Direct Testimony and Schedules
Daniel W. Gunderson

Before the Minnesota Public Utilities Commission

State of Minnesota

In the Matter of the Application of Minnesota Power
for a Certificate of Need and Route Permit for the HVDC Modernization Project
in Hermantown, Saint Louis County

OAH Docket No. 5-2500-39600
MPUC Docket Nos. E015/CN-22-607
and E015/TL-22-611

PROJECT OVERVIEW AND RISKS OF ALTERNATIVE PROPOSAL

February 14, 2024

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I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Daniel ("Dan") W. Gunderson, and my business address is 30 West Superior Street, Duluth, Minnesota 55802.

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

A. I am employed by ALLETE, Inc., doing business as Minnesota Power ("Minnesota Power" or the "Company") as the Vice President of Transmission and Distribution.

Q. Please summarize your qualifications and experience.

A. I hold a Bachelor of Science degree in Electrical Engineering from Michigan Technological University. I obtained a master's degree in business administration with an emphasis in business operations from the Carlson School of Management at the University of Minnesota in 2006. I completed requirements for obtaining Professional Engineers licensure in Minnesota in 2007 and have also held a Minnesota Class A Master Electrician's license since 2004. I began my career with Minnesota Power in 2006 as a Meter Engineer and later a Supervising Engineer of the Electric Meter Department, where I was responsible for providing project management and oversight for the Smart Grid Investment Grant project, the Advanced Metering Infrastructure ("AMI") System technology and implementation and managing work for technicians that maintain all metering systems. In 2013, I served as Manager of Technical Systems, where I was responsible for oversight of Substation Maintenance, Substation Construction, and Relay and Protection Systems. In this role, I also managed transmission substation asset management programs. I have also worked as the Manager of Distribution Resources where I led our Distribution Services area—including line operations, operations planning, trouble, and dispatch—before being promoted to Director of Distribution Operations in 2015. In 2019, I was promoted to Vice President of Transmission and Distribution where I have led the Transmission and Distribution operations, support and strategy. These areas include approximately 373 employees,

with nearly 200 of those employees as members of International Brotherhood of Electric Workers Local 31.

Q. What is the purpose of your testimony?

A. The purpose of my Direct Testimony is to provide background on the Company's Square Butte high-voltage, direct-current ("HVDC") system and the American Transmission Company, LLC ("ATC") Arrowhead Substation. I also discuss the Company's diligent efforts to obtain funding via state and federal programs to mitigate costs of the HVDC Modernization Project ("Project") for Minnesota Power customers. Finally, I discuss funding, in-service, rate impact, and cost recovery risks associated with the system alternative proposed by ATC, which I will refer to as the "ATC Arrowhead Alternative."

Q. Who are the other Company witnesses filing Direct Testimony?

A. The other Company witnesses providing Direct Testimony on behalf of Minnesota Power are:

- Daniel McCourtney, Manager Strategic Environmental Initiatives – provides an overview of the routing efforts undertaken by Minnesota Power prior to filing the Certificate of Need and Route Permit Application ("Application") for the Project and discusses the environmental considerations for the Proposed Route. Mr. McCourtney addresses feedback that Minnesota Power has received on the Project since filing the Application and the Company's mitigation measures to limit potential natural and socioeconomic impacts of the Project. Mr. McCourtney provides testimony regarding environmental and permitting considerations related to the ATC Arrowhead Alternative.
- Christian Winter, Manager Regional Transmission Planning – describes the need for the Project and Minnesota Power's existing transmission system from a technical perspective. Mr. Winter also discusses how the Project interacts with the planning process of the Midcontinent Independent System Operator, Inc. ("MISO"). Mr. Winter also provides testimony regarding Minnesota Power's

evaluation of transmission system alternatives to the Project and explains why Minnesota Power's proposed Project is the most technically-sound, reasonable, and prudent alternative that will continue to provide the greatest benefit to Minnesota Power's customers for decades and is the most consistent with local and long-term regional transmission planning needs.

Q. Are you sponsoring any exhibits in this proceeding?

A. Yes. I am sponsoring the following schedules to my Direct Testimony:

- MP Exhibit ___ (Gunderson), Direct Schedule 1 – ATC Response to Minnesota Power Information Request No. ("MP IR") 009;
- MP Exhibit ___ (Gunderson), Direct Schedule 2 – ATC Response to MP IR 007; and
- MP Exhibit ___ (Gunderson, Direct Schedule 3 – Minnesota Power Response to ATC Information Request No. ("ATC IR") 031.

II. PROJECT BACKGROUND

A. The HVDC System

Q. When was the HVDC system constructed?

A. The Square Butte Cooperative ("Square Butte") was created under a joint agreement between Minnesota Power and Minnkota Power Cooperative in May of 1972. The HVDC system was subsequently constructed by Square Butte and has been operating continuously since 1977.

Q. Please explain how the HVDC System delivers power to the AC system in northeastern Minnesota.

A. The HVDC system is designed to convert alternating-current ("AC") generated power from the 230 kV Square Butte East Substation in Center, North Dakota into ±250kV high-voltage, direct-current ("HVDC") via a converter station. Power is then transmitted by HVDC over approximately 465 miles of line ("HVDC Line") east to Minnesota Power's 230 kV/115 kV Arrowhead Substation and converted back into AC

power at that location. The transmitted power is then primarily injected into Minnesota Power's transmission system in northeastern Minnesota to serve Minnesota Power's customers. These assets are collectively referred to as the "HVDC System."

Q. Why did Minnesota Power acquire the Square Butte HVDC System?

A. Minnesota Power was a 50 percent owner of Square Butte, which was the sole owner of the HVDC System from 1977 through 2009. Minnesota Power fully acquired the HVDC assets in 2009 through a mutual agreement with Square Butte Cooperative and is now the sole owner of the HVDC System. The system was acquired by Minnesota Power as part of its transition to carbon-free energy and allowed for the transition from coal-fired generation resources in North Dakota to high-capacity factor wind resources delivered through the HVDC System.

Q. What approvals did the Company seek in acquiring the Square Butte HVDC System?

A. The Company was required to submit a FERC 203 Application for a straight-forward purchase of transmission facilities that is utilized by two users (FERC Docket No. EC09-108-000 – Order dated November 24, 2009). The Company also received approval of the Minnesota Public Utilities Commission ("Commission") to acquire the assets (MPUC Docket No. E015/PA-09-526). Therefore, Minnesota Power obtained all necessary approvals, including those of the Midcontinent Independent System Operator, Inc. ("MISO").[1]

Q. What has the Company proposed in this proceeding?

A. On June 1, 2023, Minnesota Power filed a combined Application for the HVDC Modernization Project with the Commission. In that Application, Minnesota Power proposed to replace and modernize HVDC terminal equipment that has operated for more than 47 years, well beyond its 30-year design life. In recent years, Minnesota Power has experienced HVDC terminal outages due to failures in the control system,

[1] At the time, MISO was known as the Midwest Independent Transmission System Operator, Inc.

power electronics, transformers, and other components of the HVDC terminals. The HVDC System is an important asset for Minnesota Power and its customers. The HVDC Line connecting the HVDC terminals transmits electricity from the generation of wind at Minnesota Power assets located in North Dakota directly to Minnesota Power customers in northeastern Minnesota.

To modernize the HVDC System, Minnesota Power proposed to construct new HVDC terminals (containing HVDC/345 kV equipment) near existing HVDC terminals in Hermantown, Minnesota and Center, North Dakota. Additionally, Minnesota Power proposed to construct a new St. Louis County 345 kV/230 kV Substation, construct a short (less than one mile) 345 kV transmission line between the HVDC terminal and the St. Louis County 345 kV/230 kV Substation, and construct two short 230 kV circuits (less than one mile) between the St. Louis County 345 kV/230 kV Substation and the existing Minnesota Power 230 kV/115 kV Arrowhead Substation.[2] The decades-old connection between the existing HVDC terminal and the existing Minnesota Power 230 kV/115 kV Arrowhead Substation would then be replaced by this connection to the new HVDC terminal.

Q. Were any alternatives suggested as part of the Environmental Assessment ("EA") scoping process for the Project?

A. Yes. While no route alternatives were suggested, Minnesota Power did request that a portion of the Route Width for the Project be expanded to allow for sufficient space for Project construction. Minnesota Power also requested that the crossing of the West Rocky Run Creek be evaluated as a double-circuit 230 kV transmission line crossing instead of two parallel transmission lines. Company witness, Mr. McCourtney, discusses both of these requests in more detail in his Direct Testimony. Additionally, during the EA development process, ATC requested that an electrical system alternative to Minnesota Power's proposed configuration be evaluated. ATC requested that, instead

[2] In his Direct Testimony, Company witness, Mr. McCourtney discusses the Company's revision to include a double-circuit 230 kV transmission line instead of two separated 230 kV transmission lines.

of the Project connecting to Minnesota Power's local AC transmission system at 230 kV at Minnesota Power's Arrowhead 230 kV/115 kV Substation, that the Project connect to ATC's Arrowhead 345 kV/230 kV Substation at 345 kV and that the St. Louis County 345 kV/230 kV Substation not be constructed as part of the HVDC Modernization Project. ATC's proposed Arrowhead Alternative is inferior to the Project and does not serve the Project need for reasons discussed in my Direct Testimony and the Direct Testimony of Company witnesses Mr. McCourtney and Mr. Winter.

