

STATEMENT OF PROJECT OBJECTIVES (SOPO)

Minnesota Power (MP)

HVDC Terminal Expansion Capability (HTEC) Project

A. OBJECTIVES

MP will implement the HVDC Transmission Expansion Capability Project (HTEC Project) by building on the foundation of an existing modernization effort to increase the design capacity of the HVDC converter terminals from 900 MW to 1500 MW with a target in-service date of December 31, 2028. The additional capacity from the HTEC Project will make the HVDC System future-ready for further expansion to support the increased transfer of clean energy from one of the highest efficiency renewable energy areas in North America, provide greater grid support and operating flexibility, and enhance resiliency of the system as intermittent generation continues to be added to the grid.

B. SCOPE OF WORK

The HTEC Project team will work with an HVDC supplier to design and build two voltage source converter (VSC) HVDC terminal stations capable of delivering 1500 MW, ensuring that they are sized and configured for future local and regional grid expansion. HVDC terminal stations are designed and equipment is manufactured by a limited number of suppliers globally. Due to their specialized nature, MP will enter an engineer, procure, construct (EPC) contract with a selected supplier for this project. The supplier will help define the project by performing front-end engineering and design (FEED) studies. The supplier will then develop a firm price bid, complete detailed engineering, manufacture the equipment, conduct acceptance testing, and will work with a contractor to install, test, and commission the terminals under a known schedule in line with the grant period. MP will own and operate all of the facilities proposed.

C. TASKS TO BE PERFORMED**Task 1.0: Project Management and Planning****Subtask 1.1 – Project Management Plan (PMP)**

Within 30 days of award, the Recipient shall submit a Project Management Plan (PMP) to the designated Federal Project Officer (FPO). The Recipient shall not proceed beyond Task 1.0 until the PMP has been accepted by the FPO.

The PMP shall be revised and resubmitted as often as necessary, during the course of the project, to capture any major/significant changes to the planned approach, budget, key personnel, major resources, etc.

The Recipient shall manage and direct the project in accordance with the accepted PMP to meet all technical, schedule and budget objectives and requirements. The Recipient will coordinate activities to effectively accomplish the work. The Recipient will ensure that project plans, results, and decisions are appropriately documented, and that project reporting and briefing requirements are satisfied.

Subtask 1.2 - National Environmental Policy Act (NEPA) Compliance

As required, the Recipient shall provide the documentation necessary for NEPA compliance.

Subtask 1.3 - Create Cybersecurity Plan (CSP)

The CSP shall be revised and resubmitted as often as necessary, during the course of the project, to capture any major/significant changes.

Subtask 1.3.1 Determine and assign NERC CIP impact rating

Subtask 1.3.2 Determine Vendor Support Model and requirements

Subtask 1.3.3 Determine secure equipment delivery of control system

Subtask 1.3.4 Define network architecture to utilize security zones

Subtask 1.3.5 Create/Update device management documentation

Subtask 1.3.6 Implement network architecture and security zones

Subtask 1.3.7 Onboard and apply NERC CIP processes and controls

Subtask 1.3.8 Determine best practice to monitor network/system

Subtask 1.3.9 Implement and tune security monitoring

Subtask 1.3.10 Conduct third party cyber vulnerability assessments

Subtask 1.3.11 Implement remediation wherever possible

Subtask 1.3.12 Review/Update incident reporting and response plan

Subtask 1.4 – Receive certificate of need from the MN Public Utilities Commission

Go/No-Go

Subtask 1.5 - Continuation Briefing(s)

The Recipient will brief DOE on roughly an annual basis to explain the plans, progress and results of the technical effort. The briefing shall also describe performance relative to project success criteria, milestones, and the Go/No-Go Decision point that are documented in the Project Management Plan (PMP).

Task 2.0 - Community Benefits Plan (CBP)

Subtask 2.1 – CBP Updates

The CBP shall be revised and resubmitted as often as necessary during the course of the project, to capture any major/significant changes.

