STATE OF MINNESOTA
BEFORE THE OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Application of Minnesota Power for a Certificate of Need and a High Voltage Transmission Line (HVTL) Route Permit for the HVDC Modernization Project in Hermantown, Saint Louis County	MPUC Docket Nos. E015/CN-22-607 and E015/TL-22-611 OAH Docket No. 5-2500-39600

MINNESOTA POWER'S INITIAL POST-HEARING BRIEF

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I. INTRODUCTION

On June 1, 2023, Minnesota Power ("Minnesota Power" or the "Company") submitted its combined application for a Certificate of Need and Route Permit ("Application") to the Minnesota Public Utilities Commission ("Commission") under Minn. Stat. § 216B.243, Minn. Stat. § 216E.04, Minn. R. 7849 and Minn. R. 7850 for the high-voltage, direct-current ("HVDC") Modernization Project ("HVDC Modernization Project" or the "Project").[1] As stated in the Application, the HVDC Modernization Project needed to modernize aging HVDC assets that are critical to the grid, continue to position the grid for the clean energy transition, and improve the reliability of the transmission system in Minnesota and North Dakota.[2] In recent years, Minnesota Power has experienced HVDC terminal outages due to failures in the control system, power electronics, transformers, and other components. Based on experience with other electric system components, the failure rate is expected to increase, which is of particular concern for the existing HVDC system because of limited parts availability.[3]

In the Application, Minnesota Power proposed to modernize certain portions of its high-voltage, direct-current ("DC") ("HVDC") assets located in Minnesota and North Dakota.[4] Specifically, Minnesota Power's Application detailed the work necessary adjacent to its existing HVDC assets located in Hermantown, Minnesota, which included construction of a new HVDC converter station, reconfiguration of a short portion (a few hundred feet) of the existing ±250 kV HVDC transmission line ("HVDC Line") into the new HVDC converter station, construction of a short (less than one mile) single-circuit 345 kV transmission line, a new 345 kV/230 kV substation,

[1] Ex. MP-104 (Application).
[2] Ex. MP-104 at 2 (Application).
[3] Ex. MP-104 at 3 (Application).
[4] The siting of the North Dakota HVDC converter station and substation upgrades will be regulated by the North Dakota Public Service Commission and permitted as part of the Certificate of Corridor Compatibility and Route Permit Application process in North Dakota. The North Dakota facilities are included in the overall $800 million mid-range cost estimates for the HVDC Modernization Project.

a short (less than one mile) double-circuit 230 kV transmission line,[5] and interconnection of the 230 kV transmission line at the same bus in the Minnesota Power Arrowhead 230 kV/115 kV Substation where the existing HVDC Line interconnects today (the "Minnesota Power Proposed Configuration" or "Minnesota Power's Proposed Configuration"). A new HVDC converter station is necessary to accommodate modernized equipment and minimize the outage necessary for the HVDC Line while maintaining the existing direct connection between the HVDC Line and the underlying Minnesota Power 230 kV transmission system.[6]

The HVDC Modernization Project mid-range cost estimate is $800 million for the Minnesota and North Dakota components. While the majority of the cost for the HVDC Modernization Project is to accommodate existing and planned transmission service request capacity held by Minnesota Power for the benefit of its customers, approximately $100 million of the proposed HVDC Modernization Project cost is intended to ensure the new HVDC converter stations are designed to accommodate future expansion of another 600 megawatts ("MW") of capacity to a total of 1500 MW.[7] As Minnesota Power's customers will be the ones paying for the HVDC Modernization Project, Minnesota Power initiated early efforts to secure state and federal grant funding for the HVDC Modernization Project to offset as much of the incremental $100 million as practicable.[8] To date, Minnesota Power has secured a total of $75 million in grant funding from the Minnesota Legislature, the first round funding opportunity of the U.S.

[5] Minnesota Power initially proposed two parallel 230 kV transmission lines but after additional evaluation and design was able to consolidate these lines onto double-circuit structures. Ex. MP-120 at 2 (Daniel McCourtney Direct Testimony and Schedules ("McCourtney Direct")); Ex. MP-129 at 4-5 (Daniel McCourtney Rebuttal Testimony and Schedules ("McCourtney Rebuttal")); MnDNR Comments on the EA (Mar. 28, 2024) (eDocket No. 20243-204708-01); DOC-EERA Hearing Comments (Apr. 15, 2024) (eDocket No. 20244-205360-01, 20244-205360-02, 20244-205360-03, 20244-205360-04).

[6] Ex. MP-104 at 32 (Application).

[7] An increase to this capacity would require the likely reconstruction of the HVDC Line, which is not part of this proceeding and would be initiated in a separate proceeding when conditions warranted this expansion.

[8] Ex. MP-104 at 18-19 (Application).

Department of Energy ("DOE") Grid Resilience and Innovation Partnerships ("GRIP") Program, and the Department of Commerce ("Department") grant matching program.[9] Minnesota Power is also pursuing another $50 million grant from the second round funding opportunity of the DOE GRIP Program for the Minnesota Power Proposed Configuration.

During the Environmental Assessment ("EA") scoping comment period, American Transmission Company LLC, by and through its corporate manager ATC Management Inc. ("ATC") proposed a system alternative for the HVDC Modernization Project (in place of the Minnesota Power Proposed Configuration) that would require construction of a double-circuit 345 kV transmission line from the new HVDC converter station to the existing ATC Arrowhead 345 kV/230 kV Substation as well as additional substation interconnection work within the new HVDC converter station, ATC's existing Arrowhead 345 kV/230 kV Substation, and Minnesota Power's existing Arrowhead 230 kV/115 kV Substation (the "ATC Arrowhead Alternative").[10] Despite Minnesota Power previously considering and rejecting this alternative, and including the reasons for its rejection in its September 29, 2023 and October 2, 2023 comments,[11] the Commission ordered a contested case proceeding on whether the ATC Arrowhead Alternative was a more prudent and reasonable system alternative to the Minnesota Power Proposed Configuration of the HVDC Modernization Project.

Both the Department – Division of Energy Resources ("DOC-DER") and Department – Energy Environmental Review and Analysis ("DOC-EERA") reviewed the overall HVDC Modernization Project as well as the Minnesota Power Proposed Configuration and the ATC Arrowhead Alternative system alternatives for the Minnesota interconnection facilities. The DOC-

[9] Ex. MP-119 at 13-19 (Daniel W. Gunderson Direct Testimony and Schedules ("Gunderson Direct")).
[10] Ex. MP-132 (September 15, 2023 ATC EA Scoping Comment Letter).
[11] Ex. MP-116 (Response to Route Alternative and Conditions); Ex. MP-117 (Supplemental Response to Route Alternative and Conditions).

DER concluded that Minnesota Power complied with all Minnesota Statutory and Rule requirements for the HVDC Modernization Project to be certified by the Commission. DOC-EERA concluded that both the Minnesota Power Proposed Configuration and the ATC Arrowhead Alternative were consistent with the standards and criteria under Minnesota Statutes and Rules for the Commission to issue a Route Permit. Both DOC-DER and DOC-EERA concluded that the Commission should weigh various standards and criteria in determining whether the Minnesota Power Proposed Configuration or the ATC Arrowhead Alternative was the most appropriate system alternative for the HVDC Modernization Project.

Minnesota Power and ATC provided studies of the system alternatives, all of which demonstrated a transfer of power flow to Wisconsin with the ATC Arrowhead Alternative that is not present with the Minnesota Power Proposed Configuration. DOC-DER agreed with this assessment of the ATC Arrowhead Alternative. This additional power flow away from Minnesota Power customers and into Wisconsin will benefit ATC's Wisconsin transmission system, even though Minnesota Power customers will be paying for the HVDC Modernization Project.

DOC-EERA's analysis of the environmental and socioeconomic potential impacts of both system alternatives indicated minimal impacts for all standards and criteria, except it noted a potentially-greater aesthetic impact for the Minnesota Power Proposed Configuration due to the proximity of the St. Louis County 345 kV/230 kV Substation near a road and, for the ATC Arrowhead Alternative, a potentially greater environmental impact to West Rocky Run Creek. To mitigate any potential aesthetic impact, Minnesota Power proposed to leave existing vegetation between the roadway and substation to the greatest extent practicable and install additional vegetation for screening, if necessary. Minnesota Power also agreed to lighting conditions for the

St. Louis County 345 kV/230 KV Substation. ATC proposed no additional mitigation measures related to the ATC Arrowhead Alternative's crossing of West Rocky Run Creek.

The ATC Arrowhead Alternative is slightly more costly than the Minnesota Power Proposed Configuration when the same basis for estimate is used and ATC's requested tax gross-up is applied.[12] Further, the ATC Arrowhead Alternative may put existing federal and state grant funding at risk given the volume of studies and agreements that have not yet been initiated for the ATC Arrowhead Alternative. The ATC Arrowhead Alternative would also not be eligible for the additional $50 million Minnesota Power is pursuing through the second round funding opportunity of the DOE GRIP Program for the Minnesota Power Configuration; this specific opportunity is in no way transferrable to ATC for the ATC Arrowhead system alternative.

Finally, ATC has demonstrated, and Minnesota Power agrees, that the ATC Arrowhead Alternative is not capable of implementation earlier than April 2030. A key aspect of the HVDC Modernization Project is that it is Minnesota Power's desire to implement the HVDC Modernization Project earlier than 2030 to capture additional benefits of a reduction in outages for Minnesota Power customers. Minnesota Power has continued to take all reasonable and necessary steps to ensure that an in-service date as early as 2028 would be achievable if the HVDC supplier indicated that it would be able to guarantee an earlier in-service date than April 2030. On March 1, 2024, the HVDC supplier informed Minnesota Power that it would like to initiate discussions with Minnesota Power to move the in-service date for the HVDC Modernization Project (with the Minnesota Power Proposed Configuration) up earlier than April 2030. In stark contrast, Minnesota Power's assessment (based on the pre-design study work that is complete for the Minnesota Power Proposed Configuration and that ATC has not undertaken for its system alternative), demonstrates

[12] No tax gross-up is necessary for Minnesota Power's Proposed Configuration.

that the ATC Arrowhead Alternative is not likely to be capable of an April 2030 in-service date and would likely fall into 2031 or even 2032 based on current HVDC supplier lead-times. As ATC has only demonstrated on the record an April 2030 in-service date, at the earliest, the desired earlier in-service dates are not practicable for the ATC Arrowhead Alternative.

The record demonstrates that the ATC Arrowhead Alternative does not meet the needs of the HVDC Modernization Project by transferring benefits away from Minnesota Power customers and introducing a multitude of risks related to incomplete or uninitiated studies, coordination with MISO and other transmission owners, inability to meet an accelerated in-service date, questionable ability to meet a 2030 in-service date, and timing risks associated with federal and state grant funds. A delay of any portion of the HVDC Modernization Project will result in a delay of the *entire* HVDC Modernization Project. As a result, the risks inherent to the implementation of the ATC Arrowhead Alternative to overall in-service timing, the ATC Arrowhead Alternative is an inferior system alternative to the Minnesota Power Proposed Configuration of the HVDC Modernization Project. Based on the record evidence, as detailed in this Initial Brief,[13] Minnesota Power respectfully requests that the ATC Arrowhead Alternative be rejected and that the HVDC Modernization Project, with the Minnesota Power Proposed Configuration, be certified and a Route Permit with the conditions agreed upon in this proceeding be issued by the Commission.

II. PROCEDURAL MATTERS

A. Minnesota Power has met all procedural requirements under Minnesota Statutes and Rules for a Certificate of Need and Route Permit.

Minn. Stat. § 216B.243 and Minn. R. 7849 set forth the procedural requirements for an applicant for a Certificate of Need. Minn. Stat. § 216E.03 and Minn. R. 7850 set forth the

[13] With this Initial Brief, Minnesota Power also files proposed Findings of Fact, Conclusions of Law, and Recommendations that are intended to augment the record evidence discussed in this Initial Brief.

procedural requirements for an applicant for a Route Permit. These Minnesota Statutes and Rules set forth certain threshold information that any applicant seeking to eventually be a Permittee must provide within an application, including certain information unique to each applicant if there is more than one applicant for a project, including:

- Peak demand and annual consumption forecast information for each applicant;
- Information on each applicant's transmission system capacity (including seasonal forecasts) and the reserve margins on each applicant's transmission system; and
- Information on each applicant's energy conservation goals and objectives.

Additionally, an applicant must provide notices to landowners and interested parties via various mailed and published notices under Minn. Stat. § 216E.04, subd. 4, Minn. R. 7829.2500, subp. 5, Minn. R. 7829.2550, subp. 3, Minn. R. 7849.2550, and Minn. R. 7850.3300.

These requirements can be modified by Minn. R. 7849.0200, subp. 6 via the filing of an exemption request. Minnesota Power filed such a request for certain exemptions from Minn. R. 7849.0270, Minn. R. 7849.0280, Minn. R. 7849.0290, and Minn. R. 7849.0300 on November 30, 2022. The Commission granted the requested exemptions to Minnesota Power via order on February 1, 2023.[14] Minnesota Power filed its Combined Application for a Certificate of Need and Route Permit with all required information on June 1, 2023.[15] The Commission found that the Application was complete and ordered that the Application be evaluated under joint review on August 8, 2023.[16]

[14] ORDER GRANTING EXEMPTIONS FROM CERTIFICATE OF NEED APPLICATION DATA REQUIREMENTS (Feb. 1, 2023) (eDocket Document No. 20232-192809-01). Minnesota Power also sought and obtained exemption from Minn. R. 7829.2550, subp. 6. ORDER APPROVING NOTICE PLAN AND GRANTING EXEMPTION (Feb. 14, 2023) (eDocket Document No. 20232-193128-01)

[15] Exhs. MP-104 and MP-105 (Application).

[16] Ex. PUC-700 (Order Accepting Application as Complete, Authorizing Joint Review under Informal Procedure, and Requesting Summary Proceeding).

Minnesota Power provides the procedural history for this matter in its Proposed Findings of Fact, Conclusions of Law and Recommendation, filed concurrently with this Initial Brief. Minnesota Power has met all procedural requirements for obtaining a Certificate of Need and Route Permit provided in Minnesota Statutes and Rules. Minnesota Power has included all information in the Application required by Minnesota Rules or has otherwise been exempted from providing certain information or supplemented information as requested and has met all application procedures for a Certificate of Need and Route Permit. Further, Minnesota Power has provided all mailed and published notices required under Minnesota Statutes and Rules to date. Additionally, all notices provided by mail or by publication by the Commission or EERA have identified Minnesota Power as the only applicant for the HVDC Modernization Project. There are not any procedural requirements under Minnesota Statutes or Rules that preclude granting a Certificate of Need or issuing a Route Permit for Minnesota Power's Proposed Configuration of the HVDC Modernization Project based on the record.

B. ATC seeks to be a co-Permittee and has failed to provide all necessary information for a co-Permittee under Minnesota Rules.

In general, when a landowner or state agency proposes a system alternative for consideration (alternative endpoint, for example) in a Certificate of Need or Route Permit proceeding, the facilities are still constructed, owned, and operated by the Permittee or co-Permittees. While ATC has suggested its ATC Arrowhead Alternative is a route alternative, ATC actually seeks status as a co-Permittee for the HVDC Modernization Project Certificate of Need and Route Permit. This is due to the fact that ATC seeks, from the Commission, permission to

construct and own HVDC Modernization Project associated facilities within its existing ATC Arrowhead 345 kV/230 kV Substation.[17]

Regarding data requirements for Certificate of Need applications, Minn. R. 7849.0220, subp. 3 provides in part that "[i]f the proposed LEGF or LHVTL is to be owned jointly by two or more utilities or by a pool, the information required by parts 7849.0010 to 7849.0400 must be provided by each joint owner for its system." Because ATC proposes to own interconnection equipment associated facilities required to be constructed within its Arrowhead 345 kV/230 kV Substation and Minnesota Power would own the proposed double-circuited 345 kV transmission line required to interconnect Minnesota Power's HVDC system with the bulk AC transmission system for the ATC Arrowhead Alternative, for the ATC Arrowhead Alternative to be considered, the Commission should determine that ATC should be considered a co-applicant and should have provided the information required by Minn. R. 7849.0010 to 7849.0400 as Minnesota Power provided in the Application.

While it is undisputed that Minnesota Power would own the proposed double-circuit 345 kV transmission line if the ATC Arrowhead Alternative is constructed, as an entity that has proposed a new LHVTL that would be part of the HVDC Modernization Project and would be the owner of associated facilities necessary for operation of the HVDC Modernization project within its Arrowhead 345 kV/230 kV Substation, ATC has neither provided all information required of

[17] Ex. MP-132 (September 15, 2023 ATC Scoping Comment Letter). The work proposed to be constructed, owned, and operated by ATC as part of the ATC Arrowhead Alternative (the facilities within the existing ATC Arrowhead 345 kV/230 kV Substation) are not, by themselves, within the jurisdiction of the Commission as that scope of work does not include a transmission line capable of operation greater than 100 kV and in excess of 1,500 feet in length. Minn. Stat. § 216E.01, subd. 4. However, as the facilities ATC seeks to construct, own, and operate at the ATC Arrowhead 345 kV/230 kV Substation are associated with a 345 kV transmission line in excess of 1,500 feet in length, they are "associated facilities" under the Commission's jurisdiction.

applicants for certificates of need or route permits nor sought an exemption from providing such information or otherwise a rule variance, where ATC would have been required to show:

> A. enforcement of the rule would impose an excessive burden upon the applicant or others affected by the rule;
> B. granting the variance would not adversely affect the public interest; and
> C. granting the variance would not conflict with standards imposed by law.[18]

Further, the ATC Arrowhead Alternative would provide additional transfer capability between the transmission system in northeastern Minnesota with the Wisconsin transmission system and provide additional benefits to the Wisconsin transmission system via the additional power flow of up to seven to ten percent to Wisconsin, which is not present with Minnesota Power's Proposed Configuration.[19] In light of these benefits flowing to the Wisconsin transmission system, the generally-required information related to ATC's Wisconsin transmission system under Minn. R. 7849.0270 (Peak Demand and Annual Consumption Forecast), Minn. R. 7849.0280 (System Capacity); Minn. R. 7849.0290 (Conservation Programs) should have been provided by ATC regarding the Wisconsin transmission system performance in this proceeding prior to being elevated to the status it is seeking to be eventually named as a co-Permittee if the Commission were to order construction of the ATC Arrowhead Alternative.

Granting a Certificate of Need for the ATC Arrowhead Alternative as ATC has proposed it, with ATC constructing and owning the substation associated facilities within the ATC Arrowhead 345 kV/230 kV Substation, would require the Commission to name ATC as a co-Permittee on the Certificate of Need and the Route Permit for the HVDC Modernization Project. Given that ATC has neither provided the information required by Minn. R. 7849 to be considered a co-applicant for a Certificate of Need (and a co-Permittee on a granted Certificate of need) nor

[18] Minn. R. 7829.3200, subp. 1.
[19] Ex. MP-121 at Schedule 14 (Winter Direct); Ex. MP-130 at 48 (Winter Rebuttal).

requested an exemption from these requirements under Minn. R. 7829.3200, subp. 1 or Minn. R. 7849. 0200, subp. 6, ATC has not met its burden to provide the baseline information required for a co-applicant to receive a Certificate of Need for the ATC Arrowhead Alternative. The record closed on March 28, 2024.

C. Minnesota Statutes and Rules set forth the requisite legal standard for the Commission's determination on a Certificate of Need and evaluation of any system alternatives proposed during the proceeding.