B. Arrowhead Substations

Q. Please describe the two Arrowhead Substations in Hermantown, Minnesota.

A. There are two distinct substation facilities located adjacent to each other in Hermantown, MN. The first facility is Minnesota Power's Arrowhead 230 kV/115 kV Substation. This substation is wholly-owned by Minnesota Power and is the current interconnection point for the existing HVDC System to Minnesota Power's AC transmission system. The HVDC System has interconnected at this location to directly serve Minnesota Power's customers at 230 kV for decades.

The second facility in this area is ATC's Arrowhead 345 kV/230 kV Substation. This substation was energized in February 2008 as part of Minnesota Power and ATC's joint Arrowhead – Weston 345 kV Transmission Project for the purpose of facilitating increased transfer capability to Wisconsin to improve the reliability of the Wisconsin transmission system.

Q. What is the purpose of Minnesota Power's 230 kV/115 kV Arrowhead Substation?

A. Minnesota Power's Arrowhead 230 kV/115 kV Substation serves multiple purposes. First, it is interconnected with the 230 kV AC network in northeastern Minnesota and is used to provide service to Minnesota Power customers. Second, the facility is the interconnection point for the existing HVDC system and is the primary facility for energy delivery from Minnesota Power's renewable assets in North Dakota. Lastly, this facility is an interconnection from the Minnesota Power 230 kV system to the

Arrowhead 345 kV system that is regulated by a phase shifter designed to limit flow due to the demand of the transmission network in Wisconsin.

Q. What is the purpose of ATC's 345 kV/230 kV Arrowhead Substation?

A. The purpose of ATC's 345 kV/230 kV Arrowhead Substation is to be the interconnection point between the northwestern Wisconsin and northeastern Minnesota AC transmission systems. The ATC 345 kV/230 kV Arrowhead Substation was constructed as part of the Arrowhead – Weston 345 kV transmission project ("Arrowhead – Weston Project") as a critical path to support the transmission network in Wisconsin and help resolve some of the constraints on the Minnesota – Wisconsin transmission interface. The purpose of this facility was explained by ATC as follows:

> First, Arrowhead – Weston improves electric system reliability by reducing the strain on Wisconsin's single transmission connection to the west, the Eau Claire – Arpin transmission line. Second, this project increases import and transfer capability into Wisconsin, a state that depends on imports to meet its power needs. Third, it provides needed support for WPS Weston 4 power plant and helps all of Central Wisconsin be less vulnerable to outages. Fourth, the Stone Lake Substation provides critical support for Xcel customers in Northwestern Wisconsin, and lastly the line improves access to lower cost, Western energy markets, which is an unanticipated advantage.[3]

In summary, the ATC 345 kV Arrowhead Substation was built to benefit the Wisconsin AC transmission system and Wisconsin electrical users.

Q. What was Minnesota Power's role in the permitting and construction of ATC's 345 kV/230 kV Arrowhead Substation?

A. Minnesota Power supported the development and Minnesota permitting process for the Arrowhead – Weston Project in the 1990s in collaboration with Wisconsin Public Service (which was acquired by what is now WEC Energy Group in 2007, eventually creating ATC). After the creation of ATC, Minnesota Power worked collaboratively

[3] *Arrowhead – Weston Transmission Line Energized*, T&D World, https://www.tdworld.com/overhead-transmission/article/20957492/arrowhead-weston-transmission-line-energized (Feb. 20, 2008), *accessed* Feb. 13. 2024.

with the new entity to complete the Arrowhead – Weston Project, including acting as the construction manager for ATC's Arrowhead 345 kV/230 kV Substation. Minnesota Power led the efforts with Minnesota regulators and agencies associated with construction of the substation and provided resources to ensure the safe completion of the facility in compliance with Minnesota regulatory requirements.

Q. Were any limitations imposed on the Arrowhead – Weston Project when it was permitted for construction in Minnesota?

A. Yes. The Minnesota Environmental Quality Board put a limitation of 800 MVA on the transfer of power for the Arrowhead – Weston 345 kV transmission line. The requirement was set such that ATC would need to seek authorization from the Commission[4] to increase the capabilities at the ATC Arrowhead 345 kV/230 kV Substation. No such authorization has been requested in this proceeding to date, as Minnesota Power's proposed HVDC Modernization Project configuration would have no impact on this 800 MVA limitation at ATC's Arrowhead 345 kV/230 kV Substation.

Q. Please explain how the operation of ATC's 345 kV/230 kV Arrowhead Substation relates to the 800 MVA limitation for the Arrowhead – Weston 345 kV transmission line.

A. Currently, the flow on the Arrowhead - Weston line is maintained within the 800 MVA limitation through the use of a phase-shifting transformer at ATC's Arrowhead 345 kV/230 kV Substation. Company witness, Mr. Winter, discusses concerns with the impacts of the ATC Arrowhead Alternative on this operational limitation.

Q. Are there any such limitations on the Minnesota Power 230 kV/115 kV Arrowhead Substation?

A. No, there are no similar regulatory limitations on Minnesota Power's Arrowhead 230 kV/115 kV Substation. This facility does not have a direct connection to the Wisconsin

[4] Transmission line permitting authority was transferred from the Environmental Quality Board to the Commission and the Minnesota Department of Commerce after the permit to construct was issued by the Environmental Quality Board.

AC system (any electricity must flow, first, through ATC's 345 kV/230 kV Arrowhead Substation). Instead, Minnesota Power's 230 kV/115 kV Arrowhead Substation has, for decades, been the connection point between the HVDC System and Minnesota Power's AC transmission system, which connects to and serves Minnesota Power's customers.

Minnesota Power planned the HVDC Modernization Project to take advantage of the existing 230 kV transmission backbone infrastructure for its AC system by maintaining the connection between the HVDC System and the Minnesota Power 230 kV/115 kV Arrowhead Substation via the St. Louis County 345 kV/230 kV Substation. This configuration ensures that the electricity transmitted by the HVDC Line remains preferentially on the Minnesota Power AC system for the benefit of Minnesota Power's customers. This configuration is discussed in more detail in the Direct Testimony of Company witness Mr. Winter.

Q. What is the appropriate time for upgrading the ATC Arrowhead 345kV Substation in the future?

A. The expansion of the ATC Arrowhead Substation should be considered as part of long-term regional planning between MISO, Minnesota Power, and ATC. Upgrades to this facility should have costs allocated appropriately to all those who receive benefits from the upgrades and surrounding facilities have been appropriately jointly studied and agreed upon by all stakeholders.

C. HVDC Modernization Project

Q. How long has Minnesota Power been evaluating system needs for the Square Butte HVDC Modernization System?

A. Minnesota Power has been actively evaluating the needs associated with the HVDC System since 2012. This has been a long and iterative process that Minnesota Power has approached carefully and collaboratively with stakeholders, such as MISO and other transmission owners in northeastern Minnesota, including ATC. Given the significant value of the HVDC System to provide carbon-free wind energy from Minnesota

Power's North Dakota wind facilities and purchases directly to Minnesota Power's customers, and the level of investment necessary to modernize the HVDC System, the Company has taken this process very seriously and has been very diligent in its evaluation and development of the HVDC Modernization Project.

Q. What system studies and evaluations were necessary to prepare for filing the Certification of Need Application with the Commission for the HVDC Modernization Project?

A. Since 2012, the Company has undertaken multiple, iterative studies and analyses. The most definitive of these studies for the currently-proposed HVDC Modernization Project began in 2020. These are discussed in more detail in the Direct Testimony of Company witness Mr. Winter.

Q. During this evaluation process, what external coordination did Minnesota Power undertake with other utilities or MISO?

A. Minnesota Power has been engaged with MISO throughout the planning process and has paced with MISO on our current plan filed with the Commission. The Company has also coordinated with MISO on long-term planning, particularly regarding the value of the HVDC System and the future role of HVDC transmission within MISO's operating territory. The HVDC Modernization Project is a critical component in support of the transition to carbon-free electricity for Minnesota Power customers.

Q. Why was 230 kV selected as the connecting voltage for the Square Butte HVDC System?

A. When the HVDC System was designed, 230 kV was selected as it was the high voltage standard for the Minnesota Power transmission network in northeastern Minnesota. It was the logical choice for the power transfer requirements on the transmission network at the time of construction. Prior to and following the establishment of the connection to the HVDC System, Minnesota Power's AC transmission system in northeastern Minnesota developed around 230 kV to establish the backbone of the local transmission

network used to serve the needs of Minnesota Power's customers. In his Direct Testimony, Company witness Mr. Winter discusses the importance of maintaining the 230 kV connection to the Minnesota Power transmission system.

