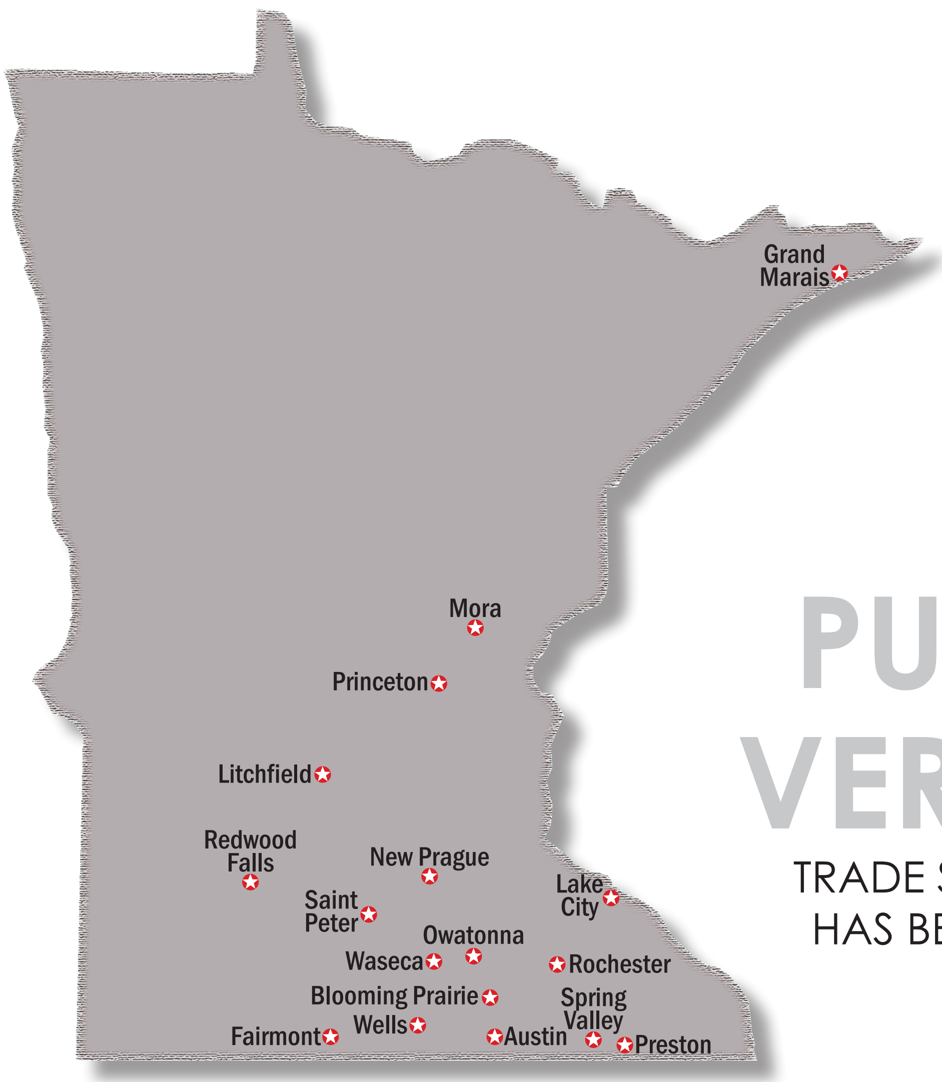
Southern Minnesota Municipal Power Agency

2025-2039 Integrated Resource Plan

Submitted to Minnesota Public Utilities Commission
November 27, 2024
Docket No. ET9/RP-24-356



PUBLIC VERSION

TRADE SECRET DATA HAS BEEN EXCISED

500 1st Avenue SW | Rochester, MN 55902 | smmpa.com

Southern Minnesota
Municipal Power Agency
Your Partner for a Bright Energy Future

November 27, 2024

Will Seuffert – Executive Secretary
MN Public Utilities Commission
121 7th Place East
Suite 350
St. Paul, MN 55101

Re: **IN THE MATTER OF SOUTHERN MINNESOTA MUNICIPAL POWER AGENCY'S SUBMITTAL OF ITS 2025-2039 INTEGRATED RESOURCE PLAN: DOCKET NO. ET9/RP-24-356**

Dear Mr. Seuffert:

Southern Minnesota Municipal Power Agency (SMMPA) is a municipal joint action agency serving seventeen municipal utilities in Minnesota. Pursuant to MN Statutes §216B.2422 and MN Rules Part 7843, and in compliance with the Commission's order regarding our previous Integrated Resource Plan (IRP) filing (Docket No. ET9/RP-21-782), SMMPA respectfully submits this 2024 IRP covering the years 2025-2039. This IRP has been filed by e-filing with the Minnesota Public Utilities Commission on November 27, 2024, as shown in the attached Certificate of Service.