1. Minnesota Power has the burden of proof to demonstrate the facility is needed to obtain a Certificate of Need.

Minnesota Statutes and Rules specify the criteria the Commission should apply in determining whether to grant a Certificate of Need for the Project. The principal legal requirements for transmission Certificates of Need are found in Minn. Stat. § 216B.243, subds. 3 and 3a, together with the Commission's criteria for Certificates of Need in Minn. R. 7849.0120(A)-(D). In addition, Minn. Stat. § 216B.2422, subd. 4 (renewable energy preference) and Minn. Stat. § 216B.2426 (distributed generation) must be taken into account when considering a Certificate of Need request. The applicant bears the burden of proving the claimed need for a proposed transmission line. The burden of proof in this proceeding is proof by a preponderance of the evidence.[20]

Minn. Stat. § 216B.243 provides that a Certificate of Need is required prior to the construction of a "large energy facility" in Minnesota, as that term is defined in Minn. Stat. § 216B.2421.[21] Pertinent to this proceeding, the definition of a "large energy facility" includes "any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length."[22] The Project constitutes a large energy facility and requires a Certificate of Need from the Commission before construction can commence.

[20] *See* Minn. R. 1400.7300, subp. 5; Minn. R. 7849.120.
[21] Minn. Stat. § 216B.243, subd. 3.
[22] Minn. Stat. § 216B.2421, subd. 2(2).

Minn. Stat. § 216B.243, subds. 3 and 3a prescribe the Certificate of Need statutory requirements for large energy facilities and require the Commission to take into account all of the decision criteria set forth in the statute. The statutory provisions relevant to a Certificate of Need for a high-voltage transmission line are as follows:

> Subd. 3. **Showing required for construction.** No proposed large energy facility shall be certified for construction unless the applicant can show that demand for electricity cannot be met more cost effectively through energy conservation and load-management measures and unless the applicant has otherwise justified its need. In assessing need, the commission shall evaluate:
>
> (1) the accuracy of the long-range energy demand forecasts on which the necessity for the facility is based;
>
> (2) the effect of existing or possible energy conservation programs under sections 216C.05 to 216C.30 and this section or other federal or state legislation on long-term energy demand;
>
> (3) the relationship of the proposed facility to overall state energy needs, as described in the most recent state energy policy and conservation report prepared under section 216C.18, or, in the case of a high-voltage transmission line, the relationship of the proposed line to regional energy needs, as presented in the transmission plan submitted under section 216B.2425;
>
> (4) promotional activities that may have given rise to the demand for this facility;
>
> (5) benefits of this facility, including its uses to protect or enhance environmental quality, and to increase reliability of energy supply in Minnesota and the region;
>
> (6) possible alternatives for satisfying the energy demand or transmission needs including but not limited to potential for increased efficiency and upgrading of existing energy generation and transmission facilities, load-management programs, and distributed generation;
>
> (7) the policies, rules, and regulations of other state and federal agencies and local governments;
>
> (8) any feasible combination of energy conservation improvements, required under section 216B.241, that can (i) replace part or all of the energy to be provided by the proposed facility, and (ii) compete with it economically;
>
> (9) with respect to a high-voltage transmission line, the benefits of enhanced regional reliability, access, or deliverability to the extent these factors improve the

> robustness of the transmission system or lower costs for electric consumers in Minnesota;
>
> (10) whether the applicant or applicants are in compliance with applicable provisions of sections 216B.1691 and 216B.2425, subdivision 7, and have filed or will file by a date certain an application for certificate of need under this section or for certification as a priority electric transmission project under section 216B.2425 for any transmission facilities or upgrades identified under section 216B.2425, subdivision 7;
>
> (11) whether the applicant has made the demonstrations required under subdivision 3a; and
>
> (12) if the applicant is proposing a nonrenewable generating plant, the applicant's assessment of the risk of environmental costs and regulation on that proposed facility over the expected useful life of the plant, including a proposed means of allocating costs associated with that risk.
>
> Subd. 3a. **Use of renewable resource.** The commission may not issue a certificate of need under this section for a large energy facility that generates electric power by means of a nonrenewable energy source, or that transmits electric power generated by means of a nonrenewable energy source, unless the applicant for the certificate has demonstrated to the commission's satisfaction that it has explored the possibility of generating power by means of renewable energy sources and has demonstrated that the alternative selected is less expensive (including environmental costs) than power generated by a renewable energy source. For purposes of this subdivision, "renewable energy source" includes hydro, wind, solar, and geothermal energy and the use of trees or other vegetation as fuel.

Minn. R. 7849.0120 establishes criteria mirroring the criteria established in Minn. Stat. § 216B.243, subd. 3 for evaluating need for a transmission line. The Commission must evaluate each of the "factors listed under each of the criteria set forth in part 7849.0120 . . . to the extent that the commission considers them applicable and pertinent to a facility proposed" and "[t]he commission shall make a specific written finding with respect to each of the criteria."[23]

A Certificate of Need must be granted to the applicant on the Commission determining that:

[23] Minn. R. 7849.0100.

A. the probable result of denial would be an adverse effect upon the future adequacy, reliability, or efficiency of energy supply to the applicant, to the applicant's customers, or to the people of Minnesota and neighboring states, considering:

(1) the accuracy of the applicant's forecast of demand for the type of energy that would be supplied by the proposed facility;

(2) the effects of the applicant's existing or expected conservation programs and state and federal conservation programs;

(3) the effects of promotional practices of the applicant that may have given rise to the increase in the energy demand, particularly promotional practices which have occurred since 1974;

(4) the ability of current facilities and planned facilities not requiring certificates of need to meet the future demand; and

(5) the effect of the proposed facility, or a suitable modification thereof, in making efficient use of resources;

B. a more reasonable and prudent alternative to the proposed facility has not been demonstrated by a preponderance of the evidence on the record, considering:

(1) the appropriateness of the size, the type, and the timing of the proposed facility compared to those of reasonable alternatives;

(2) the cost of the proposed facility and the cost of energy to be supplied by the proposed facility compared to the costs of reasonable alternatives and the cost of energy that would be supplied by reasonable alternatives;

(3) the effects of the proposed facility upon the natural and socioeconomic environments compared to the effects of reasonable alternatives; and

(4) the expected reliability of the proposed facility compared to the expected reliability of reasonable alternatives;

C. by a preponderance of the evidence on the record, the proposed facility, or a suitable modification of the facility, will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health, considering:

(1) the relationship of the proposed facility, or a suitable modification thereof, to overall state energy needs;

(2) the effects of the proposed facility, or a suitable modification thereof, upon the natural and socioeconomic environments compared to the effects of not building the facility;

(3) the effects of the proposed facility, or a suitable modification thereof, in inducing future development; and

(4) the socially beneficial uses of the output of the proposed facility, or a suitable modification thereof, including its uses to protect or enhance environmental quality; and

D. the record does not demonstrate that the design, construction, or operation of the proposed facility, or a suitable modification of the facility, will fail to comply with relevant policies, rules, and regulations of other state and federal agencies and local governments.

To be granted a Certificate of Need, Minnesota Power, as an applicant, must satisfy the requirements of both the Statutes and Rules. In many respects, the statutory criteria and the Commission's rules are essentially the same. Because the Commission must make a written finding regarding each of the rule criteria.[24] As discussed in this Initial Brief, Minnesota Power has satisfied the Commission's Certificate of Need criteria for the HVDC Modernization Project (incorporating the Minnesota Power Proposed Configuration). Therefore, the Commission should certify the Minnesota Power Proposed Configuration of the HVDC Modernization Project.

2. ATC has the burden of proof to demonstrate the ATC Arrowhead Alternative is a more reasonable and prudent alternative to the Minnesota Power Proposed Configuration.

With respect to the second criterion under the Commission's Certificate of Need rule criteria, in determining whether a more reasonable and prudent system alternative to a project has not been demonstrated, Minnesota Power meets this burden by showing that the HVDC Modernization Project is the most reasonable and prudent way to satisfy the articulated and demonstrated needs. It is not, however, Minnesota Power's burden to disprove other potential system alternatives or to prove the absence of theoretical alternatives. The Commission and courts have found that the burden falls squarely on other parties to introduce alternatives into the record for consideration and then to establish that any such alternatives provide a more reasonable and prudent means of meeting the articulated needs than does the Project.

In examining the Commission's certificate of need rules for natural gas pipelines, whose criteria are similar to the criteria in the high-voltage transmission line certificate of need Rules, the court of appeals has stated:

> We do not agree that Minn. R. 7851.0120, subp. B, changes an applicant's burden of proof. Under the certificate-of-need process established by statute and rule, an

[24] Minn. R. 7849.0100.

> applicant bears the burden of proving the need for a proposed facility. An applicant fails to meet this burden when another party demonstrates that there is a more reasonable and prudent alternative to the facility proposed by the applicant. Minn. Stat. § 216B.243, subd. 3; Minn. R. 7851.0120, subp. 8. This regulatory scheme is simply a practical way to prevent the issuance of a certificate of need when there is a more reasonable and prudent alternative to the proposed facility without requiring an applicant to face the extraordinary difficulty of proving that there is not a more reasonable and prudent alternative.[25]

While the rule criterion requiring evaluation for natural gas pipelines differs from transmission lines in that the criterion for evaluation of project alternatives for transmission project certificates of need do not refer to the showing being required "by parties or persons other than the applicant," the Commission has applied this burden to parties or persons other than the applicant in the context of certificate of need proceedings involving transmission line projects.[26] Therefore, ATC has the burden of showing by a preponderance of the evidence that the ATC Arrowhead Alternative is a more reasonable and prudent alternative for the HVDC Modernization Project than Minnesota Power's Proposed Configuration. As discussed in this Initial Brief, ATC has failed to meet its burden of proof.

[25] *In re Application of the City of Hutchinson (Hutchinson Utils. Comm'n)*, No. A03-99, 2003 WL 22234703, at *7 (Minn. App. Sept. 23, 2003) (unpublished).

[26] *See, e.g.*, *In re Applications of Plum Creek Wind Farm, LLC for a Certificate of Need, Site Permit, and Route Permit for an up to 414 MW Large Wind Energy Conversion System and 345 kV Transmission Line in Cottonwood, Murray, and Redwood Cntys.*, Docket No. IP-6997/CN-18-699, ORDER GRANTING CERTIFICATE OF NEED AND ISSUING SITE PERMIT AND ROUTE PERMIT at 4 (Sept. 23, 2021) (adopting ALJ's findings of fact, conclusions of law, and recommendation) (eDocket No. 20219-178198-01); OAH Docket No. 71-2500-36664, FINDINGS OF FACT, CONCLUSIONS OF LAW, AND RECOMMENDATION at 39, ¶ 182 (May 18, 2021) (eDocket No. 20219-178198-04) ("It is true that Minn. R. 7849.0120 does not specifically reference the role that other parties or persons may play in advancing evidence regarding alternatives to a proposed project. The Administrative Law Judge determines, however, that the better reading of the rule acknowledges that the proponent of such alternatives, and the bearer of the burden to establish that a more reasonable and prudent option exists, is not the applicant.").

III. MINNESOTA POWER'S HVDC SYSTEM

A. The existing HVDC System has operated well beyond its original operating life and is due for modernization.

Minnesota Power owns and operates the 465-mile ±250 kV HVDC Line and two converter stations: one located near Center, North Dakota, and one located in Hermantown, Minnesota ("HVDC System").[27] The HVDC System is currently used to deliver up to 550 MW of Minnesota Power's North Dakota wind energy resources directly to its customers via a 230 kV interconnection at Minnesota Power's Arrowhead 230 kV/115 kV Substation.[28] The HVDC System was constructed by the Square Butte Cooperative, which was created under a joint agreement between Minnesota Power and Minnkota Power Cooperative in May of 1972.[29] The HVDC System has been operating continuously since 1977.[30]

The HVDC System is designed to convert alternating-current ("AC") generated power received at the 230 kV Square Butte East Substation in Center, North Dakota into ±250 kV HVDC via a converter station.[31] The power generated in this area of North Dakota is wind generation associated with Minnesota Power's Bison Wind Facility ("Bison") and the NextEra Oliver Wind Facility, for which Minnesota Power has entered into Commission-approved Power Purchase Agreements.[32] Power is then transmitted at ±250 kV over approximately 465 miles of line ("HVDC Line") east to Minnesota Power's 230 kV/115 kV Arrowhead Substation, where it is converted back into AC electricity at this location.[33] The power transmitted across the HVDC Line from North Dakota to northeastern Minnesota is injected into Minnesota Power's transmission

[27] Ex. MP-121 at 6 (Winter Direct).
[28] Ex. MP-121 at 6-7 (Winter Direct).
[29] Ex. MP-119 at 3 (Gunderson Direct).
[30] Ex. MP-119 at 3 (Gunderson Direct).
[31] Ex. MP-119 at 3 (Gunderson Direct).
[32] Ex. MP-130 at 15 (Winter Rebuttal).
[33] Ex. MP-119 at 3-4 (Gunderson Direct).

system at the Minnesota Power Arrowhead 230 kV/115 kV Substation to serve Minnesota Power customers.[34] While Minnesota Power was originally a 50 percent owner of the Square Butte Cooperative and the HVDC System, Minnesota Power fully acquired the HVDC System in 2009.[35] Minnesota Power obtained Commission approval for this strategic transaction to ensure that critical assets were available to support Minnesota Power's transition to carbon-free energy as Minnesota Power phased out of purchases from coal-fired resources in North Dakota and new wind generation facilities were constructed.[36]

The HVDC converter stations are the gateway between the HVDC System and the interconnected AC network. The HVDC System cannot operate without functional and reliable converter stations.[37] The existing converter stations within the HVDC System have operated for more than 47 years, well beyond their 30-year design life.[38] More recently, Minnesota Power has experienced outages at the HVDC converter stations due to failures in the control system, power electronics, transformers, and other components of the HVDC converter stations.[39] Based on Minnesota Power's experience with other electric system components, the failure rate is expected to increase. In recent years, it has been increasingly difficult to procure spare parts for the converter stations as the original technology is becoming obsolete.[40] Modernizing the HVDC converter stations by replacing the original equipment with modern equipment will greatly reduce the likelihood of an extended outage due to component failures in the HVDC converter stations.[41] The

[34] Ex. MP-119 at 4 (Gunderson Direct).
[35] Ex. MP-119 at 4 (Gunderson Direct).
[36] Ex. MP-119 at 4 (Gunderson Direct); *In the Matter of Minnesota Power's Petition to Purchase Square Butte Cooperative's Transmission Assets and for Restructuring Power Purchase Agreements from Milton R. Young Unit 2 Generating Station*, Docket No. E015/PA-09-526, ORDER GRANTING PETITION WITH CONDITIONS at 14-15 (Dec. 21, 2009).
[37] Ex. MP-121 at 7 (Winter Direct).
[38] Ex. MP-119 at 4 (Gunderson Direct).
[39] Ex. MP-119 at 4-5 (Gunderson Direct).
[40] Ex. MP-121 at 9 (Winter Direct).
[41] Ex. MP-121 at 9 (Winter Direct).

impact to Minnesota Power customers of these outages has been quantified by the DOC-DER as approximately $7 million annually or approximately $211 million over the next 30 years, ignoring inflation and a likely increase of outages and outage costs.[42] This quantification does not account for a full outage of the HVDC Line, and the DOC-DER concluded that this estimate is likely "substantially lower than what actual outage costs for the" HVDC System would be should the HVDC System not be modernized.[43] This financial impact does not take into account the additional reliability benefit Minnesota Power customers receive from the HVDC Line as well as additional costs that would be borne by Minnesota Power's customers if this resource were unavailable to achieve Minnesota's carbon-free goal.[44]

As previously stated, the HVDC Line connects Minnesota Power's 230 kV Square Butte East Substation in Center, North Dakota to Minnesota Power's Arrowhead 230 kV/115 kV Substation in northeastern Minnesota.[45] Through this interconnection, the HVDC System serves as an effective bridge between Minnesota Power's high-capacity renewable energy resources in central North Dakota and Minnesota Power's backbone 230 kV network in northeastern Minnesota.[46] The geographic area bridged by the HVDC Line is an often-congested area of the regional AC transmission network.[47] Once the renewable energy from North Dakota is transmitted directly to the existing 230 kV network in northeastern Minnesota, that renewable energy can be transmitted locally to Minnesota Power's customers.[48] Both the existing HVDC System and Minnesota Power's Proposed Configuration of the HVDC Modernization Project make use of

[42] Ex. DOC DER-600 at 10-11 (Direct Testimony and Attachments of Michael N. Zajicek ("Zajicek Direct")).
[43] Ex. DOC DER-600 at 11-12 (Zajicek Direct).
[44] Ex. DOC DER-600 at 11 (Zajicek Direct).
[45] Ex. MP-121 at 84 (Winter Direct).
[46] Ex. MP-121 at 8 (Winter Direct).
[47] Ex. MP-121 at 8 (Winter Direct).
[48] Ex. MP-121 at 8 (Winter Direct).

Minnesota Power's Arrowhead 230 kV/115 kV Substation as the point of interconnection for delivery of power from the HVDC System to the existing Minnesota Power 230 kV backbone transmission network.[49] Maintaining the point of interconnection at the Arrowhead 230 kV/115 kV Substation for both the existing HVDC System and Minnesota Power's Proposed Configuration of the HVDC Modernization Project is important due to the fact this is the first location where there is a connection between the HVDC System and the existing AC transmission network, and that location is directly owned, operated, and maintained by Minnesota Power for the benefit and use of its customers.[50]

The Minnesota Power Arrowhead 230 kV/115 kV Substation is an important hub for Minnesota Power's local transmission system resulting from its location near the important Duluth load center and its long-standing interconnection to the HVDC System. The Minnesota Power Arrowhead 230 kV/115 kV Substation also provides reliability support to a weaker northern and central Wisconsin transmission system in addition to serving local needs in northeastern Minnesota. The surrounding 230 kV AC transmission system has been developed to accommodate and rely on the power delivered by the HVDC System. Minnesota Power's Arrowhead 230 kV/115 kV Substation is a direct source to the local 115 kV system and also includes critical 230 kV AC transmission connections with the Iron Range and the Interstate 35 Corridor as part of Minnesota Power's backbone network to serve its customers.[51]

[49] Ex. MP-121 at 13 (Winter Direct).
[50] Ex. MP-121 at 18 (Winter Direct). The ATC Arrowhead Alternative moves the point of interconnection to the ATC Arrowhead 345 kV/230 kV Substation. This is the result of the ATC Arrowhead Alternative connecting the HVDC Modernization Project at the ATC Arrowhead 345 kV/230 kV Substation *before* it connects to Minnesota Power's Arrowhead 230 kV/115 kV Substation. For the ATC Arrowhead Alternative, the first AC interconnection location where there is an existing AC network is the ATC Arrowhead 345 kV/230 kV Substation. Evid. Hrg. Tr. at 105:3-106:16 (Dagenais). This is discussed in more detail in Section V.A.5.
[51] Ex. MP-121 at 35 (Winter Direct).

Without the HVDC System, Minnesota Power's wind generation would be injected into the regional AC transmission network in North Dakota and then Minnesota Power would withdraw an equivalent amount of energy from the AC transmission network in northeastern Minnesota, bearing the market risk of potentially significant cost differences between central North Dakota and northeastern Minnesota that are the result of transmission constraints on the AC network.[52] Similar to a traffic jam on a freeway, AC transmission systems can be subject to congestion resulting from competing power flows.[53] HVDC transmission systems, however, are not subject to this condition because of their direct power delivery for specified power flows.[54]

B. The Company has carefully considered the HVDC System equipment and future opportunities while developing the HVDC Modernization Project.