Q. What is the purpose of the HVDC Modernization Project?

A. The primary purpose of the HVDC Modernization Project is to replace the aging HVDC terminal assets in both North Dakota and Minnesota. The HVDC Modernization Project is also intended to ensure that Minnesota Power's customers continue to receive the HVDC System benefits to the greatest extent practical, especially in light of the fact that they will be responsible for the cost of the HVDC Modernization Project. Therefore, Minnesota Power has closely aligned those facilities identified in the Application with this asset renewal need to extend and enhance the important investments made by Minnesota Power customers in both the HVDC System and existing North Dakota wind facilities.

Q. Please explain the Company's reasons for proposing to use VSC technology instead of the traditional LCC technology for the HVDC Modernization Project.

A. Voltage Source Converter ("VSC") technology offers several benefits over the traditional Line Commutated Converter ("LCC") technology and positions Minnesota Power in line with the global market as the industry positions for a clean energy future. The grid-supporting benefits of VSC include voltage regulation to support the interconnecting grids, frequency response, and blackstart capability. These benefits will enable Minnesota Power and the region to continue to reliably support its clean energy transition. Globally, most systems being designed and constructed are utilizing VSC due to the range of benefits provided over LCC, which will ensure support throughout the operating life of the HVDC system. VSC is also more flexible for the conditions in which it can operate, so it is better suited to work where future system conditions are less predictable.

Q. What are key considerations in the future operability and potential expandability of the HVDC Modernization Project?

A. As Minnesota Power approached its planning for the HVDC Modernization Project, it was very thoughtful in evaluating design to build both expandability and optionality into the Project to maximize value for Minnesota Power customers. The Company took steps to work with HVDC vendors as well as taking into consideration long-term planning to source the highest-capacity renewable energy in the region to thoughtfully plan for a flexible facility over its operating life. As a result of this innovative approach, Minnesota Power was eligible to apply for federal funding (and supporting state funding) to mitigate Minnesota Power customer costs for integrating future considerations for a system that could provide the foundation for that flexibility over its operating life to support the clean energy transition. These designed-for-flexibility features allow Minesota Power to leverage its existing HVDC System to provide even greater transfer capabilities for additional carbon-free electricity from North Dakota in the future, when needed.

Q. Can you describe the sequence of decisions that led to the company to deciding on upgradability and designing the HVDC system in this way?

A. As Minnesota Power approached the decision of upgradability of its HVDC System, several factors came into consideration. The first was the availability of federal funding for a unique potential upgrade of capacity and voltage at the facility, where the rate impacts of such a project could be substantially reduced. The most optimal solution for an upgraded HVDC facility would be to interconnect at a higher voltage today to avoid future reconfiguration related to that voltage. As such, the Company opted for a higher voltage in this Certificate of Need filing as a prudent measure to avoid future re-configuration at this site. The Company then studied the best way to interconnect given the voltage upgrade and found that the most optimal use of this site is the configuration proposed in the filing, which was in line with appropriate planning processes for a facility of this type. It was this configuration and innovative thinking that allowed

Minnesota Power to access state and federal grant funding opportunities for the HVDC Modernization Project.

III. STATE AND FEDERAL FUNDING

Q. What has Minnesota Power done to mitigate costs of the HVDC Modernization Project for its customers?

A. In addition to working with our HVDC supplier on thoughtful long-term Project savings, Minnesota Power has done extensive work seeking grants to mitigate costs associated with the HVDC Modernization Project, particularly those costs related to the innovative technology and forward-thinking future considerations that have been integrated into the design of the Project. Minnesota Power has been selected for $75 million in total grant funding for the Project, the details of which I discuss below.

Q. Are there conditions that Minnesota Power must meet in order to receive this grant funding for the Project?

A. Yes. As I discuss later in my testimony, the awarding of certain funds is contingent upon two significant milestones: (1) negotiating and entering into an award contract for the federal funding portion of our awarded grants and (2) the delivery of the Project on established federal timelines. Minnesota Power believes both of these milestones can be achieved if the Commission approves Minnesota Power's proposed configuration of the HVDC Modernization Project. The second of these milestones is of concern for Minnesota Power if the Commission orders it to construct the ATC Arrowhead Alternative because the Company will no longer have full control of the Project schedule, which may prevent the Company from meeting the timeline requirements for the federal award.

Q. Is Minnesota Power considering any other grant applications?

A. Minnesota Power continues to evaluate if there are any additional grant opportunities that would be available for the HVDC Modernization Project to reduce overall Project costs for Minnesota Power customers. On January 12, 2024, Minnesota Power

submitted the HVDC Interconnection Facilities concept paper for the U.S. Department of Energy ("DOE") second round funding opportunity of the Grid Resilience and Innovation Partnerships ("GRIP") Program for Fiscal Years 2024 and 2025.

Submitting a concept paper in response to the funding opportunity announcement is the required first step for submitting a full application for the second round of GRIP funding. If Minnesota Power receives a letter of encouragement to apply from the DOE, which is expected in the first quarter of 2024, the Company will submit a full application in May 2024 to request grant funding to support the 345 kV/230 kV interconnections needed to connect Minnesota Power's upgraded converter stations to the AC grid. If Minnesota Power's full application is selected for DOE award negotiation, the Company could apply up to $50 million in additional DOE grant funding toward the new 345 kV/230 kV substations and AC interconnection facilities proposed for the HVDC Modernization Project, including Minnesota Power's proposed St. Louis County 345 kV/230 kV Substation. If awarded, this federal funding could only be applied to Minnesota Power's Project configuration for the HVDC Modernization Project and would not be available if the Commission orders construction of the ATC Arrowhead Alternative, which I discuss in further detail in Section IV.A of my Direct Testimony.

In the event that any additional grants are awarded to Minnesota Power or other cost mitigation opportunities become available, the Company will provide an update to the Commission.

A. Federal Funding

Q. What federal funding opportunities has Minnesota Power been awarded for the Project to date?

A. During the first round DOE GRIP funding opportunity, Minnesota Power had an opportunity to apply for federal funding and developed the HVDC Terminal Expansion Capability Project ("HTEC") concept as an innovative idea to create expandability of the HVDC terminal capacity for future use, including elements of the interconnection

components at the HVDC converter stations that were also within the scope of the project submittal. HTEC includes innovative technology components of the HVDC Modernization Project that have specifically been designed to preserve future expandability options for the new HVDC converter stations over their multi-decade operating life.

The DOE's Grid Deployment Office ("GDO") recommended the HTEC concept for negotiation of a $50 million grant during the first round of DOE GRIP funding, which would reduce customer costs associated with the Company's proposed configuration of the HVDC Modernization Project. The Company is currently working with the DOE to finalize contract requirements for the first round federal grant and the cooperative agreement with the DOE is anticipated to be executed in the second quarter of 2024. Once that agreement is executed, the Company can commence the performance of the Project and submit for reimbursement up to the $50 million awarded. The HVDC Modernization Project (including the HTEC components) must proceed on the agreed-upon milestones within 60 months after the execution of the Cooperative Agreement with the DOE.

Q. What was the application process for this federal grant?

A. Applicants for GRIP funding were required to submit a concept paper which described the project and its benefits, the approach to be taken with the community benefits plan, and an overview of the project team qualifications and experience. Only applicants who submitted an eligible concept paper were eligible to submit a full application. Following DOE's review of the concept paper, DOE encouraged the Company to submit a full application. Full applications were comprised of over a dozen separate files including a technical volume, the community benefits plan, environmental questionnaires, and a budget workbook. These documents were all developed by Minnesota Power over a period of several months to complete the extensive work necessary just for DOE to consider the HTEC concept for federal grant funding.

Q. Please explain the process Minnesota Power must go through to receive this grant.

A. On October 17, 2023, the Company was notified that DOE had completed its evaluation of the full application and that the HTEC project had been recommended by the GDO for negotiation of a financial award. The notification letter further stated the notification does not guarantee federal funding, as funding will only be obligated upon completion of successful negotiations. Receipt of the notification letter does not authorize the Company to commence with performance of the concept. Only an award document signed by the Contracting Officer obligates DOE to provide the awarded reimbursements under the grant program. As part of the pre-award process, the Company was required to submit a pre-award information sheet, Davis Bacon Assurances, a cybersecurity plan, a community benefits plan, and other information and documents as requested. Key award negotiation elements include a detailed statement of project objectives, technical evaluation of the project budget, development of an environmental questionnaire, and DOE completing its required environmental review.

This process has required a significant amount of time and effort by Minnesota Power to provide information necessary to receive this federal funding. This process has also necessitated Minnesota Power making commitments related to cybersecurity, community benefits, and Davis Bacon Assurances that must be implemented for all aspects of the HVDC Modernization Project, whether Minnesota Power's configuration is approved by the Commission or the Commission orders construction of the ATC Arrowhead Alternative. Therefore, in the event that the Commission orders construction of the ATC Arrowhead Alternative, the Commission's order should direct ATC to follow all compliance requirements including responsibility for the aforementioned project reporting for awarded grant funding within the required timeline.

