished community foundation located in the region, to plan and administer grant funding to select area non-profits that will be invited to respond to a request for proposals process. The foundation will convene a community-driven panel to oversee the grant process, taking care to select individuals who are active in and knowledgeable about the priority issues identified in the grant. In this way, CMP will ensure Justice40 goals for disadvantaged communities are met with measurable outcomes. The nonprofits we will engage in this purposeful effort will be those working in the fields of workforce development, diversity, equity, and inclusion, and removing barriers for disadvantaged communities. The intent of these grants is to ensure they will provide feedback to CMP over the project lifetime and beyond, to ensure that the utility has access to information about community priorities and needs and can effectively give and receive two-way feedback about grid resilience work that is underway in the community. Letters of support are attached to this application.

Engagement Evaluation Strategy: CMP will conduct regular quarterly assessments to evaluate the success of stakeholder engagement, including evaluating community and labor stakeholder perceptions of the progress.

It is anticipated that benefits associated with this project will exceed the Justice40 targets. Planned analysis of anticipated benefits will examine how this project can increase energy resiliency, decrease environmental exposures, increase parity in energy technology, increase clean energy enterprise creation and contracting as well as the pipeline of energy jobs for communities within the project area.

The projects in this proposal prioritize investments in DACs, specifically focusing in the company's Augusta, Lewiston, Bridgton, Dover, Fairfield, and Skowhegan districts which all include areas designated by the DOE as DACs *Specifically 83% of all Maine DAC (190,000 of households measured by the number of connected meters) are within CMP's service territory.*

The CMP CBP will characterize and document the existing burdens DACs in the service territory are facing using EJSCREEN, disadvantaged community definition tools, and other analytic tools (state, regional, etc.).

The plan will include an assessment of potential barriers to realizing project benefits, minimizing negative impacts, and plans for mitigating those barriers and identified gaps.

. These benefits, combined with preparing the grid for integration of a significant amount of new distributed generation, will serve to decrease the energy burden and reduce future emissions for DACs.

The CBP team will also track impacts to job creation, investments in the clean energy job pipeline and training for individuals.

Long-Term Constraints: This project does not plan any long-term constraint on natural resources or Tribal cultural resources. The team will review all right-of-way agreements included in the scope of work and ensure all line path land use agreements are up to date. The sites scoped do not require significant clean up, however some areas will require undergrounding of lines to comply with constraints (physical, regulatory, etc.). Underground sites will be soil tested prior to excavation. Clean soil will be reused on site. Excavated soil samples displaying issues will be disposed of at a landfill.

Climate Resilience Strategy: CMP has developed a decade long plan for improvement in resiliency. More than 50% of CMP customers are within 15 miles of the coast and lie within the FEMA National Flood Hazard zone. The regulator in the region is the Maine Public Utilities Commission (MPUC). CMP has a four-year proposal for the Resiliency Plan pending with MPUC, however *none of the efforts proposed in this application are included in the MPUC plan.*

The State of Maine's Legislature passed Public Law Chapter 478 directing the MPUC to undertake a series of procurements of DER projects to meet statutory targets for distributed renewable projects. This proposed DOE effort will assist in enabling the integration of the upcoming addition of significant state procured distributed generation.

CMP's Distribution Automation Program was prioritized by ranking the Worst Performing Region. The plan's assumptions are: 1) customer "pockets" within remote control devices (case by case analysis), 2) no more than a reasonable number of reclosers in series (non-effective coordination), and 4) All circuit tie points to receive SCADA/SCADA switches installed in locations to maintain the "pocket" size where reclosers coordination is not possible and also installed in areas with frequent tie points.

TECHNICAL DESCRIPTION, INNOVATION, AND IMPACT

Relevance and Outcomes: The grid enhancing technologies planned have potential to modernize the grid, increase capacity, reduce clean energy curtailment, unlock additional clean energy generation, and enable a more resilient grid operation. CMP is a net exporter of energy. Any additional renewables will increase the export of renewable energy to ISO-NE communities benefiting a far greater population than CMP's direct customers.