Exhibits 1 and 2 of this IRP contain trade secret data and have been marked pursuant to MN Statute §13.37 and MN Rule 7829.0500. Attached is a statement justifying SMMPA's determination of specific data being considered "trade secret data." Hard copies of the non-public version of the document are being provided to the Commission and the Department of Commerce as requested, and the public version has been served upon all parties listed on the attached official service list.

If you have any questions, please contact me at (507) 292-6460.

Sincerely,

Jeremy Sutton

Director of Operations and COO

Attachments

cc: Dave Geschwind

Docket No. ET9/24-256

Statement of Southern Minnesota Municipal Power Agency Regarding Designation of Trade Secret Data in its 2025-2039 Integrated Resource Plan

Pursuant to MN Statute §13.37 and MN Rule 7829.0500, Southern Minnesota Municipal Power Agency (SMMPA) has designated data contained in Exhibits 1 and 2 of its 2025-2039 Integrated Resource Plan (IRP) to be Trade Secret Data and, as such, has excised this data from the public version of the IRP document.

The data designated by SMMPA as Trade Secret contains detailed information about the operating characteristics, parameters, fuel costs and operating costs of SMMPA's existing generation fleet. This data is used when offering SMMPA's generation into the energy market of the Midcontinent Independent System Operator and public disclosure of such data could provide competitors and suppliers a commercial advantage over SMMPA. The economic hedge and market revenue provided by SMMPA's generating resources is a critical component of SMMPA's economic model, and a key to maintaining fair and reasonable rates to its members. Therefore, ensuring the confidentiality of the data designated as Trade Secret is critical to SMMPA and its member municipal utilities.

STATE OF MINNESOTA
BEFORE THE PUBLIC UTILITIES COMMISSION

Katie Sieben	Chair
Joseph Sullivan	Vice-chair
Hwikwon Ham	Commissioner
Valerie Means	Commissioner
John Tuma	Commissioner

In the Matter of Southern Minnesota Municipal Power Agency's 2025-2039 Resource Plan
Docket No. ET9/RP-24-356

Initial Filing

CERTIFICATE OF SERVICE
I, Joseph A. Hoffman, hereby certify that I have this day served a copy of the following, or a summary thereof, on Will Seuffert and Sharon Ferguson by e-filing and First Class mail, and to all other persons on the attached service list by electronic service or by First Class mail.

Dated this **27th** day of **November, 2024**

Joseph A. Hoffman
Chief External Affairs Officer
Southern Minnesota Municipal Power Agency
507-292-6427

Official Service List
Southern Minnesota Municipal Power Agency
2025-2039 Integrated Resource Plan
Docket No. ET9/RP-24-356

Last Name	First Name	Email	Company Name	Delivery Method	View Trade Secret
Black	William	bblack@mmua.org	MMUA	Electronic Service	No
Commerce Attorneys	Generic Notice	commerce.attorneys@ag.state.mn.us	Office of the Attorney General-DOC	Electronic Service	No
Crocker	George	gwillc@nawo.org	North American Water Office	Electronic Service	No
Cunningham	Brooke	Health.Review@state.mn.us	Minnesota Department of Health	Electronic Service	No
Ferguson	Sharon	sharon.ferguson@state.mn.us	Department of Commerce	Electronic Service	No
Geschwind	David P.	dp.geschwind@smmpa.org	Southern Minnesota Municipal Power Agency	Electronic Service	No
Hoffman	Joe	ja.hoffman@smmpa.org	SMMPA	Electronic Service	No
Jones	Nate	njones@hcpd.com	Heartland Consumers Power	Electronic Service	No
Lunder	Robert	Robert.Lunder@mdu.com	Montana-Dakota Utilities (ET)	Electronic Service	No
McCollough	Tim	tmccollough@rpu.org	Rochester Public Utilities	Electronic Service	No
Pranis	Kevin	kpranis@liunagroc.com	Laborers' District Council of MN and ND	Electronic Service	No
Residential Utilities Division	Generic Notice	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	Electronic Service	No
Schulte	Robert H.	rhs@schulteassociates.com	Schulte Associates LLC	Electronic Service	No
Seuffert	Will	Will.Seuffert@state.mn.us	Public Utilities Commission	Electronic Service	No
Soholt	Beth	bsoholt@cleangridalliance.org	Clean Grid Alliance	Electronic Service	No
Swanson	Eric	eswanson@winthrop.com	Winthrop & Weinstine	Electronic Service	No
Volkmeier	Toni	toni.volkmeier@state.mn.us	MPCA	Electronic Service	No