Subtask 2.2 – Conduct community and labor engagement

Subtask 2.2.1 – Hold community listening sessions and stakeholder events

Subtask 2.2.2 – Meet regularly with Tribal Nations

Subtask 2.2.3 – Offer community educational sessions

Subtask 2.2.4 – Establish a Community Benefits Committee to develop a Community Benefits Agreement

Subtask 2.3 – Invest in the American Workforce

Subtask 2.3.1 – Hold meetings with labor and union representatives

Subtask 2.3.2 – Attend job fairs near host and disadvantaged communities

Subtask 2.4 – Advance DEIA

Subtask 2.4.1 – Increase the percentage of diverse suppliers in project bids

Subtask 2.4.2 – Identify diverse Tier 1 and Tier 2 suppliers

Subtask 2.5 – Contribute to the Justice40 Initiative

Subtask 2.5.1 – Increase Energy Democracy in DACs served by MP

Subtask 2.5.2 – Offer scholarships for Tribal members to attend Workforce Empowerment Training

Task 3.0 - Technical Specification Development**Subtask 3.1 - Preliminary Engineering**

- Subtask 3.1.1 – Develop Main Circuit Parameter Study
- Subtask 3.1.2 – Perform Transients & Insulation Coordination Study
- Subtask 3.1.3 – PSCAD Model Development to be used for control system simulations
- Subtask 3.1.4 – Develop AC System Equivalents for Power System Models
- Subtask 3.1.5 – Draft DC Switchyard Concept
- Subtask 3.1.6 – Determine Civil and Building Requirements
- Subtask 3.1.7 – Conduct route survey for transformers
- Subtask 3.1.8 – Define Electrical and Mechanical Building Services requirements
- Subtask 3.1.9 – Perform Preliminary Dynamic Performance Study
- Subtask 3.1.10 – PSS/E Model Development
- Subtask 3.1.11 – Create Single Line Diagram

Subtask 3.2 – Completed Technical Specification**Subtask 3.3 – Deliver Firm Pricing based on technical specification *Go/No-Go*****Subtask 3.4 – Engineer, Procure, Construct Contract negotiation and execution****Subtask 3.5 – Final Notice to Proceed/Invoice to secure equipment *Go/No-Go*****Task 4.0 – System Studies****Subtask 4.1 – Design Studies**

- Subtask 4.1.1 – External Insulation and Air Clearance including approval
- Subtask 4.1.2 – Main Circuit Parameters finalized including approval
- Subtask 4.1.3 – Prepare Power Line Carrier requirement
- Subtask 4.1.4 – Electromagnetic Fields study including approval
- Subtask 4.1.5 – Low Frequency Characteristic including approval

Subtask 4.2 – Performance Studies

- Subtask 4.2.1 - Reliability Availability Maintenance – Performance Study including approval
- Subtask 4.2.2 - Electromagnetic Compatibility Plan
- Subtask 4.2.3 – Prepare Electromagnetic coupling
- Subtask 4.2.4 – Prepare Radio Interference including approval
- Subtask 4.2.5 – Dynamic Performance Study including approval

Subtask 4.3 – Network Studies

- Subtask 4.3.1 – Digital Stability Preliminary Program Model
- Subtask 4.3.2 – AC System Equivalents including approval
- Subtask 4.3.3 – Network Study including Sub synchronous Torsional Interaction
- Subtask 4.3.4 – Stability Modulation/Frequency Control including approval
- Subtask 4.3.5 – Digital Stability final Program Model

Subtask 4.4 – Performance Verification

- Subtask 4.4.1 – Radio Interference Measurements modeled
- Subtask 4.4.2 – Prepare Electrical Interference report
- Subtask 4.4.3 – Performance Verification Study including approval (loss and overload calcs)

Subtask 4.5 – Engineering Converter Modules

- Subtask 4.5.1 – Procurement and PO for converter modules
- Subtask 4.5.2 – Supplier Design and manufacturing
- Subtask 4.5.3 – Converter Module factory acceptance testing *Go/No-Go decision*

Task 5.0 – Main Component Design and Manufacture**Subtask 5.1 – AC Equipment**

Subtask 5.1.1 – Converter Transformer Design and Manufacture

Subtask 5.1.2 – Converter Transformer factory acceptance testing *Go/No-Go decision*