Q. Is Minnesota Power capable of meeting all of the conditions required to maximize the federal grant if the Company's HVDC Modernization Project is granted a certificate of need and route permit from the Commission?

A. Yes. The Company has established a Government Funding & Compliance Steering Committee and employs individuals whose roles and responsibilities relate specifically to the administration of, and compliance with, this grant. Additionally, Minnesota Power has established, or is in the process of establishing, specific processes for ensuring compliance with grant obligations and legal requirements as well as internal and external audits. Should the Commission order construction of the ATC Arrowhead Alternative, Minnesota Power may need to be granted independent audit rights related to ATC's construction, procurement, and contracting activities for any portions of the HVDC Modernization Project it would own or be responsible for constructing. Further, any arrangement would likely require filing, and Commission approval, of an affiliated interest under Minn. Stat. Section § 216B.48.

B. State Funding

Q. What Minnesota state funding opportunities has Minnesota Power been awarded for the Project to date?

A. In 2023, the Minnesota legislature passed, and Governor Walz signed, HF 2310 which appropriated $15 million for a grant to Minnesota Power to increase the capacity and improve the reliability of the HVDC system.

Additionally, on January 8, 2024, the Minnesota Department of Commerce ("DOC") informed the Company that its application for the State Competitiveness Fund Match Program had been deemed complete and that pursuant to procedure in statute, the DOC was reserving $10 million for the purpose of cost-share (or match) for the federal funding.

Q. What are the requirements associated with the Minnesota legislative award?

A. The Company is working closely with the DOC to complete the transfer of these dollars, which are only to be spent as a cost share as federal funds are accessed. This is a onetime award and must be used to support the cost-share component of a federal grant application to a program enacted in the federal Infrastructure Investment and Jobs Act, Public Law 117-58 ("IIJA"), to reduce the cost of the HVDC Modernization Project and to reimburse the reasonable costs incurred by the DOC to administer the grant.

Q. What are the requirements associated with the Minnesota DOC grant?

A. Execution of a final grant contract with the DOC for reserved funds requires:

- Written notice from the federal granting agency that funds have been awarded.
- The Statement of Project Objectives and the payment schedule for the federal award.
- The name and e-mail address of the person qualified to sign the grant contract.
- The name, title, and e-mail address for the grantee's project manager.

Q. What North Dakota state funding opportunities has Minnesota Power been awarded for the Project to date?

A. To help strengthen Minnesota Power's federal application for DOE grant funds authorized through the IIJA, the North Dakota Legislature passed, and Governor Burgum signed, HB1014, which included state support for the HVDC Modernization Project by stating:

> "It is the intent of the sixty-eighth legislative assembly that the state provide support for [Minnesota Power's] application for federal funding to upgrade a high-voltage direct current transmission line in the state and that the state provide support for energy development projects in the state through the state's energy-related programs.[5]"

In addition to this statement of support from North Dakota, the Company is working with the Bank of North Dakota to determine whether North Dakota's low-interest loan

[5] https://ndlegis.gov/assembly/68-2023/regular/bill-overview/bo1014.html?bill_year=2023&bill_number=1014

conditions are appropriate for the HVDC Modernization Project and in the interest of Minnesota Power's customers.

Q. What are the requirements of the North Dakota loan conditions?

A. The requirements will ultimately depend on the loan conditions established by the Bank of North Dakota. At this time, Minnesota Power is exploring financial options.

Q. Are any of the state grants dependent on the federal grant?

A. Yes. The $10 million grant from the Minnesota State Competitiveness Fund, administered by the DOC, is appropriated as part of the Company's cost-share requirements for the $50 million from the round one federal GRIP funding. This funding can only be accessed by Minnesota Power for the HVDC Modernization Project after a cooperative agreement is signed with the DOE for the GRIP funding and must be expended over a specified time period.

Q. Is Minnesota Power capable of achieving all the requirements required to maximize the state grants at this time if the HVDC Modernization Project in the Company's proposed configuration is granted a certificate of need and route permit from the Commission?

A. Yes.

IV. RISKS ASSOCIATED WITH THE ATC ARROWHEAD ALTERNATIVE

A. State and Federal Funding Risks

Q. Are any of the grant monies at risk if the ATC Arrowhead Alternative is ordered by the Commission for the Project?

A. Federal funding through the GRIP program round one will be awarded based on the submitted HTEC concept for the HVDC Modernization Project. Alterations to the project concept would need to be addressed with the DOE given the total HTEC project concept. Initiating project changes now could alter project timing and create unnecessary delays in execution.

Minnesota Power believes that the round one DOE GRIP funding has a low probability of being impacted and the Company does not believe that any funding dollars for the state grants described above would be withheld in total in the event the Commission orders the Company to proceed with the ATC Arrowhead Alternative instead of the 230 kV interconnection, as the grant funding selections to date have all related to the HVDC equipment and its expandability capabilities. However, grant funds may be at risk or delayed if ATC cannot deliver all aspects of the ATC Arrowhead Alternative on the requisite timeline, including the concerns related to studies and equipment procurement discussed in the Direct Testimony of Company witness Mr. Winter. The GRIP round one federal grant period is only 60 months from the time of award expected in the second quarter of 2024. Minnesota Power continues to make all practicable efforts to achieve an in-service date of the fourth quarter of 2027 for the HVDC equipment with an earlier completion date for the 230 kV interconnection infrastructure and is well-situated to achieve this in-service date, as discussed in more detail by Company witness Mr. Winter.

However, Minnesota Power has been working toward achieving this in-service date since 2020, and has completed significant study, engineering, power flow analyses, design, and procurement work to date for the HVDC equipment and 230 kV interconnection infrastructure.

The Company is actively continuing this important work to make all efforts to achieve an in-service date earlier than 2030. ATC has only just proposed its alternative for the 345 kV interconnection infrastructure as of September 2023. The Company is concerned about the ability to deliver the ATC Arrowhead Alternative on the 2030 timeline, let alone by 2028, given the planning work that still needs to occur if the Commission orders construction of the ATC Arrowhead Alternative. These concerns are discussed in detail in the Direct Testimony of Company witness Mr. Winter.

According to the procedural schedule for this proceeding, the earliest this decision would be made by the Commission would be late July 2024. I discuss these concerns in more detail in Section IV.B of my Direct Testimony. Not being able to deliver the HVDC Modernization Project on these timelines could put portions of the funding at risk under the various grant programs.

Additionally, if Minnesota Power is encouraged to submit a full application for the DOE GRIP round two funding and selected for an award for the HVDC Interconnection Facilities concept, up to $50 million in additional federal funding would be lost if the Commission orders construction of the ATC Arrowhead Alternative. This is because Minnesota Power's DOE GRIP round two application will only support interconnection components of Minnesota Power's Project configuration, including the St. Louis County 345 kV/230 kV Substation. Minnesota Power is working hard to secure as much federal funding as practical for the HVDC Modernization Project to reduce overall customer rate impacts associated with the Project. To date, the Company has identified up to $100 million in potential federal funding available for the HVDC Modernization Project. Not receiving this funding means Minnesota Power customers must make up the difference in Project costs. I discuss estimated rate impacts with federal and state funding applied to the Project in Section IV.C of my Direct Testimony.

Q. What efforts has ATC undertaken to obtain federal or state grants to reduce the overall costs of the ATC Arrowhead Alternative?

A. In its response to MP IR 009, ATC has stated that it has not applied for any federal or state grants to reduce the costs of the Arrowhead Alternative. A copy of this response is attached to my Direct Testimony as Schedule 1.

B. Overall Procurement and Construction Timing Risks

1. Deliverability Concerns

Q. How long has Minnesota Power been working on achieving the 2030 in-service date for the HVDC Modernization Project?

A. Minnesota Power began the current concept design implementing VSC going back to 2020-21. Procurement activities for this Project were able to be advanced in 2022, after outreach efforts with major HVDC suppliers revealed that demand for HVDC systems was skyrocketing globally given their critical role in renewable-based energy grids. As a result of the outreach, Minnesota Power set an in-service goal of 2028 for this facility and immediately began procurement activities to meet that date. Minnesota Power has been seeking the earliest possible in-service date for the HVDC facilities from the origination of the current HVDC Modernization Project. The extensive work completed by Minnesota Power to achieve this in-service goal is discussed in the Direct Testimony of Company witness Mr. Winter.

Q. Please describe the actions Minnesota Power has taken to ensure that the 2030 in-service date is achievable.

A. During the procurement process, the Company secured the earliest "guaranteed" date of delivery available from the manufacturer, which was April 2030. As part of this arrangement, the HVDC supplier may also propose an earlier in-service date should such an opportunity become available in its manufacturing queue, which the Company could then evaluate and accept if it is in a position to do so. The Company believes there is a strong probability of accelerating the delivery schedule for the HVDC Modernization Project HVDC components.

