PUBLIC DOCUMENT
NOT PUBLIC DATA HAS BEEN EXCISED

minnesota power
AN ALLETE COMPANY

30 West Superior Street
Duluth, MN 55802-2093
www.mnpower.com

November 13, 2024

VIA E-FILING
Mr. Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

Re: In the Matter of the Petition of Minnesota Power for Approval of Investments and Expenditures in the Boswell Solar Project for Recovery through Minnesota Power's Renewable Resources Rider under Minn. Stat. § 216B.1645
Docket No. E015/M-24-344

Petition for Approval

Dear Mr. Seuffert:

Minnesota Power (or, "the Company") is pleased to present this Petition to the Minnesota Public Utilities Commission ("Commission") pursuant to Minn. Stat. § 216B.1645, subd. 1 and Minn. Rule 7829.1300. Minnesota Power is seeking Commission approval for investments, expenditures, and costs related to the Boswell Solar Project ("Project") and the Boswell Interconnector through Minnesota Power's Commission-approved Rider for Renewable Resources ("Renewable Resources Rider").

The Boswell Solar Project is an 85 megawatt ("MW") alternating current ("AC") solar facility to be constructed near the Boswell Energy Center in Itasca County, Minnesota and will cost approximately $163.5 million to build. The Project complies with the Commission's 2021 IRP Order[1] through which the Company was directed in Order Point 1b to "[a]cquire up to 300 MW of regional/in-service territory or net-zero solar … as practicable." The Project will generate carbon-free energy for customers, help Minnesota Power make progress on the Carbon Free and Renewable Energy Standards, boost the tax base of local economies, and create local union jobs. Siting a new solar project at the Boswell Energy Center is an intentional effort on behalf of Minnesota Power to reinvest in communities impacted by coal plant retirements as part of its transition to a less carbon intense energy future. To further benefit customers, the Boswell Solar Project will leverage existing utility assets and an existing MISO generator interconnection, along

[1] Docket No. E015/RP-21-33

with taking advantage of Inflation Reduction Act ("IRA") tax incentives for carbon free energy that qualify for the impacted Energy Community Tax Credit Bonus.

Please contact me at (218) 591-4870 or avang@mnpower.com with any questions related to this matter.

Sincerely,

Ana Vang
Senior Public Policy Advisor

AMV:th
Attach.

STATEMENT REGARDING JUSTIFICATION FOR EXCISING
TRADE SECRET INFORMATION

Pursuant to the Commission's revised Procedures for Handling Trade Secret and Privileged Data in furtherance of the intent of Minn. Stat. 13.37 and Minn. Rule Part 7829.0500, Minnesota Power has designated portions of the attached Petition and exhibits thereto as Trade Secret.

The Petition contains terms and conditions that are materially sensitive to Minnesota Power and contains Minnesota Power's unique methods, techniques and process for new solar resources and the Solar Request for Proposal bidding information. Minnesota Power follows strict internal procedures to maintain the secrecy of this information in order to capitalize on the economic value of the information. Potential competitors and vendors would gain a commercial advantage if this information was publicly available, with severe competitive implications resulting.

Minnesota Power believes that this statement justifies why the information excised from the attached report should remain a trade secret under Minn. Stat. §13.37. Minnesota Power respectfully requests the opportunity to provide additional justification in the event of a challenge to the trade secret designation provided herein.

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Petition of Minnesota Power for Approval of Investments and Expenditures in the Boswell Solar Project for Recovery through Minnesota Power's Renewable Resources Rider under Minn. Stat. § 216B.1645	Docket No. E015/M-24-344 PETITION FOR APPROVAL

SUMMARY OF FILING

The Boswell Solar Project is an 85 megawatt "net-zero[1]" interconnected solar facility to be constructed in Itasca County, Minnesota near the Boswell Energy Center. The Project will be connected to the 230 kV substation at Boswell Energy Center via an approximately 2.75-mile 230 kV transmission line (Boswell Interconnector). The Project will generate carbon-free energy for customers, help Minnesota Power make progress on the Carbon Free and Renewable Energy Standards, boost the tax base of local economies, and create local union jobs. Siting a new solar project at the Boswell Energy Center is an intentional effort on behalf of Minnesota Power to reinvest in communities impacted by coal plant retirements as part of its transition to a less carbon intense, cleaner energy future. To benefit customers further, the Boswell Solar Project will leverage existing utility assets, an existing MISO generator interconnection, along with taking advantage of Inflation Reduction Act ("IRA") tax incentives for carbon free energy that qualify for the impacted Energy Community Tax Credit Bonus. This project was identified as a competitive resource addition to Minnesota Power's supply portfolio as part of its 2021 Integrated Resource Plan Order.[2] Minnesota Power respectfully submits this Petition to the Minnesota Public Utilities Commission pursuant to Minn. Stat. § 216B.1645 and Minn. Rule 7829.1300. Minnesota Power requests that the Commission approve the following requests set out in this Petition:

1. Approval for investments and expenditures related to the Boswell Solar Project and the Boswell Interconnector pursuant to Minn. Stat. § 216B.1645. Minnesota Power's

[1] "Net-zero" refers to MISO's "Surplus" interconnection service where a generator resource can be added to an existing Generator Interconnection Agreement injection point.
[2] Docket No. E015/RP-21-33

development of this 85 MW solar project will facilitate compliance under the requirements under Minn. Stat. § 216B.1691.

2. Approval to include associated costs in the existing Renewable Resources Factor under its Renewable Resources Rider.

TABLE OF CONTENTS

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Petition of Minnesota Power for Approval of Investments and Expenditures in the Boswell Solar Project for Recovery through Minnesota Power's Renewable Resources Rider under Minn. Stat. § 216B.1645	Docket No. E015/M-24-344 PETITION FOR APPROVAL

I. INTRODUCTION

Minnesota Power (or, "the Company") respectfully submits this Petition to the Minnesota Public Utilities Commission ("Commission") pursuant to Minn. Stat. § 216B.1645, subd. 1 and Minn. Rule 7829.1300. Minnesota Power is seeking Commission approval for investments, expenditures, and costs related to the Boswell Solar Project ("Project") and the Boswell Interconnector through Minnesota Power's Commission-approved Rider for Renewable Resources ("Renewable Resources Rider").

In total, Minnesota Power requests that the Commission approve the following requests set out in this Petition:

1. Approval for investments and expenditures related to the Boswell Solar Project and the Boswell Interconnector pursuant to Minn. Stat. § 216B.1645. Minnesota Power's development of this 85 MW solar project will facilitate compliance under the requirements under Minn. Stat. § 216B.1691.

2. Approval to include associated costs in the existing Renewable Resources Factor under its Renewable Resources Rider.

Minnesota Power's commitment to diversifying its power supply and supporting renewable energy options is guided by the Company's 2021 Integrated Resource Plan[3] ("IRP") and its climate related goals in its *EnergyForward* resource strategy. In 1906, Minnesota Power got its start by

[3] Docket No. E-015/RP-21-33

harnessing the clean, emission-free hydro energy generated by the St. Louis River near Duluth, Minnesota. Today, Minnesota Power utilizes a diverse combination of resources and has nearly tripled its renewable energy generation since 2014. The Company is continuing its leadership in the renewable energy space and ALLETE is the largest investor in renewable energy of any investor-owned utility in the country for its size. The Boswell Solar Project is an integral part of Minnesota Power's progress towards meeting both the Carbon Free Standard ("CFS") and Renewable Energy Standard ("RES")[4] and an example of its ongoing commitment to reinvest in host communities.

In the Commission's January 9, 2023 Order In the Matter of Minnesota Power's 2021-2035 Integrated Resource Plan, Minnesota Power was directed in Order Point 1b to "[a]cquire up to 300 MW of regional/in-service territory or net-zero solar … as practicable." Additionally, Order Point 4a laid out a bidding process for resource acquisitions for projects in the IRP. Compliance with this order point will be outlined in detail in section III.D.

Minnesota Power filed a Request for Proposal ("RFP") for up to 300 MW of regional/in-service territory or net-zero solar for the Commission's review on October 2, 2023, and issued the RFP on November 15, 2023. This RFP was issued in response to IRP Order Points 1b and 4. The RFP closed at 5 p.m. CST on January 17, 2024 and sought to maximize the regional economic benefits of solar development by including preferences for diverse bidders and domestically sourced materials, requirements for using local union labor for construction and permanent staffing, and the development of apprenticeship programs. Quantitative and qualitative evaluations on received bids were performed by Minnesota Power and Independent Evaluator ("IE") Levelized Consulting; the IE report can be found in Appendix A. On September 23, 2024, Minnesota Power announced the selection of 205 MW of new solar projects, the Regal[5] and Boswell Solar Projects.

The Boswell Solar Project is an important project for Minnesota Power, as it will generate carbon-free energy for customers, help the Company to reach the CFS and exceed the RES, boost the tax base of local economies, and create local union jobs. The proposed site at the Boswell Energy Center ("BEC") represents a continued investment in a host community that has

[4] Minn. Stat. § 216B.1691
[5] Docket No. E015/24-343

experienced impacts from the Company's transition away from coal-fired generation, as coal operations ceased at BEC Units 1 and 2 in 2018. The retirement of those units resulted in a significant reduction of employees at the facility, along with decreased economic activity in the community. Siting a new solar project at BEC is an intentional effort on behalf of Minnesota Power to reinvest in communities impacted by its transition to a less carbon intense, cleaner energy future.

Additionally, the Boswell Solar Project will leverage existing utility infrastructure to benefit customers as a "net-zero"[6] solar interconnected site. By using Midcontinent Independent System Operator's ("MISO") Surplus Interconnection Service, the Boswell Solar project intends to avoid the schedule and cost risks associated with the general MISO generation interconnection queue process. Boswell Solar will be partially located on land already owned by Minnesota Power, reducing the land costs for the Project. Furthermore, the Project will utilize the Energy Community Tax Credit Bonus incentive from the Inflation Reduction Act ("IRA") to provide additional cost reduction benefits for customers.

A. Overview of the Project

The Boswell Solar Project is an 85 megawatt ("MW") alternating current ("AC") solar facility to be constructed in Itasca County, Minnesota near BEC in Itasca County, and will cost approximately $163.5 million to build. The Boswell Solar Project was submitted as a self-build project into the Minnesota Power Solar RFP on January 15, 2024, and was the lowest cost project bid into the RFP. Minnesota Power intends to apply for required state permits by the end of 2024 and intends to utilize MISO's Surplus Interconnection Service to leverage the existing interconnection rights at BEC Unit 3. The Project consists of land already under Minnesota Power ownership as well and leased land from multiple nearby landowners. The Project is proposed to consist of approximately 180,000 monocrystalline, bifacial solar modules and use single axis tracking technology mounted on conventional driven piles. The project site will be connected to the 230kV transmission system at the BEC 230 kV substation. This 85 MW Project will provide enough electricity to power approximately 20,300 homes.

[6] "Net-zero" refers to MISO's "Surplus" interconnection service where a generator resource can be added to an existing Generator Interconnection Agreement injection point.

B. *EnergyForward* Strategy

The Company's renewable resource development is guided by its 2021 IRP and *EnergyForward* resource strategy, which incorporates a diverse renewable and carbon-free strategy including hydroelectric, solar, biomass, wind, and energy storage resources. Under this strategy, Minnesota Power is currently delivering over 50 percent renewable energy to customers and is the first Minnesota utility to achieve this milestone.