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Requirements by Statute

Statute		Requirement	Section Reference
§216B.2422	Subd. 2	Include least cost plans for meeting 50% and 75% of all new and refurbished capacity needs with conservation and renewable energy resources.	Section 7, page 4
	Subd. 2a	Include a description of the development of the long range load forecast.	Section 3
	Subd. 2c	Include a narrative of the utility's progress in helping the state meet its greenhouse gas emission reduction goals.	Section 9, pages 3-5
	Subd. 3	Utility must use the environmental cost values established by the Commission, along with other socioeconomic factors, when evaluating and selecting resources.	Section 2, page 2, part k
	Subd. 4	Commission shall not approve a new or refurbished nonrenewable energy facility unless utility has demonstrated that a renewable energy facility is not in the public interest.	Section 2, page 2 Section 7, pages 1-4
	Subd. 6	Utility should state if it intends to site or construct a large energy facility.	Section 8, page 8
§216B.1691	Subd. 3	Report on progress in meeting the Renewable Energy Standard (RES).	Section 6
§216B.241	Subd. 1c(b)	Annual energy savings goal equivalent to 1.5% of gross annual retail energy sales.	Section 5

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Requirements by Rule

Rule		Requirement	Section Reference
7843.03	Subp. 5	Submit 15 copies of the plan to the Commission, and copies to the Department, RUD-OAG, MEQB members and other interested parties.	See Official Service List
7843.04	Subp. 1	Include a copy of the latest long range load forecast.	Section 3
	Subp. 2	Show resource options utility used for future needs. Show how resource plans vary with change in supply or demand. Discuss any plans to reduce existing resources.	Section 2, pages 2-3 and Section 7
	Subp. 3A	Include a list of resource options considered.	Section 2, page 3 & 4 and Exhibit 2
	Subp. 3B	Description of the process and analytical techniques used in developing the plan.	Section 7
	Subp. 3C	Include a 5-year action plan with a schedule of key activities and regulatory filings.	Section 8, page 8
	Subp. 3D	Include a narrative and quantitative discussion of why the plan is in the public interest considering: A. Reliability B. Rates C. Socioeconomic effects D. Ability to respond to change E. Limit risk of factors utility cannot control	Section 8, pages 9-12
	Subp. 4	Include a non-technical summary, not to exceed 25 pages in length, describing resource needs.	Section 1

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1. Non-Technical Summary

Southern Minnesota Municipal Power Agency (SMMPA or Agency) is pleased to submit this Integrated Resource Plan (IRP) to the Minnesota Public Utilities Commission under MN Statute §216B.2422, MN Rules Part 7843, and MN Statute § 216B.1691 Renewable Energy Objective. This IRP documents how SMMPA will provide for the capacity and energy needs of its seventeen municipal utility members for the period of 2025 through 2039.

As we reported in our 2021 IRP filing, the Agency, in coordination with Xcel Energy, plans to retire the Sherburne County Unit 3 (Sherco 3) coal-fired generator in 2030. During the bulk of compiling this IRP, we operated with the assumption that the expiration of the Agency's power sales contracts with the cities of Austin, MN, and Rochester, MN, would coincide with Sherco 3 retirement, which means SMMPA would only need to replace approximately 70 megawatts (MW) of its 360 MW share of Sherco 3. In August 2024, Austin elected to renew their contract, adding 70 MW into SMMPA's resource obligation, leaving little time for the Agency to start the complex IRP process over with all the necessary model analysis to meet requirements. For this reason, SMMPA continued with the original assumptions but accounted for the additional load within the sensitivity analyses.

The preferred plan in SMMPA's 2021 IRP called for replacing the lost Sherco 3 capacity with solar, wind, and a small amount of diesel generation. However, significant changes in the capacity construct of the Midcontinent Independent System Operator (MISO) since 2021, coupled with Minnesota's newly enacted carbon-free requirements for electric utilities, have resulted in the Agency having to take a different approach to meet its capacity obligations and energy needs.

Historically, SMMPA and other utilities in the Midwest have planned generation additions based on summer peak load requirements. However, in the fall of 2022, MISO changed from an annual capacity construct to a seasonal one. Each of the four seasons has a unique Planning Reserve Margin Requirement (PRMR) or an increment of accredited generating capacity a utility must have above its seasonal peak load forecast. For MISO's 2024/25 Planning Year, the PRMRs range from a low of 9 percent in summer to a high of 27.4 percent in winter. In addition to moving to seasonal requirements, MISO has also made significant changes to how it accredits generating capacity. The changes effectively reduce the amount of credit given to existing and new-generation resources. MISO has proposed additional changes to be effective beginning in Planning Year 2027/28 that will further reduce accreditation.