Minnesota Power has been considering a modernization of the HVDC converter stations since 2012 and reporting this need to the Commission since 2013.[55] Over many years, through multiple studies, and through coordination with MISO, Minnesota Power developed the HVDC Modernization Project.[56] The HVDC System is a critical part of Minnesota Power's transition to carbon-free generation for Minnesota Power's customers.

The existing HVDC converter stations were released for commercial operation in May 1977, with an expected operating lifetime of 30 years based on their original design. As of 2024, the HVDC converter stations have operated for nearly 47 years, continuously delivering value for Minnesota Power's customers. When evaluating approaches to modernization due to the age and condition of the HVDC System, Minnesota Power explored different converter technologies for

[52] Ex. MP-121 at 8 (Winter Direct).
[53] Ex. MP-121 at 8 (Winter Direct).
[54] Ex. MP-121 at 8 (Winter Direct.
[55] Ex. MP-121 at 8 (Winter Direct).
[56] There are no upgrades to the HVDC Line, itself, proposed as part of the HVDC Modernization Project. Additionally, The siting of the North Dakota HVDC converter station and substation upgrades will be regulated by the North Dakota Public Service Commission and permitted as part of the Certificate of Corridor Compatibility and Route Permit Application process in North Dakota.

the HVDC converter stations. Through this analysis, Minnesota Power evaluated both line commutated converter ("LCC") HVDC technology and current best-available voltage source converter ("VSC") HVDC technology. While earlier Minnesota Power evaluation efforts focused on in-kind replacement of the existing LCC with new LCC converters retrofitted into the existing infrastructure, evolving near-term and long-term needs for renewable energy integration and robust grid-supporting transmission technologies initiated a shift in Minnesota Power's outlook for the HVDC Modernization Project in the early 2020s. VSC HVDC technology started to eclipse LCC HVDC technology in the global market and long-term transmission needs in northeastern Minnesota began to take shape between 2020 and 2022.[57]

This shift in technology adoption also coincided with the enactment of Minnesota's carbon-free policy, the Commission's order for Minnesota Power to cease coal-fired operations at the Boswell Energy Center in Minnesota Power's 2021 Integrated Resource Plan,[58] and MISO's embarkation on its multi-year Long Range Transmission Plan ("LRTP") effort to identify the reliability needs of the grid over the next several decades. In light of these events, Minnesota Power engaged in a detailed evaluation of converter technology for the HVDC Modernization project and embarked on a thorough due diligence process to inform its decision-making.[59]

In early 2022, Minnesota Power engaged the HVDC suppliers and began a comprehensive assessment of technology and configuration options for the modernization and replacement of the HVDC converter stations. As part of this effort, Minnesota Power and the HVDC suppliers evaluated current HVDC market conditions and supplier capabilities to assist Minnesota Power in developing a strategy for the cost-effective and efficient design, procurement, and execution of its

[57] Ex. MP-121 at 10 (Winter Direct).
[58] *See* Ex. MP-122 at Schedule 11 at 10 (Winter Direct) (TS).
[59] Ex. MP-121 at 10 (Winter Direct).

HVDC Modernization Project. Several HVDC converter upgrade options were considered, including bipole and monopole configurations, using either LCC or VSC technology, considering both half-bridge and full-bridge VSC topologies, and assessing either 230 kV or 345 kV AC interconnection voltages. These alternative technologies and configurations were presented to the HVDC suppliers together with an invitation to participate in workshops exploring technical advantages and disadvantages of each technology and configuration option more fully.[60]

Early in discussions with the HVDC suppliers, there was unanimous consent that market trends heavily favored VSC converters and that LCC converters might not be supported by some HVDC suppliers for new projects. The continuing evolution and technological advancement of VSC HVDC converter technology, which has been around for approximately three decades but only really began to accelerate globally around 2015, offers the opportunity to maintain or even enhance power system reliability despite significant retirements of conventional synchronous generation. Therefore, Minnesota Power determined that the technical advantages of VSC HVDC converters would most fully meet Minnesota Power's needs for the modernization of the HVDC converter stations, positioning them to provide value to, and system flexibility for, Minnesota Power's customers and the region for another 40 years or more.[61]

Upgrading to VSC technology addresses several other significant needs related to reliability and grid support, renewable integration, and long-term flexibility. These attributes of VSC HVDC technology will support Minnesota Power as it navigates the continued evolution of the power system, making positive contributions to grid reliability as the clean energy transition continues. With their inherent technological advantages, VSC HVDC converters are better suited

[60] Ex. MP-121 at 10-11 (Winter Direct).
[61] Ex. MP-121 at 11 (Winter Direct).

to operations in weaker and less predictable system conditions associated with higher penetrations of renewable energy. In addition, the VSC HVDC converters to be implemented as part of the HVDC Modernization Project will provide flexibility and scalability to support both the near-term and long-term needs of Minnesota Power's customers and the electric grid.[62]

The existing HVDC System LCC converters in Minnesota are located within the Minnesota Power Arrowhead 230 kV/115 kV Substation. The LCC converters transform the HVDC electricity to AC transmission at 230 kV and connect to the Minnesota Power AC transmission system at Minnesota Power's Arrowhead 230 kV/115 kV Substation. VSC converters have different spatial requirements than LCC converters. This prevents the VSC HVDC technology from being retrofitted into the existing site infrastructure associated with the original LCC converters. Implementing VSC technology does not, by itself, however, fundamentally change the electrical interconnection configuration or the point of interconnection of the HVDC System. Due to the spatial requirements, implementation of new VSC HVDC converters for the Project requires relocation of the HVDC converter stations and construction of each on a new site so that the existing HVDC converters may remain in service until the new ones (one in North Dakota and one in Minnesota) are ready to be placed in service. This minimizes the length of the outage of the HVDC Line and the amount of replacement power that Minnesota Power may need to acquire for its customers during an outage of the HVDC Line.[63]

This necessary construction of a new converter station in Minnesota means that from the new HVDC converter station, new AC transmission lines will need to be constructed to ensure that the HVDC system reconnects at the Minnesota Power Arrowhead 230 kV/115 kV Substation.

[62] Ex. MP-121 at 9-10 (Winter Direct).
[63] Ex. MP-121 at 12-13 (Winter Direct).

Today, the HVDC System interconnects to the 230 kV Minnesota Power backbone transmission system. To ensure the same power delivery to Minnesota Power customers, the modernized HVDC equipment should make the same interconnection at the same substation, with AC transmission facilities being constructed to reconnect the HVDC System to its existing point of interconnection at the Minnesota Power Arrowhead 230 kV/115 kV Substation.[64]

The Company evaluated both 230 kV and 345 kV AC transmission voltages for the HVDC Modernization Project before ultimately deciding to develop the Project with a 345 kV AC transmission voltage at the HVDC converter stations while maintaining a 230 kV AC transmission system interconnection at the Minnesota Power Arrowhead 230 kV/115 kV Substation. The selection of the AC transmission voltage at each of the two HVDC converter stations (one in Minnesota and one in North Dakota) is significant in the development of the Project because approximately 20 percent of the cost of each converter station is associated with the converter transformers. Converter transformers make the final transformation of the voltage from HVDC to AC. If the Company were to design the system today to only provide for final transformation to 230 kV AC transmission voltage but future planning supported 345 kV AC transmission within the Minnesota Power transmission system during the 40 year (plus) life of the HVDC System, there would be a significant sunk cost due to the need to replace 230 kV converter transformers with new 345 kV converter transformers.[65]

While any future need for 345 kV AC transmission in this part of northeastern Minnesota is separate and distinct from the purpose and need for the HVDC Modernization Project, given the rapidly-evolving outlook for the potential long-term needs of the local and regional transmission

[64] Ex. MP-121 at 13 (Winter Direct).
[65] Ex. MP-121 at 14 (Winter Direct).

network, Minnesota Power concluded, based on all available information, that the best long-term solution for the HVDC Modernization Project would be to purchase 345 kV converter transformers for the HVDC converter stations and establish a separate transformation to 230 kV at the proposed new St. Louis County 345 kV/230 kV Substation. This configuration allows for the maximum flexibility of Minnesota Power's AC system for the future as the HVDC converter stations will include HVDC/345 kV converter transformers and the St. Louis County 345 kV/230 kV Substation will provide for transformation from 345 kV to 230 kV.[66]

The HVDC Modernization Project, with Minnesota Power's Proposed Configuration, ensures that the power generated by Minnesota Power's North Dakota wind facilities and transmitted over its HVDC System is delivered directly to Minnesota Power's customers to the greatest extent practicable without relying on the use of other utilities' transmission systems. Finally, the Minnesota Power Proposed Configuration avoids complex and unnecessary system changes to the configuration of the existing transmission system that do not align with the HVDC Modernization Project's purpose.[67]

Minnesota Power's Proposed Configuration includes the following facilities, all of which would be wholly owned by Minnesota Power, which is most appropriate given that Minnesota Power customers will be paying for the entirety of the HVDC Modernization Project:

- New St. Louis County HVDC/345 kV Converter Station;
- New St. Louis County 345 kV/230 kV Substation;
- Relocation of the ±250 kV HVDC Line to terminate at the new St. Louis County HVDC/345 kV Converter Station;

[66] Ex. MP-121 at 14 (Winter Direct).
[67] Ex. MP-121 at 14-15 (Winter Direct); Ex. MP-119 at 11 (Gunderson Direct); Evid. Hrg. Tr. at 154:22-155:16 (Winter).

- Less than one mile of 345 kV single-circuit transmission line between the new St. Louis County HVDC/345 kV Converter Station and the new St. Louis County 345 kV/230 kV Substation;
- Less than on mile of double-circuit 230 kV transmission line between the new St. Louis County 345 kV/230 kV Substation and the existing Minnesota Power Arrowhead 230 kV/115 kV Substation; and
- Modifications at the existing Minnesota Power Arrowhead 230 kV/115 kV Substation to facilitate interconnection of the new proposed 230 kV transmission lines to the existing HVDC System point of interconnection.[68]

IV. THE HVDC MODERNIZATION PROJECT IS URGENTLY NEEDED

A. The HVDC Modernization Project is needed to replace aging equipment that is subject to increasing outages.

The HVDC Modernization Project is needed to modernize aging HVDC assets that are critical to the grid, allow for Minnesota Power to position the grid for the clean energy transition, and improve the reliability of the transmission system in Minnesota and North Dakota.[69] In light of these needs, Minnesota Power applied to the Commission for a Certificate of Need and Route Permit for the HVDC Modernization Project, identifying within the Application the Minnesota interconnections facilities configuration that has come to be known as Minnesota Power's Proposed Configuration.

Minn. Stat. § 216B.2421, subd. 2(2) defines a "large energy facility" as "any high-voltage transmission line with a capacity of 200 kilovolts or more and greater than 1,500 feet in length."

[68] Ex. MP-121 at 12 (Winter Direct).
[69] Evid. Hrg. Tr. at 158:11-160:6 (Winter) ("we have a project here in front of us that its core purpose isn't for the regional transmission system, its core purpose is to replace aging HVDC assets that Minnesota Power's customers have exclusive access and use of currently and will have exclusively pay for as a result of this project, the replacement of them.").

Minn. Stat. § 216B.243, subd. 3 provides that the Commission shall not certify a large energy facility for construction "unless the applicant can show that demand for electricity cannot be met more cost effectively through energy conservation and load-management measures and unless the applicant has otherwise justified its need." Minn. Stat. § 216B.243, subd. 3 and Minn. R. 7849.0120 set forth the standards and criteria the Commission should evaluate in its review of a Certificate of Need application. By a preponderance of the evidence on the record, the applicant must demonstrate that the project "will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health."[70] Further, the Commission shall certify a project when it determines that the "probable result of denial would be an adverse effect upon the future adequacy, reliability, or efficiency of energy supply to the applicant, the applicant's customer, or to the people of Minnesota."[71] The Commission must also find that a more reasonable and prudent alternative to the proposed facility has not been demonstrated by a preponderance of the evidence on the record.[72] Finally, the record must demonstrate that the design, construction, or operation of the project will not fail to comply with relevant policies, rules, and regulations of other state and federal agencies and local governments.[73]

As stated in the Application, the HVDC Modernization Project is "needed to modernize aging HVDC assets, continue to position the transmission grid for [the] clean energy transition, and improve the reliability of the transmission system."[74] The primary driver of the HVDC Modernization Project is the age and condition of the existing HVDC converter stations.[75]

[70] Minn. R. 7849.0120(C).
[71] Minn. R. 7849.0120(A).
[72] Minn. R. 7849.0120(B).
[73] Minn. R. 7849.0120(D).
[74] Ex. MP-104 at 20 (Application).
[75] Ex. MP-104 at 20 (Application).

Minnesota Power has been actively evaluating approaches to modernize the HVDC System since 2012 and providing information on these efforts to the Commission since 2013.[76]

Minnesota Power provided extensive information in the record to fulfill the requisite baseline information required for a Certificate of Need as well as additional and thorough information regarding analysis of alternatives to the HVDC Modernization Project. As to the required baseline information, the DOC-DER agreed that Minnesota Power provided all the requisite information to allow for the Commission to issue a Certificate of Need.[77] As to the alternatives analyses required under, Minn. R. 7849.0120(B), the DOC-DER found that Minnesota Power "provided a thorough discussion of alternatives to the Project."[78] The DOC-DER agreed with the Company's analysis, but initially questioned whether it might be cost-effective to replace the North Dakota generation assets with Minnesota generation, the costs of a no-build alternative could be quantified, or it might be cost-effective to implement distributed generation as an alternative.[79] Minnesota Power provided additional information to the DOC-DER, as requested through information requests served on the Company.[80] After review and thorough analysis of this information, the DOC-DER concluded that the no-build and Minnesota generation alternatives would be more costly than the HVDC Modernization Project without providing many of the HVDC Modernization Project benefits.[81] The DOC-DER also agreed with the Company's conclusion that there is no distributed generation solution that can replace the HVDC Modernization Project.[82]

[76] Ex. MP-121 at 10 (Winter Direct).
[77] Ex. DOC DER-600 at 13-14 (Zajicek Direct) (Minn. R. 7849.0120(A)(1)); Ex. DOC DER-600 at 14 (Zajicek Direct) (Minn. R. 7849.0120(A)(2)); Ex. DOC DER-600 at 15-16 (Zajicek Direct) (Minn. R. 7849.0120(A)(3)).
[78] Ex. DOC DER-600 at 16 (Zajicek Direct).
[79] Ex. DOC DER-600 at 19-20 (Zajicek Direct).
[80] Ex. DOC DER-602 at 3-4 (Rebuttal Testimony and Attachments of Michael N. Zajicek ("Zajicek Rebuttal")).
[81] Ex. DOC DER-602 at 4-5 (Zajicek Rebuttal).
[82] Ex. DOC DER-602 at 5 (Zajicek Rebuttal).

Minnesota Power thoroughly evaluated all potential alternatives to the proposed Minnesota Power Configuration of the HVDC Modernization Project, as required under applicable Minnesota Statutes and Rules and that the HVDC Modernization Project meets the applicable Certificate of Need requirements.[83] The DOC-DER recommended that the Commission issue a Certificate of Need to Minnesota Power for the HVDC Modernization Project.[84] Further, while the DOC-EERA identified that potential impacts to the natural and socioeconomic environments, it did appear to identify that the HVDC Modernization Project's benefits would outweigh any of the potential impacts.[85]

The expedient and orderly replacement of the HVDC terminal equipment is prudent to ensure continuous efficient delivery of Minnesota Power's renewable, carbon-free energy resources into the future, maximizing the benefit for Minnesota Power's customers.[86] Therefore, Minnesota Power has proposed the HVDC Modernization Project to modernize to current technology and restore the HVDC System reliability.[87] Minnesota Power's Proposed Configuration for the HVDC Modernization Project is the most reasonable, prudent, and expedient approach to modernizing Minnesota Power's HVDC System.

The Project requires modernization of the HVDC converter stations and then reconnection of the new HVDC converter stations to the AC transmission system. To modernize the HVDC converter stations, new buildings and electrical infrastructure would be constructed on a new site near the existing HVDC terminals. This adjacent construction is prudent and necessary to provide

[83] Ex. DOC DER-602 at 5 (Zajicek Rebuttal).
[84] Ex. DOC DER-602 at 7 (Zajicek Rebuttal). The DOC-DER noted that its recommendation still required the Commission to find that the "proposed facility 'will provide benefits to society in a manner compatible with protecting the natural and socioeconomic environments, including human health,'" noting that the DOC-EERA would provide information on this factor in is Environmental Assessment.
[85] *See* Ex. DOC EERA-515 at 8-9 (EA).
[86] Ex. MP-119 at 4-5 (Gunderson Direct).
[87] Ex. MP-119 at 4 (Gunderson Direct); Ex. MP-121 at 8 (Winter Direct).

for the spatial requirements of the upgraded VSC converter stations and avoid a prolonged outage of the HVDC Line. The new HVDC converter stations will consist of outdoor DC equipment, a building housing converter valves and control and protection equipment, outdoor HVDC/345 kV converter transformers, and outdoor 345 kV AC interconnection equipment.[88]

Minnesota Power was able to initially obtain a guaranteed in-service date from the HVDC supplier of 2030.[89] However, Minnesota Power has been actively working to ensure that the Minnesota Power Proposed Configuration of the HVDC Modernization Project could be implemented at an earlier date if the HVDC supplier offered Minnesota Power an earlier in-service date.[90] On March 1, 2024, Minnesota Power's HVDC supplier made a formal request to begin discussions with Minnesota Power regarding potential early completion dates for the HVDC Modernization Project components needed to implement the Minnesota Power Proposed Configuration.[91] Being able to achieve an in-service date earlier than 2030 would mitigate the risk of outages for Minnesota Power customers, including the financial risk of outage costs associated with the aging existing HVDC System. Given Minnesota Power's many years of working on developing the Minnesota Power Proposed Configuration of the HVDC Modernization Project, as well as the front-end cooperative design work and coordination of studies that must be completed to satisfy the HVDC supplier's design requirements, the Minnesota Power Proposed Configuration is well-situated to achieve this potential earlier in-service date for the HVDC Modernization Project for the benefit of Minnesota Power's customers.

[88] Ex. MP-121 at 18 (Winter Direct).
[89] Ex. MP-121 at 71 (Winter Direct).
[90] Ex. MP-130 at 40 and Rebuttal Schedule 25 (Winter Rebuttal).
[91] Ex. MP-130 at 40 (Winter Rebuttal).

B. The HVDC Modernization Project is needed to support the additional 350 MW of transmission service requests held by Minnesota Power for the benefit of its customers.