Q. Has ATC initiated design and procurement collaboration with Minnesota Power in the event the Commission orders the construction of the ATC Arrowhead Alternative?

A. No. ATC has not engaged meaningfully with Minnesota Power to coordinate or plan for the ATC Arrowhead Alternative. The communication and minimal planning

information that ATC has shared with Minnesota Power has primarily taken place through the regulatory process. If ATC has undertaken any design, engineering, or procurement activities to meaningfully advance planning for the ATC Arrowhead Alternative in the event the Commission orders its construction, ATC has done so without any collaboration with, or requested input from, Minnesota Power. Such collaboration is critical to ensure that the facilities will be properly designed and delivered consistent with required system performance.

Q. What information has ATC provided in this proceeding about its engineering, design, and procurement activities for the ATC Arrowhead Alternative?

A. ATC has provided very limited information about these activities. As part of MP IR 007, attached to my Direct Testimony as Schedule 2, Minnesota Power asked ATC about the status of ATC's engineering and procurement activities for each component of Arrowhead Alternative. ATC declined to provide this detailed information and instead referred Minnesota Power to its response to another information request, MP IR 012, that only provided ATC's proposed overall schedule for the Arrowhead Alternative. Of note, this schedule states that ATC will not even commence procurement activities for any materials required for the construction of the Arrowhead Alternative until May 2024. A copy of ATC's response to MP IR 012 is attached to the Direct Testimony of Mr. Winter as Schedule 37.

Q. What concerns does Minnesota Power have with achievement of a 2030 in-service date in the event the Commission orders construction of the ATC Arrowhead Alternative?

A. Given the fact that ATC failed to present any meaningful alternatives to Minnesota Power during various conversations and meetings prior to Minnesota Power filing its Application and, instead, provided only a conceptual plan in September 2023, absent (1) updated studies that evaluate the ATC Arrowhead Alternative to determine if the Arrowhead phase shifting transformer is necessary and what impact it may have on the 800 MVA limitation placed on the facility by the Minnesota Environmental Quality

Board or (2) front-end collaboration on things as basic as interconnection configurations for the ATC Arrowhead Alternative where it connects to Minnesota Power facilities and inter-utility cooperation agreements, Minnesota Power has significant concerns with the achievement of the 2030 in-service date for the ATC Arrowhead Alternative, as well as any possibilities of moving the in-service date forward to 2028, as desired. The Company also has concerns with the time and collaboration required for completing and updating necessary project design and integration studies, negotiating project agreements, and procuring major AC interconnection facility equipment at such a late planning stage of the project and a known strained supply chain for these types of materials.

2. Procurement and Performance

Q. What steps has Minnesota Power undertaken to procure the equipment necessary for the HVDC Modernization Project with a 230 kV interconnection?

A. Minnesota Power has determined the required equipment and has issued a Request for Proposal and selected a vendor for the longest lead time equipment, which can be as long as three years from the time initial design and specification work is completed and the order is placed with a vendor. The Company has followed a procurement process that will allow Minnesota Power to achieve an in-service date for the AC interconnections of the Company's proposed HVDC Modernization Project configuration by the end of 2027 and the in-service date of the entire HVDC Modernization Project by 2028. Minnesota Power detailed its design, engineering, procurement, and construction schedule for the HVDC Modernization Project in response to ATC IR 031 which is attached to my Direct Testimony as Schedule 3. This process is detailed in the Direct Testimony of Company witness Mr. Winter.

Q. Why did the Company start the procurement process for the 230 kV interconnection infrastructure before receiving a certificate of need and route permit from the Commission?

A. When the Company began the planning for the Project, both external consultants and those vendors associated with high-voltage interconnection equipment, the Company was advised in these early planning processes that lead times were increasing and that it would be critical to plan for early procurement in order to avoid delays related to manufacturing capacity. Given the need for modernization of this facility at the earliest possible date to provide the maximum benefit to customers, the Company took action towards initiating the procurement process.

Q. What steps has ATC undertaken to procure the equipment necessary for its proposed 345 kV interconnection for the HVDC Modernization Project?

A. As I noted earlier, based on ATC's response to MP IR 012, ATC has not started the procurement process for the proposed 345 kV interconnection.

Q. Has the Company identified any performance concerns with a 345 kV interconnection versus a 230 kV interconnection for the HVDC Modernization Project?

A. Yes, the Company has concerns that the ATC Arrowhead Alternative has not been studied or worked on in a broader planning setting with MISO or Minnesota Power. This is concerning as the proposed configuration by ATC has a strong probability of providing a tremendous benefit to Wisconsin ratepayers through increased flows onto their constrained Wisconsin AC transmission system, while being fully funded by Minnesota Power customers. This dynamic detailed performance concerns, are further detailed in Mr. Winter's testimony.

Q. Please explain your overall concerns with procurement and performance of the 345 kV interconnection.

A. As an initial matter, it is concerning that between the time ATC asked that its ATC Arrowhead Alternative be considered in this proceeding and early January, ATC had already changed its proposed alignment for the 345 kV transmission line more than once as discussed in detail in the Direct Testimony of Company witness Mr. McCourtney. This means that the alignment proposed by ATC and presented to the Commission when it considered this matter in November 2023 was changed to a new location for purposes of the EA evaluation the DOC, Energy Environmental Review and Analysis and more changes may be necessary in the future. This highlights how little planning has gone into this alternative proposed by ATC in this proceeding.

Second, given that there has been no long term planning for this option with either the Company or MISO, the need for and procurement of additional equipment such as a phase shifting transformer and the procurement of other long lead time equipment (specialized high voltage transformer and apparatus have 36-month (or more) lead times at current date) could result in both delays in the project timeline as well as unanticipated outage times. This has significant additional potential financial risk to the rates paid for by Minnesota Power customers for both the initial construction cost of the ATC Arrowhead Alternative and through the Fuel and Purchased Energy Adjustment Clause for replacement energy as the existing HVDC converter stations continue to experience outages due to failure. Both delays in overall schedule as well as unanticipated outages are major challenges at the current time.

Lastly, the Company is concerned that the ATC Arrowhead Alternative, while funded by Minnesota ratepayers, will result in greater power transfers to Wisconsin. The need for increased Wisconsin transfer capability has not been demonstrated by ATC and the impacts of these greater power flows on the system have not been properly evaluated by MISO, ATC, or Minnesota Power. Should the Commission order the ATC Arrowhead Alternative to be constructed as a part of the HVDC Modernization Project,

Wisconsin ratepayers would receive the benefit of this increased transfer capability at the expense Minnesota Power's customers, who would be solely responsible to pay for it.

3. Transmission – Transmission Agreement Negotiations

Q. What are transmission – transmission agreements?

A. Transmission-transmission agreements are necessary to define the terms, conditions, and characteristics by which transmission connections are performed when connecting facilities of disparate ownership. They are required as every interconnection between different utilities requires contractual requirements for ownership, operations, and maintenance over the life of a given facility.

Q. Do Minnesota Power and ATC have a transmission – transmission agreement in place?

A. Minnesota Power has a Transmission Interconnection Agreement between itself, ATC, and MISO with an execution date of January 22, 2008, that encompasses the current configuration and operation of the ATC Arrowhead 345 kV/230 kV Substation

Q. Why does a new transmission – transmission agreement need to be negotiated if the Commission orders the Company to construct the ATC Arrowhead Alternative?

A. The circumstances at ATC Arrowhead Substation would be materially changed and would require a new interconnection between Minnesota Power's 345 kV double-circuit transmission line required by the ATC Arrowhead Alternative and the ATC 345 kV system as well as an updated connection between the ATC 345 kV system and the Minnesota Power 230 kV system. A new transmission – transmission agreement would have to be reached on the development, ownership, operations and maintenance of the facilities being added.

Q. Who would own the 345 kV transmission line proposed in ATC's Arrowhead Alternative?

A. Minnesota Power would own the 345 kV transmission line as the first interconnection to the AC system from the HVDC system.

Q. What would the ownership be of the other 345 kV transmission infrastructure if the ATC Arrowhead Alternative is ordered to be constructed?

A. If ordered, Minnesota Power would own the 345 kV transmission infrastructure from the new St. Louis County HVDC/345 kV Converter Station to a new line termination structure at the ATC Arrowhead 345 kV/230 kV Substation, and ATC would own the additional 345 kV and 345 kV/230 kV transmission infrastructure inside the ATC Arrowhead 345 kV/230 kV Substation. Minnesota Power has also determined that the ATC Arrowhead Alternative would require modifications within the Minnesota Power Arrowhead 230 kV/115 kV Substation, as described by Mr. Winter, which would be owned by Minnesota Power.

Q. Are there any ownership issues to be determined if the 230 kV interconnection proposed by Minnesota Power is ordered to be constructed by the Commission?

A. No. If the 230 kV interconnection included in Minnesota Power's proposed HVDC Modernization Project configuration is ordered, there are no ownership determinations needed, interconnection agreement required, or Transmission - Transmission agreements required.