In its 2021 IRP, the Agency planned to meet its long-term capacity needs following the retirement of Sherco 3 by adding 225 MW of new solar, 50 MW of new wind, and 12 MW of small new diesel generation installed in member communities. This was based on meeting a summer peak need. Using the MISO capacity construct at the time, these resource additions would have provided approximately 70 MW of needed capacity and would have resulted in the Agency being approximately 80 percent carbon-free beginning in 2030. With the combination of MISO's change to a seasonal capacity construct, the changes in the way capacity accreditation is calculated within MISO's tariff, and the significantly higher winter PRMR compared to summer, the Agency's need for additional capacity is now the same in both summer and winter, still approximately 70 MW. The same resources that would have fulfilled the capacity requirement in the 2021 IRP, under MISO's new and proposed construct, would now provide less than 25 MW of capacity credit in summer or winter. Adding enough wind and solar generation to meet the Agency's capacity requirements under the new and proposed MISO rules would result in Agency resources producing significantly more annual energy than its members' annual energy requirements.

While the previously planned wind and solar additions would allow the Agency to meet or exceed the new carbon-free requirements, the Agency has had to look for additional dispatchable resources to meet its capacity requirements cost-effectively.

In this IRP, the Agency seeks to balance and optimize to the extent possible a generation mix that meets or exceeds the state carbon-free energy requirements while also providing the required capacity to meet MISO obligations in all seasons and allows the Agency to manage its exposure to energy market price risks.

Load growth on the SMMPA system continues to be low. The primary drivers for this are the considerable success of the Agency and its members with demand side management and conservation (DSM) programs and modest economic growth. The load forecast used in this IRP shows a modest compound average annual growth rate in both energy and demand requirements of 0.3 percent over the IRP period.

This IRP shows that the Agency can meet its MISO capacity obligations, member load requirements, and state carbon-free requirements throughout the study period with the retirement of Sherco 3 in 2030 by adding 225 MW of new solar generation and 50 MW of new wind generation to supplement its existing fleet of renewable generation to meet the state carbon-free requirement, continuing operation of the

Fairmont Energy Station and Owatonna Energy Station natural gas engine plants, and continuing to contract with its members for use of their diesel and dual fuel generators. In addition, the Agency will need to build up to 55 MW of new conventional dual fuel generation, add approximately 14 MW of new diesel generators in member communities, and continue its DSM efforts. Some of this conventional generation may be offset by the addition of small battery installations at strategic locations. We anticipate that the bulk of the annual energy to serve Agency member loads will be produced by existing and new renewable resources, while new and existing dispatchable generation will allow the Agency to meet its capacity obligations and help support grid reliability.

We believe this IRP is consistent with and meets all the statutory and regulatory requirements as defined by the state and provides important and valuable guidance regarding the energy future of SMMPA and its members.

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SMMPA OVERVIEW

SMMPA is a municipal joint action agency formed in 1977 under Chapter 453 of the Minnesota Statutes. It was originally formed by thirteen Minnesota cities, all of which operate municipal electric utilities. The membership increased to eighteen cities when SMMPA merged with the United Minnesota Municipal Power Agency in 1984. As with other joint action agencies, the cities joined together to create economies of scale to allow them to meet their growing generation and transmission needs more cost-effectively. SMMPA is one of several joint action agencies in Minnesota, including Central Minnesota Power Agency/Services, Minnesota Municipal Power Agency, Missouri River Energy Services, and Northern Minnesota Municipal Power Agency. Services provided by SMMPA, and other joint action agencies are equivalent to services provided to distribution cooperatives by generation and transmission cooperatives such as Great River Energy (GRE).

A change of note since the Agency's last IRP is that the City of North Branch, MN, a former SMMPA member, sold its electric system to East Central Electric Cooperative, a member of GRE. Under the terms of the Agency's Power Sales Contract with North Branch, the sale of the North Branch system was facilitated by GRE "stepping into the shoes" of North Branch in the form of a long-term power purchase agreement between SMMPA and GRE under which GRE purchases the capacity and energy from SMMPA that would have otherwise been sold to North Branch. This long-term agreement with GRE is incorporated into this IRP as part of the Agency's resource obligations, and references to SMMPA's 17 members (formerly 18 members) also include the sale to GRE.