The proposed program will advance community benefits, improving the reliability and efficiency of existing grid systems. Deployment of these technologies will also help integrate DERs, electric vehicles, and other beneficial electrification applications. An example is that reclosers and switches will provide benefits by connecting and disconnecting portions of a distribution circuit to an upstream power source. Strategically placed reclosers and switches help isolate faulted parts of a distribution feeder and reduce the number of customers that lose power when a fault occurs. Automating reclosers and switches enable remote control by sophisticated automatic switching schemes. Direct benefits of the proposed project are the company's ability to do the following in the event of extreme weather or natural disaster:

- **Anticipate and mitigate the impacts of extreme weather** or natural disaster on grid resiliency and increase the ability to redirect or shut off power to minimize blackouts, prevent wildfires, and avoid further damage.
- **Improve the visibility of the electrical system to grid operators**, to help quickly rebalance the electrical system with autonomous controls, through data analytics, software, and sensors. As described above, the addition of recloser technologies coupled with modes of operation Sequential Reclosing, AGR and wireless communications enhances the visibility of the real time grid performance. Operators can make more anticipatory decisions using data provided from technologies. Circuit Sensing technologies add to the ability of Grid Operators with cost-effective, real-time data, decisions can be made to complete unscheduled maintenance or inspections, with the backup of AGR helping the grid operators monitor, able to make decisions absent grid operators.
- **Aggregate and integrate distributed energy resources** - and other "grid-edge" devices to provide system benefits, such as renewable energy resources, electric vehicle charging infrastructure, and vehicle-to-grid technologies. Noted above, sensing technologies and AGR will provide valuable data for the implementation of EV Charging station technologies and DER penetration, as AGR self-healing technologies are compatible with DERs due to load sensing capabilities.
- Increase the capability of the transmission system to reliably transfer increased amounts of electric energy.
- Prevent faults that may lead to wildfires or other system disturbances.
- Integrate variable renewable energy resources at the transmission and distribution level.

Feasibility: The proposed technology is extremely feasible and is very likely to be successful. CMP routinely completes projects in 2-3 years from project inception. Projects are carefully and systemically managed via a written corporate Planning and Investment Decision Process (PIDP). The "IP1 Milestone" takes 1-3 months for each subproject and results in a project need.

- The Technical Scoping Phase is designated "IP2 Milestone" and takes 6-12 months for each subproject depending upon complexity, which results in a technical scoping of the proposed project, an evaluation of stakeholder needs, a baseline budget, and a Go/No Go Decision.
- Full Financial Funding is designated "IP3 Milestone", takes 12-36 months, and results in a subproject budget and release of funds against estimates accuracy.
- IP4 Milestone, Project Change, is for significant changes in scope, schedule, or budget.
- The Project Closure is IP5 Milestone, takes 3 months and documents pre-project mapping, asset management, lessons learned, and unitization of assets put in service.

Project duration is estimated to be just under five years from program start date, but first implementations are planned to be completed within 24 months. Funding availability will allow the launch of tasks on an expedited timeline. Engineering and procurement of materials is expected to take 12-18 months. The longest lead time materials currently are transformers, reclosers and wire, expected between 1-2 years. CMP has mitigated current transformer supply chain issues by implementing new standards utilizing non-standard 1kVa potential transformers (PTs) to power recloser technologies reducing supply chain constraints on recloser installation to 16 weeks currently. The project will be able to take advantage of rolling wave planning for materials over the project duration after the initial influx of funding. Projects can be implemented quickly except for substation rebuild projects which take longer to engineer and procure.

Previous efforts have been conducted with successful results. CMP implements automation investments annually on projects with varying degrees of size and scope, and these investments follow the processes articulated above and account for approximately \$58M annually.

The project has access to all necessary infrastructure (e.g. transportation, water, electric transmission), including use of existing infrastructure which CMP owns and operates. CMP has a skilled workforce engaged and mature processes to conduct the design, documentation, procurement, and construction. These projects are viable within a 3-5 year window.

Innovation and Impacts: The smart grid innovations planned include AGR and SR. These two innovative technologies focus on “self-healing” improvements to the grid. AGR is a state of the art “self-healing” technology implemented using Siemens Spectrum Grid Management Solutions Software. Capable of load analysis and management and utilizing the same devices as SR, AGR is implemented in cooperation with SR to enhance system “self-healing” capabilities. This system takes advantage of automated tie points and is capable of facilitating load transfers independent of human interface. AGR is an adaptive protection technology, enhances the ability to protect regions implementing DER’s as AGR is capable of interacting with distributed energy resources (DERs). The system is programmed to evaluate load while bringing customers back online safely during a disruptive event. SR employs coordination of multiple devices along a circuit, with no limit to the number of zones that can be implemented. SR allows bi-directional restoration *automatically* without the need for communications, shortening outage durations and reducing total customers impacted.