Over the past two decades, the Company has undertaken an intentional effort to increase its deployment of renewable energy. In 2006 and 2007, Minnesota Power began purchasing the entire output of the Oliver County Wind Energy Center 1 and 2 (just under 100 MW), wind farms built and operated by NextEra Energy in North Dakota. In 2008, Minnesota Power constructed the Taconite Ridge Energy Center, the first commercial wind generating station in northern Minnesota. The Bison Wind Energy Center ("Bison") in North Dakota came next, with four phases of the project completed between 2010 and 2015. Bison, now the largest wind farm in North Dakota with a capacity of just under 500 MW, leverages premier wind resources to deliver carbon-free energy via the Company's High Voltage Direct Current ("HVDC") line to the Company's customers. After record rainfall and flooding in June 2012, Minnesota Power's Thompson Restoration restored production after damages to the hydroelectric station, maintaining a key 72 MW hydroelectric resource on its system. In 2016, Minnesota Power completed the 10 MW Camp Ripley solar project. In 2018, the Company's 1.04 MW Community Solar Garden program officially started. In late 2020, Minnesota Power added 250 MW of wind energy through a Power Purchase Agreement ("PPA") with the completion of the Nobles 2 Wind Farm and 383 MW of hydro energy through PPAs with Manitoba Hydro and the completion of the international 500 kV Great Northern Transmission Line. In 2020, the Minnesota Public Utilities Commission asked the state's utilities to accelerate planned projects to help kick-start local economies affected by the pandemic. The Company's three resulting solar projects (22.4 MW) generate carbon-free energy for customers, boost the tax base of local economies, created local union jobs, contracted with local and diverse suppliers whenever possible, and were built with solar panels from regional manufacturers. Combined, these projects added more than 1350 MW of renewable electricity to the Company's generation portfolio.

The Company is currently exceeding the RES requirement in the near term, nearing completion of an RFP to procure up to 400MW of additional wind energy and the Company's upcoming IRP in 2025 will assess a wide range of power supply resources and pathways to meet the recent carbon-free energy generation standard.

II. PROCEDURAL MATTERS

A. General Filing Information

Pursuant to Minn. Stat. § 216B.16, subd. 1 and Minn. Rule 7829.1300, Minnesota Power provides the following required general filing information.

1. Summary of Filing (Minn. Rule 7829.1300, subp.1)

A one-paragraph summary accompanies this Petition.

2 Service on Other Parties (Minn. Rule 7829.1300, subp. 2)

Pursuant to Minn. Stat. § 216.17, subd. 3 and Minn. Rule7829.1300, subp. 2, Minnesota Power eFiles the Petition on the Department of Commerce - Division of Energy Resources ("the Department") and the Minnesota Office of the Attorney General - Antitrust and Utilities Division. A summary of the filing prepared in accordance with Minn. Rule 7829.1300, subp. 1 is being served on Minnesota Power's general service list.

3. Name, Address and Telephone Number of Utility (Minn. Rule 7829.1300, subp. 4(A))

Minnesota Power
30 West Superior Street
Duluth, MN 55802
(218) 722–2641

4. Name, Address and Telephone Number of Utility Attorney (Minn. Rule 7829.1300, subp. 4(B))

Sarah Whiting
Attorney
ALLETE, Inc.
30 West Superior Street
Duluth, MN 55802
(218) 355–3033
swhiting@allete.com

5. Date of Filing and Date Proposed Rate Takes Effect (Minn. Rule 7829.1300, subp. 4(C))

This Petition is being filed on November 13, 2024. The effective date is the date of the Commission's Order or such other date as directed in the Commission's Order.

6. Statute Controlling Schedule for Processing the Filing (Minn. Rule 7829.1300, subp. 4(D))

This Petition is made pursuant to Minn. Stat. § 216B.1645, subd. 1. Minn. Rule 7825.3200 requires that utilities serve notice to the Commission at least 90 days prior to the proposed effective date of modified rates. Furthermore, Minnesota Power's Petition falls within the definition of a "Miscellaneous Tariff Filing" under Minn. Rules 7829.0100, subp. 11 and 7829.1400, subp. 1 permitting comments in response to a miscellaneous filing to be filed within 30 days, and reply comments to be filed no later than 10 days thereafter.

This Petition is also made pursuant to Minn. Rules 7825.2400, 7825.2500 and 7825.2600, which permit public utilities to adjust rates to reflect changes in the cost of energy delivered to customers by utilizing an adjustment to recover costs for fuel used in the generation of electricity.

7. Utility Employee Responsible for Filing (Minn. Rule 7829.1300, subp. 4€)

Analeisha Vang
Senior Public Policy Advisor
Minnesota Power
30 West Superior Street
Duluth, MN 55802
(218) 591-4870
avang@mnpower.com

8. Impact on Rates and Services (Minn. Rule 7829.1300, subp. 3(F))

This filing will have no effect on Minnesota Power's base rates. However, since this is a request for current cost recovery eligibility that, if approved by the Commission, Minnesota Power will seek to include, in the future, the costs as part of its Renewable Resources Rider. The anticipated rate implications are provided in Section IV.

9. Service List (Minn. Rule 7829.0700)

Sarah Whiting
Attorney
ALLETE, Inc.
30 West Superior Street
Duluth, MN 55802
(218) 355-3033
swhiting@allete.com

Analeisha Vang
Senior Public Policy Advisor
Minnesota Power
30 West Superior Street
Duluth, MN 55802
(218) 591-4870
avang@mnpower.com

Information Request Service List:

Sarah Whiting
Attorney
ALLETE, Inc.
30 West Superior Street
Duluth, MN 55802
(218) 355-3033
swhiting@allete.com

Analeisha Vang
Senior Public Policy Advisor
Minnesota Power
30 West Superior Street
Duluth, MN 55802
(218) 591-4870
avang@mnpower.com

Minnesota Power Discovery Manager
discoverymanager@mnpower.com

Minnesota Power Regulatory Compliance
MPRegulatoryCompliance@mnpower.com

B. Trade Secret Designation (Minn. Rule 7825.0500)

Pursuant to Minn. Stat. §§ 13.01 et seq. and Minn. Rule 7829.0500, Minnesota Power has designated portions of the Petition as containing Trade Secret Information and these have been redacted as appropriate to reflect the Trade Secret nature of the documents. Trade Secret and Public copies of the Petition are being eFiled in accordance with the Commission's Rules and Minn. Stat. § 216.17, subd. 3. A statement regarding justification for excising Trade Secret information accompanies this Petition.

III. THE PROJECT – RENEWABLE RESOURCES RIDER AUTHORIZATION

Minn. Stat. § 216B.1645 allows the Commission to approve a schedule that provides for the automatic adjustment of charges to recover prudently incurred investments, expenses, or costs associated with facilities constructed, owned, or operated by a utility to satisfy the requirements of Minn. Stat. § 216B.1691.

The solar energy generated by the Boswell Solar Project qualifies as eligible energy technology and carbon free technology under Minn. Stat. § 216B.1691, subd. 1b and 1c Minnesota Power requests Commission approval pursuant to Minn. Stat. § 216B.1645, subd. 2a of this Petition for eligibility to include cost recovery of incurred investments and costs for the Boswell Solar Project and Boswell Interconnector through Minnesota Power's Commission-approved Renewable Resources Rider.

A. Project Description and Overview (Minn. Stat. § 216B.1645, subd. 2a(b)(1))

The Boswell Solar Project is an 85 MW solar energy facility that will be near the BEC in Itasca County, Minnesota. The Project will use approximately 180,000 monocrystalline, bifacial solar modules and is anticipated to add approximately 166,000 MWh of renewable energy, and cost approximately $163.5 million to build. The Boswell Solar Project will interconnect to Minnesota Power's transmission system at the Boswell 230 kV substation. Minnesota Power intends to use Surplus Interconnection Service at the existing Unit 3 generator to interconnect the Boswell Solar Project. The Boswell Solar Project is scheduled to begin construction in 2026 and be fully operational before year-end 2027. Minnesota Power partnered with National Grid Renewables Development ("National Grid") to acquire certain project assets through an Asset Purchase Agreement. Minnesota Power intends to apply for a site permit under Minn. Stat. Ch. 216E with the Commission by the end of 2024.

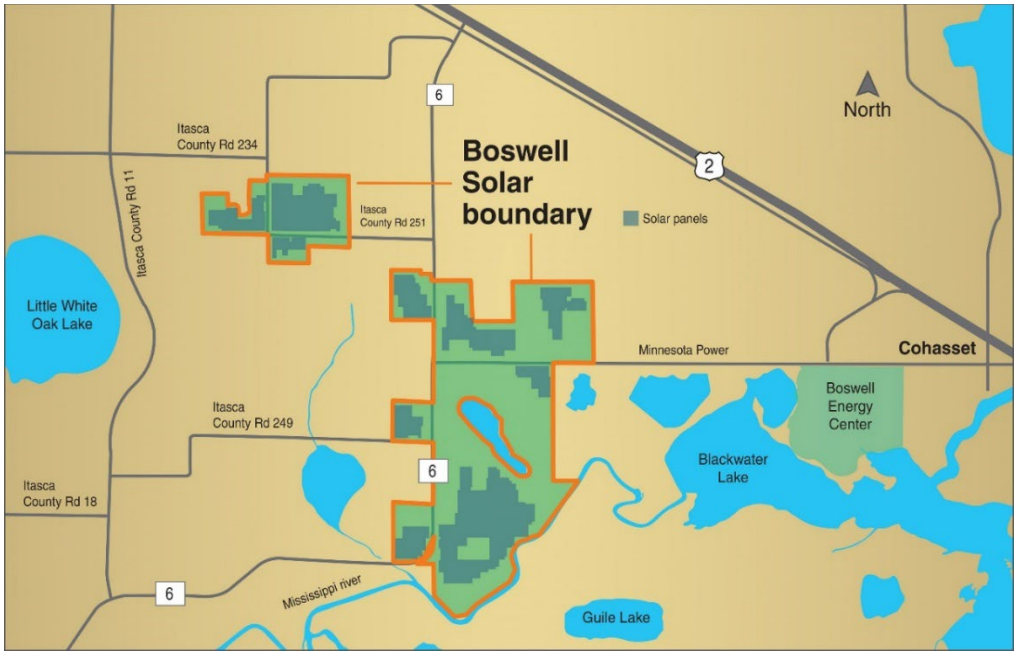
B. Project Location

The Boswell Solar Project is located near the BEC in Cohasset and in rural Itasca County, Minnesota (Figure 1). A portion of the project is also on privately owned land within the Leech Lake Band of Ojibwe reservation boundaries. Minnesota Power has had project introductory meetings with Leech Lake and has engaged their Tribal Historic Preservation Office. Initial project introductory letters were provided to the 11 federally recognized tribes within the state as part of

the Site Permit process. Minesota Power will continue to work with Leech Lake and other tribal nations it serves on siting renewable assets in the service territory.

The Project site consists of land currently owned by Minnesota Power and land under lease or purchase agreements. The site was selected to utilize existing assets at the BEC, including land already owned by Minnesota Power and the interconnection rights of BEC Unit 3. Locating the Project partially on land already owned by Minnesota Power is efficient and will reduce the revenue requirements of the Project for customers. Including additional land near BEC allows for a larger project size than could otherwise fit on land owned by Minnesota Power alone. The site is currently a combination of agricultural land and woodland. Additionally, the Boswell Solar Project is in census tracts identified by the US Department of Energy as containing or adjoining a tract containing a coal-fired electric generation unit retirement. This qualifies the Boswell Solar project for the 10 percent Energy Community Tax Credit Bonus, further reducing the project cost for customers.

Figure 1. Location of the Boswell Solar Project.



C. National Grid Renewables Partnership

Minnesota Power entered into an Asset Purchase Agreement with National Grid on November 20, 2023. This Asset Purchase Agreement provided a pathway for Minnesota Power to acquire National Grid's assets associated with the Boswell Solar Project, including land agreements and some early development work products. Minnesota Power closed on the Asset Purchase Agreement on September 11, 2024. The Asset Purchase Agreement price is included in the overall project cost being asked for cost recovery.

D. Request for Proposal Process and Project Award

In July 2023, Minnesota Power retained an independent evaluator to oversee the RFP process for Minnesota Power's Regional Solar Request for Proposals and provide an independent evaluation of bids. Per order point 4e in the Order Approving Plan and Setting Additional Requirements for Docket No. E-015/RP-21-33, issued January 9, 2023, "In instances where Minnesota Power or an affiliate proposed a project, engage an independent evaluator to oversee the bid process and provide a report for the Commission." An independent evaluator was obtained because Minnesota Power was interested in proposing solar projects into the bidding process as the Company has extensive experience developing, implementing, and operating utility scale energy generation facilities and had existing assets that could be utilized for solar to provide benefit to customers and the region.[7]

Minnesota Power issued a press release on the release of the RFP which was open to all developers. The press release was circulated through the Minnesota Power website on November 15, 2023, and an email was issued by the North American Energy Markets Association ("NAEMA") on December 11, 2023, notifying the public and industry members of the RFP opportunity. On November 28, 2023, Minnesota Power held an online seminar that allowed prospective bidders to ask clarifying questions regarding the RFP that was issued.