The SMMPA members had a significant generation need that was met by joining forces with Northern States Power (NSP) in 1982 to jointly develop Unit 3 at NSP's Sherburne County Generating Station (Sherco 3), with construction being completed in 1987. At that time, federal law limited new baseload generation fuel sources to either coal or nuclear due to concerns with long-term oil and natural gas supplies. Coal-fired Sherco 3 was the most cost-effective solution to meet the joint requirements of the SMMPA members and NSP. Sherco 3 is the newest coal-fired generator in Minnesota and has been equipped with systems that allow it to meet or exceed all environmental requirements. Sherco 3 was critical to SMMPA's initial formation and continues to be the Agency's largest resource, providing a critical economic hedge in the energy market.

SMMPA's resource portfolio has evolved, grown, and diversified over the years. It now includes a mix of DSM programs, renewable resources (wind, solar, landfill gas, waste to energy, and biodiesel), natural gas, diesel, coal, and periodically, power purchase agreements. SMMPA prides itself on environmental stewardship and has continued to expand its resource mix with additions of renewable resources that now comprise over 25 percent of its energy supply – ensuring SMMPA meets the state's current Renewable Energy Standard. In 2017, the Agency added the first utility-scale solar project to its mix with a 20-year power purchase agreement for the 5 MW Lemond Solar Center. SMMPA also collaborated with its members to launch a community solar program aimed at allowing retail customers to "buy into" a utility-scale project that adds solar power to the system in a more efficient and cost-effective way than roof-top solar. The Agency also contracted to add a new 100 MW wind project that began commercial operation in 2020, adding to the 108 MW of wind that first entered the Agency's renewable resource portfolio between 2002 and 2009. This renewable resource fleet allows the Agency to meet its obligations under the state's renewable portfolio standard and provides a foundation for the Agency to build on to meet the carbon-free requirements in Minnesota statute.

In addition, the Agency and its members created their first demand-side management program in 1993 and have been successfully developing and employing a growing number of DSM-Conservation programs ever since. These programs have cost-effectively "served load" by reducing the overall load on the SMMPA system that is met with more conventional resources. Since the state's Conservation Improvement Program (CIP) savings goal of 1.5 percent took effect in 2010, SMMPA and its members have collectively saved an annual average of 1.73 percent of their energy sales through their DSM programs. In 2024, SMMPA received their fifth federal Environmental Protection Agency ENERGY STAR® Award recognizing its programs. SMMPA is committed to meeting the state's 1.5 percent CIP savings goal in the future, just as it has in the past.

In addition to generating assets, SMMPA owns a significant amount of transmission assets ranging in voltage from 69 kilovolts (kV) to 345 kV. The Agency's $255 million investment in transmission helps provide reliable service to its members, as well as access to generating resources, including new wind and solar projects. SMMPA continues to invest in the transmission grid to help support the reliable transition to more carbon-free resources with planned investments in MISO Tranche 1 transmission expansion.

SMMPA operates in the Midcontinent Independent System Operator (MISO) market. As such, the Agency offers its generating resources into the MISO market, running the generation as called for by the market. SMMPA then purchases the energy needed to serve the load of its members from the MISO market. SMMPA's generating assets serve as an economic hedge to help manage the cost of energy it purchases from MISO. SMMPA has also turned over functional control of its transmission assets to MISO.

As the remainder of this IRP will show, SMMPA's plan is consistent with the requirements of Minnesota statutes and rules and explains how its investment in a diverse portfolio of generation resources, transmission, and energy efficiency has provided excellent value to its members and their retail customers in the past and positions the Agency to continue to provide excellent value in the long term.

PLAN DEVELOPMENT

This is SMMPA's tenth resource plan filing to the Minnesota Public Utilities Commission under MN Statute §216B.2422 and MN Rules Part 7843. It has been developed to address the five factors to be considered by the Commission when reviewing integrated resource plans: (1) maintain or improve the adequacy and reliability of utility service; (2) keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints; (3) minimize adverse socio-economic effects and adverse effects upon the environment; (4) enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and (5) limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control. These factors are objectives SMMPA strives to achieve in both the planning and operation of its system as it serves its member communities.

The Agency used a detailed hourly production cost model, the AURORAxmp Electric Market Model, to evaluate its resource needs and alternatives in this IRP. The plan assumes that SMMPA and its members will continue their successful demand-side management programs to continue to meet the state objective of a 1.5 percent reduction in energy requirements each year of the plan. The plan also considers a range of supply-side generating alternatives to meet any identified resource needs.