Current Standard Practices: Enhancing Topology within service territories is a standard practice in the utility industry, including the installation of switches, both automated and non-automated. These installations allow operators to isolate problem areas when disruptions occur and problem areas are identified. Manual loop schemes have also been implemented since the 1980’s. However, problems associated with overload conditions can result when normally open points are used to transfer load without analysis of impacts on load transfers on the adjacent circuit.

Topology and Automation

Enhancing resiliency - the ability to limit the number of outages and improve the speed of recovery – can be advanced by changing utility topology through multiple strategies including upgrading lines and enabling segmentation of circuits during outages to limit the number of customers that are impacted by a particular outage. Segmentation is achieved by adding and automating feeder ties that allow utility companies to switch power flows around specific

outages and thereby reduce the number of “downstream” customers on a radial circuit that would otherwise be impacted by an event. The investments that support these strategies include upgrading and adding more circuits and lines, upgrading or adding substations, and other investments that support desired outcomes. Providing alternative sources of power by adding connected circuits also helps minimize outages and their durations.

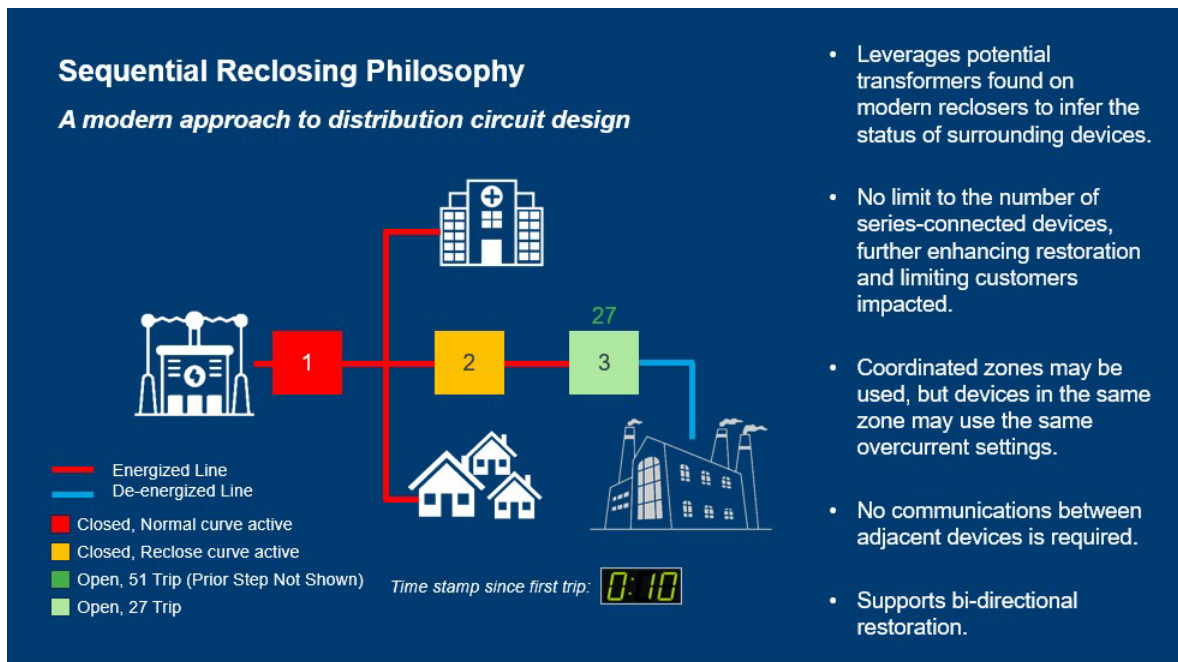
De-Risking Future Technologies

Additionally, sensing technologies will be considered as part of the project’s engineering. Company territories currently have limited load sensing data. Implementation of sensing technologies will enhance system planning activities and the implementation of future DER’s, EV charging stations, Loop Scheme Self-Healing and customer integration. Loop Schemes implemented without load sensing analysis requires annual no-impact analyses as traditional loop schemes do not anticipate load when addressing an incident. The proposed implementation of AGR enhances the ability to implement Loop Schemes with long term benefit to the customer and without annual no-impact studies. By utilizing programmable reclosers the company can re-program devices with new settings as strategies and technologies change.

Facilitate the safe operation, extend generation uptime, and increase penetration of Distributed Energy Resources (DERs) - Implementation of Comprehensive Area Studies upgrades will prepare systems for DER penetration safely. These projects increase the capacity of transmission facilities or the capability of the transmission system to reliably transfer increased amounts of electric energy and allow for integration of renewable energy resources at the transmission and distribution levels. Increased system capacity results in more locations for DER installations with acceptable cost benefit ratios due to lower interconnection costs.