Minnesota Power's RFP requesting up to 300 MW of regionally located solar generation could be comprised of PPAs, Build-Operate-Transfer ("BOT") agreements, and/or self-build

[7] The independent evaluator was obtained through a competitive bidding process. Minnesota Power received bids from four independent evaluators and selected Levelized Consulting from this process.

projects. The RFP received 11 proposals consisting of two energy storage projects, one PPA, two self-build projects, one BOT project, and five BOT or PPA proposals. All proposals were submitted directly to the independent evaluator, who provided the first initial screening of the proposals to determine compliance with the requirements set out in the RFP. During the initial review, it was determined that six proposals did not meet the criteria set forth in the RFP. The remaining five proposals were moved forward to the next phase of the evaluation which included qualitative and quantitative (cost) evaluations.

Consistent with the Commission's Order and FERC Code of Conduct requirements, since Minnesota Power was expecting to receive self-build proposals, under the guidance of legal counsel, the Company instituted a "wall" prior to submitting the RFP between its RFP Team who was responsible for developing, issuing, and implementing the Solar RFP and the Solar Development Team who was responsible for developing the self-build proposals. This separation ensured both the integrity of the process and value for Minnesota Power's customers. The wall was removed after the projects were shortlisted.

The Company received bids for BOT, PPA, and self-build options ranging from approximately [**TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS].** As a reference the 2021 IRP assumed a range of [**TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**. The higher cost range than what was modeled in the IRP is largely attributable to supply chain uncertainty, concerns about workforce availability, MISO interconnection costs and general inflation and higher interest rates than were assumed in the 2021 IRP filing. While the IRA provides benefits for solar projects, those benefits did not fully offset the increase in cost of solar projects, as evidenced by the higher costs compared to the 2021 IRP assumptions.

Through the shortlisting process, Minnesota Power's Boswell Solar proposal was deemed the lowest cost option by the initial assessment performed by the independent evaluator, and the Company's Regal Solar Project proposal[8] was the second lowest cost option. In the RFP shortlisting process, three other projects, including another self-build proposal (Regal Solar Project) from Minnesota Power and two BOT proposals were selected to continue to the next phase

[8] Docket No. E015/24-343

of evaluation, which included further risk assessment and pricing adjustments as needed to meet Minnesota Power's technical specifications.

Through the final selection process, Minnesota Power worked with the shortlisted bidders to assess the risk of the projects, requested updated pricing to meet Minnesota Power technical specifications and reevaluated the projects where the costs were increased from the initial bids received. At the end of the final selection process, Minnesota Power selected the Boswell Solar and Regal Solar[9] self-build projects, totaling 204.5 MW, to move through the final phase of execution – petitioning for Commission approval of investments and expenditures related to the Boswell Solar and Regal Solar projects, as well as approval to include costs to the existing Renewable Resources Factor under its Renewable Resources Rider. Minnesota Power did not select the full 300 MW of solar projects through this RFP process due to the large gap in cost between the self-build projects and the next lowest cost projects shortlisted. During the shortlisting process Minnesota Power requested a price refresh with the desire to receive lower priced bids. The response from bidders did not move pricing materially, in fact the cost increased slightly.

E. Utilization of Federal Legislation

The passage of the IRA brought both change and opportunity for renewable energy projects. The Boswell Solar Project was well positioned to capture these benefits as it is located in a community impacted by the energy transformation that is occurring locally and nationally.

The Boswell Solar Project will take advantage of the extended Production Tax Credit ("PTC") and will qualify for a 110 percent production tax credit. The Boswell Solar Project is in census tracts identified by the US Department of Energy as containing or adjoining a tract containing a coal-fired electric generation unit retirement. This qualifies the Boswell Solar project for the 10 percent Energy Community Tax Credit Bonus. The Project will utilize labor resources complying with the IRA's wage and apprenticeship requirements to secure the full base tax credit.

F. Solar Array Construction

The Boswell Solar Project initial design is based on a **[TRADE SECRET DATA BEGINS** [redacted] **TRADE**

[9] Docket No. E015/M-24-343

SECRET DATA ENDS]. Final module selection has not been determined. The project will consist of approximately 180,000 modules. Modules will be on conventional piles using single axis tracking technology. The tracker technology will be equipped with backtracking, snow shed, and wind/hail stow capabilities. Approximately 22 central inverters will be located throughout the project site.

A 34.5 kV collector line system will connect the inverters back to a new central collector substation located at the project site. This collector substation will contain a single 230/34.5 kV with a top rating of 150 megavolt-amperes ("MVA") and will connect to a 230 kV line that will deliver energy back to the point of interconnection at BEC.

The Boswell Solar Project plans to utilize local union labor and businesses as much as possible to ensure the community benefits from the project. The project team will work with regional contractors to prioritize local union labor and diverse suppliers as much as possible. All labor will meet the prevailing wage and apprenticeship requirements outlined in the IRA.

Once construction is complete, the site restoration work will be completed to establish diverse and native perennials at the site that will provide soil stability and improve soil health while also supporting native pollinators.

G. Socioeconomic Impact

Economic benefits from the approximately $163.5 million investment in solar energy provide an average of $319,000 in annual tax revenue in Minnesota Power's local communities. If approved, Minnesota Power expects that the Boswell Solar Project would add an estimated $1.26 million to the 2028 Gross Regional Product and boost 2028 regional employment by about 10 jobs (full-time equivalent). The Project would also provide long-term employment, tax revenue, and local consumer spending.

H. Transmission and Interconnection

Minnesota Power intends to use Surplus Interconnection Service at the existing BEC Unit 3 generator to interconnect the Boswell Solar Project. Surplus Interconnection Service will allow Minnesota Power to "increase the gross generating capability at the same Point of Interconnection of an Existing Generation Facility without increasing the total amount of Interconnection Service at the

Point of Interconnection." Surplus Interconnection Service would allow BEC Unit 3 and the Boswell Solar Project to both operate concurrently so long as "the total combined generating output at the Point of Interconnection for both the original and surplus Interconnection Customer is limited to and shall not exceed the total amount of Interconnection Service of an Existing Generating Facility."[10] Operationally at the facility, when solar energy is being produced the BEC Unit 3 will need to decrease coal generation to allow room for the solar energy to be injected into the grid, resulting in a reduction in carbon and other emissions and fuel cost savings for customers. Application for the Boswell Surplus Interconnection Service is anticipated to be a 9-month process.[11] Minnesota Power intends to apply for Surplus Interconnection Service in early 2025.

The Boswell Solar Project will be connected to the 230 kV substation at BEC via an approximately 2.75-mile 230 kV transmission line ("Boswell Interconnector"). The line will be built as part of Minnesota Power's Boswell Interconnector plan. The Boswell Interconnector will be designed to have enough capacity to facilitate surplus or replacement interconnection requests for the total combined 959.5 MW generation interconnection rights of BEC Unit 3 and Unit 4. The Boswell Interconnector will also be designed and constructed as a double circuit capable transmission line, meaning that a second 230 kV transmission line may be constructed in the future on the same structures in the event that transmission planning considerations identify such a need. These future considerations for the Boswell Interconnector are reasonable given the rapidly-evolving utility industry landscape and the significant constraints for siting new transmission lines near BEC. The Boswell Solar Project will be allocated a portion of the total cost of the construction of the Boswell Interconnector based on the percentage of total line capacity used by the Boswell Solar Project, excluding the estimated additional cost to make the line double circuit capable. On page 19, Table 2 provides an overview of the total cost of the Boswell Interconnector, along with the portion of cost being allocated to the Boswell Solar Project.

Construction of the Boswell Interconnector will also require modifications at the Boswell 230 kV Substation to facilitate one additional 230 kV transmission line entrance. As part of the Boswell Interconnector plan, the new interconnection to the Boswell 230 kV Substation will also be designed with capacity to facilitate the full 959.5 MW generation interconnection rights of BEC

[10] MISO FERC Electric Tariff Attachment X Generator Interconnection Procedures (BIP) 163.0.0
[11] MISO Generation Interconnection Business Practices Manual BPM-015-r28 Effective Date JAN-22-2024

Unit 3 and Unit 4. The Boswell Solar Project will be allocated a portion of the total cost of the modifications to the Boswell 230 kV Substation based on the percentage of total line capacity used by the Project. A new solar collector substation called Warburg Lake will be constructed along the Boswell Interconnector transmission line and will contain a single 230/34.5 kV transformer with a top rating of 150 MVA connecting the Boswell Solar Project. The Project will be responsible for 100 percent of the cost of the new Warburg Lake collector substation.

I. Ensuring Reasonable Project Costs (Minn. Stat. § 216B.1645, subd. 2a(b)(4))

Minnesota Power has employed multiple steps to help ensure the procurement of cost-effective resources to meet its customer and renewable product needs, including for the Boswell Solar Project. As described previously, Minnesota Power engaged in an RFP process for the selection of the Boswell Solar Project to ensure the lowest costs for customers.

Contracts for the engineering, procurement, and construction of the project will be issued based on competitive bidding when possible. In some cases, contracts may be awarded on a single source basis to qualified contractors based on utilizing existing partnering agreements or to those who have a specific expertise. Equipment selection will not only include price, but also reliability, operability, adaptability to northern climates, equipment lead times, product availability, and overall integration into Minnesota Power's solar fleet equipment selection with the intent to deliver the highest value to customers.

In addition to keeping project costs reasonable, contractors on this project will be asked to enroll in Minnesota Power's Tier 2 reporting program, which promotes them to do business with diverse and small companies (as subcontractors). Contractors in the program will report their diverse and small business spend quarterly to Minnesota Power.

To benefit customers, the Boswell Solar Project will also leverage existing utility assets – including siting the project partially on land already owned by the Company, an existing MISO generator interconnection which will reduce interconnection costs and schedule uncertainty, and will take advantage of IRA tax incentives for carbon free energy that qualify for the impacted Energy Community Tax Credit Bonus.

J. Renewable Energy Credits

Between 2006 and 2023, Minnesota Power executed PPAs, constructed, or rebuilt over 1350 MW of wind, solar, and hydro facilities to increase its Minnesota-eligible renewable energy supply. In 2023, the renewable portion of Minnesota Power's retail energy supply was greater than 50 percent of its projected 2025 retail and wholesale electric sales. With the Commission approved 2021 IRP, Minnesota Power's renewable portfolio is expected to increase by up to 400 MW of new wind and up to 300 MW of new regional solar, as practicable. Minnesota Power is currently working through an RFP process to procure up to 400 MW of additional wind resources. Additionally, Minnesota Power is currently working through an RFP process to comply with the Distributed Solar Energy Standard ("DSES"),[12] which the Company expects will add approximately 65 to 85 MW of additional solar energy to Minnesota Power's portfolio. These anticipated additions, including the Boswell Solar Project, will put Minnesota Power's on a path to complying with the CFS. Minnesota Power's customers will receive all the renewable energy credits ("RECs") and carbon free benefits from the Project.

The Company has exceeded current compliance with the RES and is well positioned to exceed the recently expanded standard of 55 percent renewable by 2035. Minnesota Power will continue the evaluation and consideration of renewable power supply alternatives in upcoming IRPs as it works towards a sustainable path to meeting the CFS by 2040.

K. Project Schedule and Permitting (Minn. Stat. § 216B.1645, subd. 2a(b)(2))

Minnesota Power strives to develop the Boswell Solar Project at the best value to customers. The proposed project schedule is shown in Table 1. This schedule assumes that the Company receives a Commission Order by October 2025 and approves the necessary permitting by Q1 2026.

[12] Docket No. E002, E015, E017/CI-23-403

Table 1. Boswell Solar Project Schedule

Task	Anticipated Date
MPUC Permitting Application Filing	Q4 2024
Application for Surplus Interconnection Service with MISO	Q2 2025
Construct Solar Array	Q1 2026-Q2 2027
Conduct Commissioning / Start-up	Q2 2027
Begin Commercial Operation	Q3 2027

Minnesota Power intends to apply for state permitting with the MPUC by the end of 2024. The Project will require a Site Permit under Minn. Stat. Ch. 216E. Additionally, the Boswell Interconnector will require a Route Permit. Minnesota Power intends to apply for a Route Permit for Boswell Interconnector concurrently with the Site Permit for the Boswell Solar Project.