LOAD FORECAST

The load forecast is a critical foundation for the development of an IRP. The load forecast for this IRP was developed by nFront Consulting LLC, working in conjunction with the Agency and its members. The Agency's peak demand is made up of the coincident peak load of its 17 members (plus the long-term sale to GRE), so local knowledge of current and future economic and business activities is critical to the load forecast. SMMPA's peak load and energy sales have been relatively flat for the last several years.

The forecast for this plan reflects a modest projected increase in peak demand and energy requirements of 0.3 percent per year over the IRP period.

SMMPA actively supports the increased use of electric vehicles (EVs) and has invested in an extensive EV charging network involving its member communities. As EVs have continued to gain market share and have the potential to significantly increase the IMS energy and peak demand of SMMPA's members, the 2023 Load Forecast reflected an upward adjustment to the baseline forecast developed above to capture the potential impact on future SMMPA loads related to EV adoption.

RESOURCES

SMMPA owns and contracts for a diverse fleet of generating resources. Its largest resource is its 41 percent share of the Sherco 3 coal-fired generator co-owned with Xcel Energy. In recent years, the Agency has added new, high-efficiency natural gas engines to its fleet. In addition, the Agency has a portfolio of renewable resources, including wind, solar, biomass, and small hydro. SMMPA also contracts with its members for gas, dual fuel (fuel oil and natural gas), and straight-fuel oil generators. While these member generators run infrequently, they provide important capacity for SMMPA and are critical resources in times of emergency that provide increased reliability in member communities and support grid reliability. During the polar vortex event in 2019 and winter storm Uri in 2021, these small diesel and dual fuel units were called into service by MISO and played a vital role in maintaining grid stability and resiliency. Because many of the dual-fuel units can also be operated using straight diesel fuel and the SMMPA members maintain a supply of diesel on site, these units were able to run while natural gas supplies were curtailed to other generators in the region.

SMMPA uses this fleet of resources to participate in the MISO market. Its generation meets its MISO capacity obligations and serves as a hedge against high market prices, as it offers its resources for sale in the market and purchases the energy it needs to serve its members' load.

DEMAND-SIDE MANAGEMENT RESOURCES

Demand-side management is a key strategic element in SMMPA's resource planning efforts. It is an overall cost-effective resource in SMMPA's supply portfolio that serves a key role in meeting customer demand and energy needs. SMMPA and its members have a long-standing commitment to DSM-Conservation programs dating back to 1985 when members began installing direct load control (DLC) systems. Beginning in 1993, the Agency started developing a range of conservation/high-efficiency initiatives for its members.

SMMPA and its members have a proven track record of strong DSM performance and have collectively exceeded the CIP savings goal and CIP spending requirement every year, on average. They are on track to do so again in 2024. The Agency is committed to continued success with its DSM programs with the challenge of continuing to meet the state's 1.5 percent annual goal into the future.

RENEWABLE RESOURCES

In 2007, the Minnesota Legislature amended the renewable energy objective statute, creating a renewable energy standard. The standard set forth requirements for Minnesota utilities, including SMMPA, to serve a percentage of their retail sales from qualifying renewable resources. The requirement was seven percent in 2010 and steps up in increments until it reaches 25 percent in 2025. SMMPA is following the current requirement of 20 percent every year. SMMPA may generate excess renewable credits in years that are "banked" for future use. Each year, SMMPA retires the number of credits required to ensure compliance.

The Agency has taken a portfolio approach to procuring qualifying renewable resources. This strategy utilizes multiple technologies and various ownership structures. SMMPA's renewable portfolio includes wind, solar, waste-to-energy, landfill gas, biodiesel, and small hydro. The existing renewable resource fleet and strategy were designed to allow the Agency to meet or exceed the requirements of the renewable portfolio standard.

In 2023, the Minnesota Legislature passed legislation requiring public power utilities like SMMPA to meet the energy requirements of their member loads with 60 percent carbon-free energy by 2030. The carbon-free requirement grows to 90 percent by 2035 and 100 percent by 2040. This IRP has been developed to meet these new carbon-free requirements and the MISO capacity requirements.

PREFERRED PLAN

The preferred plan resulting from this IRP analysis is to add small resources prior to 2030 to ensure the Agency can meet its MISO capacity obligations. After 2030, the preferred plan will result in a significant transformation of the Agency's generation portfolio. The preferred plan includes the addition of approximately 55 MW of conventional dual fuel generation and 14 MW of small diesel generators located in member communities prior to 2030. Some of this conventional generation may be offset by the addition of small battery installations at strategic locations. These additions will allow the Agency to meet its MISO capacity obligations while also providing local reliability and broader grid resilience and reliability in times of severe weather and critical load periods, as described in the Resources section above.