Recloser Automation of Prioritized Circuits - Installed as priority reclosers for the purposes of automation and segmentation. SCADA switches are also utilized to achieve more flexibility in the event of a storm. Automating prioritized circuits will also include improving communication pathways from Energy Control Center (ECC) to the devices in the field and reducing restoration time by providing better information to the ECC for faster decision making when rerouting power.

Sequential Reclosing Schemes - Includes the execution and enabling of new self-healing schemes by automation of devices on lines. Circuits are divided into multiple sections, programmed to open on a fault at the same time, then sequentially reclose upon Live-Dead voltage detection and a definitive time delay.



Automatic Grid Restoration - Additional self-healing functionality, able to identify faults, execute automatic reconfiguration switching via programmed reclosers and conduct power flow analysis.

Circuit Line Sensors - Installation of additional circuit sensors (as required) is a cost-effective way to enhance planning capabilities by providing load data to areas where data is currently unavailable. CMP has developed a Reliability Calculator, which will be continuously improved, for planning based on data driven decisions. Load sensing equipment enhances more efficient planning studies thereby providing best value to customers. The information is required to assist in DER planning activities and is particularly useful when determining future EV charging station needs. Line Sensor technologies are important in future automation planning, providing real time load sensing and enhancing the ability to safely operate the system.

Upon implementation, the funded project will expand the Resiliency Program from just eight circuits and the more limited in scope Distribution Automation Program addressing 700 circuits an additional approximately 80 circuits impacting approximately 112,000 additional customers.. These improvements will happen five to ten years earlier than currently planned. With this project funding, CMP's data driven planning sequence can expand the program's reach to maximize improvement to the DACs served. Improvements in the SAIFI are expected as a benefit of this effort with potential to reduce SAIFI by 40-68%.

Project Deployment Risks and Mitigations: Key project and technical risks and mitigations:

- **Supply Chain Lead Times** - Transformers (1-2 Years) and wire (1-2 Years) are key items. Alternatives such as the use of potential transformer (PTs) as a replacement for service transformers are being implemented as PTs have shorter lead times. Long lead time materials are ordered during the design engineering task, often one year in advance of anticipated construction to reduce overall schedule. Transformer Recycling and refurbishment is also being actively undertaken as CMP procurement has engaged partners in transformer

refurbishment programs to reuse transformers salvageable from the existing system for use on future projects.

- Weather Events – Storm events have historically created delays in project execution. This risk can be mitigated by maximizing resources during non-storm event. CMP program management plans for storm delays by building into the schedule an historical average of storm days.
- Recloser technologies require maintenance programs to ensure that batteries are replaced on time in deployed devices. If batteries fail, communications can be lost and functionality can be diminished. CMP is developing a maintenance program to address the deployment of devices in the system. Inventory of safety stock ensures availability of key parts on hand to address emergency needs.
- AGR – AGR is dependent on operational available wireless communications. If communications are not available when an incident occurs AGR can fail to operate. Additionally, AGR relies on programming to effectively operate. Sequential Reclosing was a mode of operation developed specifically to operate with AGR absent operational communications, even if wireless communications are not available, sequential reclosing can still operate.

Support of State, Local, Tribal, Regional and National Resilience, Decarbonization, or Other Energy Goals, Strategies and Plans: The State of Maine’s Legislature passed Public Law Chapter 478 directing the MPUC to undertake a series of procurements of DER projects to meet statutory targets for distributed renewable projects. Renewable energy incentives passed by the Maine State Legislature in 2019 have led to a surge of hundreds of new solar and other distributed generation (DG) projects statewide. CMP is committed to helping the State of Maine reach its renewable energy goals by working to connect small and large generators to our energy delivery system. Since late 2019, CMP has received hundreds of applications for interconnections from dozens of solar developers. Most of these are community solar projects that will generate between 2 MW (megawatts) and 5 MW of electricity. CMP follows an interconnection process established by the Maine Public Utilities Commission (PUC) that emphasizes timeliness, cost efficiency, and safety. We are a dedicated team of engineers, project managers, construction workers and others focusing solely on distribution generation projects and interconnections. This proposed DOE effort will assist in enabling the integration of the upcoming addition of significant state procured distributed generation.

Encouraging and Facilitating the Development of Smart Grid Functions: Restoration is a recent innovation being introduced to utility grids. SR was an innovation released by AVANGRID for use in projects in 2022 to combat issues with consistent AGR functionality in areas where wireless communications consistency is problematic. Together, they offer a tandem approach to system operators to restore electricity during a disruptive event. The implementation is not widespread across the industry, and AVANGRID would be able to share details around its effectiveness and implementation with industry partners.