The Project will pursue a License to Cross Public Waters from the Minnesota Department of Natural Resources for one overhead crossing along the proposed Boswell Interconnector route. The Boswell Solar Project will also obtain driveway and utility in road right-of-way permits from applicable road authorities, as required. The Project does not currently anticipate impacting jurisdictional wetlands. However, the Boswell Solar Project will assess the need for wetland impact permitting from both the US Army Corps of Engineers and the Minnesota Board of Water and Soil Resources as the Project design and layout progresses. The Project will work with Engineering and Construction partners to develop a Storm Water Pollution Prevention Plan and receive coverage under the statewide general National Pollutant Discharge Elimination System construction stormwater permit from the Minnesota Pollution Control Agency.

IV. SUMMARY OF INVESTMENTS, EXPENDITURES, AND CUSTOMER IMPACTS

A. Estimated Project Costs (Minn. Stat. § 216B.1645, subd. 2a(b)(3))

The Boswell Solar Project will help comply with 2021 IRP Order Point 1b, requiring the Company to acquire up to 300 MW of solar. The Project will cost approximately $163.5 million as shown in Table 2 below. This estimate assumes that the Company receives a Commission order by October 2025 and booking of retail revenue requirements begins on October 1, 2025.

Table 2. Minnesota Power's Capital Costs for the Boswell Solar Project and Surplus Interconnector

Capital Costs * (dollars in millions)	
	[TRADE SECRET DATA BEGINS
1) Solar Array	[redacted]
2) Solar Transmission Interconnection	
3) Sub-total Boswell Solar Project	
4) Boswell Surplus Interconnection	
Total Project	$ 163.5
**Costs include AFUDC and internal capitalized costs and assumes current cost recovery starting October 1, 2025.*	
	TRADE SECRET DATA ENDS]

The total annual revenue requirements over the 35-year life of the Project are shown below in Table 3 and Table 4. The revenue requirements are calculated using the total capital costs and anticipated PTC revenue, including Allowance for Funds Used During Construction ("AFUDC") and internal capitalized costs. The Company will appropriately exclude internal capitalized costs and AFUDC on internal capitalized costs from the revenue requirements once the project is included in a subsequent Renewable Resources Rider filing. The revenue requirements will also be updated as appropriate to reflect the outcomes of the Company's current rate case (Docket E-015/GR-23-155).

Table 3. Total Annual Revenue Requirements for the Boswell Solar Project

(dollars in thousands)

Year	Boswell Solar Array 1/	Solar Transmission Interconnection 2/	Ongoing Capital Costs	Total Solar Project
	[TRADE SECRET DATA BEGINS			
2025 /3				
2026				
2027				
2028				
2029				
2030				
2031				
2032				
2033				
2034				
2035				
2036				
2037				
2038				
2039				
2040				
2041				
2042				
2043				
2044				
2045				
2046				
2047				
2048				
2049				
2050				
2051				
2052				
2053				
2054				
2055				
2056				
2057				
2058				
2059				
2060				
2061				
2062				
			TRADE SECTRET DATA ENDS]	

1/ Based on Table 2 row 1 components; 2/ Based on Table 2 row 2 components; 3/ Assumes Commission approval of Petition by October 2025 and project in-service on September 30, 2027.

Table 4. Total Annual Revenue Requirements for the Total Boswell Solar Project & Surplus Interconnection

(dollars in thousands)

Year	Boswell Solar Array 1/	Total Transmission Interconnection 2/	Ongoing Capital Costs	Total Project
	[TRADE SECRET DATA BEGINS			
2025 /3				
2026				
2027				
2028				
2029				
2030				
2031				
2032				
2033				
2034				
2035				
2036				
2037				
2038				
2039				
2040				
2041				
2042				
2043				
2044				
2045				
2046				
2047				
2048				
2049				
2050				
2051				
2052				
2053				
2054				
2055				
2056				
2057				
2058				
2059				
2060				
2061				
2062				
				TRADE SECTRET DATA ENDS]

1/ Based on Table 2 row 1 components; 2/ Based on Table 2 rows 2 plus 4 components; 3/ Assumes Commission approval of Petition by October 2025 and project in-service on September 30, 2027.

Minnesota Power and its contractors will be responsible for project management, permitting, licensing and approvals, design, procurement, site preparation, balance of plant construction, and ancillary facilities. Minnesota Power intends to procure the modules for the project. The Procurement and Construction Contractor will be responsible for delivery of all the remaining solar components to the project site, as well as the installation and commissioning of the solar array.

B. Operations and Maintenance

With four operating solar facilities in the generating portfolio, Minnesota Power will build on its experience operating and maintaining solar facilities, including the Boswell Solar Project. Minnesota Power will continue to use renewable technicians to perform the operations and maintenance activities required to operate the solar facility.

While solar photovoltaic systems do not require fuel, have minimal moving parts and do not require substantial personnel, considerable operations and maintenance ("O&M") costs exist to properly maintain the array. Minnesota Power anticipates base O&M expense for the Boswell Solar Project to be approximately **[TRADE SECRET DATA BEGINS [redacted] TRADE SECRET DATA ENDS]** per year and include both preventative and corrective maintenance. This amount is in 2027 dollars and is projected to escalate at approximately 2.5 percent annually. It is assumed that many internal components will need to be replaced when equipment warranties come to an end. These ongoing Capital costs of approximately **[TRADE SECRET DATA BEGINS [redacted] TRADE SECRET DATA ENDS]** will begin in 2037 and are projected to escalate at approximately 1.5 percent annually. Additional ongoing costs include insurance costs, taxes and land lease payments.

Base O&M activities include cleaning and inspecting modules, inspecting module mounting system and tracker components, checking breakers and terminations on inverters and transformers, inspecting plant grounding equipment, maintaining and evaluating site conditions. Also included are site maintenance such as snowplowing, dust control and vegetation management. Minnesota Power plans to implement a long-term vegetation management plan using a combination of sheep grazing, mowing/haying, and herbicide treatment. The estimate also accounts for necessary replacements of parts needed within the 35-year expected life of the system.

C. Estimated Customer Impact

Table 5 below summarizes the estimated rate impact by customer class assuming the Project is approved by the Commission by October 2025, with rider recovery from customers starting in October 2025, and the Project is in-service by September 30, 2027. The rate impacts are based on Table 4 above that include the Total Boswell Solar Project and Surplus Interconnection. The rate increases in cents per kWh shown below are the incremental changes expected in subsequent Renewable Factors due to adding the Project compared to current average rates. The Boswell and Regal Solar Projects are the first Minnesota Power solar projects where costs will apply to all customer classes, as previously Large Power classes were exempt from solar projects that complied with the Solar Energy Standard.

Based on the above assumptions, all of the Non-Large Power classes would have a gradual increase in rates in 2025 and 2026 to about 0.185 cents per kWh by 2027, the first-year in-service. For an average residential customer this would be about a 1.34 percent increase or about $1.31 more per month in 2027. The Large Power average class rate would see a gradual increase in 2025 and 2026 to about 0.151 cents per kWh by 2027. This would be an increase of about 1.78 percent in 2027. Note that this analysis does not factor in the benefits of adding zero fuel cost energy into the Fuel and Purchased Energy Adjustment Clause ("FAC"), displacing either market purchases or fuel cost (i.e. coal and/or natural gas). The total rate impact when factoring in the reduction in the FAC will be lower than the values discussed above. Section 5C includes more information on rate impacts when factoring in the reduction to the FAC and carbon savings.

Table 5. Estimated Rate Impacts

Rate Class Impacts /1	2025	2026	2027
Annual MN Jurisdictional Revenue Requirements	340,508	6,723,418	12,693,770
Residential (average current rate, cents/kWh)	13.814	13.814	13.814
Increase/Decrease (cents/kWh) /2	0.005	0.098	0.185
Increase/Decrease (%)	0.04%	0.71%	1.34%
Average Impact ($ / month)	$0.03	$0.69	$1.31
General Service (average current rate, cents/kWh)	13.879	13.879	13.879
Increase/Decrease (cents/kWh) /2	0.005	0.098	0.185
Increase/Decrease (%)	0.04%	0.71%	1.34%
Average Impact ($ / month)	$0.13	$2.65	$5.02
Large Light & Power (average current rate, cents/kWh)	10.862	10.862	10.862
Increase/Decrease (cents/kWh) /2	0.005	0.098	0.185
Increase/Decrease (%)	0.05%	0.90%	1.71%
Average Impact ($ / month)	$12	$235	$445
Large Power (average current rate, cents/kWh)	8.491	8.491	8.491
Increase/Decrease (Demand & Energy Combined) (cents/kWh) /2	0.004	0.080	0.151
Increase/Decrease (%)	0.05%	0.94%	1.78%
Average Impact ($ / month)	$1,996	$39,919	$75,346
Lighting (average current rate, cents/kWh)	31.171	31.171	31.171
Increase/Decrease (cents/kWh) /2	0.005	0.098	0.185
Increase/Decrease (%)	0.02%	0.31%	0.59%
Average Impact ($ / month)	$0.01	$0.15	$0.29

Notes:

1/ Average current rates are 2022 Final General base rates without riders per MPUC decision (E-015/GR-21-335) adjusted to include current rider rates. Current rider rates included Renewable Resources Rider rates, Transmission Cost Recovery Rider rates, Solar Adjustment rates, Conservation Program Adjustment rates, and Fuel and Purchased Energy with True-Up. Average $/month impact based on 2024 budgeted billing units.

2/ Increase/Decrease (cents/kWh) shown is the estimated average rate based on annual revenue requirements of the new project with full transmission costs.

D. Tax Matters

The Boswell Solar Project has an anticipated in-service date of 2027 and will qualify for the federal PTC. The Project will comply with prevailing wage and apprenticeship requirements and expects to qualify for 110 percent of the PTC value. The total gross PTC benefit of approximately $63.4 million will reduce the revenue requirement as the credits are earned during the first 10 years the Project is in service.

The construction of Minnesota Power's four Bison Wind projects, as well as the construction and repowering of Taconite Ridge Energy Century, generated significant PTCs starting in 2009. The PTCs reduced the Company's revenue requirement in the years in which they were generated, but because the Company was in a Net Operating Loss ("NOL") position for those years, the PTCs could not be applied to reduce the Company's federal tax liability and were instead carried forward as an Accumulated Deferred Income Tax Asset ("ADITA"). The PTC ADITA was incorporated into base rates in the 2016 Rate Case. In 2020, the Company fully utilized its federal NOL and began utilizing the PTC ADITA to offset its federal tax liability.

The IRA allows PTCs generated after 2022 to be transferred (sold) to an eligible taxpayer in exchange for cash. The Company intends to transfer (sell) the credits for the Boswell Solar Project. Transferring credits is a benefit to customers because the ADITA will remain unchanged; the credits earned will increase the ADITA, but the cash received will immediately reduce the ADITA. This will allow the ADITA to decrease faster than if the Company retained the credits for its own use. Minnesota Power expects to transfer the PTCs at a discount which is necessary to incentivize eligible transferee taxpayers to purchase the credits. The discount will reduce the net benefit of the PTCs to customers, but the cumulative benefit of immediately reducing the ADITA through the sale of PTCs and customers seeing those benefits sooner will outweigh the detriment of the discount. The benefits will flow through the Renewable Resource Rider.

V. THE BOSWELL SOLAR PROJECT IS IN THE PUBLIC INTEREST

The Boswell Solar Project is a key component of the Company's *EnergyForward* resource strategy. The Project will provide substantial benefits to Minnesota Power's system and its customers through the addition of local renewable clean power that will continue to diversify the Company's wind, hydro, and distributed solar centric renewable portfolio, provide energy during higher demand periods, and will reduce greenhouse gases and other criteria pollutants directly at BEC with the sharing of the BEC Unit 3 GIA (i.e. "net-zero solar"). The proposed site at BEC also represents progress towards a just transition and continued investment in a host community that has experienced impacts from the Company's transition from coal-fired generation. The Boswell Solar Project will also ensure that the Company is making progress towards the RES and CFS, while leveraging federal tax credits and existing energy infrastructure to efficiently add new renewable energy to the system.