Subtask 5.1.3 – Design and manufacture balance of AC equipment

Subtask 5.1.4 – Transport balance of AC equipment

Subtask 5.2 – DC Equipment

Subtask 5.2.1 – Design and manufacture DC Equipment

Subtask 5.3 – Measuring Devices

Subtask 5.3.1 – Engineer DC Voltage and Current Measurement devices

Subtask 5.3.2 – Manufacture measurement devices

Task 6.0 – Control and Protection System**Subtask 6.1 – Control and Protection Cubicles**

Subtask 6.1.1 – Design specification for control and protection cubicles

Subtask 6.1.2 – Manufacture control and protection cubicles

Subtask 6.1.3 – Transport control and protection cubicles

Subtask 6.2 – Functional and Dynamic performance test without replica

Subtask 6.2.1 – Setup test area and simulator

Subtask 6.2.2 – Pre-communication test

Subtask 6.2.3 – Integration Functional Performance Test

Subtask 6.2.4 – Integration Dynamic Performance Test

Subtask 6.2.5 – Official Functional Performance Test – Factory acceptance testing*Go/No-Go decision*

Subtask 6.2.6 – Official Dynamic Performance Test – Factory acceptance testing*Go/No-Go decision*

Subtask 6.3 – Software Engineering and simulation

Subtask 6.3.1 – Simulator setup and implementation

Subtask 6.3.2 – Control Parameter Study

Subtask 6.3.3 – DC Protection Study

Subtask 6.3.4 – AC Protection Study

Task 7.0 – Installation

Subtask 7.1 – Auxiliary power supply including pre-commissioning

Subtask 7.2 – Converter Transformers

Subtask 7.3 – AC Switchyard equipment

Subtask 7.4 – Control and protection equipment in control building

Subtask 7.5 – converter modules into converter hall

Subtask 7.6 – DC balance of equipment into DC Hall

Subtask 7.7 – Converter Water cooling equipment

Task 8.0 – Commissioning

Subtask 8.1 – Pre-commissioning

Subtask 8.2 – Sub system tests

Subtask 8.3 – High Voltage AC Energization

Subtask 8.4 – Station tests

Subtask 8.5 – DC Overhead Line ready for energization

Subtask 8.6 – Start First Power Transmission**Subtask 8.7 – Power Transmission Tests****Task 9.0 – Trial Operation and Substantial completion****Subtask 9.1 – Trial period operational track begins****D. DELIVERABLES**

Subtask 1.1- Project Management Plan

Subtask 1.2 – Cybersecurity Plan

Subtask 1.3 – Pre-Continuation Briefing Document(s)

Subtask 2.1 – Community Benefits Plan Updates

Subtask 4.3.1 – Preliminary digital stability program model

Subtask 4.3.5 – Final digital stability program model

Subtask 5.1.2 – Results of converter transformer factory acceptance testing

Subtask 6.2.5 – Results of functional performance test

Subtask 6.2.6 – Results dynamic performance test

In addition to the deliverables listed above, the Recipient shall submit all periodic, topical, final, and other reports in accordance with the Federal Assistance Reporting Checklist and accompanying instructions.

E. BRIEFINGS/TECHNICAL PRESENTATIONS

The Recipient shall prepare, and present periodic briefings, technical presentations and demonstrations as requested by the Federal Project Officer, which may be held at a DOE or the Recipient's facility, other mutually agreeable location, or via webinar. Such meetings may include all or a combination of the following:

Kickoff Briefing - Not more than 30 days after submission of the Project Management Plan, the Recipient shall prepare and present a project summary briefing as part of a Project Kickoff Meeting.

Pre-Continuation Briefing - Not less than 90 days prior to the planned start of a budget period, the Recipient shall brief the DOE on the results to date, and their plans for the subsequent periods of work. The DOE will consider the information from this briefing, as well as the content of deliverables submitted to date, prior to authorizing continuing the project.

Final Project Briefing - Not less than 30 days prior to the end of the project, the Recipient shall prepare and present a Final Project Briefing on the results and accomplishments of the entire project.

Other Briefings – The Recipient shall prepare and present technical, financial, and/or administrative briefings as requested by the DOE. Additionally, the DOE may require Recipients to make technical presentations at national and/or industry conferences.