Minnesota Power has proposed the HVDC Modernization Project to leverage the significant investment that must be made to modernize the HVDC System for the benefit of Minnesota Power's customers. While Minnesota Power initially began evaluation of the HVDC System in 2012 with an intent to replace the aged equipment with a more like-for-like plan, the enactment of Minnesota's carbon-free transition, the Commission ordering the cessation of coal-fired generation at Minnesota Power's Boswell Energy Center, and other factors previously discussed, Minnesota Power identified the possibility that if the HVDC converter stations were appropriately designed, they could allow for future expansion as conditions require. Specifically, Minnesota Power identified that it had the opportunity to secure an additional 350 MW of capacity possible with the HVDC Line for the benefit of Minnesota Power customers if the HVDC converter stations were designed accordingly.[92]

To secure this capacity on the HVDC System, Minnesota Power submitted transmission service requests to MISO for the additional 350 MW of HVDC Line capacity and repositioned its project reporting to MISO with respect to the HVDC System from an asset renewal project only (MTEP Project #4295 – "HVDC Valve Hall Replacement" – assigned in 2013) to a network upgrade required to facilitate the new transmission service requests. MISO evaluated Minnesota Power's Proposed Configuration of the HVDC Modernization Project within the System Impact Study for Minnesota Power's transmission service requests for 350 MW of additional HVDC capacity.[93] The MISO externally-driven process that is required to be followed when a transmission service request is received also required Minnesota Power to review the results of

[92] Ex. MP-121 at 42 (Winter Direct).
[93] Ex. MP-121 at 42 (Winter Direct).

MISO's System Impact Study, provide a Facilities Study, and enter into a Facilities Construction Agreement with MISO for completion of the required network upgrades, including Minnesota Power's Proposed Configuration of the HVDC Modernization Project.[94]

While Minnesota Power only has an immediate need for 550 MW of the capacity on the HVDC System, securing the additional 350 MW in capacity ensures a continued benefit for Minnesota Power customers.[95] If Minnesota Power has a resource need for the 350 MW of capacity, it will hold that priority on the HVDC System.[96] If Minnesota Power does not have a resource need for the 350 MW of capacity when the HVDC Modernization Project is placed in-service, Minnesota Power can assign all or part of its rights to this capacity on a limited basis to one or more third parties, which will lead to a financial benefit to Minnesota Power customers.[97]

LPI is critical of Minnesota Power ensuring that the HVDC Modernization Project is efficiently configured for future expansion for the 350 MW and also that Minnesota Power holds the 350 MW in transmission service requests for this additional HVDC System capacity.[98] Additionally, LPI grossly overstates the costs associated with this 350 MW incremental increase.[99] The costs to which LPI refers in testimony are those that are "assigned" to the particular transmission service requests through the MISO process such that, if Minnesota Power does not have a need for this capacity, these costs can be assigned to the user of the capacity for whom the upgrades benefit.[100] The assignment of costs through the MISO process is separate and distinct

[94] Ex. MP-121 at 42-43 (Winter Direct); *C.f.* Ex. ATC-244 at 18-22 (Rebuttal Testimony of Thomas Dagenais ("Dagenais Rebuttal")); Ex. ATC-255 at Schedule 9 at Figure 2.4.5-1 (Dagenais Rebuttal Schedule 9) (MISO's Business Practices Manual No. 020 shows that transmission service requests are MISO "Externally Driven Projects" and not the "Top-Down" projects that ATC has claimed they are).
[95] Ex. MP-127 at 21, Rebuttal Schedule 9, and Rebuttal Schedule 10 (Gunderson Rebuttal).
[96] Ex. MP-127 at 21 (Gunderson Rebuttal).
[97] Ex. MP-127 at 21, Schedule 9, and Schedule 10 (Gunderson Rebuttal).
[98] Ex. LPI-300 at 12-16 (Miani Direct); Ex. LPI-301 at 5-6 (Miani Rebuttal).
[99] Ex. LPI-301 at 8-9 (Miani Rebuttal).
[100] Ex. MP-121 at Direct Schedule 17 at 85-85 (Winter Direct).

from the direct incremental costs of the HVDC Modernization Project compared to a lower-capacity alternative and should not be used as a basis for discussion of such incremental costs. Instead, for purposes of this proceeding, the incremental costs should be evaluated based on the information already provided on the record by Minnesota Power. As stated previously, the incremental cost for designing the new HVDC converters with a potential capacity of 1500 MW rather than limiting them to 900 MW is approximately $100 million. Furthermore, the incremental cost of designing the new HVDC converters with a capacity of 900 MW rather than 550 MW is approximately $260 per kilowatt,[101] or a total of $91 million for the 350 MW incremental capacity that is being achieved for the transmission service requests. Furthermore, in the Facilities Study Report, it is only the "Transmission Line Modification" line item of $58 million, that is solely attributable to the 350 MW of transmission service requests.[102] And, none of the costs of this line item are included in the HVDC Modernization Project nor are they part of a current cost recovery request before the Commission. If Minnesota Power is able to assign all or a portion of the 350 MW transmission service requests for a period of time, Minnesota Power customers will receive the financial benefit of the investments it made through reimbursement by the user for the costs assigned through the MISO process. If Minnesota Power seeks to use the 350 MW to address a resource need, Minnesota Power will already have secured the HVDC converter station capacity through this proceeding and will seek cost recovery of the incremental $58 million for the HVDC Line upgrades at that time.[103]

Minnesota Power has demonstrated that the HVDC Modernization Project, while primarily needed to replace aging equipment, will also provide the additional benefit of the capability to be

[101] Ex. 130 at Rebuttal Schedule 10 (Winter Rebuttal).
[102] Ex. MP-130 at Rebuttal Schedule 3 at 2 (Winter Rebuttal).
[103] Ex. MP-130 at Rebuttal Schedule 2 (Winter Rebuttal).

expanded to 350 MW. Further, MISO has analyzed these transmission service requests, reviewed and performed the necessary studies, and entered into the requisite Facilities Construction Agreements with Minnesota Power for this additional HVDC System capacity. These Facilities Construction Agreements were filed with the Federal Energy Regulatory Commission on March 5, 2024 in FERC Docket No. ER24-1409-000.[104] Minnesota Power will be able to leverage these 350 MW of transmission service requests at the appropriate time with a modest investment of $58 million to modify the HVDC Line. Minnesota Power would seek the requisite cost approval from the Commission for this effort at the appropriate time and outside this proceeding.

C. It is reasonable and prudent to approve an HVDC Modernization Project that incorporates future optionality and expandability.

Minn. Stat. § 216E.04, subd. 9(b) provides that the Commission "may order the construction of high-voltage transmission line facilities that are capable of expansion in transmission capacity through multiple circuiting or design modifications." The Commission has ordered such thoughtful expandability previously when considering large investment transmission line projects.[105] Minnesota Power proposed the HVDC Modernization Project and the Minnesota Power Proposed Configuration to thoughtfully allow for future optionality and expandability of the HVDC System transmission facilities.

While, in the end, no party objected to the concept of the optionality and flexibility, LPI was concerned that "the costs associated with the expandability beyond fulfilling the size

[104] Ex. MP-127 at 19 (Gunderson Rebuttal). MISO refiled the FCA on March 8, 2024. No comments or protests were filed by the FERC deadline of April 1, 2024.

[105] *In the Matter of the Application of Great River Energy, Northern States Power Company (d/b/a Xcel Energy) and Others for Certificates of Need for the CapX 345-kV Transmission Projects*; Docket No. ET2/E002, *et al.*/CN-06-1115, ORDER GRANTING CERTIFICATES OF NEED WITH CONDITIONS at Order Point 3 (May 22, 2009) (Commission ordered construction of the Upsized Alternative, which leveraged the needed 345 kV transmission structures by ordering that they be constructed to 345 kV/345 kV double circuit compatible, with the second circuit positions available for future needs. Fifteen years later, projects are currently being planned or evaluated to install the second circuit on the majority of these lines, including some which are part of the MISO LRTP).

capability needed for Minnesota Power's customers should be subject to cost sharing and assigned to those that benefit."[106] To be clear, there are no costs associated with the additional HVDC Line reconstruction necessary to expand from 900 MW to 1500 MW, beyond the sizing of the converter station equipment, as part of this proceeding. The HVDC converter station equipment sizing necessary for the HVDC System to be ready for the additional 600 MW[107] is estimated to comprise $100 million of the overall mid-range HVDC Modernization Project estimate of $800 million. Put another way, for an overall HVDC converter station capacity of 1500 MW, the 900 MW of capacity for which Minnesota Power holds transmission service requests will comprise approximately $700 million of the HVDC Modernization Project and the 600 MW of capacity for potential future needs will account for approximately $100 million of the HVDC Modernization Project. The HVDC Line would still need to be rebuilt to achieve the additional 600 MW of capacity and that work is not part of this proceeding.

In an effort to offset this $100 million incremental cost, Minnesota Power has obtained state and federal grant funding in the amount of $75 million due solely to this innovativeness and future-planning aspects of this equipment.[108] Additionally, based on a concept paper submitted by Minnesota Power in January 2024, the DOE invited the Company to submit a full application for another $50 million through the DOE GRIP Program round two funding opportunity based on the Minnesota Power Proposed Configuration of the HVDC Modernization Project.[109] The Company is working diligently on this application and continues to evaluate whether there are other opportunities available to defray some of the overall cost of the HVDC Modernization Project for

[106] Ex. LPI-301 at 12 (Maini Rebuttal).
[107] To actually implement the 600 MW expansion, the HVDC Line would require rebuilding the 465 mile length between Minnesota and North Dakota – a significant investment that would also require Commission approval, significant public outreach, and administrative proceedings under Minnesota Statutes and Rules.
[108] Ex. MP-127 at 4 (Gunderson Rebuttal); Ex. MP-130 at 10 (Winter Rebuttal).
[109] Ex. MP-127 at 6-7 (Gunderson Rebuttal).

Minnesota Power's customers. If the optionality for future expandability[110] is removed from the HVDC Modernization Project, the cost of the overall project would decrease by approximately $100 million.[111] However, with this $100 million reduction, Minnesota Power would also lose grant funding of up to $75 million, along with the potential additional DOE grant funding through the GRIP Program round two funding opportunity for the HVDC Interconnections concept paper.[112] Finally, while the HVDC Modernization Project, itself, is not currently eligible for cost allocation through MISO, Minnesota Power continues to explore opportunities for cost allocation associated with the potential future expansion.[113]

The Minnesota Power Proposed Configuration of the HVDC Modernization Project meets all needs for the HVDC Modernization Project, will not have an adverse impact on existing transmission system performance or reliability, has been studied, vetted, and approved by MISO, and appropriately, reasonably, and prudently incorporates opportunities for future optionality and expandability. Minnesota Power has agreed to the environmental conditions requested by the MnDNR in this proceeding. Minnesota Power has proposed additional conditions to address aesthetic and sound concerns, including completion and compliance filing of a sound study prior

[110] The Commission has previously encouraged planning and constructing transmission facilities to be ready for future expandability. *In the Matter of the Application of Great River Energy, Northern States Power Company (d/b/a Xcel Energy) and Others for Certificates of Need for the CapX 345-kV Transmission Projects*; Docket No. ET2/E002, *et al.*/CN-06-1115, ORDER GRANTING CERTIFICATES OF NEED WITH CONDITIONS at Order Point 3 (May 22, 2009) (Commission ordered construction of the Upsized Alternative, which leveraged the needed 345 kV transmission structures by ordering that they be constructed to 345 kV/345 kV double circuit compatible, with the second circuit positions available for future needs. Fifteen years later, projects are currently being planned or evaluated to install the second circuit on the majority of these lines, including some which are part of the current MISO LRTP).

[111] Ex. MP-130 at 10 (Winter Rebuttal); Ex. MP-131 at Rebuttal Schedule 10 (Gunderson Rebuttal).

[112] Ex. MP-130 at 10 (Winter Rebuttal); Ex. MP-131 at Rebuttal Schedule 10 (Gunderson Rebuttal).

[113] Ex. MP-127 at 20 (Gunderson Rebuttal); Ex. MP-130 at 8-11 (Winter Rebuttal); Ex. DOC DER-602 at 7 (Zajicek Rebuttal). LPI expressed frustration in this docket related to the overall cost of the Project being assigned solely to the Minnesota Power Large Power and Large Light & Power customers and that the HVDC Modernization Project was not being allocated more broadly across the MISO region. However, the only clear way for costs to be assigned to others would be if the Project meets cost allocation criteria in the MISO Tariff. Ex. LPI-300 at 18 (Maini Direct). LPI expressed additional concerns that the ATC Arrowhead Alternative would result in greater power flows to Wisconsin without Wisconsin ratepayers paying for this benefit. Ex. LPI-301 at 14 (Maini Rebuttal).

to commencing construction of the Project. These commitments, made solely by Minnesota Power, will mitigate, to the greatest extent practicable, potential environmental impacts. Based on a preponderance of the evidence on the record, the Commission should grant a Certificate of Need and issue a Route Permit for the Minnesota Power Proposed Configuration of the HVDC Modernization Project.

V. THE ATC ARROWHEAD ALTERNATIVE

The ATC Arrowhead Alternative proposes to significantly modify Minnesota Power's Proposed Configuration for the HVDC Modernization Project. While Minnesota Power considered and rejected the ATC Arrowhead Alternative when evaluating system alternatives prior to developing the Application, ATC filed a request on September 15, 2023, that the Commission require the ATC Arrowhead Alternative to be considered as part of the HVDC Modernization Project Proceeding.[114]

Specifically, the ATC Arrowhead Alternative would require construction of a double-circuit 345 kV transmission line that would need to cross over the existing HVDC Line and the existing Minnesota Power Arrowhead – Bear Creek 230 kV transmission line,[115] expansion within the existing fence line at the ATC Arrowhead 345 kV/230 kV Substation to install a new 345 kV/230 kV transformer and remove other existing substation equipment, additional 345 kV equipment within the HVDC converter station to accommodate the second 345 kV transmission line circuit, and reconfiguration of the 230 kV interconnection to the Minnesota Power Arrowhead

[114] Ex. MP-132 (September 15, 2023 ATC Scoping Comment Letter); one public comment objected to the inclusion of the ATC Arrowhead Alternative in this proceeding given the way in which ATC proposed the alternative and supporting Minnesota Power's position that the ATC Arrowhead Alternative does not meet the stated needs of the HVDC Modernization Project. Public Comment by World Organization for Landowner Freedom (Mar. 28, 2024) (eDocket Document No. 20243-204759-01, 20243-204759-02, 20243-204759-03, and 20243-204759-04).

[115] Neither of these crossings (and associated outages) would be necessary for the Minnesota Power Proposed Configuration of the HVDC Modernization project. Ex. MP-121 at 80 (Winter Direct).

230 kV/115 kV Substation.[116] ATC has proposed that Minnesota Power construct and own the double-circuit 345 kV transmission line and the necessary 230 kV interconnection equipment within the Minnesota Power 230 kV/115 kV Substation while ATC would construct and own the equipment within the existing fence line of the ATC Arrowhead 345 kV/230 kV Substation.[117] The ATC Arrowhead Alternative would not include construction of the St. Louis County 345 kV/230 kV Substation and, as a result, it would relocate the point of interconnection of the HVDC System with the existing AC transmission system from the Minnesota Power Arrowhead 230 kV/115 kV Substation to the ATC Arrowhead 345 kV/230 kV Substation before eventually connecting to the Minnesota Power Arrowhead 230 kV/115 kV Substation where electricity can then be transmitted to Minnesota Power's customers in northeastern Minnesota.[118]

A. ATC has failed to demonstrate a more reasonable and prudent alternative to the Minnesota Power Proposed Configuration for the HVDC Modernization Project.

Consistent with the burden of proof established in Minnesota Statute and Rule, for the ATC Arrowhead Alternative to be selected by the Commission for the HVDC Modernization Project, ATC must demonstrate, by a preponderance of the evidence on the record, that the ATC Arrowhead Alternative is a more reasonable and prudent alternative than the Minnesota Power Proposed Configuration.[119] ATC has failed to meet its burden of proof and the Commission should

[116] Ex. MP-121 at Direct Schedule 4 at 3-4 (Winter Direct); Ex. ATC-265 at Table 2 and Table 3 (Corrections to Johanek Testimonies). ATC and Minnesota Power dispute whether a phase-shifting transformer would be required at the ATC Arrowhead 345 kV/230 kV Substation. While ATC insists that no phase-shifting transformer is necessary, no installation of a phase-shifting transfer would only be possible if the Commission removed the 800 MVA limitation that currently exists on the ATC Arrowhead 345 kV/230 kV Substation. However, ATC has provided no notice to the parties to the proceeding that placed the 800 MVA limitation on the ATC Arrowhead 345 kV/230 kV Substation and also has not initiated a request to the Commission to request that the Commission seek comment broadly on that proposal or evaluate the system impacts on removing that 800 MVA limitation or modify the existing permit for the original construction of the facility that included the 800 MVA limitation. This is discussed in more detail in Section V.A.7.

[117] Ex. MP-121 at 19-20 (Winter Direct).

[118] Ex. MP-121 at 20 (Winter Direct); Ex. MP-130 at 30-31 (Winter Rebuttal).

[119] Minn. R. 7849.0210(B). In other words, the burden is such that the proposer of an alternative must prove that the alternative is a more reasonable and prudent solution to the identified need – not that the applicant for a certificate of need must prove that the proposed alternative is not more reasonable and prudent that the applicant's proposal.

reject the ATC Arrowhead Alternative for the HVDC Modernization Project for the reasons discussed in detail below.

1. The ATC Arrowhead Alternative does not meet the purpose of the HVDC Modernization Project.

The HVDC Modernization Project addresses local reliability and aging equipment needs identified by Minnesota Power to serve its customers. Minnesota Power has been reporting the need to replace the existing HVDC Converter Stations to MISO since at least the MISO Transmission Expansion Plan ("MTEP") 2013 cycle. As discussed previously, MISO has also evaluated Minnesota Power's Proposed Configuration of the HVDC Modernization Project in a System Impact Study as a network upgrade needed to facilitate increased transfer capacity on the HVDC System in response to HVDC Line transmission service requests submitted to MISO. MISO's definitive review of the Project has therefore taken place through the transmission service request System Impact Study process, as demonstrated by the fact that MISO filed a Facilities Construction Agreement with FERC which included the HVDC Modernization Project in March 2024. It was Minnesota Power's responsibility as the incumbent transmission owner to inform MISO of the proposed scope of the Project, and MISO's responsibility to evaluate the HVDC Modernization Project. In all cases, the scope has reflected Minnesota Power's Proposed Configuration and continued interconnection at the 230 kV bus at Minnesota Power's Arrowhead 230 kV/115 kV Substation.[120]

Minnesota Power rejected interconnecting the new HVDC converter station to the ATC Arrowhead 345 kV/230 kV Substation because moving the point of interconnection for the HVDC System from its existing location on the Minnesota Power Arrowhead 230 kV/115 kV Substation

[120] Ex. MP-121 at 42 (Winter Direct).

to a new location on the ATC Arrowhead 345 kV/230 kV Substation was found to be an unnecessarily complex system alternative with system impacts and project risks that were not consistent with the purpose and need for the HVDC Modernization Project. These included risk of impacts to the regional transmission system and Minnesota Power's use of the HVDC System, as well as operational concerns within conditioned limits for the ATC Arrowhead 345 kV/230 kV Substation. These added risks and complexities necessitate additional studies due to extraneous power system modifications, as well as introducing certain regulatory considerations, project development and construction impacts, and operations and maintenance impacts.[121]

Nothing in this record has addressed or identified ways to mitigate these risks and complexities. Each of these concerns is discussed in the following sections of this Initial Brief. Any one of these concerns is sufficient to reject the ATC Arrowhead Alternative, as Minnesota Power did prior to submitting its Application for the HVDC Modernization Project.[122] However, when all of these concerns are considered cumulatively, it is abundantly clear that the ATC Arrowhead Alternative does not meet the basic needs of the Project to urgently modernize the HVDC System for the benefit of Minnesota Power's customers and should be rejected.

2. The ATC Arrowhead Alternative does not provide a "significant" environmental benefit over the Minnesota Power Proposed Configuration.