CMP and the parent Avangrid have prepared a paper that presents an automatic tool integrated in the control system to isolate faults and to restore the network in a close loop. The lack of references of similar tools in operation and the promising results makes it highly innovative. The

current implementation is giving solutions to network faults in less than five minutes (statutory limit) and is improving the QoS significantly but has other beneficial impacts on the utility with enormous potential. The number of telecontrol elements and fault detectors has an impact in the area/KVA isolated and in the speed of isolation (higher penetration of telecontrol reduces the isolated KVA and allows finding the fault faster). Two R&D initiatives, the "Grid4EU" European project cofounded by European Union under the 7th Framework Programme and "BIDELEK Sareak", co-founded by the Basque Country Government, have sponsored this solution designed by IBERDROLA and implemented by SIEMENS¹. NYSEG is implementing this innovative approach under this proposed project and will continue to collaborate with the utility industry to expand its use.

Meeting Program Objectives: The proposed project will result in a strong, positive benefit for residents, limiting the scope and impact of outages when they occur and increasing the Company's ability to quickly restore power after a significant outage. The scope will implement Smart Grid technologies including AGR and SR, innovative "self-healing" technology implemented and designed to reduce the frequency and impact of outages to the communities served. The project is in line with DOE and regulatory goals and objectives.

State of Maine is actively and aggressively pursuing actions to address climate change and develop new infrastructure in a sustainable manner. "Maine Won't Wait" is a four-year climate plan adopted in 2020 that is packed with actionable strategies and goals to emit less carbon, produce energy from renewable sources and protect Maine's natural resources, communities and people from worst case scenarios. The goal of the plan is to create historic momentum for reducing emissions, advancing clean energy, and protecting Maine's infrastructure and environment from the harms of climate change.

WORKPLAN

Project Objectives: The proposed project will implement Smart Grid technologies including AGR and SR, designed to reduce the frequency and impact of outages to the communities served and maximize benefits to DACs as defined by the U.S. Department of Energy, the White House and/or the State of Maine. The grid enhancing technologies planned have potential to modernize the grid, increase capacity, reduce clean energy curtailment, unlock additional clean energy generation, and enable more resilient grid operation. Targeted improvements to the baseline infrastructure include: smart grid upgrades to approximately 80 circuits.

Technical Scope Summary: The CMP power delivery system is comprised of high and medium voltage transmission lines which move electric power across long distances, and the accompanying distribution network system. The distribution system includes familiar roadside lines and equipment that deliver power directly to customers. Distribution is connected to the transmission system through distribution substations. A substation may supply one or more distribution circuits, and the lines in a circuit may serve a small portion of a single town or they may extend along 50 or more miles of roadside through several towns. CMP's system generally ends at the meter box on the outside of a customer's home or business. Distribution lines

¹ Marti, Richter and de Gabriel. CIRED 23rd International Conference on Electricity Distribution, Automatic Grid Recovery (AGR/ARA), The Virtual Operator.

generally operate at 4,000-34,500 volts (4-34.5 kV). The energized (live), primary-voltage conductors are at the top of the pole on a horizontal crossarm or a pole-top insulator in America's most forested state. A neutral wire is typically attached about four feet below the energized conductors. Additional equipment may include distribution transformers (round, grey canisters mounted just below the primaries), streetlights, energized, secondary-voltage conductors, and service cables to individual customers. Below the electrical equipment, distribution poles also provide space for telecommunications attachments such as cable television, fiber optic and telephone cables. Specific project tasks include:

- Distribution Automation Program incorporating "self healing" technologies resulting in a reduction of both the quantity of customers that experience outages and the duration those customers lose power.
- Comprehensive area studies to increase the capacity of transmission facilities or the capability of the transmission system to reliably transfer increased amounts of electric energy and allow for integration of renewable energy resources at the transmission and distribution levels
- Substation studies to facilitate the aggregation and integration of electric vehicles and other grid-edge devices or electrified loads
- Transmission SCADA Switch Program to prevent faults that may lead to wildfires or other system disturbances

WBS and Task Description Summary: The Workplan will focus on implementation of the CMP Distribution Automation Program, focused on DACs.