Additionally, the Project is consistent with Minnesota Power's 2021 IRP orders, as stated earlier in this filing. Minnesota Power was directed in Order Point 1b to "[a]cquire up to 300 MW of regional/in-service territory or net-zero solar … as practicable."

Finally, the Boswell Solar Project will provide additional renewable resources to Minnesota Power's system that will reduce the amount of energy needed from Minnesota Power's remaining thermal power plants and market purchases. Thus, this project would both reduce carbon emissions and criteria pollutants and increase access to clean energy resources for Minnesota Power's customers in northern Minnesota, as well as boost the tax base of local economies and create local union jobs.

A. Capacity and Energy

When fully operational, the Boswell Solar Project will add approximately 166,000 MWh of renewable energy and on average about 3 MW of accredited capacity across the four planning seasons per year to Minnesota Power's power supply. Minnesota Power anticipates the accredited capacity value for the Boswell Solar Project to decline as additional solar is added to the broader regional system and as MISO continues to update its resource adequacy program. See Table 6 below for anticipated seasonal capacity values.

Table 6. Boswell Solar Project - Seasonal Accredited Capacity Values (MW)[13]

Boswell Seasonal Capacity Values				
	Spring	**Summer**	**Fall**	**Winter**
2028	3	5	4	0
2038	2	4	4	0

With the Boswell Solar Project sharing a generator interconnect with BEC Unit 3, approximately 15 MW of the 85 MW of nameplate capacity can be accredited in MISO. BEC Unit 3 is using the remainder of the interconnect for their accredited capacity, which is better overall for customers due to the higher accreditation a dispatchable resource reserves in MISO's construct. This is explained in more detail in Appendix C. Minnesota Power will continue to evaluate the Boswell interconnect to see if there is value on securing another Generation Interconnection agreement specifically for the Boswell Solar Project.

The Boswell Solar Project generation is projected to supply just under 2 percent of Minnesota Power's customer demand.

B. Meeting the RES and CFS

As discussed earlier in this filing, the Boswell Solar Project is an important project for Minnesota Power, as it will help the Company meet the order points from its 2021 IRP and continue to move towards the goals of the CFS and exceed the RES. Additional actions being taken towards meeting the CFS includes the Company seeking up to 400 MW of wind through an RFP that was issued on February 15, 2024. The Company expects to bring forward wind projects from the RFP for Commission approval in early 2025. Additionally, Minnesota Power is seeking approximately 65 to 85 MW of distributed solar through at least two rounds of RFPs in compliance with the DSES. The first DSES RFP was filed with the Commission on November 1, 2024 for review by the Department of Commerce. These initiatives will each continue Minnesota Power's decarbonization progress.

[13] Capacity values are based off MISO's current Seasonal Accredited Capacity methodology. The 2028 and 2037 value applies an Effective Load Carrying Capability curve. This accredited capacity values could be reduced further if FERC approves MISO's proposed Direct-Loss of Load approach for resource adequacy, which is expected to start for MISO Planning Year 2028-2029.

In the upcoming IRP, Minnesota Power will continue the evaluation and consideration of power supply alternatives as it works towards a sustainable path to meet the CFS by 2040. Currently, Minnesota Power is engaged with stakeholders through the 2025 IRP process seeking input into the upcoming plan that will define the next steps in the Company's *EnergyForward* strategy.

The Boswell Solar Project is projected to provide energy during periods of high customer demand during the on-peak hours of a day when solar irradiance is available. Customer demand is typically higher when solar energy is available. The Project can also help to protect customers against the volatility of regional energy markets. Figure 2 demonstrates the profile of customer load and the output of the solar array during a typical summer week.

Figure 2. Expected Boswell Generation for a Summer Week

[TRADE SECRET DATA BEGINS

TRADE SECRET DATA ENDS]

Although timing of the Project's energy production is fairly well-matched with customer demand in the summer, this is not the case in the winter season. In the winter it is possible to have no solar generation during the daily peak demand period because customer demand for energy is highest in the evening hours when the sun isn't shining. Figure 3 demonstrates how the timing of customer demand versus solar production in a typical winter week is more misaligned than in a typical summer week, demonstrated in Figure 2. This variability of solar generation contributes to a no accredited capacity value for a solar project for the purposes of demonstrating resource adequacy. Consequently, it is estimated that the Boswell Solar Project will provide 0 MW of accredited capacity versus the full 85.0 MW nameplate of the solar array during the winter season.

Figure 3. Expected Boswell Solar Generation for a Winter Week

[TRADE SECRET DATA BEGINS

TRADE SECRET DATA ENDS]

C. Customer Impact Analysis

Timing of the Boswell Solar Project implementation allows Minnesota Power to capture the benefit of Federal IRA legislation and associated tax incentives. To quantify these benefits and to ensure that the Project is cost effective as a solar energy resource for Minnesota Power's customers, a power supply analysis was performed. The Boswell Solar Project was added to the current Minnesota Power supply portfolio to determine the customer impact of the Q3 2027 addition. Note, for the cost impact analysis, the Company assumed a January 1, 2028 in-service date for the Boswell Solar Project in the EnCompass modeling.

To determine the cost impact of the Project in Minnesota Power's long-term power supply, an incremental addition of the Project was added to Minnesota Power's power supply and

evaluated in the Encompass production cost modeling software. The Encompass results quantified that the proposed Boswell Solar Project will: 1) displace on-peak wholesale market purchases and some fossil fuel based generation as the new solar energy is added to the Minnesota Power system, 2) reduce total carbon dioxide ("CO_2") emissions, as well as other emissions, and 3) result is a small increase in power supply cost for Minnesota Power's customers.

To quantify the change in power supply cost when adding the Boswell Solar Project in 2028, the Encompass production cost model was utilized by simulating a power supply dispatch. To provide additional insight on the total solar projects selected in the RFP, included in this filing is the change in power supply cost when the Boswell Solar Project and Regal Solar Project are added. There were two Encompass scenarios used to simulate the addition of the Boswell Solar Project, and both scenarios were run – both with and without – the Commission-approved mid-CO_2 regulation tax of $40 per ton in 2028 and the mid-CO_2 externality cost of $260 starting in 2025, and other mid-environmental costs.[14] Minnesota Power also evaluated the power supply cost impacts for the other Commission-ordered carbon regulation cost and environmental cost scenarios (i.e. high and low scenarios), those results are shown in Appendix B (additional analysis petition) and a table of all the environmental cost scenarios evaluated is included in Appendix C (assumptions appendix).

- Scenario 1 – Baseline
- Scenario 2 – Baseline + Boswell Solar
- Scenario 3 – Baseline + Regal + Boswell Solar

The Baseline scenario contains all Minnesota Power existing thermal and renewable energy resources. Scenario 2 incrementally adds the proposed Boswell Solar Project and associated project costs to the Baseline scenario. The third scenario incrementally adds Boswell and Regal Solar,[15] and associated costs, to the baseline scenario. The three scenarios are compared to each other to identify the power supply and cost impacts of adding the Projects.

The 85 MW Boswell Solar Project is anticipated to increase the solar energy supply to Minnesota Power customers by approximately 166,000 MWh per year. As this energy is added to

[14] See Docket No. E999/CI-07-1199; E999/DI-22-236 - October 2023.
[15] The petition for the Regal Solar Project will be filed in Docket No. E015/M-24-344.

the Minnesota Power energy portfolio, existing market energy purchases and thermal generation that was projected to serve customer load are displaced. The chart in Figure 4 demonstrates the annual amount of market and thermal generation energy that is projected to be displaced over the first 20 years of the Project. Figure 4 identifies that on average, the Boswell solar energy generated will displace a mix of 49 percent market purchases and 51 percent existing thermal generation each year.

Figure 4. Energy Displaced by the Boswell Solar Project

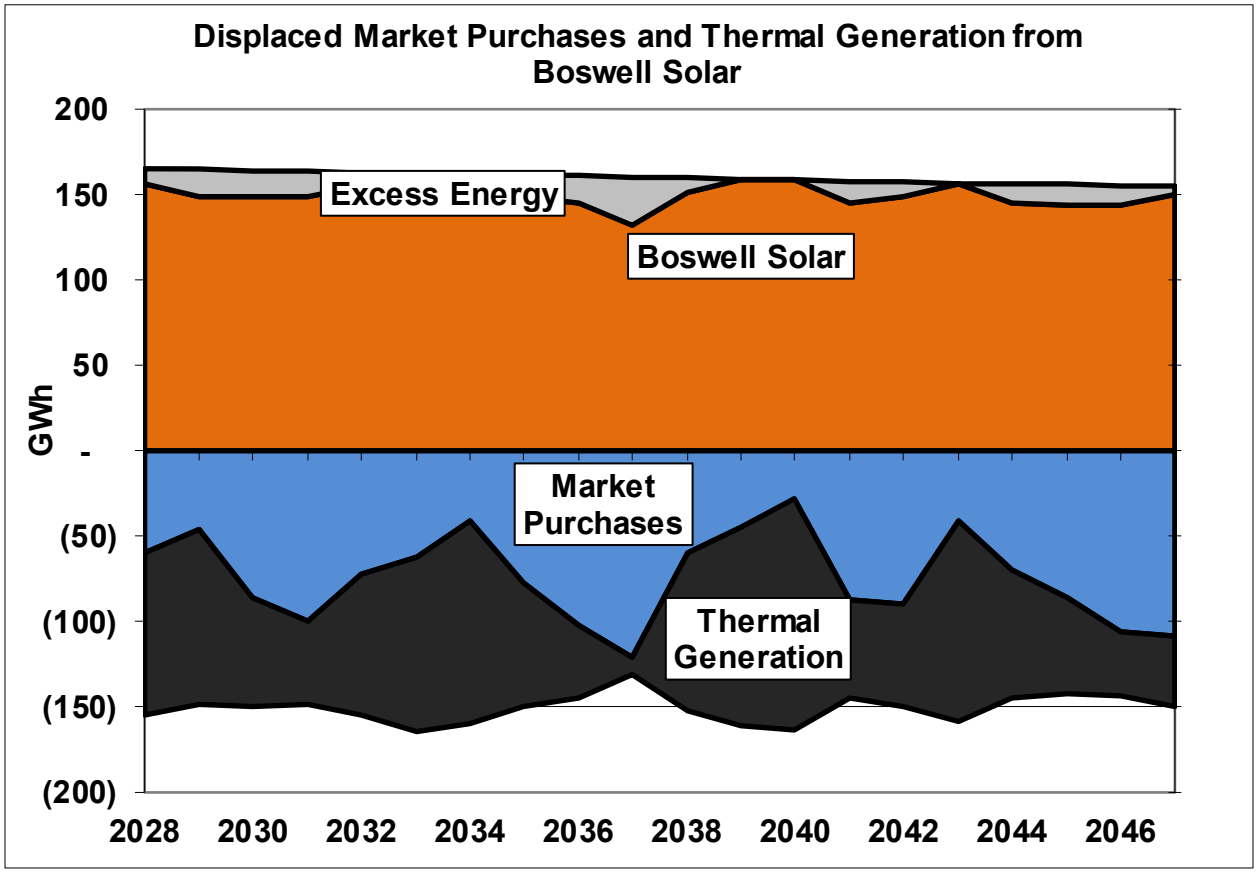
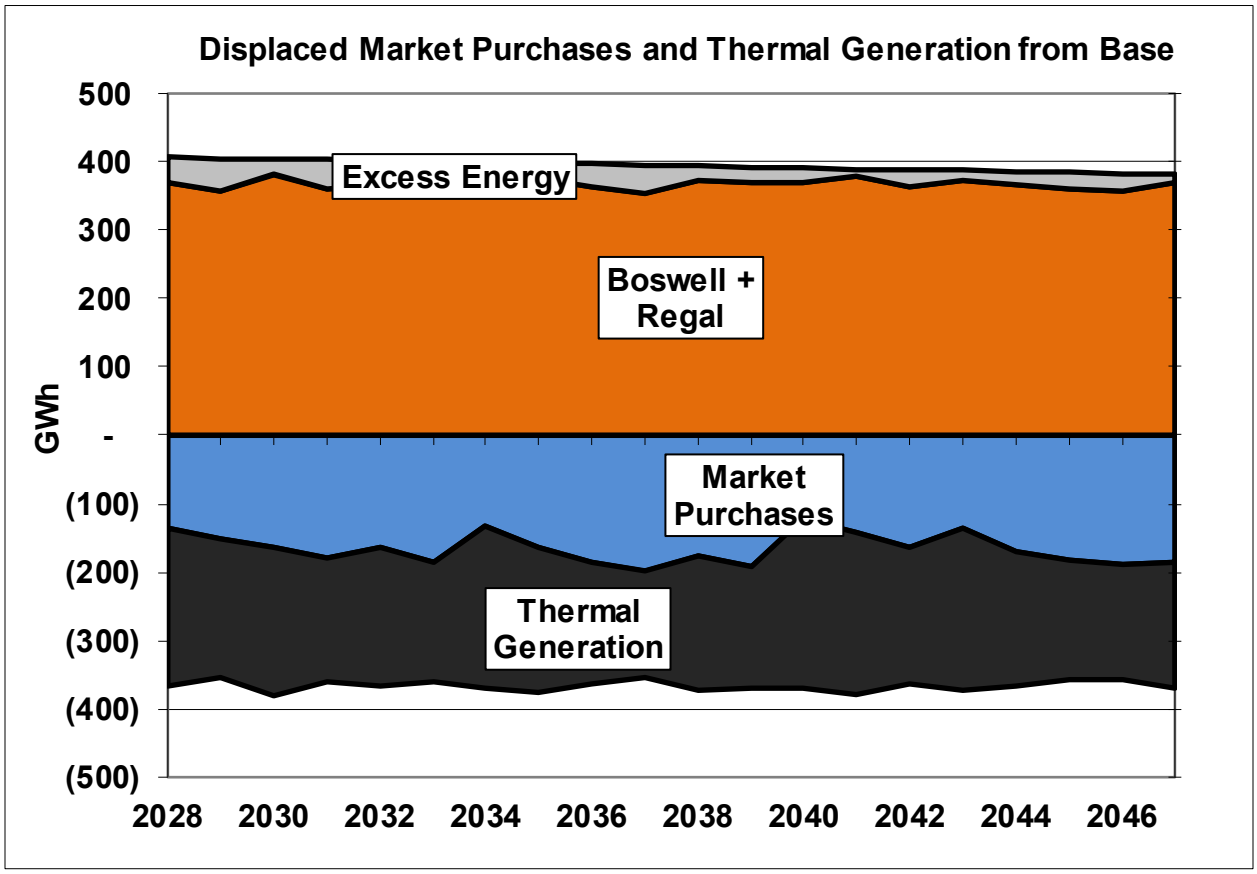