For an alternative to be more reasonable and prudent than the facility proposed by an applicant, it should be likely to have "significant environmental benefits."[123] Additionally, a project may be certified if "the proposed facility, or a suitable modification of the facility, will provide benefits to society in a manner compatible with protecting the natural and socioeconomic

[121] Ex. MP-121 at 42-43 (Winter Direct).
[122] Ex. MP-122 at 54-56 (Winter Direct); Ex. MP-130 at 21-28 (Winter Rebuttal).
[123] Minn. R. 7849.1400, subp. 6. In fact, alternatives that are "not likely to have any significant environmental benefit compared to the project as proposed" may even be excluded from further analysis in a Certificate of Need proceeding. *Id.*

environments."[124] DOC-EERA evaluated the potential impacts to the natural and socioeconomic environments for the Minnesota Power Proposed Configuration and the ATC Arrowhead Alternative in the EA developed for the HVDC Modernization Project.[125] DOC-EERA's analysis indicated that potential impacts to the natural and socioeconomic environments are anticipated to be minimal with a couple of exceptions.[126] DOC-EERA anticipates that the following elements have the potential for moderate impacts: (i) aesthetics, surface water, and topography for both the Minnesota Power Proposed Configuration and the ATC Arrowhead Alternative) and (ii) cultural values for those who place a high value on the rural nature of the HVDC Modernization Project area for the Minnesota Power Proposed Configuration.[127]

DOC-EERA affirmed that it believes potential impacts to human settlement are anticipated to be minimal for the HVDC Modernization Project.[128] DOC-EERA also clarified that "[o]n whole, impacts are anticipated to be moderate for both options. However, the ATC [Arrowhead] Alternative infrastructure and subsequent clearing is farther away from residents."[129] Finally, DOC-EERA also differentiated the two system alternatives related to impacts to the West Rocky Run Creek. Both the Minnesota Power Proposed Configuration and the ATC Arrowhead Alternative will require crossings of the creek, but DOC-EERA concluded that while the right-of-way for the crossing of the Minnesota Power Proposed Configuration will be allowed to revegetate after removal of the existing HVDC Line, the "right-of-way will remain cleared near the ATC

[124] Minn. R. 7849.0120(C).
[125] Ex. DOC EERA-515 (EA); DOC-EERA Hearing Comments (Apr. 15, 2024) (eDocket Document Nos. 20244-205360-01, 20244-205360-02).
[126] Ex. DOC EERA-515 at 8-9 and 34-123 (EA).
[127] Ex. DOC EERA-515 at Table 23 and Table 24 (EA).
[128] DOC-EERA Hearing Comments (Apr 15, 2024) (eDocket Document Nos. 20244-205360-01, 20244-205360-02).
[129] Ex. DOC EERA-515 at Table 24 (EA).

[Arrowhead] Alternative's new crossing, which could exacerbate warming impacts."[130] ATC objected to this conclusion in its comments on the EA, but DOC-EERA responded:

> EERA does not disagree that ATC offered a buffer of low-growing vegetation adjacent to West Rocky Run Creek in its direct testimony. EERA notes, however, that this vegetative mitigation measure does not change conclusions made in the Water Resources section of the EA. Minnesota Power would also retain a buffer of low-growing vegetation where new clearings for right-of-way would be adjacent to West Rocky Run Creek. As noted in the EA, the total length of new clearing is slightly less for Minnesota Power's proposed crossing compared with that for ATC's crossing. Thus, EERA believes the analysis in the EA is correct – the ATC Alternative presents slightly higher potential for warming impacts to West Rocky Run Creek.[131]

These "tradeoffs"[132] between the two system alternatives support that the ATC Arrowhead Alternative does not provide significant environmental benefits when compared to the Minnesota Power Proposed Configuration.

In response to DOC-EERA identifying these differences, Minnesota Power proposed several additional mitigative measures related to potential impacts associated with aesthetics and cultural resources for the Minnesota Power Proposed Configuration. Specifically, to mitigate the potential moderate aesthetic and cultural values impacts associated with residents in the area being able to see portions of the St. Louis County 345 kV/230 kV Substation from or near Morris Thomas Road, Minnesota Power has proposed to maintain the existing vegetation buffer between these features.[133] Minnesota Power has also committed to using neutral colors for the facade of the

[130] Ex. DOC EERA-515 at 88-89 (EA); Minnesota Power modified the Minnesota Power Proposed Configuration at West Rocky Run Creek from two parallel 230 kV lines as proposed in the Application to a double-circuit crossing in this location along with removal of the existing HVDC Line and allowing the right-of-way to revegetate in this area. Ex. MP-120 at 11-12 (McCourtney Direct); Ex. MP-129 at 3-6 (McCourtney Rebuttal); Minnesota Power Comments on the EA at 2 (Mar. 28, 2024) (eDocket Document Nos. 20243-204709-01, 20243-204709-02).
[131] DOC-EERA Hearing Comments at 3 (Apr. 15, 2024) (eDocket Document Nos. 20244-205360-01, 20244-205360-02).
[132] Ex. DOC EERA-515 at 9 (EA).
[133] Ex. MP-129 at 3 (McCourtney Rebuttal); Minnesota Power Comments on the EA at 1-2 (Mar. 28, 2024) (eDocket Document Nos. 20243-204709-01, 20243-204709-02).

HVDC converter station so that it will better blend with the landscape.[134] Finally, to address comments received during the public hearings, Minnesota Power committed to completing a noise study once final HVDC Modernization Project design is sufficiently complete and filing that study as a compliance filing before starting construction on the HVDC Modernization Project.[135]

DOC-EERA found neither the Minnesota Power Proposed Configuration nor the ATC Arrowhead Alternative are inconsistent with any routing criteria.[136] Minnesota Power's Proposed Configuration and the ATC Arrowhead Alternative would be anticipated to have minimal impacts to the natural and socioeconomic environment.

The ATC Arrowhead Alternative is also inferior when considering opportunities for future expansion. Should additional transmission be necessary in northeastern Minnesota, the St. Louis County 345 kV/230 kV Substation design, which is only available with the Minnesota Power Proposed Configuration, will have room for certain expansions. The ATC Arrowhead Alternative would not provide this flexibility for future expansion. The ATC Arrowhead 345 kV/230 kV Substation footprint cannot be expanded to the west because of its proximity to the West Rocky Run Creek, to the south because of limited physical space and existing wetland, to the north because of the adjacent Minnesota Power Arrowhead 230 kV/115 kV Substation, or to the east because of extensive existing transmission lines and wetlands that were mitigated under a federal program in the 2000s and carry deed restrictions on them which prevent development.[137] These expandability limitations of the ATC Arrowhead 345 kV/230 kV Substation essentially prevent

[134] Minnesota Power Comments on the EA at 2 (Mar. 28, 2024) (eDocket Document Nos. 20243-204709-01, 20243-204709-02); DOC-EERA Hearing Comments at 2 and 5 (Apr. 15, 2024) (eDocket Document Nos. 20244-205360-01, 20244-205360-02).
[135] Minnesota Power Comments on the EA at 2-3 (Mar. 28, 2024) (eDocket Document Nos. 20243-204709-01, 20243-204709-02); DOC-EERA Hearing Comments at 2 and 5 (Apr. 15, 2024) (eDocket Document Nos. 20244-205360-01, 20244-205360-02).
[136] Ex. DOC EERA-515 at 125 and Table 23 (EA).
[137] Ex. MP-120 at 19 and Direct Schedule 2 (McCourtney Direct) (eDocket Nos. 20242-203446-10, 20242-203446-09).

any possibility of future expansion if the ATC Arrowhead Alternative is selected, without significant, adjacent, infrastructure build-out in the future or impacts to the mitigated wetlands.

Therefore, the ATC Arrowhead Alternative does not have "significant" environmental benefits when compared to the Minnesota Power Proposed Configuration. For these reasons, the ATC Arrowhead Alternative should be rejected.

3. The ATC Arrowhead Alternative is not more cost-effective than the Minnesota Power Proposed Configuration.

ATC has not demonstrated that the ATC Arrowhead system alternatives is more cost-effective than the Minnesota Power Proposed configuration for the HVDC Modernization Project's Minnesota interconnection facilities. On September 15, 2023; ATC estimated that the cost of the ATC Arrowhead Alternative would be $34 million without tax gross-up.[138] By January 5, 2024, ATC estimated that the cost of the ATC Arrowhead Alternative would be $39.5 million without tax gross-up.[139] At the time of filing Rebuttal Testimony on March 11, 2024, ATC estimated that the cost of the ATC Arrowhead Alternative would be $39.5 million without the tax gross-up and $43 million with the tax gross-up.[140] Approximately a week later, at the evidentiary hearing, ATC revised its estimate to $45.5 million with the tax gross-up.[141] ATC never provided any back-up documentation to support its cost estimates other than stating it asked vendors for estimates.[142] When questioned further at the evidentiary hearing, ATC admitted that the ATC Arrowhead Alternative and the HVDC Modernization Project were equal in cost.[143] This consistently-shifting cost estimate is concerning. Particularly because Minnesota Power has been

[138] Ex. MP-132 at 7 (September 15, 2023 ATC Scoping Comment Letter).
[139] Ex. MP-121 at Direct Schedule 4 (Winter Direct).
[140] Ex. ATC-209 at 8 (Rebuttal Testimony of Dustin Johanek ("Johanek Rebuttal")); Ex. ATC-265 at Table 2 and Table 3 (Corrections to Johanek Testimonies).
[141] Evid. Hrg. Tr. at 131:5-9 (Johanek); Ex. ATC-265 (Corrections to Johanek Testimonies).
[142] Ex. ATC-209 at 7 (Johanek Rebuttal).
[143] Evid. Hrg. Tr. at 138:12-140:2 (Johanek).

emphasizing in this proceeding that ATC's cost estimates are not supportable and are far too low for the scope of work to be completed.[144]

Minnesota Power initially used the 2022 MISO MTEP Cost Estimating Guide, which is publicly available and verifiable, for purposes of estimating the cost of the Minnesota Power Proposed Configuration for the Application to establish the mid-range estimate of the Minnesota interconnection facilities (the non-HVDC converter station portion of the Minnesota Power Proposed Configuration in Minnesota) at $55 million.[145] When Minnesota Power used this same basis to estimate the cost of the ATC Arrowhead Alternative, the proposal was estimated at $51.5 million, excluding tax gross-up.[146] While ATC received this information on February 2, 2024 (ahead of filing Direct Testimony), it did not inform Minnesota Power that it believed the current tax gross-up amount used in prior rate impact estimates was incorrect until it filed its Rebuttal Testimony on March 11, 2024.[147] However, when ATC's revised tax gross-up percentage of 12.668 percent is applied to the relevant portions of the $51.5 million estimate developed using the MISO MTEP Cost Estimating Guide, the ATC Arrowhead Alternative estimate is equal to the Minnesota Power Proposed Configuration: $55 million.[148]

In light of the continued dispute related to the potential cost of the ATC Arrowhead Alternative, Minnesota Power sought out a third-party contractor with expertise in this area to

[144] Ex. MP-119 at 32-33 (Gunderson Direct); Ex. MP-130 at 33-39 and Rebuttal Schedule 24 (Winter Rebuttal).
[145] Ex. MP-104 at 13 (Application); Ex. MP-130 at Rebuttal Schedule 24 (Winter Direct). For cost comparison purposes, the cost of the HVDC converter stations or the North Dakota interconnection facilities were not included in these estimates as they would be the same for both system alternatives.
[146] Ex. MP-130 at Rebuttal Schedule 24 (Winter Rebuttal).
[147] Evid. Hrg. Tr. at 124:22-125 (Johanek). Additionally, ATC has not committed on this record to a fixed tax gross-up rate that would not exceed the amount in its most current estimate. Evid. Hrg. Tr. at 130:13-17 (Johanek).
[148] Ex. MP-130 at 39 and Rebuttal Schedule 24 (Winter Rebuttal); Ex. ATC-265 (Corrections to Johanek Testimonies). Approximately $27.7 million of the $51.5 million estimate for the ATC Arrowhead Alternative would be constructed, owned, and operated by ATC. Therefore, applying the 12.668 percent tax gross-up to that portion of the estimate results in a revised estimate of $55 million ($51.5 + ($27.7*0.12668)).

prepare an independent cost estimate.[149] This independent analysis demonstrated that, at best, the ATC Arrowhead Alternative is $4 million less than the Minnesota Power Proposed Configuration, not including the tax gross-up.[150] The current tax gross-up would add at least $4.5 million to this estimate,[151] resulting in a cost for the ATC Arrowhead Alternative that is slightly higher than the Minnesota Power Proposed Configuration. All of these estimates do not take into account the potential cost of a new phase-shifting transformer for the ATC Arrowhead Alternative which, if determined to be necessary based on further study or because the Commission does not remove the 800 MVA limitation on the ATC Arrowhead 345 kV/230 kV Substation, would increase the cost of the ATC Arrowhead Alternative by approximately $30 million plus approximately $4 million for the tax gross-up.

Further, ATC has failed to commit to a cap on the costs for its portion of construction costs for the ATC Arrowhead Alternative.[152] This is troubling given that Minnesota Power will be limited for cost recovery through its Transmission Cost Recovery Rider for the HVDC Modernization to the range of estimates provided in this proceeding.[153] While ATC is not retail

[149] Ex. MP-130 at 38 (Winter Rebuttal).
[150] Ex. MP-130 at Rebuttal Schedule 24 (Winter Rebuttal).
[151] Ex. MP-130 at Rebuttal Schedule 24 (Winter Rebuttal); Ex. ATC-265 (Corrections to Johanek Testimonies). $35.8 million for the ATC Arrowhead 345 kV/230 kV Substation reconfiguration multiplied by a proposed current tax gross-up of 12.668 percent, results in a tax gross-up increase of $4.5 million. Adding this amount to the estimate provided from the independent third party results in a total ATC Arrowhead Alternative estimated cost of $65.5 million. The independent third-party estimates the Minnesota Power Proposed Configuration at $65 million, which is within the original range of costs provided in the Application. The Minnesota Power Proposed Configuration is not subject to a tax gross-up.
[152] Ex. ATC-203 at 22-23 (Rebuttal Testimony of Robert McKee ("McKee Rebuttal")); Evid. Hrg. Tr. at 132:9-15 (Johanek).
[153] *In the Matter of Minnesota Power's Petition for the 2023 Approval of a Transmission Cost Recovery Rider under Minn. Stat. 216B.16, subd. 7b*, Docket No. E015/M-22-573, ORDER at DOC-DER Recommendation at 6 (May 2, 2023) (*citing In the Matter of the Northern States Power Company, a Minnesota Corporation, d/b/z Xcel Energy, for Approval of a Modification to its TCR Tariff, 2020 Project Eligibility, TCR Rate Factors, Continuation of Deferred Accounting and 2009 True-up Report*, Docket No. E002/M-09-1048, ORDER APPROVING 2010 TCR PROJECT ELIGIBILITY AND RIDER, 2009 TCR TRACKER REPORT, AND TCR RATE FACTORS at 6 (Apr. 27, 2010)) ("project cost recovery through the rider should be limited to the amount of the initial cost estimates at the time the projects are approved as eligible projects . . . A request to allow cost recovery for project costs above the amount of the initial estimate may be brought for Commission review only if unforeseen or extraordinary circumstances arise on a project").

rate regulated by the Commission nor does the Commission have jurisdiction over ATC outside of this Docket. Therefore, if ATC's estimates are used for purposes of finding that the ATC Arrowhead Alternative is less costly than the Minnesota Power Proposed Configuration but the actual costs are more consistent with the cost estimates prepared by the independent third party (the use of which would demonstrate the ATC Arrowhead Alternative is more costly than Minnesota Power's Proposed Configuration), or even higher than what is on the record in this proceeding, ATC is asking that Minnesota Power reimburse ATC for those full costs. However, in this scenario, Minnesota Power would then unfairly be held to only the cost in this proceeding for cost recovery in the Transmission Cost Recovery Rider until the Company is able to file a rate case after the HVDC Modernization Project is placed in service.

This potential scenario is confusing as ATC has repeatedly relied on its own statement that the ATC Arrowhead Alternative is less costly than the Minnesota Power Proposed Configuration but is asking to be reimbursed even if those costs end up exceeding the Minnesota Power Proposed Configuration cost estimates. Allowing this to be adopted would encourage others with financial interests in "their" system alternative being selected to develop a less costly estimate through a Certificate of Need proceeding but then demand payment for a more costly implementation after the Certificate of Need has been issued.

The evidence in the record demonstrates that the ATC Arrowhead Alternative is not a more cost-effective alternative for the HVDC Modernization Project than the Minnesota Power Proposed Configuration. The ATC Arrowhead Alternative should, therefore, be rejected.

4. The ATC Arrowhead Alternative is not capable of implementation prior to 2030.

As stated in the Application, Minnesota Power has secured an in-service date for the Minnesota Power Proposed Configuration for the HVDC Modernization Project of April 2030.[154] However, Minnesota Power also made clear in the Application that the 2030 date is three years later than the originally-desired in-service date.[155] This delay was because the HVDC supplier could only guarantee Minnesota Power an April 2030 in-service date due to its own supply and manufacturing limitations when considered alongside the number of equipment requests it already has with earlier confirmed in-service dates. Because of this, Minnesota Power has continued to accelerate study and design work necessary to be ready to move forward quickly with the HVDC Modernization Project (with the Minnesota Power Proposed Configuration) in the event that the HVDC supplier indicated it would be able to achieve an earlier in-service date.[156] On March 1, 2024, the HVDC supplier notified Minnesota Power that it would like to discuss moving to an earlier guaranteed in-service date.[157] The actions Minnesota Power has taken to date would allow it to be ready to move forward with a guaranteed in-service date from the HVDC Supplier as early as 2028.[158]

ATC has only provided evidence on this record that it could achieve the April 2030 in-service date.[159] Further, the DOC-DER inquired with MISO for its estimates for what additional time MISO would need to vacate the System Impact Studies completed for the Minnesota Power Proposed Configuration and complete the requisite study work before the ATC Arrowhead

[154] Ex. MP-104 at 12 (Application).
[155] Ex. MP-104 at 17 (Application).
[156] Ex. MP-104 at 17-18 (Application).
[157] Ex. MP-130 at 40 and Rebuttal Schedule 25 (Winter Rebuttal).
[158] Ex. MP-130 at 15 and 40 (Winter Rebuttal).
[159] Ex. ATC-205 at 9 (Direct Testimony of Dustin Johanek ("Johanek Direct")); Ex. ATC-207 (Johanek Direct Schedule 2).