The plan further calls for the addition of 225 MW of solar generation and 50 MW of wind generation to meet resource needs with the retirement of Sherco 3. This combination of resource additions allows the Agency to meet the carbon reduction goals of SMMPA 2.0 while also meeting reliability and affordability objectives.

Renewable project pricing is significantly higher than forecasted in SMMPA's last IRP. The additional cost inputs have driven the preferred plan to meet SMMPA 2.0 goals significantly higher over the base sensitivity. While the Agency remains focused on its SMMPA 2.0 goals for 2030, we are compelled to maintain a fiduciary responsibility to our members, particularly considering renewable energy cost increases, MISO accreditation changes, and the 2023 Minnesota carbon-free legislation – all of which have occurred since the original development of SMMPA 2.0. As such, it may be necessary to incorporate a responsible off-ramp in the timing of the renewable build-out. The Agency will continue to monitor economic and load forecasts, pricing, and regulations to ensure the best possible mix for stewardship goals and fiduciary responsibility.

SENSITIVITY CASES

SMMPA and its members can be impacted by sudden or unexpected events, changes in environmental regulations, changes in tax laws, and other events over which it has little or no control. To understand the potential impact of unexpected changes, SMMPA ran several sensitivity cases. Variables used in these cases include low, base, and high forecasts for load, energy prices, and natural gas prices; low, high, and very high externality costs; incrementally higher prices for renewable purchased power agreements, extreme weather events, and loss of capacity credit for renewable resources in MISO.

The sensitivity case analysis helped refine a range of alternative plans into a robust preferred plan that can withstand significant changes from base assumptions and meets the carbon reduction objectives of SMMPA 2.0.

As we reported in our 2017 and 2021 IRP filing, sixteen of the Agency's eighteen (at the time) members have contracts that extend to 2050. Two of the Agency's members, the cities of Austin and Rochester, which combine to represent over fifty percent of the Agency's resource requirements, currently have contracts that terminate on March 31, 2030. After that date, SMMPA has no obligation to provide capacity and energy to those two members. As noted, Austin elected to renew their contract in August of 2024, adding 70 MW to SMMPA's resource obligation after 2030. To account for this load addition, given the timing of the notice of contract extension, we added the "Large New Member" sensitivity.

ENVIRONMENTAL

SMMPA is committed to environmental stewardship, which includes not only meeting all federal and state environmental regulations, but also conducting our business in a way that reflects the collective values of the communities we serve.

Numerous state and federal environmental laws and regulations apply to generating resources owned and/or operated by SMMPA. The Agency works closely with Xcel Energy, its partner in Sherco 3, to ensure ongoing compliance with environmental requirements, including the Acid Rain Program, the Cross-State Air Pollution Rule, the Regional Haze regulations, and the Mercury Air Toxics Standard, and will continue to do so through the remaining operating life of the unit. As legislative and regulatory proposals are being considered at the state and federal levels, SMMPA is actively engaged in those activities.

The resource changes and additions in this IRP will provide the Agency with a reduced-carbon energy portfolio that is expected to meet the state's long-standing greenhouse gas reduction goals and the newly enacted carbon-free requirements.

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2. Plan Development

GENERAL DISCUSSION

This is SMMPA's ninth resource plan filing to the Minnesota Public Utilities Commission under MN Statute §216B.2422 and MN Rules Part 7843.

PLAN OBJECTIVES

As stated in Minnesota Rules Part 7843, the factors to be considered by the Commission in their review of resource plans includes the following: (1) maintain or improve the adequacy and reliability of utility service; (2) keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints; (3) minimize adverse socio-economic effects and adverse effects upon the environment; (4) enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and (5) limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control. SMMPA and the public power utilities it serves also share these objectives which have served as a guide as SMMPA evaluated various resource options to provide adequate, reliable, and cost-effective electric power.

PLANNING MODEL

SMMPA uses the AURORAxmp Electric Market Model developed by EPIS, Inc. (Aurora) for its short- and long-range resource planning. The Aurora model is designed to mimic the way in which the Midcontinent Independent System Operator (MISO) operates. The model dispatches all utility generating assets into a Locational Marginal Price (LMP) market independent of utility load. Each generator is then paid the hourly LMP price for its energy. The model then serves the utility load requirements from the MISO pool of energy, not specific generators, for which the utility pays MISO the hourly LMP price. The model will sum the 8760 hours for each year to determine the total annual revenue received from MISO for all generating assets and the total annual expense paid to MISO for serving all utility load requirements.