Figure 5. Energy Displaced by the Boswell and Regal Solar Projects



The reduction in market purchases and thermal generation from the addition of emission-free energy from Boswell Solar to the power supply results in an associated reduction in emissions for Minnesota Power customers over the life of the Project. Table 7 below summarizes the average emissions that are estimated to be avoided annually with the Boswell Solar Project for CO_2, sulfur dioxide ("SO_2"), nitrogen oxides ("NOx"), and mercury ("Hg"), over the study period. Carbon dioxide is projected to see the greatest reduction with an average of 105,785 tons of CO_2 removed per year from Minnesota Power's existing fleet and carbon associated with market purchases. When environmental externality effects are included in the analysis, the reduction in emissions over the life of the Project results in a reduction in environmental cost[16] of $221 million.[17]

[16] The externality values tie to values published by the Commission on May 27, 2015, in Docket Nos. E-999/CI-93-583 and E-999/CI-00-1636.
[17] Based on the net present value for years 2025 through 2050, in 2025 dollars.

Table 7: Average Annual Avoided Emissions (2027-2050)

Effluent (Tons)	Average Annual Reduction when adding Boswell Solar	Average Annual Reduction when adding Boswell + Regal
CO2	105,785	266,832
SO2	55	135
NOx	3	9

The resource planning evaluation conducted in Encompass identifies a range of outcomes that are dependent on the carbon and regulation costs incorporated. The cases provided below are the Customer Billing Case[18] and Mid Environmental and Carbon Regulation Case.[19] In the Customer Billing case, adding the Boswell Solar Project will increase total power supply costs by $34 million.[20] When considering carbon regulation and environmental cost benefits the power supply cost is projected to decrease by $209 million or 1 percent, demonstrating an overall net benefit for customers.

Table 8: Encompass Power Supply Cost Summary ($2025, NPV 2025-2050)

Customer Billing Case ($ in Millions, 2025 $)			
	Base	Base + Boswell (Delta from Base)	Base + Regal + Boswell (Delta from Base)
Total Cost	$9,569	$34	$88

Mid Environmental and Carbon Regulation Case ($ in Millions, 2025 $)			
	Base	Base + Boswell (Delta from Base)	Base + Regal + Boswell (Delta from Base)
Base Cost	$10,032	$8	$35
Carbon Regulation	$1,234	($25)	($65)
Environmental Cost	$13,350	($192)	($496)
Total Cost	$24,616	($209)	($526)

[18] The Customer Billing Case does not include carbon regulation or environmental cost benefits.
[19] The Mid Environmental and Carbon Case includes mid-level carbon regulation and environmental cost benefits.
[20] Based on the net present value for years 2025 through 2050, in 2025 dollars.

When considering both projects in the Customer Billing case, the Company saw an increase in total power supply cost of $88 million. In the Mid Environmental and Carbon Regulation case where carbon regulation and environmental benefits are being modeled, the total power supply cost decreased $526 million.

Table 9: Customer Billing $/MWh Power Supply Cost Impact ($2025, NPV 2025-2050)

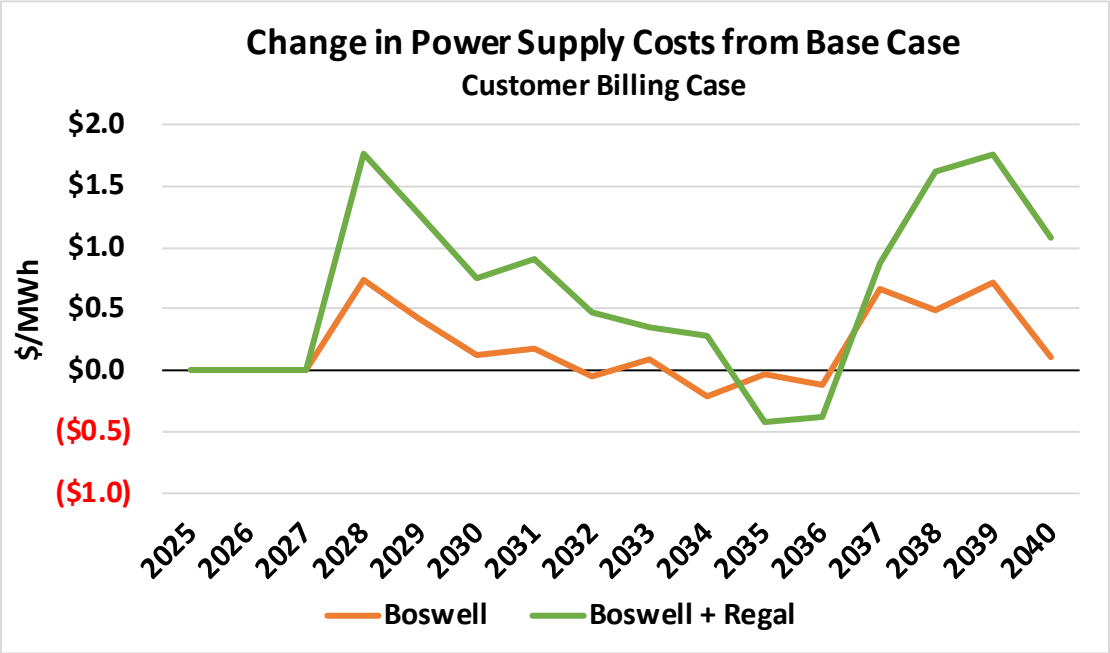


Table 9 shows $/MWh customer cost impacts when adding the Boswell project and Regal + Boswell projects to Minnesota Power's power supply. When adding the Boswell project, the cost impacts range from approximately $0.20/MWh in savings to $0.70/MWh increase in cost. When adding the Regal and Boswell projects the cost impacts range from approximately $0.40/MWh in savings to $1.80/MWh increase in cost. The reason for the increase from 2037 to 2038 is due to production tax credits rolling off starting in 2038.

The Boswell Solar Project will further Minnesota Power's initiative towards decarbonizing its generation portfolio and obtaining additional renewable energy as detailed in Minnesota Power's *EnergyForward* strategy and determined as part of its 2021 IRP order. This opportunity brings a unique solar project that strategically leverages existing interconnection infrastructure at BEC Unit 3, reinvests in a local community impacted by coal facility retirements, and takes advantage of the federal tax incentives with a small increase to power supply costs for customers.

VI. CONCLUSION

Minnesota Power respectfully requests that the Commission approve the following requests set out in this Petition:

1. Approval for investments and expenditures related to the Boswell Solar Project and the Boswell Interconnector pursuant to Minn. Stat. § 216B.1645. Minnesota Power's development of this 85 MW solar project will facilitate compliance under the requirements under Minn. Stat. § 216B.1691.

2. Approval to include associated costs in the existing Renewable Resources Factor under its Renewable Resources Rider.

The Boswel Solar Project complies with the Commission's 2021 IRP Order where the Company was directed in Order Point 1b to "[a]cquire up to 300 MW of regional/in-service territory or net-zero solar … as practicable." Additionally, Minnesota Power believes moving forward with the Boswell Solar Project has multiple benefits for its customers including helping the Company to reach the Carbon Free Standard and the Renewable Energy Standard, capturing the value of the IRA, leveraging existing utility assets, boosting the tax base of local economies, and creating local union jobs, all while reinvesting in a community impacted by the transition to a less carbon intense, cleaner energy future. Minnesota Power looks forward to working with the Commission and other interested stakeholders to implement the Boswell Solar Project.

Dated: November 13, 2024

Respectfully submitted,

Ana Vang
Senior Public Policy Advisor
Minnesota Power
30 West Superior Street
Duluth, MN 55802
(218) 591-4870
avang@mnpower.com

INDEPENDENT EVALUATION REPORT FOR MINNESOTA POWER'S 2023 SOLAR RFP SOLICITATION

Submitted by:
Levelized Consulting, LLC
Boulder, Colorado

November 6, 2024

Table of Contents

Introduction and Background

On January 9, 2023, the Minnesota Public Utilities Commission (MPUC) issued its order approving Minnesota Power's (MP) 2021 Integrated Resource Plan.[1] The order directed MP to procure cost-effective resources to meet it customer and renewable product needs between 2025-2030 by acquiring up to 300 MW of new regional/in-service territory or net-zero solar resources by 2026, as practicable.

The order also required that MP use a bidding process for its resource acquisitions and retain an independent evaluator (IE) to oversee the bidding process in instances where MP or an affiliate proposes a project. In addition, in solicitations where an IE is retained, the IE is requested to specifically address the impact of material delays or changes of circumstances on the bid process. In July 2023, in compliance with the order, MP retained Levelized Consulting, LLC (Levelized Consulting) as the IE to oversee MP's 2023 Solar Request for Proposals (RFP) and provide an independent evaluation of all proposals.

Since MP was expecting to receive self-build proposals, MP instituted a "wall" between its RFP Team responsible for developing, issuing, and implementing the Solar RFP and the MP Solar Development Team responsible for developing the MP self-build proposals. The "wall" was designed to manage communications with bidders and avoid any improper communications with, between, or among members of the RFP Team and the MP Solar Development Team. For the remainder of this report, these teams will be referred to as the RFP Team or the MP Solar Development Team, as necessary. The team wall was put in place in mid-2023 and the RFP Team shared the details of the teams and restrictions of the "wall" with Levelized Consulting as well as employees at MP.