Alternative could be implemented.[160] In response, MISO confirmed that with a change in the point of interconnection (from the Minnesota Power Arrowhead 230 kV/115 kV Substation to the ATC Arrowhead 345 kV/230 kV Substation), MISO's transmission service request process would need to "start again."[161] MISO estimated that the process could take 300 days.[162] This is consistent with Minnesota Power's estimate for the additional study review by MISO.[163] Based on this information, DOC-DER concluded that "achieving an in-service date earlier than 2030 is unlikely."[164] This MISO process timing does not take into account the additional time that will be necessary to develop the studies required by the HVDC supplier.[165] Minnesota Power worked with its HVDC Owners' Engineer to assess additional studies that would be necessary to implement the ATC Arrowhead Alternative. The result of those conversations indicates that the ATC Arrowhead Alternative would not be able to achieve the necessary timing milestones to even deliver an April 2030 in-service date.[166]

This timing uncertainty demonstrates that the ATC Arrowhead Alternative would not be able to achieve the desired earlier in-service date that would be available to the Minnesota Power Proposed Configuration.[167] Further, not only does it demonstrate an earlier in-service date would not be achievable, but, based on coordination with the HVDC supplier related to pre-design study work, it does not appear that the requisite work could be completed by ATC for the ATC Arrowhead Alternative in time for the HVDC supplier to continue to guarantee a 2030 in-service

[160] Ex. DOC DER-602 at 28 (Zajicek Rebuttal).
[161] Ex. DOC DER-602 at Rebuttal Schedule MZ-R-11 at 1 (Zajicek Rebuttal).
[162] Ex. DOC DER-602 at Rebuttal Schedule MZ-R-11 at 1 (Zajicek Rebuttal).
[163] Ex. MP-121 at 33-34 (Winter Direct).
[164] Ex. DOC DER-602 at 29-30 (Zajicek Rebuttal).
[165] Ex. MP-121 at 34 (Winter Direct).
[166] Ex. MP-130 at Rebuttal Schedule 27 (Winter Rebuttal) (showing that an October 1, 2026 study completion date is necessary for the HVDC supplier to achieve an April 2030 in-service date, but that the requisite studies for the ATC Arrowhead Alternative could not be completed until September 17, 2027).
[167] It is worth noting that, at the Commission meeting on the completeness of the Application, certain Commissioners indicated a strong desire for the HVDC Modernization Project to be in-service prior to April 2030, if possible.

date. These delays in the implementation of the ATC Arrowhead Alternative, and consequently the entire HVDC Modernization Project if the Commission were to order implementation of the ATC Arrowhead Alternative, will only be amplified by the highly competitive market conditions for procurement of major equipment and materials and labor availability due to the significant amount of transmission development currently being planned and developed to support the clean energy transition. The result would be an even later in-service date for the ATC Arrowhead Alternative, which is directly in conflict with the purpose and need of the HVDC Modernization project and the ATC Arrowhead Alternative should be rejected.

5. The ATC Arrowhead Alternative does not use the same point of interconnection as the existing HVDC System and the Minnesota Power Proposed Configuration and this change would require additional studies that would lead to significant delays to the in-service date.

Maintaining the existing point of interconnection at the Minnesota Power Arrowhead 230 kV/115 kV Substation best aligns with Minnesota Power's purpose for the HVDC Modernization Project to replace aging HVDC equipment while maintaining a reliable connection between its customers and its wind energy resources in North Dakota and to implement the Project as expeditiously as possible to minimize failure-related outages or prolonged construction outages. Minnesota Power's Proposed Configuration has been carefully studied and planned, and is being designed, to not result in significant changes in the regional transmission system. In fact, altering the final point of interconnection from 230 kV at the Minnesota Power Arrowhead 230 kV/115 kV Substation to 345 kV at the ATC Arrowhead 345 kV/230 kV Substation would lead to additional complexity and required coordination to implement major changes to the regional

transmission system in addition to running counter to Minnesota Power's simple HVDC Modernization Project purpose.[168]

While moving the point of interconnection from one voltage at one substation to another voltage at another, adjacent, substation, may not seem significant, changing the point of interconnection for the HVDC System from the Minnesota Power Arrowhead 230 kV/115 kV Substation to the ATC Arrowhead 345 kV/230 kV Substation would move the HVDC System away from the local transmission 230 kV network that Minnesota Power uses to serve its customers and onto a regional 345 kV tie line that primarily serves the purposes of supporting reliability in northern and central Wisconsin as well as exporting power from Minnesota to other utilities in Wisconsin. The ATC Arrowhead 345 kV/230 kV Substation is also part of the historically complex and stability-limited Minnesota-Wisconsin Export ("MWEX") interface, which Minnesota Power, in designing the HVDC Modernization Project, sought to avoid disrupting.[169]

There are significant differences between the Minnesota Power Arrowhead 230 kV/115 kV Substation and ATC Arrowhead 345 kV/230 kV Substation points of interconnection, as each has a unique normal use and intended purpose. These differences are also reflected in the operation of the MWEX interface and the technical design and operation of the connection between the Minnesota Power Arrowhead 230 kV/115 kV Substation and the ATC Arrowhead 345 kV/230 kV Substation.[170] Relocating the point of interconnection for the HVDC System from Minnesota Power's local AC transmission system to the ATC regional transmission system represents a fundamentally different project from the Minnesota Power Proposed Configuration. Use of the ATC Arrowhead Alternative results in a system alternative with different operational and

[168] Ex. MP-121 at 17 (Winter Direct).
[169] Ex. MP-121 at 36 (Winter Direct).
[170] Ex. MP-121 at Section IV (Winter Direct).

performance considerations and different value propositions that do not align with the purpose and need of the HVDC Modernization Project.[171]

After careful consideration of the purpose and need of the HVDC Modernization Project, as well as flexibility for long-term planning considerations, Minnesota Power determined that the best solution for the modernization of the HVDC System would be to purchase HVDC/345 kV transformers for the converter stations while also maintaining the existing point of interconnection at the Minnesota Power Arrowhead 230 kV/115 kV Substation. This configuration provides Minnesota Power and its customers with a streamlined solution for the present needs and flexibility for future possibilities in light of various local and regional planning considerations over the long operating life of the new HVDC converter stations.[172]

To reconcile the difference in voltages in the simplest possible way, Minnesota Power proposed to install a new 345 kV/230 kV transformer to step down the 345 kV voltage from the HVDC converter station to 230 kV before reestablishing the connection to the Minnesota Power Arrowhead 230 kV/115 kV Substation. While Minnesota Power could have done this all in one large substation at the HVDC converter station, it was a more prudent solution to construct a new substation (the St. Louis County 345 kV/230 kV Substation) to provide a new source for future expansion of 345 kV and 230 kV voltages in the area given the spatial limitations at the existing Minnesota Power 230 kV/115 kV Substation and the ATC 345 kV/230 kV Substation in northeastern Minnesota. This will allow Minnesota Power to maintain the point of interconnection to the existing AC transmission system at the existing 230 kV bus at the Minnesota Power Arrowhead 230 kV/115 kV Substation while reasonably planning for the future.[173]

[171] Ex. MP-121 at 36-37 (Winter Direct).
[172] Ex. MP-121 at 17 (Winter Direct).
[173] Ex. MP-121 at 31 (Winter Direct).

For the ATC Arrowhead Alternative, additional facilities and reconfigurations would be required at the ATC Arrowhead 345 kV/230 kV Substation. To accommodate this, ATC would need to install a second 345 kV/230 kV transformer at the ATC Arrowhead 345 kV/230 kV Substation. This would require ATC to reconfigure the interconnection of its existing Arrowhead – Stone Lake 345 kV Line by removing two existing fast-switched capacitor banks currently installed in the ATC Arrowhead 345 kV/230 kV Substation and relocating the termination of the transmission line within the substation. ATC assumes that these existing capacitor banks would no longer be necessary due to the reactive power support provided by Minnesota Power's VSC HVDC converters.[174] Because ATC's existing Arrowhead 345 kV/230 kV transformer also connects to a 230 kV phase-shifting transformer designed to regulate the flow of power on the interface between Minnesota Power's 230 kV network and ATC's Wisconsin 345 kV network, any consideration of the ATC Arrowhead Alternative must also account for the possibility that a second 230 kV phase-shifting transformer may need to be installed with the second Arrowhead 345 kV/230 kV transformer in the ATC Arrowhead 345 kV Substation. This potential need for a phase-shifting transformer requires additional evaluation coordinated through regional transmission planning and operating studies involving MISO, ATC, Minnesota Power, and other impacted regional utilities. This additional evaluation has not yet been undertaken by ATC, to Minnesota Power's knowledge. Such coordinated review and analysis is far beyond what has been undertaken in this proceeding. If the coordinated evaluation determines a phase-shifting transformer is necessary for the ATC Arrowhead Alternative to maintain regional reliability and stability, or if the phase shifting transformer is needed for other reasons such as maintaining the existing 800 MVA Limit, this

[174] Ex. MP-121 at 20 (Winter Direct). This approach could result in negative impacts to Minnesota Power's customers and the HVDC System that neither exist today with the HVDC System in its current configuration nor are a risk with the Minnesota Power Proposed Configuration of the HVDC Modernization Project, as discussed further in Section V.A.6 of this Initial Brief.

equipment would add approximately $30 million to the ATC Arrowhead Alternative cost estimate. Ignoring the potential need for a phase-shifting transformer could result in negative impacts to Minnesota Power's customers and the HVDC System that neither exist today with the HVDC System in its current configuration nor are a risk with Minnesota Power's Proposed Configuration.[175]

The ATC Arrowhead Alternative would also require modifications to the Minnesota Power Arrowhead 230 kV/115 kV Substation and the new St. Louis County HVDC/345 kV Converter Station. ATC did not consult with Minnesota Power to develop a clear understanding of these modifications prior to proposing the ATC Arrowhead Alternative. Instead, Minnesota Power communicated these requirements to ATC through discovery in this proceeding.[176] At the Minnesota Power Arrowhead 230 kV/115 kV Substation, modifications would be required to accommodate the interconnection of the second ATC 345 kV/230 kV transformer (and potentially, the second 230 kV phase-shifting transformer) from the ATC Arrowhead 345 kV/230 kV Substation. Minnesota Power would need to reconfigure the interconnection of the existing ATC 345 kV/230 kV transformer and a 230 kV transmission line within the Minnesota Power Arrowhead 230 kV/115 kV Substation to establish a new bus position for this second transformer source at the ATC Arrowhead 345 kV/230 kV Substation.[177] At the new HVDC converter station, an additional 345 kV line exit and 345 kV circuit breakers would be needed to accommodate the

[175] Ex. MP-121 at 21 (Winter Direct).
[176] Ex. MP-121 at 21, Direct Schedule 2, and Direct Schedule 3 (Winter Direct).
[177] ATC incorrectly assumes that there will be an open rung for this interconnection at the existing Minnesota Power Arrowhead 230 kV/115 kV Substation. Ex. ATC-218 at 7 (Direct Testimony of Tobin Larsen). This is despite Minnesota Power informing ATC that open rung will not exist at the time the HVDC Modernization Project is placed in-service as Minnesota Power is in the final stages of design work for the Duluth Loop Reliability Project, which was approved by the Commission in 2023 and will connect at this location. Ex. MP-130 at 26 at n.29 and at 32 (Winter Rebuttal); *In the Matter of the Application of Minnesota Power for a Certificate of Need and a Route Permit for the Duluth Loop Reliability Project in St. Louis County, Minnesota*, Docket Nos. E015/CN-21-140 and E015/TL-21-141, ORDER GRANTING CERTIFICATE OF NEED AND ISSUING ROUTE PERMIT (Apr. 3, 2023).

two 345 kV circuits proposed by ATC for the ATC Arrowhead Alternative versus the one 345 kV circuit required for the Minnesota Power Proposed Configuration.[178]

Moving the point of interconnection from the Minnesota Power Arrowhead 230 kV/115 kV Substation to the ATC Arrowhead 345 kV/230 kV Substation would likely render all previous study results invalid or, at a minimum, incomplete. The detailed design and system integration studies completed or currently in progress to support detailed design of the HVDC converter stations would need to be updated or replaced if the ATC Arrowhead Alternative is ordered by the Commission to be constructed. Studies to be updated or replaced would include Power Flow Analysis, Stability Analysis, Transformer Energization Study, Short Circuit and Subsynchronous Torsional Interaction Screening Analysis, Harmonic Impedance Study and updated AC Equivalents, at a minimum. Additionally, due to its potential impacts on the regional transmission system discussed further in Section V.A.6 of this Initial Brief, the ATC Arrowhead Alternative may also require additional studies that are not currently needed for the development of Minnesota Power's Proposed Configuration for the Minnesota interconnection facilities of the HVDC Modernization Project. ATC would need to complete these studies prior to updating the other studies listed above to ensure that all major assumptions about the configuration of the ATC Arrowhead Alternative are validated prior to re-commencing work on detailed design and system integration studies.[179] In addition, MISO confirmed that, if the ATC Arrowhead Alternative were ordered by the Commission to be constructed, the completed MISO study work and associated Facilities Construction Agreement for the existing transmission service requests would need to be vacated given the change in the point of interconnection and repeating the process for the System

[178] Ex. MP-121 at 21-22 (Winter Direct).
[179] Ex. MP-121 at 28 (Winter Direct).

Impact Study, Facilities Study, and Facilities Construction Agreement negotiation is anticipated to take approximately 300 days.[180] The other study work would take many months beyond this and would likely delay the overall in-service date by an estimated 15 to 24 months from the April 2030 in-service date.[181]

In this proceeding, ATC attempted create confusion in the record by referring to the St. Louis County 345 kV/230 kV Substation as the point of interconnection for the Minnesota Power Proposed Configuration.[182] However, as explained above, a point of interconnection is where a new connection interconnects with an existing transmission system. The only options for such a point of interconnection for the HVDC System are the Minnesota Power Arrowhead 230 kV/115 kV Substation or the ATC Arrowhead 345 kV/230 kV Substation. This is because the St. Louis County 345 kV/230 kV Substation is not proposed in this proceeding to be configured to transmit electricity anywhere but *from* the new HVDC converter station *to* the present HVDC System point of interconnection to the existing AC transmission system at the Minnesota Power Arrowhead 230kV/115 kV Substation. At the evidentiary hearing, ATC confirmed this understanding and that only these two substations are otherwise connected to the AC network.[183] ATC also confirmed that the Minnesota Power 230 kV/115 kV Substation is the point of interconnection for the Minnesota Power Proposed Configuration.[184]

Given the complexities that changing the point of interconnection introduces to the HVDC Modernization Project, including the necessity for additional ATC, Minnesota Power, and MISO

[180] Ex. DOC DER-602 at Rebuttal Schedule MZ-R-11 at 1 (Zajicek Rebuttal).
[181] Ex. MP-121 at 73 (Winter Direct); Ex. MP-130 at 44 (Winter Rebuttal).
[182] Ex. ATC-244 at 4 (Dagenais Rebuttal).
[183] Evid. Hrg. Tr. at 105:10-29 (Dagenais)
[184] Evid. Hrg. Tr. at 106:1-16 (Dagenais).

study work and pre-design work for the HVDC supplier, the ATC Arrowhead Alternative should be rejected.

6. The ATC Arrowhead Alternative transfers benefits to the Wisconsin transmission system while Minnesota Power customers would pay for the HVDC Modernization Project.

As has been alluded to previously, moving the point of interconnection between the HVDC System and the AC transmission system from the Minnesota Power Arrowhead 230 kV/115 kV Substation to the ATC Arrowhead 345 kV/230 kV Substation materially benefits ATC's regional 345 kV transmission in Wisconsin in at least three ways that are not observed with Minnesota Power's Proposed Configuration of the HVDC Modernization Project. These include (1) additional power flow from the HVDC System into Wisconsin and away from Minnesota Power's customers; (2) removal of the grid-support of the VSC HVDC System from Minnesota Power's 230 kV local transmission system; and (3) reducing the impedance between Minnesota Power's 230 kV local transmission system and ATC's 345 kV regional transmission system, further increasing power flow into Wisconsin while at the same time removing the ability to control and limit such power flows. Each of these benefits to ATC is at the detriment to Minnesota Power's customers, even though Minnesota Power customers will pay the full cost of the Project.[185]

The ATC Arrowhead Alternative would result in a greater portion of the power delivered by the HVDC System flowing away from Minnesota Power's customers. Instead, more power

[185] Ex. MP-121 at 38 and Direct Schedule (Winter Direct): Ex. MP-130 at 73-74 (Winter Rebuttal); Ex. DOC DER-602 at 18 (Zajicek Rebuttal).

from the HVDC System would flow into Wisconsin on the Arrowhead – Weston 345 kV Line.[186] This occurs as a direct result of moving the HVDC System point of interconnection onto the ATC 345 kV system and because ATC is proposing its ATC Arrowhead Alternative without the phase-shifting transformer necessary to prevent this preferential flow to the Wisconsin 345 kV system. Minnesota Power's analysis indicates that for every 100 MW of power delivered to Minnesota by the HVDC System an additional seven to ten MW of that power would flow into the Wisconsin 345 kV network (and away from Minnesota Power's customers) as a result of the ATC Arrowhead Alternative when compared to Minnesota Power's Proposed Configuration. This means that, just due to this operational concern, Minnesota Power customers would lose seven to ten percent of the benefit from delivery of their North Dakota wind generation resources on the HVDC System.[187]

ATC downplays this concern by repeatedly stating that all AC transmission is interconnected.[188] While it is certainly true that all AC transmission is interconnected, the *way* in which ATC would interconnect the HVDC System with the existing AC transmission system *would be different* than what currently exists if the ATC Arrowhead Alternative were ordered by the Commission to be constructed for the HVDC Modernization Project, which means the actual power flows would also be different compared to Minnesota Power's Proposed Configuration.[189] This change is illustrated in **Figure 1**.

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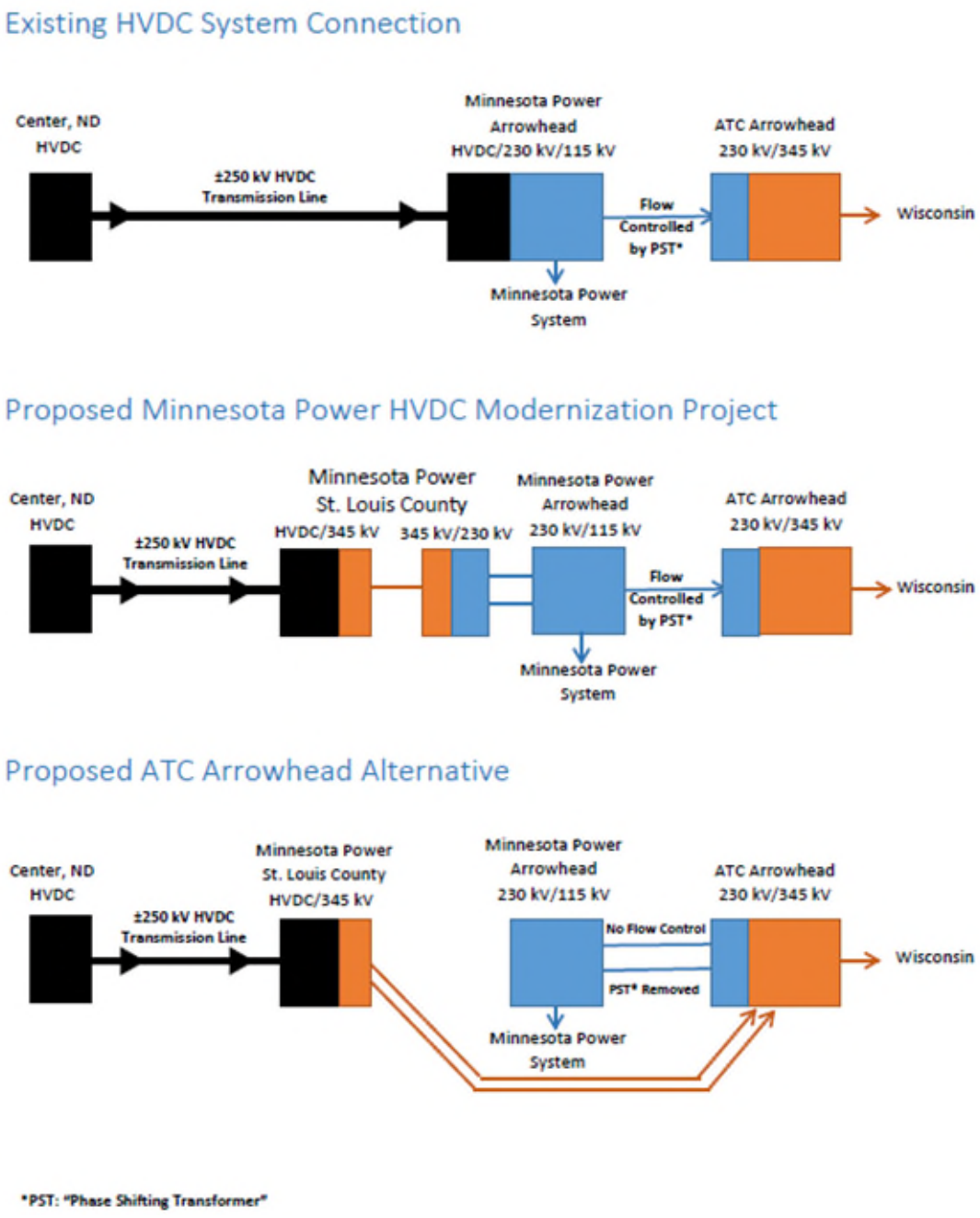
[186] ATC objected to Minnesota Power's characterization that this transmission line is "used almost exclusively to facilitate regional power transfers through Minnesota Power's transmission system to other utilities in Wisconsin." Ex. ATC-228 at 8 (Direct Testimony of Thomas Dagenais ("Dagenais Direct")) (*citing* Ex. MP-121 at 6 (Winter Direct)). ATC went on to state "that is not their only purpose." Ex. ATC-228 at 8 (Dagenais Direct). Minnesota Power never said this power transfer was not the existing ATC transmission line's "only purpose" and was, instead, merely repeating what ATC has previously stated. Ex. MP-119 at 7 at n.3 (Gunderson Direct) (according to ATC's own words in the cited article: "[The Arrowhead – Weston 345 kV Line] increases import and transfer capability into Wisconsin.").