Zone 1: CMP Distribution Automation Program: The Distribution Automation Program (DAP) aims to increase the reliability of the entire Central Maine Power (CMP) distribution network through targeted topology enhancements including the installation of SCADA controllable switches and reclosers, as well as creating smaller and easier manageable customer zones to improve Advanced Restoration and Automation (ARA). This program will also add additional tie points to the distribution network in an effort to implement Loop Scheme to decrease outage time for customers. Overall, the program will install devices over 5 years to improve the reliability of the entire CMP network and improve the electric service for all customers powered by CMP.

The project will proceed independently through a standard CMP Project Development Process, including the WBS tasks of:

- **Subtask 2.X.1 – Conceptual Design** – The Recipient will conduct conceptual design tasks necessary for integration of smart grid capabilities into the portfolio of selected sites.
- **Subtask 2.X.2 – Detailed Design** – The Recipient will solicit for contactors and conduct detailed design tasks for integration of smart grid capabilities into the portfolio of selected sites.
- **Subtask 2.X.3 – Long lead Materials Procurement** – The Recipient will initiate long lead procurement under the Buy America Act for Reclosers, Switches, Communications Equipment, Wood Poles, Framing, Insulators, Arrestors, Wire, and Transformers in addition to any other items identified as greater than 24 weeks lead time.

- **Subtask 2.X.4 – Procurement for Construction** - The Recipient will solicit for contactors to conduct construction tasks necessary for integration of smart grid capabilities into the portfolio of selected sites.
- **Subtask 2.X.5 – Construction** - The Recipient will construct the portfolio of selected sites defined in the detailed design managing project scope, schedule, budget, quality, and measure performance following the change process.
- **Subtask 2.X.6 – Commissioning and Close Out** - Upon completion of construction, the improvements will be commissioned into use. Close out activities will be conducted to document and close out each project.

Milestone Summary: The project schedule includes quarterly milestones.

Go/No-Go Decision Points have been determined for appropriate points in the Workplan, one for each of the four (4) budget periods outlined in the schedule and SOPO.

- BP1 to BP2 decision point will be in Month 16. The criteria will be the completion of a successful IP2, Technical Scoping, for the project including technical scoping of the proposed project, an evaluation of stakeholder needs, a baseline budget (+50%-25%), and a Go/No Go Decision IAW CMP corporate procedures and the DOE SOPO.
- BP2 to BP3 decision point will be in Month 33. The criteria will be the completion of a successful IP3 IAW CMP corporate procedures and the DOE SOPO. The milestone concludes with a subproject budget and release of funds against estimates accuracy.
- BP3 to BP4 decision point will be in Month 50. The criteria will be the completion of IP4, tracking of the project for significant changes in scope, schedule, or budget.

End of Project Goal: The End of Project goal concludes with the IP5 Milestone IAW CMP corporate procedures and the DOE SOPO that documents pre-project and post-project schematics, asset management, lessons learned, and unitization of assets put in service.

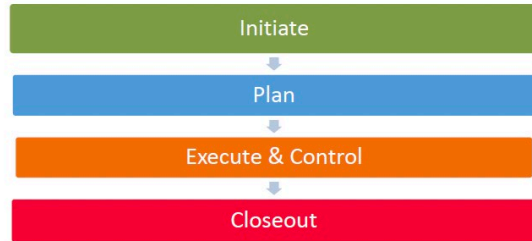
- The Zone upgraded will be analyzed with an end of project goal of advancing the resiliency for customers.

Project Schedule: The project will be conducted over five years.

Buy America Requirements for Infrastructure Projects: The proposed project does involve the construction and alteration of public infrastructure in the United States. CMP has completed a survey of major suppliers anticipated to participate on this program. Based on the information gathered, CMP intends to comply with Buy America Requirements and has a supply chain prepared to do so. The scope of work, schedule and budget estimate reflect USA sourced materials and manufactured products.

Project Management

Overall Approach to and Organization for Managing the Work: CMP follows a corporate Project Management process (last updated February 24, 2022) to safely manage capital projects and complete them on-time and on-budget given the established scope. All projects proceed through four-phases. Initiation was completed during the DOE application preparation including scope,



schedule, budget, communication, procurement and risk management plans. Upon award, each item will be updated with any guidance from DOE, the Plan phase. During execution, regular meetings and updates will guide scope, schedule and budget management, using defined project performance measurement metrics. The project will complete with defined closeout tasks, turn over to the area

operators and wrap up with lessons learned.

Roles of Each Project Team Member: CMP is the utility provider in the region and serves the communities daily with measures in place to ensure strong collaboration including customer service support and planning procedures. CMP will call upon a strong group of qualified contractors to perform the work. Existing contracts, master services agreements, and certifications will allow the progress timeline to proceed quickly. CMP has already surveyed contractors for their planned contribution to Community Benefits Plan and catalogued responses to assist in planned request for proposals and contractor selection. CMP has agreements through the AVANGRID network that allows the capability to pull resources and economies of scale from other operating companies in the region.