On November 15, 2023, the RFP Team issued its 2023 Solar RFP for up to 300 MW of regionally located solar generation with online dates between January 1, 2026 and December 31, 2027.[2] The Solar RFP solicited proposals for solar generation supplies with installed capacity between 10 MW and 200 MW using one of three different types of contracts/resources:

- Power Purchase Agreements (PPAs),
- Build-Own-Transfer agreements (BOT), and
- MP self-build projects.

[1] Docket No. E-015/RP-21-33, ORDER APPROVING PLAN AND SETTING ADDITIONAL REQUIREMENTS, January 9, 2023

[2] While the Order specified acquiring by 2026, as practicable, Levelized Consulting and MP agreed that given likely development schedules and interconnection queue timelines, accepting proposals with online dates between January 1, 2026 and December 31, 2027 would increase the probability of receiving a competitive number of viable proposals.

This report provides an assessment of MP's solar resource solicitation from the initial phase of the solicitation through shortlisting and includes a final economic assessment of the shortlisted proposals as filed with the MPUC. After shortlisting, Levelized Consulting also monitored the remaining schedule for material delays and changes of circumstances.

Levelized Consulting undertook the following tasks as part of this engagement:

- Reviewed and commented on the RFP documents before the solicitation was launched,
- Attended the Solar RFP webinar hosted by the RFP Team on November 28, 2023 that provided an overview of the Solar RFP to potential bidders and allowed attendees to ask questions,[3]
- Participated in RFP Team planning calls/meetings to establish the screening procedures and evaluation methodologies that would be employed in the review and evaluation of all proposals,
- Acquired and archived important evaluation parameters and market price assumptions prior to the receipt of bids for use in Levelized Consulting's proprietary evaluation models,
- Received all proposals directly from bidders,
- Evaluated whether proposals met the requirements of the RFP through a complete and conforming check of all proposals,
- Conferred with the RFP Team in periodic calls/meetings to discuss proposal clarification, disqualification, and evaluation decisions,
- Reviewed and sent questions to bidders and was copied on all correspondence between the RFP Team and bidders,
- Independently reviewed all proposals and computed costs and benefits for the ranking of proposals,
- Completed comparisons of Levelized Consulting's and the RFP Team's quantitative evaluations. The performance of independent, parallel evaluations allowed for cross-checking and verification of proposal costs and ranking,
- Participated in calls/meetings to discuss proposal reviews and Levelized Consulting's quantitative evaluation results and determine an appropriate short list of proposals, and

[3] The webinar was posted on the Solar RFP website afterwards, along with the list of Q&A.

- Completed final economic evaluation of shortlisted proposals to allow for cross-checking and verification of selected projects costs and ranking.

Levelized Consulting was provided access to all necessary materials, received proposal information directly from bidders, and was able to perform an independent evaluation of all proposals.

This Independent Evaluation Report includes a Confidential Appendix describing each proposal and providing an overview of the evaluation results and sensitivity analyses. This material is being afforded confidential treatment to protect participants from having their project pricing and operational information provided to their competitors, and from making ranking and disqualification information public before contracts are completely negotiated and signed. Furthermore, MP's customers could be harmed if too much information was made publicly available, allowing some participants to game future solicitations rather than delivering the best renewable projects at the lowest possible prices.

Overview of Conclusions

Levelized Consulting developed an economic ranking of all proposals based on their levelized $/MWh net costs, assessed the qualitative risks and benefits associated with the proposals, presented the results to the RFP Team, and discussed with the RFP Team the selection of an appropriate set of projects and counterparties to shortlist and with whom to commence negotiations. During the negotiation phase, MP retained Levelized Consulting to perform an updated quantitative evaluation of the shortlisted proposals. Two projects were ultimately selected for filing for MPUC approval:

- Minnesota Power's Boswell Solar project, a new 85 MW solar resource located adjacent to the Boswell Energy Center in Itasca County, MN. Boswell Solar will use Midwest Independent System Operator (MISO) Surplus Interconnection Service on Boswell Energy Center Unit 3 and has an expected commercial operation date in 2027.

- Minnesota Power's Regal Solar project, a 119.5 MW solar resource located in Benton County, MN that will interconnect to the MP system at the new Two Rivers 115 kV substation. Regal Solar has an expected commercial operation date of the third quarter of 2027.

Levelized Consulting concluded that the RFP Team made the appropriate shortlisting and final selection decisions in its solicitation and concurred with the decision to develop petitions for the Boswell Solar and Regal Solar projects, noting that other shortlisted proposals were more expensive.

Activities Prior to the Receipt of Proposals

RFP Materials

Prior to the launch of the Solar RFP, Levelized Consulting reviewed and provided comments and recommendations on MP's RFP materials to the RFP Team. Per the requirements of the IRP, the RFP Team submitted a compliance filing with the MPUC within 30 days of developing the RFP detailing the RFP process that included a template of the RFP.

Qualitative Evaluation Matrix

Levelized Consulting assisted the RFP Team in developing a spreadsheet qualitative evaluation matrix that was used to track the qualitative review of proposals. This included a complete and conforming assessment and qualitative ranking metrics.

Quantitative Evaluation Model

The Levelized Consulting team had provided independent evaluation services in previous MP RFPs[4] and was thus familiar with MP's evaluation processes and available planning assumptions. Prior to the receipt of proposals, Levelized Consulting discussed appropriate components to include in the quantitative evaluation with the RFP Team and requested and incorporated MP's latest market price forecasts into Levelized Consulting's evaluation model. Levelized Consulting requested that the RFP Team provide as much information as possible prior to the receipt of proposals. This allowed Levelized Consulting to lock down and archive the basic evaluation parameters for the process. These assumptions were incorporated into Levelized Consulting's own evaluation models and formed the basis for independently assessing the benefits and costs of resources that were bid into the Solar RFP solicitation.

RFP Schedule

Table 1 outlines the schedule for MP's 2023 Solar RFP. As shown in the table, the original schedule included a Proposal Submission Deadline of January 5, 2024. There were requests from bidders to extend the deadline because of the holidays and asserting that they would be able to put together more complete bid packages if the deadline was moved. The RFP Team and Levelized Consulting conferred and agreed that extending the Proposal Submission Deadline to January 17, 2024 would be a prudent step to ensure the best bidder response to the Solar RFP. The RFP Team and Levelized Consulting also agreed that the Proposal Submission

[4] Levelized Consulting has assumed the prime consulting responsibilities over the same team of individuals that were included with Sedway Consulting, Inc. in that firm's provision of IE services for several previous MP power supply solicitations.

Deadline could be extended without impacting the remaining RFP schedule. The RFP Team notified the MPUC of the schedule change on December 8, 2023 and sent out a market notice on December 11, 2023 notifying the bidding community of the extension.

Table 1
Minnesota Power 2023 Solar RFP Schedule

Event	Anticipated Date
Release of RFP	November 15th, 2023
Proposal Submission Deadline	~~January 5th, 2024~~ January 17th, 2024
Proposal Evaluation	1st Quarter 2024
Negotiations with Selected Bidders	2nd Quarter 2024
Application for Regulatory Approval filed with MPUC	3rd Quarter 2024

On September 20, 2024, MP notified the commission that the applications for regulatory approval resulting from the 2023 Solar RFP would be delayed from 3rd Quarter, 2024 to 4th Quarter, 2024. And, on September 23, 2024, MP publicly announced the results of the 2023 Solar RFP and plan to move forward with preparing petitions for the Boswell and Regal solar projects. The additional time allowed for closing of the Asset Purchase Agreement for the Regal Project which was signed on October 7, 2024.

Receipt and Evaluation of Proposals

At Levelized Consulting's recommendation, the RFP Team requested that the MP Solar Development Team submit any self-build proposals early to prevent any potential allegation that MP could have used 3rd-party proposal information to adjust self-build proposals to be more competitive. Self-build proposals were submitted via email to the RFP Team and the IE on January 15, 2024, two days before the proposal due date. Then, on January 17th, 2024, the RFP Team and Levelized Consulting received a number of third-party proposals in response to its Solar RFP. The response to the Solar RFP was reasonable, representing over three times the total MW solicited. A summary of the projects is depicted in Table A-1 in the Confidential Appendix.

Levelized Consulting completed a 'complete and conforming' review of the proposals received to track that all required information was submitted in the bidders' proposals. The qualitative evaluation process entailed a general review of all proposals to first identify any proposals that did not meet the basic requirements of the RFP, such as not proposing a solar resource. Both the RFP Team and Levelized Consulting continued reviews of the submitted proposals through early-2024, periodically discussing proposal deficiencies and sending requests to specific bidders for supplemental information. Proposals meeting the requirements were then passed on to the

RFP Team subject matter experts to do a more thorough qualitative review. Those same proposals were also then included in the quantitative evaluation.

The RFP Team and Levelized Consulting performed a qualitative assessment of those proposals that met the RFP requirements to assess their full costs and benefits (described below). Concurrent with that qualitative analysis, Levelized Consulting undertook the modeling of all proposals to assess their costs and benefits; specifically, Levelized Consulting performed detailed modeling to determine each proposal's net levelized $/MWh cost (described below). Although the levelized price ranking provides a good approximation of how project economics might compare, an assessment of the offers' generation profiles and the energy benefits associated with those profiles provided a comprehensive comparison.

Description of Levelized Consulting's Quantitative Evaluation Process

The detailed economic evaluation entailed modeling the proposals using Levelized Consulting's spreadsheet-based tools that determine each proposal's net present value (NPV) by calculating the present value of the project's costs and subtracting the present value of its benefits. The components included in the net cost calculation depended on the type of proposal: PPA, BOT, or self-build.

For PPA proposals, the net cost calculation included:

- Contract payment costs for delivered energy,
- Debt equivalence (or imputed debt) costs. Debt equivalence costs are associated with a rebalancing of a utility's debt and equity ratios, considering credit rating agencies' policies that view PPAs as being partially equivalent to debt obligations,
- Energy benefits were the product of the expected hourly generation of a project and a forecast of hourly $/MWh energy market prices over the term of the contract, and
- Renewable Energy Credit (REC) benefits.

For BOT and MP self-build proposals, the net cost calculation included:

- Revenue requirements for capital expenditures which were developed using standard rate base regulatory accounting principles and determined the annual costs that a utility must collect from customers to cover capital costs over the book life of a project, including income taxes and a reasonable return on investment. Inputs to the revenue requirements calculation included:
    - Contract payment costs for BOT proposals or schedule of capital expenditures for self-build proposals,
    - Accumulated Allowance for Funds Used During Construction (AFUDC),
    - Anticipated ongoing capital expenditures,
    - Real estate purchases,

  - Inflation Reduction Act (IRA) Investment Tax Credits (ITC) or Production Tax Credits (PTC),
  - Federal and state income taxes,
  - Deferred Taxes (and their impact on project rate base),
- Operation and Maintenance costs,
- Insurance costs,
- Land costs (lease and easement costs),
- Property taxes,
- Other costs (if any),
- Energy benefits (the product of the expected hourly generation of a project and a forecast of hourly $/MWh energy market prices over the term of the contract), and
- Renewable Energy Credit (REC) benefits.

Accreditable Capacity benefits were not included in the quantitative evaluation. Since all proposals were for projects located in essentially the same region of Minnesota, the difference of Accreditable Capacity between projects would be immaterial.

Levelized Consulting's evaluation model normalized the net cost by dividing it by the present value of a project's expected energy deliveries, thereby yielding a levelized $/MWh net cost. This levelized $/MWh net cost metric was then used to rank the different proposals from lowest $/MWh net cost to highest $/MWh net cost.

Sensitivities were also completed on the quantitative analyses to determine if different assumptions would impact the ranking of proposals. These sensitivities included:

- Equalizing the terms of proposals. Since PPAs and BOT or self-build proposals have different terms (PPA terms of between 20 and 25 years were allowed in the RFP, while project lives of owned resources were more than 30 years), Levelized Consulting completed additional analyses that equalized the term of each proposal by adding a "tail" past the end of shorter-term proposals.

- Using an average generation profile across proposals to eliminate the impact of differing generation profiles (and potentially overly optimistic ones) on the rankings. Since one of the requirements of the RFP was that the resources need to be regionally located, the meteorological differences between the locations would be minimal. But, since project design differences can result in different generation profiles, the average profile analysis was kept as a sensitivity.