Q. How long do the companies believe it will take to negotiate a new transmission – transmission agreement?

A. Transmission – transmission agreements can be highly variable in the amount of time required to negotiate a new agreement. If there is a high level of mutual agreement the time required could be four to six months. However, if there is significant disagreement on terms, agreements can take more than a year to negotiate.

Q. Why has Minnesota Power not started negotiating a transmission – transmission agreement with ATC for the ATC Arrowhead Alternative at this time?

A. Minnesota Power provided ATC an overview of this site and our intention related to the design of Minnesota Power's proposed HVDC Modernization Project proposed configuration more than nine months before filing the Application. Minnesota Power provided a summary of the AC interconnection configuration for the Project, particularly the challenges and uncertainty described in Company witness Mr. Winter's Direct Testimony. After Minnesota Power met with ATC in 2022, ATC chose not to advance any meaningful discussions on the feasibility of an ATC Arrowhead Alternative or even present its own proposal to Minnesota Power for consideration until it presented its conceptual proposal (absent prior coordination with Minnesota Power or feasibility analysis) via letter filing in the Commission's Dockets on September 15, 2023. Due to the significant challenges the Company has identified related to ATC's Arrowhead Alternative, both in the near term and in the future, the ATC Arrowhead Alternative is not a more prudent or reasonable alternative to the Company's proposed HVDC Modernization Project configuration.

C. Project Costs and Customer Cost Recovery

1. Cost of Alternatives Comparison and Rate Impact

Q. How did the Company prepare its cost analysis for the HVDC Modernization Project with the 230 kV interconnection?

A. The Company went through preliminary engineering design of the site, which included all components necessary to connect the new interconnection for the Project and was based on current construction cost estimates both from the most recent MISO estimates as well as updates from vendor quotes for major equipment.

Q. What are some examples of the Company's history in estimating transmission project costs?

A. The Company has a very successful history of estimating transmission project costs including substation assets. Most recently, the Company completed its Great Northern

Transmission Line project, which is an example of a transmission project that was well-estimated and was constructed on time and under budget with a co-developer.

Q. How do the costs for the HVDC Modernization Project with the 230 kV interconnection compare to the ATC Arrowhead Alternative?

A. The interconnection costs for the ATC Arrowhead Alternative are significantly higher when the costs for a phase shifting transformer are included. One phase shifting transformer is currently installed within the ATC Arrowhead 345 kV/230 kV Substation, though ATC has proposed to remove this piece of equipment as part of the ATC Arrowhead Alternative. Currently, the ATC Arrowhead phase shifting transformer is needed to provide flow control on the interface between Minnesota Power's 230 kV system and ATC's Wisconsin 345 kV system, limiting power flows and maintaining reliability on the Arrowhead – Weston 345 kV line. Given that ATC has not demonstrated that this need is alleviated by implementation of the ATC Arrowhead Alternative, the existing phase shifting transformer may need to remain in place and a second phase shifting transformer may need to be installed for the ATC Arrowhead Alternative to maintain the flow control on this interface. As discussed in the Direct Testimony of Company witness Mr. Winter, the determination of whether or not this critical transmission asset is necessary as part of the ATC Arrowhead Alternative is not trivial and cannot be finalized without thorough and coordinated regional transmission planning studies involving MISO, ATC, Minnesota Power and other impacted utilities. To date, the Company is not aware that ATC has completed or even initiated any such studies to justify excluding a phase shifting transformer from its alternative. The Company estimates the facility cost for its proposed configuration of the HVDC Modernization Project is $40 to $70 million, whereas the cost for the facilities needed for the ATC Arrowhead Alternative, including a potential phase shifting transformer, is $60 to $110 million.

Q. Has the Company prepared a comparison from a customer rate perspective?

A. Yes and even assuming that the ATC Arrowhead Alternative is able to apply the same federal and state grant funding as Minnesota Power's proposed configuration of the HVDC Modernization Project, the ATC Arrowhead Alternative has higher rate impacts for Minnesota Power's customers (with the phase shifting transformer).

Minnesota Power has prepared several different rate impact scenarios depending on whether or not federal and state grants are awarded for the Project and ATC Arrowhead Alternative. Assuming that $75 million in DOE and state awards are applied to Minnesota Power's Project, the rate impact for the average residential customer for the first 12 months following Project in-service would range from $7.64 to $9.13 per month. For Large Power customers, the estimated rate impact for Minnesota Power's Project for the first 12 months following in-service would range from approximately 1.022¢ to 1.221¢ per kilowatt-hour ("kWh") of energy.

To calculate the rate impact of the ATC Arrowhead Alternative, Minnesota Power first needed to develop a cost estimate for this alternative. Minnesota Power's cost estimate and assumptions that were included in its rate impact calculations for the ATC Arrowhead Alternative are outlined in the Company's supplemental response to LPI IR 12 which is attached to the Direct Testimony of Mr. Winter as Schedule 2. Even assuming that the $75 million in DOE and state awards are applied to the ATC Arrowhead Alternative, the rate impact for the average residential customer for the first 12 months following Project in-service would range from $7.93 to $9.55 per month. For Large Power customers, the estimated rate impact for the ATC Arrowhead Alternative for the first twelve months following in-service would range from approximately 1.061¢ to 1.277¢ per kWh of energy.

Q. Do you have any concerns with ATC's proposed costs for the 345 kV interconnection?

A. Yes, the Company has significant concerns with ATC's estimated cost for the 345 kV interconnection and believes it is both underdeveloped and may be inaccurately low. Some of the concerns relate to the handling and management of the phase shifting transformer issue, appropriate costs for procurement of new 345 kV assets, ensuring labor costs reflect those costs required by current scope of the DOE GRIP Grant the Company is negotiating.

Q. Please explain the disagreement regarding whether or not a phase shifting transformer is necessary for the ATC Alternative.

A. It is Minnesota Power's position that a phase shifting transformer is needed at the Arrowhead Substation if the ATC Arrowhead Alternative is selected whereas ATC has stated that this transformer is not needed. The 800 MVA transfer constraint still exists at this time and control of East-West power flow would likely still be necessary for the ATC Alternative. Mr. Winter provides more technical detail relating to the need of the phase shifting transformer in his Direct Testimony.

Q. What is the basis of your concerns that ATC's cost estimate provided in this proceeding is too low?

A. The accuracy of cost estimates improves as a project moves further along in the planning and design phase. ATC has not completed detailed planning related to the ATC Arrowhead Alternative to the same level as Minnesota Power has for its proposed Project. In particular, ATC has not coordinated with Minnesota Power to design the connections to the new HVDC converter station or the Minnesota Power Arrowhead 230 kV/115 kV Substation and does not have specific cost estimates related to detailed construction elements. This lack of detailed planning and design for the ATC Arrowhead Alternative is demonstrated by the fact that ATC's design of the facility has continued to change during this regulatory proceeding. The lack of detailed plans, as well as the lack of interaction with the Company on configurations and construction

details at the site, creates real concerns that significant costs are missing from the ATC's cost estimate for the ATC Arrowhead Alternative.

Q. Please explain how ATC's cost recovery is different from Minnesota Power's cost recovery.

A. Minnesota Power would intend to recover costs for this Project through the Transmission Cost Recovery Rider and applicable FERC recovery through MISO Attachment O, where ATC stated they would seek recovery through a lump sum payment with a tax gross-up.

Q. Are there any other cost concerns you have with ATC's Arrowhead Alternative?

A. ATC's originally proposed construction for the ATC Arrowhead Alternative proposes to locate the 345 kV transmission line along much of the existing HVDC Line right-of-way. This may result in prolonged outages for Minnesota Power customers – much longer than would be anticipated for construction of Minnesota Power's proposed configuration of the HVDC Modernization Project. Any replacement power costs for outages would be paid entirely by Minnesota Power customers through the Fuel and Purchased Energy Adjustment Rider, while these customers would not be receiving the benefits from the Company's low cost North Dakota wind facilities.

However, ATC revised its proposed alignment and no longer would require overtaking the full length of the HVDC Line right-of-way in this area. ATC has stated that any outage of the HVDC Line would be limited to the five days needed by Minnesota Power to reconfigure the HVDC Line termination to the new St. Louis County HVDC Converter Station. While this revised alignment appears to avoid outages of the HVDC Line, this revised alignment would require crossing Minnesota Power's Arrowhead – Bear Creek 230 kV transmission line and an outage of this line during construction. No such crossing is necessary for Minnesota Power's configuration of the HVDC Modernization Project. This is discussed further in the Direct Testimony of Company witness Mr. Winter.

Due to this additional outage requirement for the ATC Arrowhead Alternative, Minnesota Power respectfully requests that the Commission consider an order point that would require ATC to cover the cost of any replacement power costs necessary for the construction of this crossing.