CMP will work with a 501(c)3 Non-profit, Electricore Inc. (Electricore), to plan and execute all DOE contracting requirements, reporting and deliverables. Existing Participant Agreements are in place to govern the effort. Electricore, founded in 1993 by the United States (US) Department of Defense (DoD), has conducted more than 250 public/private/partnership research and development programs. Over thirty years of federal programs, Electricore has developed robust systems and practices, such as DCAA and independently audited financial practices and well proven project management practices that will enable continuous monitoring of project performance, reflected in reporting to DOE. Electricore is currently using these skills to manage multiple cooperative agreements with the DOE.

Critical Handoffs/Interdependencies: CMP follows a well-developed and documented procedure for project development that includes critical handoffs/interdependencies among project team members, timing of the gates and the information required to be handed off. Important information includes requirements for entering or completing a project phase and the organization/leader responsible for each role in the handoff. The process is detailed in the corporate Project Management process (last updated February 24, 2022).

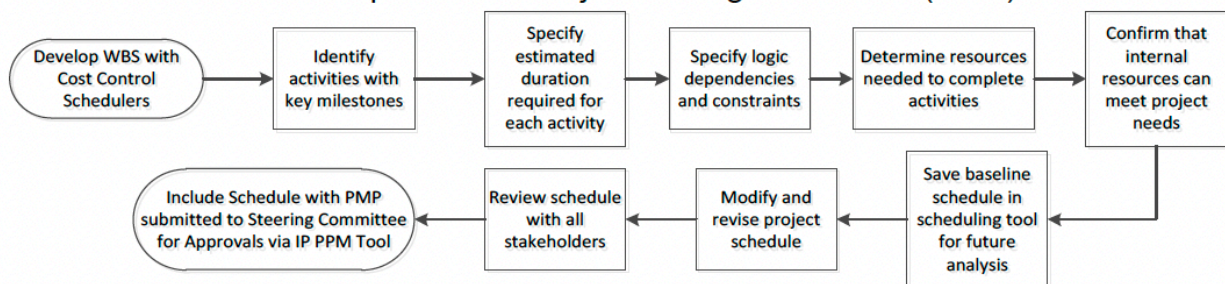
Technical and Management Aspects of the Management Plan:

Scope: The Project Manager will identify any scope variances and determine the appropriate course of action: Avoid scope creep (the gradual increase that ultimately results in performing more work than was originally envisioned or authorized) or forecast the addition or reduction of

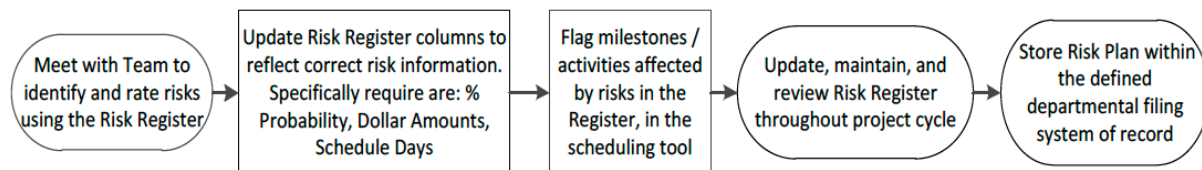
scope for project sponsor review Determine how a scope change will affect the schedule, budget, and other project elements and process the change order.

Schedule: The team will monitor schedule variances, comparing the current status of the project schedule to the approved baseline schedule and take appropriate actions including forecasting completion dates and implementing any corrective or recovery actions to avoid adverse schedule impacts. Schedule will include a Procurement Plan (in Primavera Tender Tracker) that will update accordingly as needs and/or timelines change.

Budget: The team will monitor project costs and to take appropriate actions when variances are noted. Budget Management will track all project costs, ensuring the accuracy of all project charges. It focuses on determining the present project status, comparing it to the baseline costs to determine any variances, forecasting projected costs at completion and implementing any appropriate preventive or corrective actions.



Project Risk Management: The Risk Plan will identify project risks and their probable impact, defined as an event that may have a positive or negative impact on the project's ability to meet its objectives, and document in a risk register.



Workforce and Community Agreements to Limit Disputes: CMP has relationships with unions, trade groups, universities/colleges, and many supply chain providers. These important organizations will be engaged to assist in addressing job quality and workforce continuity. Building on existing relationships with Unions, CMP will strive to maximize the use of union labor and project labor agreements. IBEW 1837, with members across Maine State, includes members who work at CMP.