Levelized Consulting cross-checked its estimates of net costs against the RFP Team's parallel quantitative evaluation to identify and address any differing inputs, assumptions, and calculations to ensure that the valuation and rankings of the proposals were correct. Any differences in calculations and assumptions were discussed and either adjusted or noted.

Shortlisting of Proposals

On March 11, 2024, Levelized Consulting and the RFP Team met to finalize shortlisting options. The teams recommended shortlisting MP's Boswell Solar and Regal Solar projects as well as other attractive proposals from third parties. The RFP Team obtained shortlisting approval from MP executives on March 18, 2024 and shortlisting notifications were sent to bidders on March 22, 2024. The shortlisted projects then moved to the negotiations phase. More details on the shortlisting process and results are included in the Confidential Appendix.

Final Economic Assessment

MP commenced negotiations with counterparties soon after shortlisting notifications were sent and bidders accepted their shortlisting status. While Levelized Consulting was not retained to monitor the negotiation process, MP requested that Levelized Consulting include a final economic assessment of the petitions for self-build proposals and/or contracts with third parties. Levelized Consulting completed the economic assessment and determined that the two MP self-build projects represent the lowest cost options for MP to procure approximately 200 MW of solar resources. While the RFP sought up to 300 MW of solar, the next best proposals would be significantly more expensive. On September 19, 2024, MP notified Levelized Consulting that MP's Executive Team had, on September 17, approved moving forward with the Boswell Solar and Regal Solar projects, as well as a strategy to meet the remaining solar requirements through a distributed solar RFP. The bidders of shortlisted projects were also sent notices of the decisions on September 19, 2024. The Confidential Appendix contains more details about the final economic assessment.

Conclusion

Levelized Consulting was provided access to all necessary materials and meetings and was able to perform its own detailed evaluation of the proposals received in MP's 2023 Solar RFP.

Levelized Consulting monitored the back-and-forth email traffic between the RFP Team and the solar resource bidders through shortlisting and believes that the RFP Team treated all bidders consistently and fairly. Levelized Consulting believes that the RFP Team selected an appropriate shortlist of proposals. Levelized Consulting also believes that the final selection of Boswell Solar and Regal Solar represent the lowest cost projects to meet the requirements of the 2023 Solar RFP.

PUBLIC DOCUMENT – NOT PUBLIC DATA HAS BEEN EXCISED
TRADE SECRET DATA EXCISED IN ITS ENTIRETY

Appendix A
Minnesota Power 2023 Solar RFP IE Report

Appendix B – Boswell Solar Project Encompass Results for High and Low Environmental Futures

This appendix shows the impact to power supply cost with the addition of the Boswell Solar Project and Boswell + Regal Solar Projects for the high and low environmental and carbon regulation costs.

1. In the high environmental cost case, the base cost increases when adding the Boswell Solar Project and Regal + Boswell Solar Project to Minnesota Power's power supply. For both scenarios the total cost decreases when including the environmental cost impacts. When adding the Boswell Solar Project, environmental costs decrease by $363 million resulting in a decrease of total costs by $355 million. When adding both Regal and Boswell Solar Projects, environmental costs decrease by $776 million resulting in a decrease of total costs by $704 million.

High Environmental Cost ($ in Millions, 2025 $)			
	Base[1]	+ Boswell (Delta from Base)	+ Regal & Boswell (Delta from Base)
Base Cost[2]	$9,584	$8	$72
Environmental Cost	$23,039	($363)	($776)
Total Cost	$32,623	($355)	($704)

2. In the high environmental and carbon regulation case, the base cost shows a small increase when adding the Boswell Solar Project and Regal + Boswell Solar Projects. For both scenarios the total cost decreases when including the carbon regulation and environmental costs. When adding the Boswell Solar Project to Minnesota Power's power supply, carbon regulation costs decrease by $56 million and environmental costs decrease by $346 million resulting in a $395 million decrease in total costs. When adding both Regal and Boswell Solar Projects to Minnesota Power's power supply, carbon regulation costs decrease by $125 million and environmental costs decrease by $712 million resulting in a $834 million decrease in total costs.

High Environmental and Carbon Regulation Cost ($ in Millions, 2025 $)			
	Base	+ Boswell (Delta from Base)	+ Regal + Boswell (Delta from Base)
Base Cost	$10,424	$7	$2
Carbon Regulation	$2,226	($56)	($125)
Environmental Cost	$18,367	($346)	($712)
Total Cost	$31,017	($395)	($834)

[1] Base assumes Minnesota Power's current power supply and previously approved projects.
[2] Base Costs includes generation revenue requirements, fuel, power purchase agreements, MISO market energy and capacity purchases and sales.

3. In the low environmental cost case, the base cost increases when adding the Boswell Solar Project and Boswell + Regal Solar Projects. When adding the Boswell Solar Project to Minnesota Power's power supply there is a $97 million decrease in environmental costs resulting in a decrease of $88 million in total costs. When adding Regal and Boswell Solar Projects there is a $277 million decrease in environmental costs resulting in a $203 million decrease in total costs.

Low Environmental Cost ($ in Millions, 2025 $)			
	Base	**Base + Boswell (Delta from Base)**	**Base + Regal + Boswell (Delta from Base)**
Base Cost	$9,583	$9	$74
Environmental Cost	$8,680	($97)	($277)
Total Cost	$18,264	($88)	($203)

4. In the low environmental and carbon regulation cost case, when adding the Boswell Solar Project and Regal + Boswell Solar Projects the base costs increase. When adding the Boswell Solar Project to Minnesota Power's power supply there is a $4 million decrease in carbon regulation cost and $136 million decrease in environmental cost resulting in $113 million decrease in total cost. When adding both Regal and Boswell Solar Projects to Minnesota Power's power supply there is an $8 million decrease in carbon regulation cost and $285 million decrease in environmental cost resulting in a $215 million decrease in total cost.

Low Environmental and Carbon Regulation Cost ($ in Millions, 2025 $)			
	Base	**Base + Boswell (Delta from Base)**	**Base + Regal + Boswell (Delta from Base)**
Base Cost	$9,621	$27	$78
Carbon Regulation	$172	($4)	($8)
Environmental Cost	$8,408	($136)	($285)
Total Cost	$18,201	($113)	($215)

Appendix C

Base Economic Modeling Assumptions

Study Period

The study period of the Boswell and Regal Solar Petition is 2025 through 2050. The power supply costs shown in the petition are the net present value of cost from 2025 through 2050 and are reported in 2025 dollars, unless noted otherwise.

General Model Assumptions

1. Boswell Solar Project: The Boswell Solar Project will share the same generator interconnect as Boswell Unit 3 ("BEC 3") through MISO's Surplus Interconnection Service. The BEC 3 generator interconnect has the capability to deliver approximately 365 MW of energy to the bulk electric system. With the shared interconnect with BEC 3, which can produce 350 MW of energy, BEC 3 may need to back down during periods where solar production is greater than 15 MW to not exceed 365 MW limit at the interconnect. The Encompass model was able to accommodate this and is implemented in the modeling for the petition analysis.
2. The modeling done for the Boswell and Regal solar projects contains only Minnesota Power's current energy portfolio and previously approved projects.
3. In the modeling, Minnesota Power has the Nemadji Trail Energy Center starting service on January 1, 2028
4. Post Coal Operations at Boswell Energy Center:
    A. The transition away from coal at Boswell Energy Center will be evaluated and discussed in the upcoming IRP due March 1, 2025. For this petition, the post coal operations assumed both facilities were refueled with natural gas.
        i. BEC 3 refuels on natural gas beginning 1/1/2030
        ii. Boswell Unit 4 refuels on natural gas beginning 1/1/2035
5. A general escalation rate of approximately 2.25 percent was utilized, on average.

Environmental Costs, Pricing, and Wholesale Market

1. The Base forecasts utilized for environmental costs, natural gas prices, market energy prices, and market capacity prices over the study period. The Reference Case Scenario considers commission-approved mid-CO2 regulation tax of $40 per ton in 2028 and the mid-CO2 environmental cost of $260 starting in 2025. Beginning in 2028, the CO2 environmental cost is netted against the carbon regulation tax. These values are found in Docket No. E999/CI-07-1199; E999/DI-22-236 - October 2023.
    A. Minnesota Power also ran models considering low and high CO2 regulation taxes and environmental costs.
        i. In the low environmental and carbon regulation cases, the low CO2 regulation tax starts at $5 per ton in 2028 and the low CO2 environmental cost starts at $155 in 2025.
        ii. In the high environmental and carbon regulation cases, the high CO2 regulation tax starts at $75 per ton in 2028 and the high CO2 environmental cost starts at $308 in 2025.

iii. Environmental and carbon regulation costs were escalated at approximately 2.25 percent annually on average.

2. The Base forecasts utilized for environmental costs, natural gas prices, market energy prices and market capacity prices over the study period[1]:

   A. Customer energy and demand requirements are based on the Expected Scenario in Minnesota Power's AFR2024 (Docket No. E-999/PR-24-11). The energy and demand forecast is based on the AFR2024 econometric modeling results plus customer adjustments for energy sales to a new customer and transmission losses. The transmission losses of 6.4 percent are added to the Annual Energies to capture the power supply requirements for serving Minnesota Power's customers.

   B. Natural gas forecast assumptions utilized in the base forecast.

      i. Natural gas for Minnesota: $2.51/MMBtu in 2025 to $10.65/MMBtu in 2050

      ii. Natural gas supply reflects the projected spot market for Minnesota. In addition, a delivery charge is applied on a resource-specific basis. The delivery charges were escalated at approximately 2.25 percent annually, on average, after 2025.

         1. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA END]** for gas supply at Boswell Energy Center.

         2. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA END]** for the Nemadji Trail Energy Center combined cycle facility.

         3. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA END]** for the Laskin Energy Center.

   C. Delivered coal price forecast assumptions utilized represent the attributes of each of Minnesota Power's facilities and include:
      i. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**

   B. Delivered gas price forecast assumptions utilized:
      i. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**

   D. Delivered biomass price forecast assumptions utilized:
      i. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**

   E. Delivered gas price forecast assumptions utilized:
      i. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**

   F. Delivered gas price forecast assumptions utilized:
      i. **[TRADE SECRET DATA BEGINS** [redacted] **TRADE SECRET DATA ENDS]**

[1] Values are in nominal dollars.

G. Average wholesale Seasonal Market Capacity (Approximate): $4,422/MW-month in 2025 to $10,131/MW-month in 2050. The forecast includes a market capacity price for each season of the MISO Planning Year.

3. The Base case energy market interaction structure for Minnesota Power's petition analysis assumed that the wholesale market was available throughout the study period. The wholesale energy market structure in the modeling represents the day-ahead interaction with the Midcontinent Independent System Operator ("MISO") regional market and helps utilities optimize power supply for customers.

   A conservative approach was taken when creating the wholesale energy market that would be made available as a power supply resource during the study period. While the regional market is a valuable and useful piece of a utility's power supply, it should not be considered an "endless" resource. To help account for the increased risk and volatility that is present when purchasing incrementally larger amounts of energy from the short-term market, an increasing price adder was included based on the level of energy purchased. As the volume of energy purchased from the market increased, so did the price adder. This is referred to as a "Tiered Energy Market" and includes the following pricing assumptions:

   A. 0 to 300 MW at base forecast price

   B. 301 to 450 MW at 125% of base market price forecast

   C. 451 to 600 MW at 150% of base market price forecast

   D. 601 to 900 MW at $600/MWh

   E. Greater than 900 MW at $10,000/MWh

STATE OF MINNESOTA)
)ss
COUNTY OF ST. LOUIS)

AFFIDAVIT OF SERVICE VIA ELECTRONIC FILING

Tiana Heger of the City of Duluth, County of St. Louis, State of Minnesota, says that on the 13th day of November, 2024, she served Minnesota Power's Compliance Filing in **Docket No. E015/M-24-344** on the Minnesota Public Utilities Commission and the Energy Resources Division of the Minnesota Department of Commerce via electronic filing. The persons on E-Docket's Official Service List for this Docket were served as requested.

Tiana Heger