2. Recovery through Transmission Cost Recovery Rider

Q. Would Minnesota Power propose to recover the costs of the HVDC Modernization Project through the TCR?

A. Yes, Minnesota Power would seek recovery of HVDC Modernization Project costs through the TCR, whether Minnesota Power's proposed configuration is approved or if the Commission orders construction of the ATC Arrowhead Alternative.

Q. What would this mean for recovery of costs if the Commission orders the ATC Arrowhead Alternative be constructed for the HVDC Modernization Project?

A. The Company would need to compensate ATC for the construction of their facilities with the tax gross-up and then it would be added to the HVDC Modernization project costs with Minnesota Power ratepayers paying the entire cost of the project, despite the likely significant benefits to Wisconsin ratepayers. These costs would then be added to the TCR.

Q. Are there any conditions Minnesota Power would ask be included in a certificate of need if the Commission orders the Company to construct the HVDC Modernization Project with the ATC 345 kV Arrowhead Alternative?

A. Yes. In the event the Commission orders Minnesota Power to construct the 345 kV interconnection that ATC has proposed as the ATC Arrowhead Alternative, Minnesota Power respectfully requests that the Certificate of Need or Route Permit include the following conditions:

- a condition affirming the ownership of the various equipment necessary for the HVDC Modernization Project equipment consistent with what has been

included in my Direct Testimony and applicable discovery responses attached to the Direct Testimony of Mr. Winter;

- a condition affirming that ATC is subject to all Certificate of Need and Route Permit standard and project-specific conditions;
- a condition that ATC must comply with all compliance requirements set forth in the Cooperative Agreement for the federal grant from the DOE. In the event that ATC's action or inaction results in any loss of funding, ATC should be required to provide the financial support to make up for any loss of funding;
- a condition that ATC agree that Minnesota Power be granted any and all independent audit rights related to ATC's construction, procurement, and contracting activities for any portion of the ATC Arrowhead alternative to ensure Minnesota Power can comply with all administrative conditions of the federal grant process;
- a condition that ATC shall be responsible for any replacement power costs incurred in the event ATC requires outages of any Minnesota Power DC or AC transmission facilities longer than the estimates provided by ATC in this proceeding;
- a condition that ATC shall provide monthly project status and cost updates to Minnesota Power with the first update to be provided no later than fourteen days after the date of the Commission order; and
- a condition that any cost overruns from estimates provided in this proceeding for the 345 kV interconnection be recoverable in the TCR and when the Company moves the HVDC Modernization Project to base rates. Given that Minnesota Power would be required to pay ATC for the 345 kV interconnection facilities and the Commission has no ratemaking or cost oversight of ATC at this time, Minnesota Power would be required to pay whatever the final cost is of the ATC Arrowhead Alternative to ATC, whether or not that amount is within the estimate that ATC has provided in this proceeding. In the alternative, in the event the Commission orders construction of the ATC Arrowhead Alternative 345 kV interconnection infrastructure, that Minnesota Power cannot pay (and

ATC cannot charge Minnesota Power for) any amount in excess of the estimate that ATC has provided in this proceeding, even if additional costs are necessary to study, design, construct, and interconnect the 345 kV alternative.

V. CONCLUSION

Q. Does this complete your testimony?

A. Yes.

MINNESOTA POWER

Utility Information Request

☐ Nonpublic ☒ Public

Docket No.:	**E015/CN-22-607** **E015/CN-22-611**	Date of Request:	December 22, 2023
Requested From:	American Transmission Company LLC	Response Due: Extension To:	January 2, 2024 January 5, 2024

SEND RESPONSE VIA EMAIL TO: discoverymanager@mnpower.com

Request by: David Moeller
Email Address(es): dmoeller@allete.com
Phone Number(s): (218)723-3963

Request Number: 009
Topic: Information Requests
Reference:

If your response includes any executable files or spreadsheets, please provide those attachments in both searchable PDF and original form with all formulas and links intact.

REQUEST: Please describe any efforts ATC has undertaken to obtain state or federal grants to reduce the overall costs of the ATC Arrowhead Alternative. Please provide all disclosures MP made to ATC personnel regarding applying for federal funding for the HVDC Terminal Expansion option at 345kV. Please describe all efforts made to coordinate efforts to obtain state or federal grants for this alternative. Please describe ATC's general practices and incentives to reduce costs on capital projects including for projects outside the State of Wisconsin.

RESPONSE: ATC objects to this request as seeking information that is irrelevant to this proceeding, overbroad as to time, vague, compound, and to the extent it seeks information that is publicly available or equally available to Minnesota Power. Subject to these objections, ATC responds as follows:

ATC has not applied for any state or federal grants related to Docket Numbers E015/CN-22-607 and 611.

To be completed by responder

Response Date: January 5, 2024
Response by: Robert McKee, Strategic Projects & Execution Director
Email Address: rmckee@atcllc.com
Phone Number: (608) 877-7052

MP Exhibit ___ (Gunderson)
Direct Schedule 1
Page 1 of 1

MINNESOTA POWER

Utility Information Request

☐ Nonpublic ☒ Public

Docket No.:	**E015/CN-22-607** **E015/CN-22-611**	Date of Request:	December 22, 2023
Requested From:	American Transmission Company LLC	Response Due: Extension To:	January 2, 2024 January 5, 2024

SEND RESPONSE VIA EMAIL TO: discoverymanager@mnpower.com

Request by: David Moeller
Email Address(es): dmoeller@allete.com
Phone Number(s): (218)723-3963

Request Number:	007
Topic:	Information Requests
Reference:	

If your response includes any executable files or spreadsheets, please provide those attachments in both searchable PDF and original form with all formulas and links intact.

REQUEST: Please provide a summary of any and all high-voltage transmission projects ATC has participated in constructing (as sole owner, joint owner, or operator) that required either a Certificate of Public Convenience and Need from the Public Service Commission of Wisconsin or a Certificate of Need and/or Route Permit from the Minnesota Public Utilities Commission.

a. State regulatory docket number;
b. Cost estimate for the project approved by the state regulatory authority (or as-provided to the state regulatory authority prior to obtaining such approval to proceed with the project if the state regulatory authority did not explicitly approve the cost estimate);
c. The proposed in-service date contemplated at the time of the state regulatory authority approval;
d. The final costs incurred for the project (or incurred as of the date of this information request, if not yet complete); and
e. The final in-service date for the project (or the planned in-service date as of this information request, if not yet complete).

Please also provide a summary of any transmission project proceedings where either (i) ATC offered an alternative project that was not the primary project proposed by another entity; or (ii) another entity offered an alternative project that was not the primary project proposed by ATC.

i. State regulatory docket number
ii. When the alternative project was introduced into the proceeding
iii. Justification for introduction of the alternative project by either ATC or another entity
iv. How (or if) the alternative project was evaluated by the state regulatory authority
v. If the alternative project was ultimately selected by the state regulatory instead of the proposed project, and why

MINNESOTA POWER

Utility Information Request

		☐ Nonpublic	☒ Public
Docket No.:	**E015/CN-22-607** **E015/CN-22-611**	Date of Request:	December 22, 2023
Requested From:	American Transmission Company LLC	Response Due: Extension To:	January 2, 2024 January 5, 2024
IR Number	007		

vi. The final cost and in-service date of the approved alternative project, compared to the cost and in-service date for the alternative project at the time it was approved by the state regulatory authority

RESPONSE: ATC objects to this request as seeking information that is irrelevant to this proceeding, overbroad as to time, vague, compound, and to the extent it seeks information that is publicly available or equally available to Minnesota Power. Subject to these objections, ATC responds as follows:

This information request does not specify a time period for which information is being sought, and ATC limits its responses to proceedings before the Public Service Commission of Wisconsin ("PSCW") or Minnesota Public Utilities Commission ("MPUC") within the last five years. ATC has made no filings for a Certificate of Need and/or Route Permit from the MPUC. Dockets in which ATC has applied for a certificate of public convenience and necessity from the PSCW are publicly available online on the PSCW's Electric Records Filing system (https://apps.psc.wi.gov/). The docket numbers are 137-CE-194 and 137-CE-195. Information concerning the cost estimate, proposed in-service date, final costs, final in-service date, and any alternatives under consideration for the projects that were the subject of those proceedings are also publicly available in filings made within those publicly available electronic filing systems.

Within the last five years, ATC has not participated in any transmission project proceedings before the PSCW or MPUC in which ATC offered an alternative project that was not the primary project proposed by the applicant in that proceeding.

To be completed by responder

Response Date: January 5, 2024
Response by: Patrisha Smith, Manager State Regulatory Affairs & Associate General Counsel
Email Address: psmith@atcllc.com
Phone Number: (262) 506-6145

AMERICAN TRANSMISSION COMPANY LLC AND ATC MANAGEMENT INC.

UTILITY INFORMATION REQUEST

Docket Numbers:	OAH 5-2500-39600; MPUC E-015/CN-22-607; MPUC E-015/TL-22-611	Date of Request:	January 17, 2024
Requested From:	Minnesota Power	Response Due:	January 29, 2024

By: American Transmission Company LLC

Information Request No. 31.