Developing the Workforce Pipeline: There are several workforce engagement programs in place and the company has taken steps to identify areas with greater vacancies and demand for qualified candidates is higher. CMP will continue its efforts to build on existing partnerships to leverage employment while engaging with new organizations to attract entry level employees, specifically those seeking construction, line supervision, electric and gas operations.

Project Changes: The Project Manager is responsible for executing the Project Management Plan and determining whether to implement a project change. Changes that push the scope, schedule

and or budget out of tolerance will be documented on a Projects Change Request Form and communicated to DOE for review and approval.

Quality Assurance/Control: The Quality Plan will document quality requirements and standards for the project, deliverables and plans to meet the requirements and standards based on the project objectives. Tools will include a Kickoff Meeting, checklists, engineering and design standards, quality gates and approvals, document management work instructions and process maps. All project requirements, as listed in the Quality Management SOP (including technical, environmental, safety, logistic, etc.) and its risks, shall be determined to ensure the quality of the project.

Communications Among Team Members: CMP will identify all stakeholders (both internal and external) and document stakeholders' specific communication and reporting needs, frequency, and method of communication at the beginning of the project and follow the process rigorously.

TECHNICAL QUALIFICATIONS AND RESOURCES

Project Team's Unique Qualifications and Expertise: CMP is Maine's largest electricity transmission and distribution utility. Established in 1899 and based in Augusta, Maine, CMP serves approximately 646,000 customers across 346 communities in central and southern Maine. It operates approximately 23,500 miles of distribution lines and 2,900 miles of transmission lines. CMP has 941 employees.

CMP employs standard operating procedures based on the Project Management Institute Project Management Book of Knowledge. In the CMP territory, at any given time, upwards of one hundred resources are planning and executing projects. The CMP Projects program is both ISO 9001 and ISO 14001 annually certified, demonstrating a commitment to both advanced project management processes and the protection of the environment. The Projects Group utilizes a regularly updated Quality and Environmental Management System Manual (SOP.P.09.01 Revision 5) focusing on continuous improvement, safety, health and environmental quality. The Projects organization has been operating for over 10 years and has maintained ISO certification since 2014.

Maine Community Foundation, a well-respected and accomplished community foundation will plan and administer grant funding to select area non-profits as part of the Community Benefits Plan.

Electricore Inc. (Electricore), founded in 1993 by the United States (US) Department of Defense (DoD), has conducted more than 250 public/private/partnership research and development programs. Over thirty years of federal programs, Electricore has developed robust systems and practices, such as DCAA and independently audited financial practices and well-proven project management practices that will enable continuous monitoring of project performance, reflected in reporting to DOE. Electricore is currently using these skills to managing multiple cooperative agreements with the Department of Energy (DoE).

Existing Equipment and Facilities: All necessary facilities exist and are in place to conduct this project. CMP is the incumbent utility with an existing workforce and serves this region daily. CMP maintains teams of internal experts for engineering, construction, and project management with deep knowledge of the resiliency issues to be addressed and territory to be modified. Processes

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are in place to immediately begin the planning and execution of the projects. Procurement channels are in place and will utilize a host of established vendors and contractors under master services agreements – pre-negotiated prices based on standard units for the scopes of work - proposed under this funding opportunity. This existing supply chain channel will allow rapid progression of contracting, planning and execution of the project and pricing.

Relevant Previous Work Efforts: CMP has prior experience in the size and complexity of the proposed scope of work, including the successful Maine Power Reliability Program (MPRP), a \$1.4 billion power grid infrastructure investment completed in 2015. Over the last decade, CMP has invested approximately \$3.5 billion in Maine system infrastructure including: i) advancing system reliability with stronger power lines and poles and new automation to reduce outage impacts, ii) Transmission line replacements, iii) Increased distribution line inspections and iv) Operational projects maintaining, reconstructing, inspection, testing, restoring, removing, and repairing of infrastructure. CMP maintains teams of internal experts for engineering, construction, and project management with deep knowledge of the resiliency issues to be addressed and territory to be modified. Processes are in place to immediately begin the planning and execution of the projects.

Procurement channels are in place and will utilize a host of established vendors and contractors under master services agreements – pre-negotiated prices based on standard units for the scopes of work - proposed under this funding opportunity. This existing supply chain channel will allow for rapid progression of contracting, planning and execution of the project and inform pricing.

DOE/NNSA FFRDCs: Not Applicable.