[187] Ex. MP-121 at 38 (Winter Direct); Ex. MP-130 at 48 (Winter Rebuttal).

[188] Ex. ATC-244 (Dagenais Rebuttal).

[189] Ex. MP-130 at 66 and 72-75 (Winter Rebuttal).

Figure 1. Illustration of Power Flow for System Alternatives[190]



ATC also attempts to redirect attention away from Minnesota Power's study results that show this additional power flow into Wisconsin of seven to ten percent (or 7-10 MW per 100 MW delivered by the HVDC System) and, instead, emphasize that the ATC Arrowhead Alternative

[190] Ex. MP-121 at Direct Schedule 1 (Winter Direct).

"results in approximately 1 MW less of electrical losses compared to" the Minnesota Power Proposed Configuration.[191] This 1 MW loss occurs within a broad area of MISO consisting of thousands of MW of load served by multiple utilities; meaning the losses are only a tiny fraction of a percentage of the total energy requirements in northeastern Minnesota.[192] Therefore, this "savings" on electrical losses reported by ATC does not make up for the approximately seven to ten percent of HVDC System delivered power that would flow into Wisconsin and away from Minnesota Power customers if the ATC Arrowhead Alternative were implemented.

Despite these positions by ATC, ATC also acknowledges that the ATC Arrowhead Alternative "results in marginal additional electric flow on certain transmission lines in Wisconsin" but states that "increased flows into Wisconsin on certain facilities will be offset by lower flows on other transmission lines into Wisconsin."[193] Minnesota Power and ATC are in agreement that the ATC Arrowhead Alternative will increase power flows into Wisconsin. What is not clear, however, is why ATC believes it is acceptable for the power flows on other tie lines into Wisconsin to be offset by the additional siphoning of power flows off the HVDC System at a real cost to Minnesota Power customers.[194]

The ATC Arrowhead Alternative would also remove Minnesota Power's grid-supporting VSC HVDC Converter Station from its point of interconnection on Minnesota Power's backbone 230 kV network, where Minnesota Power has identified a need for system strength and voltage support to serve its customers. Instead, any grid-support from the VSC HVDC Converter Station would be provided to ATC's proposed point of interconnection on ATC's regional 345 kV network if the Commission orders construction of the ATC Arrowhead Alternative, improving reliability

[191] Ex. ATC-244 at 12-13 and Table 1 (Dagenais Rebuttal).
[192] Ex. 244 at 13 at Table 1 (Dagenais Direct).
[193] Ex. MP-130 at Rebuttal Schedule 33 at 1 (Winter Rebuttal).
[194] Ex. MP-130 at 72-73 (Winter Rebuttal).

and transfer capability for the Wisconsin transmission system at the expense of Minnesota Power's customers. In demonstration of this fact, ATC has confirmed that construction of the ATC Arrowhead Alternative would provide reactive support from the VSC HVDC Converter Stations which would enable them to remove existing capacitor banks that currently provide reactive support at ATC's Arrowhead 345 kV/230 kV Substation.[195] If the Commission orders construction of the ATC Arrowhead Alternative, the additional grid support from the VSC HVDC converters would also provide significant benefit to the regional MWEX interface, enhancing ATC's ability to facilitate regional transfers into Wisconsin on its 345 kV system.[196]

The addition of a second Arrowhead 345 kV/230 kV transformer and bypassing of the existing ATC Arrowhead 230 kV phase-shifting transformer as proposed for the ATC Arrowhead Alternative would greatly reduce the impedance between the Minnesota Power 230 kV system and the ATC Wisconsin 345 kV network. Reducing the impedance of this interface would make it a more attractive path for power to flow, drawing more power into Wisconsin through the Minnesota Power 230 kV network.[197] When combined with the increased amount of power flowing from the HVDC Line into Wisconsin due to interconnecting it at the ATC Arrowhead 345 kV/230 kV Substation (as discussed above), the changes implemented for the ATC Arrowhead Alternative would substantively increase and enhance ATC's ability to import power from northeastern Minnesota into Wisconsin through the ATC Arrowhead 345 kV/230 kV Substation. At the same time, the removal of the phase-shifting transformer (and no installation of a new one) would eliminate the ability to control and limit power flows through the ATC Arrowhead 345 kV/230 kV Substation. This combination of impacts from the ATC Arrowhead Alternative would also lead to

[195] Ex. ATC-244 at 10 (Dagenais Direct).
[196] Ex. MP-121 at 38-39 (Winter Direct).
[197] Evid. Hrg. Tr. at 53:9-54:27 and 57:13-49:5 (Winter).

ATC exceeding the 800 MVA condition placed on the ATC Arrowhead 345 kV/230 kV Substation by the Minnesota Environmental Quality Board ("MEQB").[198]

Inexplicably, ATC has proposed the ATC Arrowhead Alternative, which would result in these various benefits flowing away from Minnesota Power customers and to ATC's Wisconsin transmission system, but has done so with the expectation that Minnesota Power's customers will pay for ATC to receive these benefits. This approach is unfair to Minnesota Power's customers, who will pay the *entire* costs of the HVDC Modernization Project, but ATC does not seem to consider that fairness in its arguments. Instead, ATC seeks to benefit its own transmission system with the ATC Arrowhead Alternative as a real financial and operational cost to Minnesota Power customers. For these reasons, the ATC Arrowhead Alternative should be rejected.

7. The ATC Arrowhead Alternative would require additional Commission approvals.

In March 2001, the MEQB issued an order granting a permitting exemption to Minnesota Power for the construction of the Arrowhead – Weston 345 kV transmission line and the ATC Arrowhead Substation.[199] In that order, the MEQB included a condition that the ATC Arrowhead 345 kV/230 kV Substation could not be used to "transmit power . . . beyond 800 MVA."[200] Despite this language, ATC has repeatedly insisted that the limitation was a "noise mitigation measure."[201]

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[198] Ex. MP-121 at Section IV.B (Winter Direct); Ex. MP-130 at 19-20 (Winter Rebuttal).

[199] Minnesota Power obtained the initial permitting exemption as it was acting as the construction manager for the Minnesota portion of the ATC Arrowhead – Weston 345 kV transmission line (including the ATC Arrowhead 345 kV/230 kV Substation). While the permitting exemption was in the name of Minnesota Power when it was issued in 2001, the permissions and conditions were transferred to ATC in 2005 in MPUC Docket No E015/M-04-2020. Minnesota Power was the construction manager for the Minnesota Portion of the Arrowhead – Weston 345 kV Project.

[200] Ex. MP-121 at 67 and Direct Schedule 31 (Winter Direct). While the permitting exemption was in the name of Minnesota Power when it was issued in 2001, the permissions and conditions were transferred to ATC in 2005 in MPUC Docket No E015/M-04-2020 after the authority related to these permits was transferred from the MEQB to the Commission by the Minnesota Legislature. Minnesota Power was the construction manager for the Minnesota Portion of the Arrowhead – Weston 345 kV Project. In the 2001 Order, the MEQB specifically stated that "Minnesota Power shall apply to the Minnesota Environmental Quality Board under section 16C.57 for authorization to make any changes in the Arrowhead Substation that would allow Minnesota Power to increase the capability of the substation to transmit power over the transmission line beyond 800 MVA." Ex. MP-121 at Direct Schedule 31 at 5 (Winter Direct).

[201] Ex. MP-121 at 68 and Direct Schedule 16 (Winter Direct); Ex. DOC DER-602 at 12 (Zajicek Rebuttal).

However, the record evidence does not support ATC's position that the 800 MVA limitation currently in place on the ATC Arrowhead 345 kV/230 kV Substation is a noise mitigation measure.[202] Further, until the 800 MVA limitation is removed by the Commission, ATC would not be able to implement the ATC Arrowhead Alternative without a phase-shifting transformer; and the need for a phase-shifting transformer would increase the cost of the ATC Arrowhead Alternative by at least approximately $30 million plus approximately $4 million in tax gross-up. Implementation of the Minnesota Power Proposed Configuration would not result in power flow exceeding 800 MVA at the ATC Arrowhead 345 kV/230 kV Substation.

The decision by the MEQB to limit power flow at the ATC Arrowhead 345 kV/230 kV Substation was the result of a discussion by the MEQB commissioners related to power flow concerns from the western states to those states east of Minnesota.[203] During deliberations on granting the permitting exemption, the MEQB commissioners and staff referenced a memorandum prepared by one of the other commissioners who was unable to attend the deliberations.[204] That memorandum stated concerns about the proposed west-to-east power flow and suggested an 800 MVA limitation on power flow for the ATC Arrowhead 345 kV/230 kV Substation.[205] The MEQB commissioners at the hearing unanimously approved amending the administrative law judge's report and imposing a power flow limitation of 800 MVA.[206] This condition on the ATC Arrowhead 345 kV/230 kV Substation limiting the power flow to 800 MVA remains in place today.[207]

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[202] Ex. DOC DER-602 at 12 (Zajicek Rebuttal).
[203] Ex. MP-121 at 68 and Direct Schedule 33 (Winter Direct).
[204] Ex. MP-121 at 68-69 and Direct Schedules 33 and 34 (Winter Direct).
[205] Ex. MP-121 at Direct Schedule 34 (Winter Direct).
[206] Ex. MP-121 at Direct Schedule 33 at 87 and Direct Schedule 34 at 4 (Winter Direct).
[207] Ex. DOC DER-602 at 9 (Zajicek Rebuttal) ("To interconnect the HVDC Modernization Project at ATC's Arrowhead 345 kV Substation [which would be necessary for implementation of the ATC Arrowhead Alternative], the 801 MVA limit would have to be reexamined and lifted.").

Instead of initiating a proper proceeding before the Commission, as would be standard when a Permittee seeks to modify an operating condition of its facility permit, ATC has simply stated that the Commission should remove the 800 MVA limitation and insisted this is sufficient for the Commission to remove this operating condition.[208] This is despite the condition being established after an extensive contested case proceeding, in the first place.[209] Inexplicably, ATC's request has been only made in this HVDC Modernization Docket, with no notice of the request to the Power Plant Siting Act General Service List or to the parties to the proceedings that established the operating condition or transferred the relevant permit to ATC from Minnesota Power. The request by ATC via one sentence in Rebuttal Testimony filed in this proceeding for the Commission to remove the 800 MVA limitation on the ATC Arrowhead 345 kV/230 kV Substation does not comply with the Commission's rules or standards of practice. Instead, ATC would need to seek an alteration to its existing permit that authorized the construction and operation of the ATC Arrowhead 345 kV/230 kV Substation, would need to substantiate the reasonableness of its request in such a filing to the Commission, and provide notice of its request to the requisite stakeholders under Minnesota Statutes and Rules. The Commission would then need to seek comment on the requested modification and evaluate the request against all evidence proffered in that separate proceeding.[210]

ATC has not initiated these proceedings or notifications at this time. Further, if the ATC Arrowhead Alternative were approved for the HVDC Modernization Project, this process would add even more time onto the already-challenging schedule and it is even more likely that an April

[208] Ex. ATC-244 at 48 (Dagenais Rebuttal); Evid. Hrg. Tr. at 11:3-112:13 (Dagenais).
[209] Ex. MP-121 at 67-69 and Direct Schedule 31 (Winter Direct). Although ATC has stated its belief that "there was no legitimate basis for imposing this limit." Ex. ATC-244 at 46 (Dagenais Rebuttal). Further, ATC argues now, 20 years after the condition was placed on the ATC Arrowhead 345 kV/230 kV Substation that the condition "could be subject to legal challenges as an unlawful restriction on interstate commerce." Ex. ATC-244 at 48 (Dagenais Rebuttal).
[210] Minn. R. 7850.4900.

2030 in-service date would not be capable of being met for the ATC Arrowhead Alternative. In the alternative, if the 800 MVA limitation is not removed, the ATC Arrowhead Alternative will require an additional phase-shifting transformer to limit power flows into Wisconsin, which will increase the cost of the ATC Arrowhead Alternative by approximately $30 million plus the tax gross-up of approximately $4 million. For these reasons, the ATC Arrowhead Alternative should be rejected.

8. The ATC Arrowhead Alternative has not been studied or evaluated by MISO.

Minnesota Power's Proposed Configuration has been studied for many years in a variety of ways by Minnesota Power, contractors on behalf of Minnesota Power, and MISO. Minnesota Power introduced many of these studies into the record in this proceeding.[211] ATC has not provided any studies of the ATC Arrowhead Alternative that were not prepared by ATC for purposes of this proceeding. Instead, during this proceeding ATC prepared three studies (a steady state reliability analysis, a dynamic stability analysis, and a voltage stability analysis) in a matter of months, the assumptions for which have not been evaluated by any third party other that Minnesota Power in this proceeding.[212] Of the eleven studies Minnesota Power provided for analysis in this proceeding, only two of those were prepared within the last few months for purposes of this proceeding, and were based on a series of assumptions and data that had already been subject to scrutiny from MISO as part of the standard transmission service request process and typical operating studies. Further, unlike several of the studies presented by Minnesota Power in this proceeding, ATC's

[211] Ex. MP-121 at 22-27 and Schedules 5-14 (Winter Direct); Ex. MP-130 at Schedule 18 (Winter Rebuttal). In total, Minnesota Power provided copies of 11 studies completed since 2020 that examined various aspects of the Minnesota Power Proposed Configuration of the HVDC Modernization Project and this does not include the studies performed by MISO before it entered into the Facilities Construction Agreements with Minnesota Power in 2024.
[212] Exhs. ATC-234, ATC-236, ATC-238, ATC-240 (Dagenais Schedules 4-7); Ex. MP-130 at 60 (Winter Rebuttal) (Minnesota Power provided its review of the limitations of the ATC studies).

analyses were limited in scope, not prepared by a third-party consultant and were not either initiated by or reviewed by MISO.

In stark contrast, Minnesota Power's Proposed Configuration has already been subject to multiple studies undertaken by or on behalf of Minnesota Power, or by MISO which together form a comprehensive picture of the design, impacts, and operation of Minnesota Power's Proposed Configuration of the HVDC Modernization Project.[213] This study work has resulted in Minnesota Power and MISO entering into Facilities Construction Agreements that have already been filed with FERC for final approval.[214] Receiving a Facilities Construction Agreement for the Minnesota Power Proposed Configuration means that this configuration has been assessed by MISO and, upon approval of the Facilities Construction Agreement by FERC, will be considered approved by the MISO Board. Additionally, MISO has already included Minnesota Power's Proposed Configuration for the Minnesota interconnection facilities necessary for the HVDC Modernization Project as a base assumption in MISO's Long Range Transmission Plan Tranche 2 model released in January 2024.[215]

To Minnesota Power's knowledge, the ATC Arrowhead Alternative, including its 345 kV interconnection at ATC's Arrowhead 345 kV/230 kV Substation, has neither been studied by MISO nor included in any of MISO's base models for completing other studies. Approval of the ATC Arrowhead Alternative by the Commission for the HVDC Modernization Project would require that all prior study work undertaken for MISO and the Facilities Construction Agreements would need to be cancelled. The existing transmission service requests would also need to be cancelled. Upon cancellation, MISO, ATC, and Minnesota Power would need to restart the

[213] Ex. MP-121 at 22-27 (Winter Direct).
[214] Ex. MP-127 at 19 and Rebuttal Schedule 11 (Gunderson Rebuttal).
[215] Ex. MP-121 at 30-31 (Winter Direct).

transmission service request process. This would require that certain studies be completed by ATC and Minnesota Power and certain studies completed by MISO. These studies may or may not find that the ATC Arrowhead Alternative as proposed is feasible and additional network upgrades or system design modifications not already identified (or objected to by ATC, like the phase-shifting transformer) are necessary to maintain system stability. This study work would delay the implementation of the HVDC Modernization Project by 15 to 24 months.[216] These delays do not take into account potential additional delays from equipment suppliers if Minnesota Power needs to inform them that there may need to be certain design changes to equipment being procured if the ATC Arrowhead Alternative is ordered to be constructed.

Given the long history of study undertaken by Minnesota Power for the Minnesota Power Proposed Configuration, including MISO's agreement to enter into Facilities Construction Agreements for the Minnesota Power Proposed Configuration, and the significant lack of study of the ATC Arrowhead Alternative which creates a need for additional study work and risks of potentially significant additional network upgrades or modifications, ATC has failed to prove the ATC Arrowhead Alternative is a more reasonable and prudent alternative. For these reasons, the ATC Arrowhead Alternative should be rejected.

9. Selection of the ATC Arrowhead Alternative for the HVDC Modernization Project would introduce potential risk to grant funds.