Please provide an overall design, engineering, planning, right-of-way acquisition, procurement, and construction schedule for the HVDC Modernization Project. As part of that schedule, please provide the following information:

a. Have You begun procuring equipment and materials for the Project? If so, please provide a detailed description of the current status of those procurement activities and identify the approximate date for delivery of those equipment and/or materials. If not, please identify the approximate date You intend to commence procuring equipment and materials for the Project.

b. Please identify the Project equipment and/or materials that have the longest individual leadtime and the approximate leadtime for obtaining delivery of such equipment and/or materials.

c. Do You intend to conduct any additional routing studies, environmental studies, or other field work for the Project after the Commission makes a decision in this proceeding? If so, please describe what additional studies or field work You intend to conduct and the approximate date that such studies and/or field work will be completed.

Response:

See ATC IR 031.01 Attach for a high-level Project schedule.

Response by: Peter Schommer

Title: Manager – Power Delivery & Asset Management

Department: Transmission

Telephone: 218-355-2639

AMERICAN TRANSMISSION COMPANY LLC AND ATC MANAGEMENT INC.

UTILITY INFORMATION REQUEST

Docket Numbers:	OAH 5-2500-39600; MPUC E-015/CN-22-607; MPUC E-015/TL-22-611	Date of Request:	January 17, 2024
Requested From:	Minnesota Power	Response Due:	January 29, 2024

By: American Transmission Company LLC

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a. Minnesota Power has commenced procurement activities for the Project. Our procurement strategy has been to have all AC equipment on site and installed, including substation and transmission line sections, by Q3 2028 as shown in attachment ATC IR 031.01 Attach. The early completion of this work is needed to realize any potential schedule acceleration by the HVDC supplier should they offer an in-service date that is better than the currently guaranteed April 2030.See Minnesota Power's response to ATC IR 004 part (b) for details pertaining to the procurement of the 345 kV/230 kV St. Louis County Substation transformers. Minnesota Power has issued a Request for Proposal for 230 kV breakers for the Nelson Lake Substation and expects to issue a Purchase Order in the first quarter of 2024. Minnesota Power will issue a Request for Proposal for the remaining breakers necessary for AC interconnecting facilities, including the St. Louis County substation breakers, in the second quarter of 2024 for an expected delivery in 2027. Notably, some of these breakers require special considerations such as pre-insertion resistors that substantively increase their lead time. Pre-insertion resistors will be necessary for any breakers that will be utilized to energize large power transformers.

b. The equipment with the longest individual lead times for the Project are the transformers and breakers. Currently, the lead time for the 345 kV/230 kV transformers is three years. The lead time for standard 230 kV breakers is two years. The most recent feedback Minnesota Power has received on the lead time for standard 345 kV breakers is 150 weeks (nearly three years), with an extra 10-15 weeks of additional lead time for breakers that have special considerations like pre-insertion resistors.

Response by: Peter Schommer

Title: Manager – Power Delivery & Asset Management

Department: Transmission

Telephone: 218-355-2639

AMERICAN TRANSMISSION COMPANY LLC AND ATC MANAGEMENT INC.

UTILITY INFORMATION REQUEST

Docket Numbers:	OAH 5-2500-39600; MPUC E-015/CN-22-607; MPUC E-015/TL-22-611	Date of Request:	January 17, 2024
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c. Upon receiving a decision from the Commission, normal permitting activities with federal, state, and local agencies will commence, if not already in process. This will also include final staking and survey work for the HVDC and AC facilities. Route studies and environmental studies are complete.

Response by: Peter Schommer

Title: Manager – Power Delivery & Asset Management

Department: Transmission

Telephone: 218-355-2639

minnesota power

Capital Project High-Level Timeline

Project	Capital Cost	Task	Duration	Start	End	Status	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3	2026 Q4	2027 Q1	2027 Q2	2027 Q3	2027 Q4	2028 Q1	2028 Q2	2028 Q3	2028 Q4	2029 Q1	2029 Q2	2029 Q3	2029 Q4	2030 Q1	2030 Q2	2030 Q3	2030 Q4	Notes:
High-Voltage Direct Current Modernization (HVDC)	L: $660M T: $800M H: $940M	Preferred Supplier Agreement - Siemens	Milestone		Q1 2023	✓																															
		DOE Funding Application	15 Months	Q4 2022	Q1 2024	In Process																															
		DOE Grant Application Submitted	Milestone		Q1 2023	✓																															Application submitted March '23. Award decision expected 10/23
		Receive DOE Funding Award Notification	Milestone		Q3 2023	✓																															Notified of grant award on 10/18/23
		Negotiate DOE Funding	Milestone	Q3 2023	Q1 2024	In Process																															Notified of grant award on 10/18/23
		MN & ND Land Acquisition	18 Months	Q1 2023	Q2 2024	In Process																															MN land complete June '23, ND land closings complete in Jan '24
		MN PUC Certificate of Need	21 Months	Q1 2023	Q3 2024	In Process																															
		Submit MN CON	Milestone		Q2 2023	✓																															Submitted MN CON 6/1/23
		Order accepting application as complete		Q3 2023	Q3 2023	✓																															Deemed substantially complete on 7/27/23
		Public info/scoping meeting	6 Months	Q3 2023	Q4 2023	✓																															
		MPUC Hearings	3 Months	Q4 2023	Q4 2023	✓																															
		Administrative Law Judge Report Due	3 Months	Q2 2024	Q2 2024																																
		MN PUC Approval	Milestone		Q3 2024																																
		ND Permit Application	18 Months	Q3 2023	Q4 2024	In Process																															Submit ND Permit application Dec '23 expect approval Q4 2024.
		Submit ND Permit	Milestone		Q1 2024	In Process																															
		ND Permit Approval	Milestone		Q4 2024																																
		Nelson Lake Scoping / GRE Coordination	9 Months	Q3 2023	Q1 2024	In Process																															
		St. Louis County Scoping	6 Months	Q4 2023	Q1 2024	In Process																															
		T-Line Upgrade Scoping	6 Months	Q4 2023	Q1 2024	In Process																															
		Contract T-Line Detail Engineer	6 Months	Q4 2023	Q1 2024	In Process																															
		Contract Substation Detail Engineer	6 Months	Q4 2023	Q1 2024	In Process																															
		Critical Long-Lead Time Material Procurement	48 Months	Q4 2023	Q3 2027	In Process																															
		Order Nelson Lake Breakers (2 yr. lead)	9 Months	Q3 2023	Q1 2024	In Process																															(9) 230 kV breakers; delivery February 1, 2026. Needed for '26 in-service.
		Order St. Louis County Breakers (2 yr. lead)	9 Months	Q3 2023	Q1 2024	In Process																															(3+1 spare) 230kv breakers, delivery 2027
		Order Nelson Lake Transformers (3 yr. lead)	9 Months	Q3 2023	Q1 2024	In Process																															(3+1 spare) 345/230kV, delivery August 2027. Hyundai
		Order St. Louis County Transformers (3 yr. lead)	9 Months	Q3 2023	Q1 2024	In Process																															(3+1 spare) 345/230kV, delivery August 2027. Hyundai
		Red River Flood Diversion Project (T-Line)				In Process																															
		Planning, Scoping, Engineering	30 months	Q3 2024	Q4 2025	In Process																															
		Construction	9 months	Q1 2026	Q3 2026														CONST.																		
		Nelson Lake 230 kV Substation Construction	18 Months	Q1 2026	Q2 2026										CONSTRUCTION																						
		Nelson Lake 345 kV Substation Construction	18 Months	Q3 2026	Q4 2027																		CONSTRUCTION														
		St. Louis County 345/230 kV Substation Construction	18 Months	Q3 2026	Q4 2027																		CONSTRUCTION														
		East Oliver Switching Station construction	18 Months	Q3 2026	Q4 2027																		CONSTRUCTION														
		North Dakota interconnection line construction	18 Months	Q3 2026	Q4 2027																		CONSTRUCTION														
		Minnestota interconnection line construction	18 Months	Q3 2026	Q4 2027																		CONSTRUCTION														
		MP Studies	24 Months	Q1 2023	Q4 2024	In Process																															
		Technical Workstream (MP & Siemens)	12 Months	Q2 2023	Q1 2024	In Process																															
		Siemens FEED Study Coordination	33 Months	Q2 2024	Q4 2026																																
		Final Notice to Proceed (Siemens)	Milestone		Q4 2026																																
		Converter Station Manufacturing (Siemens)	33 Months	Q4 2026	Q2 2029																																
		MN & ND Converter Station Construction	33 Months	Q3 2027	Q1 2030																				CONSTRUCTION												
		MN & ND Converter Station Commissioning	3 Months	Q1 2030	Q1 2030																								Goal								Siemens guaranteed substantial completion April 2030
		Operation ->	Milestone	Q2 2030	Cont.																																

MP Exhibit ___ (Gunderson)
Direct Schedule 3
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