Minnesota Power has worked extensively with the Minnesota Legislature, the Minnesota Department of Commerce ("Department"), and the DOE to identify and apply for grant funding to offset the costs associated with the incremental $100 million necessary to develop the HVDC Modernization Project with future expandability and optionality. There are certain risks associated

[216] Ex. MP-121 at 30 (Winter Direct); Ex. DOC DER-602 at 27 (Zajicek Rebuttal).

with securing federal and state funding for the Project if the Commission selects the ATC Arrowhead Alternative.[217] Federal funding for the Project pertains to funding from the DOE GRIP Program and state funding pertains primarily to funding from the Minnesota Legislature as well as the Department's State Competitiveness Fund Match Program.[218] Overall, federal and state grants totaling $75 million have been awarded to the Project, with the opportunity to secure an additional $50 million in funds under the GRIP Program.[219] $50 million in funding awarded during round one of the GRIP Program is for the HVDC Terminal Expansion Capability Project ("HTEC"), which is part of the overall Project that has specifically been designed to preserve future expandability options for the new HVDC converter stations over their multi-decade operating life."[220] The Company continues to work with DOE to finalize contract requirements for the round one funding award under the GRIP Program, including execution of a Cooperative Agreement in 2024.[221] State funding for the Project was awarded by the state legislature in the amount of $15 million to increase the capacity and improve the reliability of the HVDC system as well as a reservation of $10 million for the purpose of cost sharing (or matching) for federal funding under the State Competitiveness Fund Match Program.[222] Based on the content of Minnesota Power's Concept Paper submission on January 12, 2024, the DOE encouraged the Company to submit a full application for an additional $50 million for the Project through the round two funding opportunity of the GRIP Program.[223]

[217] Ex. MP-119 at 19-21 (Gunderson Direct); Ex. MP-127 at 4-8 (Gunderson Rebuttal).
[218] Ex. MP-127 at 4 (Gunderson Rebuttal).
[219] Ex. MP-119 at 14-17 (Gunderson Direct); Ex. MP-127 at 4, 6-7 (Gunderson Rebuttal).
[220] Ex. MP-119 at 14-17 (Gunderson Direct); Ex. MP-119 at 14-15 (Gunderson Direct).
[221] Ex. MP-119 at 15 (Gunderson Direct).
[222] Ex. MP-119 at 17-18 (Gunderson Direct).
[223] Ex. MP-127 at 6-7 (Gunderson Rebuttal).

a. Certain Federal and State Funding Could Be At Risk if the Commission Chooses the ATC Arrowhead Alternative.

While round one funding availability under the GRIP Program and state matching grants would likely not be directly impacted if the Commission orders construction of the ATC Arrowhead Alternative, the Company remains concerned that ATC would "not be able to meet the necessary timelines to facilitate Minnesota Power receiving the federal and state grant funding" if the ATC Arrowhead Alternative is chosen.[224] The HVDC Modernization Project, including HTEC components, "must proceed on the agreed-upon milestones within 60 months after the execution of the Cooperative Agreement with the DOE."[225] That is, the portion of the HVDC Modernization Project required to be completed within 60 months (or 5 years) from execution of the Cooperative Agreement must be completed.[226] Due to necessary planning and procurement work that needs to occur for the HVDC Modernization Project, Minnesota Power is concerned about the ability to achieve an April 2030 in-service date for the Project with the ATC Arrowhead Alternative, as well as achieving a desired earlier in-service date in 2028 or 2029.[227] As discussed previously, the Company is actively discussing, with the HVDC equipment supplier, the possibility to obtain an earlier delivery date for the Project consistent with Minnesota Power's intention to deliver the Project on an accelerated timeline.[228] The Company's ideal in-service date would be in 2028.[229]

ATC, however, has only committed to being able to deliver the ATC Arrowhead Alternative by 2030.[230] Despite assertions that ATC could theoretically meet an in-service date of April 2030 or even prior to 2030 through use of the existing 345 kV/230 kV transformer in the

[224] Ex. MP-127 at 4-5 (Gunderson Rebuttal).
[225] Ex. MP-119 at 15 (Gunderson Direct).
[226] Evid. Hrg. Tr. at 33 (Gunderson).
[227] Ex. MP-127 at 5 (Gunderson Rebuttal).
[228] Ex. MP-127 at 5-6 (Gunderson Rebuttal); Ex. MP-130 at 40-42 (Winter Rebuttal).
[229] Evid. Hrg. Tr. at 34 (Gunderson).
[230] *See* Ex. MP-127 at 5 (Gunderson Rebuttal); Ex. ATC-205 at 8-9 (Johanek Direct); Ex. 207 (Johanek Direct Schedule 2).

Arrowhead 345 kV/230 kV Substation,[231] there would be multiple concerns with the ability of the Project to be in-service on time or early if the ATC Arrowhead Alternative is chosen due to additional MISO and Minnesota Power studies that would need to be undertaken in order to address impacts of the ATC Arrowhead Alternative on the development and delivery of the HVDC converter station.[232] ATC's delivery schedule did not address these impacts.[233] Therefore, based upon the record, there is risk to federal and state funding if the Commission selects the ATC Arrowhead Alternative.

In addition, there exists another concern if the Commission adopts the ATC Arrowhead Alternative the timeline to in-service the HVDC Modernization Project could be impacted, which would not occur if the Minnesota Power Proposed Configuration is approved for construction. Minnesota Power currently has a Transmission Interconnection Agreement between itself, ATC, and MISO, which encompasses the current configuration and operation of the ATC Arrowhead 345 kV/230 kV Substation.[234] The Transmission Interconnection Agreement is significant and it reflects contractual requirements for ownership, operations, and maintenance for the ATC Arrowhead 345 kV/230 kV Substation. This Transmission Interconnection Agreement would require modification if the Commission orders construction of the ATC Arrowhead Alternative because circumstances at the ATC Arrowhead 345 kV/230 kV Substation would materially change.[235] Minnesota Power and ATC have not commenced negotiations regarding modifications to the Transmission Interconnection Agreement because ATC only recently presented its concept to Minnesota Power and the Commission through its filing in this docket on September 15, 2023.[236]

[231] Ex. ATC-209 at 13-14 (Johanek Rebuttal).
[232] Ex. MP-130 at 41 (Winter Rebuttal).
[233] Ex. MP-130 at 41 (Winter Rebuttal).
[234] Ex. MP-119 at 27 (Gunderson Direct).
[235] Ex. MP-119 at 27 (Gunderson Direct).
[236] Ex. MP-119 at 29 (Gunderson Direct); Ex. ATC-132 (September 15, 2023 ATC Scoping Comment Letter).

In the Company's experience, negotiation of changes to a Transmission Interconnection Agreement can take a matter of months if there is high-level mutual agreement among the parties or longer than a year if there is not.[237] Thus, this may present further uncertainty to the HVDC Modernization project timeline.

b. The opportunity for GRIP Program Round Two funding would likely be lost if the ATC Arrowhead Alternative is chosen.

Minnesota Power is actively pursuing an additional $50 million in funding for the Minnesota Power Proposed Configuration through round two of the GRIP Program. The possibility of this round two funding under the GRIP Program would be unavailable if the Commission were to ultimately approve the ATC Arrowhead Alternative.[238] If the Commission orders construction of the ATC Arrowhead Alternative for the HVDC Modernization Project, Minnesota Power would no longer qualify for the second round DOE GRIP funding of up to $50 million.[239] Minnesota Power's full application for the second round funding opportunity through the GRIP Program has been developed based on the need to construct the St. Louis County 345 kV/230 kV Substation and is explicitly for the assets designed to support the long-range planning concepts, including the St. Louis County 345 kV/230 kV Substation, which would not be constructed if the Commission orders construction of the ATC Arrowhead Alternative.[240] The Company's full application for second round GRIP Program funding is due by May 22, 2024. Because of the significant amount of time and resources required to submit a full application for GRIP Program funding, Minnesota Power has developed the second round GRIP Program funding

[237] Ex. MP-119 at 28 (Gunderson Direct).
[238] Ex. MP-127 at 6 (Gunderson Rebuttal).
[239] Ex. MP-127 at 6 (Gunderson Rebuttal).
[240] Ex. MP-127 at 6 (Gunderson Rebuttal).

application based on the Minnesota Power Proposed Configuration for the HVDC Modernization Project Minnesota interconnection facilities that it proposed it the Concept Paper.[241]

In addition, it is undisputed that ATC has not applied for any federal or state funding for the ATC Arrowhead Alternative.[242] And, ATC is now foreclosed from obtaining funding under either round one or two of the GRIP Program.[243] This is in stark contrast to Minnesota Power's efforts to obtain significant federal and state funding for the Project, which will reduce overall costs of the Project for its customers.

The ATC Arrowhead Alternative introduces additional grant funding risks given the elongated timeline for implementation of this system alternative. Additionally, the ATC Arrowhead Alternative would not be eligible for the additional $50 million in grant funding that Minnesota Power is pursuing for the Minnesota Power Proposed Configuration. For these reasons, the ATC Arrowhead Alternative should be rejected.

B. ATC has rejected proposed conditions associated with the ATC Arrowhead Alternative that would protect Minnesota Power customers.

In issuing any Certificate of Need or Route Permit, the Commission may impose on a Permittee or Permittees certain conditions for the construction and operation of a certified or permitted facility. Throughout this proceeding, Minnesota Power has responded to requests for certain conditions to mitigate environmental and socioeconomic potential impacts with acceptance and cooperativeness. In response to suggestions and concerns from the MnDNR, Minnesota Power accepted the proposed MnDNR conditions, proposed alternate acceptable conditions, and reconfigured its West Rocky Run Creek crossing to double-circuit. Additionally, in response to

[241] Ex. MP-127 at 6 (Gunderson Rebuttal). A copy of DOE's letter encouraging the Company to submit a full application for round two GRIP Program funding is found at Ex. MP-127, Schedule 1 (Gunderson Rebuttal).
[242] Ex. MP-127, Schedule 3 (Gunderson Rebuttal).
[243] Ex. MP-127 at 8 (Gunderson Rebuttal).

concerns from the public regarding aesthetic impacts and sound from the HVDC Modernization Project, Minnesota Power made additional commitments at hearing and in its comments on the EA to address these concerns and mitigate potential impacts. ATC has not approached this proceeding with the same level of cooperation and willingness.

One example of this relates to the federal (and matching state) grant funding. As the grant funding contemplates that the grant recipient will ensure compliance with all aspects of the grant fund, it is necessary for anyone working on the HVDC Modernization Project to comply with those conditions. If the ATC Arrowhead Alternative is selected, ATC would construct, own, and operate the ATC Arrowhead 345 kV/230 kV Substation using its own contractors and personnel. These individuals would not be subject to contract with Minnesota Power or its contracting conditions. To ensure that ATC complies with all available funding requirements for the Project if the Commission orders construction of the ATC Arrowhead Alternative, the Company recommended the following condition for the Certificate of Need and Route Permit:[244]

> [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.[245]

ATC, however, objected to this condition.[246]

ATC's position is unreasonable. Given that ATC would be constructing a portion of the HVDC Modernization Project if the Commission approves the ATC Arrowhead Alternative, it is only reasonable for ATC to be required to comply with all compliance requirements set forth in the Cooperative Agreement for DOE funding under the GRIP Program round one funding

[244] This condition is assuming that the ATC Arrowhead Alternative is ordered by the Commission to be constructed and ATC has been named as a co-Permittee, given that the ATC Arrowhead 345 kV/230 kV Substation work would be an "associated facility" under Minnesota law. Minn. Stat. § 216E.01, subd. 4.
[245] Ex. MP-119 at 35 (Gunderson Direct).
[246] Ex. ATC-202 at 20-21 (McKee Rebuttal).

opportunity as necessary to ensure that no funding is lost. ATC's position is particularly untenable given that Minnesota Power is recommending that ATC comply with funding requirements just as Minnesota Power is required to comply with them to ensure that no funding opportunity is lost. Requiring this condition for the Certificate of Need and Route Permit is necessary and reasonable to ensure that Minnesota Power's customers get the full benefit of the grant funding if the ATC Arrowhead Alternative is approved by the Commission.

As another example, ATC also objected to the request by Minnesota Power that ATC be required to share certain financial information available to Minnesota Power if the ATC Arrowhead Alternative is ordered to be constructed.[247] As Minnesota Power explained, a condition of the DOE GRIP Program funding requires the establishment of internal and external audit protocol. If the Commission orders 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 portion of the HVDC Modernization Project ATC would be constructing.[248]

While this is not a typical request, the use of federal grant funding for the HVDC Modernization Project is not a typical funding mechanism and, as such, it comes with requirements that Minnesota Power must verify are being completed in compliance with the federal grant program for *all* aspects of the HVDC Modernization Project. Before Minnesota Power can affirmatively state to the DOE that all aspects of the grant conditions have been complied with and satisfied, Minnesota Power must have a way in which to verify that compliance. The suggestion

[247] Ex. ATC-203 at 21-22 (McKee).
[248] Ex. MP-119 at 17 (Gunderson Direct). Minnesota Power also notes that the arrangement proposed by ATC may also require the filing, and Commission approval, of an affiliated interest under Minn. Stat. § 216B.48.

for such a condition by Minnesota Power would be consistent with these requirements. ATC, however, has been unwilling to agree to such a condition.

Finally, Minnesota Power had suggested that if the Commission ordered construction of the ATC Arrowhead Alternative, and if implementation of the system alternative exceeded ATC's own estimates in this proceeding, the Commission should include a condition that Minnesota Power (and, thus, Minnesota Power customers) should not be required to pay those excess costs through the Transmission Cost Recovery Rider.[249] ATC objected to this suggested condition, claiming that Minnesota Power "seeks to assure itself of full recovery of the costs associated with the [ATC Arrowhead Alternative], regardless of the size of any cost overrun, while prohibiting any such recovery by ATC.[250] Unfortunately, ATC's objection appears to be rooted in a lack of understanding by ATC of how the cost-recovery process works in Minnesota.

As discussed previously, long-standing Commission precedent provides that a rate-regulated utility may not recover any amounts in the Transmission Cost Recovery Rider in excess of the amounts estimated at the time a project is initially approved by the Commission.[251] Minnesota Power is only asking for protection for Minnesota Power and its customers if the Commission relies on the much lower estimates for the ATC Arrowhead Alternative provided by ATC in this proceeding in its attempt to establish that its system alternative is "cost-effective," that

[249] Ex. MP-119 at 35 (Gunderson Direct).
[250] Ex. ATC-203 at 22-23 (McKee Rebuttal).
[251] *In the Matter of Minnesota Power's Petition for the 2023 Approval of a Transmission Cost Recovery Rider under Minn. Stat. 216B.16, subd. 7b*, Docket No. E015/M-22-573, ORDER at DOC-DER Recommendation at 6 (May 2, 2023) (*citing In the Matter of the Northern States Power Company, a Minnesota Corporation, d/b/z Xcel Energy, for Approval of a Modification to its TCR Tariff, 2020 Project Eligibility, TCR Rate Factors, Continuation of Deferred Accounting and 2009 True-up Report*, Docket No. E002/M-09-1048, ORDER APPROVING 2010 TCR PROJECT ELIGIBILITY AND RIDER, 2009 TCR TRACKER REPORT, AND TCR RATE FACTORS at 6 (Apr. 27, 2010)) ("project cost recovery through the rider should be limited to the amount of the initial cost estimates at the time the projects are approved as eligible projects . . . A request to allow cost recovery for project costs above the amount of the initial estimate may be brought for Commission review only if unforeseen or extraordinary circumstances arise on a project").

ATC agree to keep its cost at that level for purposes of Minnesota Power's Transmission Cost Recovery Rider determinations.

If the final result is that Minnesota Power's estimates for the ATC Arrowhead Alternative (well in excess of $30 million more than ATC's estimates, should a phase-shifting transformer be necessary) turn out to be accurate, Minnesota Power is merely asking for assurances that Minnesota Power and its customers will not need to pay such excess costs to ATC until the Commission makes a determination on if the costs above the initial ATC estimate is reasonable and prudent, consistent with Commission precedent.

Such commitments would be standard for any co-Permittee of a Certificate of Need or Route Permit and are not unreasonable requests. Unfortunately ATC has refused to agree to these types of conditions in this proceeding. For these reasons, the ATC Arrowhead Alternative should be rejected, as ATC has shown an unwillingness to perform under the generally-acceptable terms of any Certificate of Need or Route Permit issued by the Commission.

VI. CONCLUSION

In the simplest terms, ATC has proposed a transmission system alternative to the Minnesota Power Proposed Configuration of the HVDC Modernization Project. Even if the Commission determines that ATC meets all procedural requirements to be a co-Permittee on any HVDC Modernization Project Certificate of Need or Route Permit and that the ATC Arrowhead Alternative meets the threshold for system alternatives to be considered in this proceeding, ATC has failed to demonstrate by a preponderance of the evidence on the record that the ATC Arrowhead Alternative is a more reasonable and prudent alternative to the Minnesota Power Proposed Configuration of the HVDC Modernization Project.

Minnesota Power, the only applicant in this proceeding, has applied for the HVDC Modernization Project, including the Minnesota Power Proposed Configuration for the Minnesota interconnection facilities necessary for the Project. The evidence on the record demonstrates that the Minnesota Power Proposed Configuration of the HVDC Modernization Project complies with the standards and criteria set forth in Minn. Stat. § 216B.243, Minn. Stat. § 216E.04, Minn. R. 7849.0120, and Minn. R. 7850.4000, taking into account all required considerations. ATC has not demonstrated, by a preponderance of evidence on the record, that the ATC Arrowhead Alternative system alternative is a more prudent and reasonable alternative to the Minnesota Power Proposed Configuration. The evidence on the record demonstrates that the Minnesota Power Proposed Configuration will provide a cost-effective modernization of the aging HVDC System infrastructure, while ensuring that the customers paying for the HVDC Modernization Project will continue to receive the benefits of the HVDC System to the greatest extent practicable, potentially on an earlier in-service date than April 2030. The ATC Arrowhead Alternative, however:

- Would not provide any significant system reliability benefits compared to the Minnesota Power Proposed Configuration, especially for Minnesota Power's customers;
- Would not be more cost-effective than Minnesota Power's Proposed Configuration;
- Would be even less cost-effective than Minnesota Power's Proposed Configuration if the Commission, upon receipt of a proper request to modify the existing 800 MVA limitation on the ATC Arrowhead 345 kV/230 kV Substation, requires that the 800 MVA limitation (along with the existing phase-shifting transformer and addition of a new phase-shifting transformer) remain as a condition of operation of the ATC Arrowhead 345 kV/230 kV Substation;

- May create greater financial impact uncertainty for Minnesota Power customers as ATC was unwilling to commit to a cost cap, or even a not-to-exceed tax percentage, on its cost estimates to construct its portion of the ATC Arrowhead Alternative;
- Is not capable of implementation earlier than 2030 and, therefore, not capable of implementation to achieve the earlier in-service date that is potentially available for Minnesota Power's Proposed Configuration;
- Would result in benefits of the HVDC System flowing *away* from Minnesota Power customers even though Minnesota Power customers will pay for the entire HVDC Modernization Project;
- Is not likely to have any "significant" environmental benefit compared to Minnesota Power's Proposed Configuration;
- Limits opportunities for future expansion given that there would be no construction of the St. Louis County 345 kV/230 kV Substation and any expansion of the ATC Arrowhead 345 kV/230 kV Substation to the east, as proposed for consideration by ATC, would result in direct impacts to wetlands that are subject to certain conservation easements;
- Has not been studied or evaluated in cooperation with other transmission owners and MISO;
- May result in adverse impacts to the state and federal grant funding available for the HVDC Modernization Project given ATC's unwillingness to agree to certain conditions required for anyone constructing the HVDC Modernization Project; and
- Would prevent Minnesota Power from continuing with its application for an additional $50 million in federal grant funding through the GRIP Program round

two funding opportunity that is available to the Minnesota Power Proposed Configuration of the HVDC Modernization Project but not available to the ATC Arrowhead Alternative.

For these reasons and as demonstrated throughout this Initial Brief and accompanying Proposed Findings of Fact, Conclusions of Law, and Recommendation, the ALJ and the Commission should reject the ATC Arrowhead Alternative. Minnesota Power respectfully requests that the ALJ recommend that the Commission grant a Certificate of Need and issue a Route Permit for Minnesota Power's Proposed Configuration of the HVDC Modernization Project.

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