The model also determines if there is enough total generating capacity to serve the peak demand plus reserve requirements every year. When the model encounters a year with insufficient reserves, it will choose additional generation from a pool of resource options (to be discussed later in this section). The model searches for the lowest overall cost resource option by performing multiple iterations using each resource option until it achieves the lowest overall cost.

PLANNING ASSUMPTIONS

These are some of the key assumptions used in the Aurora model:

a. Retirement of Sherburne County Unit 3 (Sherco 3), the coal fired generator that SMMPA co-owns with Xcel Energy, at the end of 2030.
b. Expiration of the 100.5 MW power purchase agreement with the Wapsipinicon wind farm in 2029.
c. Retirement of the six wind turbines owned by the Agency in 2025 (8.6 MW).
d. Expiration of the contract for output from the Olmsted County Waste to Energy Facility in 2030.
e. Retirement of the 1.6 MW Mora landfill gas generator in 2032.
f. Continuation of the contracts SMMPA has with its members for use of member-owned natural gas, diesel, and dual fuel generating units.
g. A capacity reserve margin of 9.0 percent for the summer season, 14.2% for Fall season, 27.4 percent for the Winter season, and 26.7 percent for Spring season based on MISO 2024/25 Planning Year requirements.
h. The study period includes the 15 years from 2025 through 2039. The AURORA optimization analysis evaluates options through 2050 to account for end-effects.
i. Total present-worth costs are expressed in 2024 dollars and are calculated by discounting annual costs with SMMPA's cost of money.
j. Projected future demand and energy forecasts were developed by nFront Consulting, LLC (nFront Consulting).
k. As required by Minnesota Statute 216B.2422 Subd.3, the model includes the cost of environmental externalities issued by the Minnesota Public Utility Commission on June 16, 2017, when optimizing future resource options.
l. The model uses the Agency's peak demand for determining resource requirements, not its demand coincident with the MISO peak.
m. The model reflects the expiration of the power sales contracts of Rochester Public Utilities and Austin Utilities with the Agency on March 31, 2030.[1]
n. The MISO UCAP rating (Unforced Capacity, or generation capacity after considering forced outage rate) for each generator was adjusted downward in 2028 to estimate the impact of the

[1] Subsequent to this Aurora modeling, Austin and SMMPA agreed to extend the power sales agreement to 2050.

proposed MISO change in accreditation to a DLOL methodology.

o. The model assumes a 36 percent solar accreditation for the summer season and two percent for the Winter season.

p. The model assumes 12 percent accreditation for wind generation during the summer season and 14 percent for Winter season.

MODEL INPUTS

The model requires a large amount of specific data inputs in order to perform its forecasts and optimizations. One of the key inputs to the model is the forecast of future demand and energy requirements. The demand and energy forecast for this IRP was developed and provided by nFront Consulting. nFront Consulting also provided alternate demand and energy forecasts used when running many of the sensitivity cases. A detailed explanation of the demand and energy forecasting methodology can be found in Section 3.

Another key model input is technical and financial data for each of the existing resources in the model. Technical data includes items such as operating capacity maximums and minimums, heat rates at various levels of production, expected forced outage rates, and future planned outages. Financial data for each generating resource includes items such as variable operating and maintenance costs (O&M), and forecasted fuel prices for coal, gas, and oil. A table of the technical and financial data used for the Agency's existing resources can be found in Exhibit 1.

The same data inputs used for existing resources are also required for the future resource options. In addition, input data for the future resource options include the capital cost required to construct the new facility, and the fixed O&M costs required to run the facility. The portfolio of new resources options for input to this model was developed internally for diesel and natural gas generation based on direct knowledge and experience, and information provided by equipment suppliers, and from region-specific data available from the National Renewable Energy Laboratory (NREL) for wind, solar and battery options. The future resource options which were available for the model to choose were:

- Short-term market capacity purchases in 1 MW increments
- 2 MW quick-start diesel generators
- 25 MW aggregated installation of small quick-start diesel generators
- 25 MW aggregated installation of conventional natural gas-fired engines
- 25 MW increments of new solar installations

- 25 MW increments of new wind installations
- 5 MW battery installation

More detailed information on the inputs used for the new resource options can be seen in Exhibit 2.

MISO SEASONAL CAPACITY MARKET

In 2023, MISO implemented a new seasonal capacity construct which included generator resource accreditation values that vary by season. MISO is also working on a new initiative to modify the process for accrediting generation under a Direct Loss of Load (DLOL) methodology which is scheduled for implementation in 2028. Under this new DLOL generator accreditation methodology, MISO estimates the capacity rating for solar in the Base scenario to be approximately 36 percent of nameplate rating during the summer season and zero percent during the winter season.

Due to those two initiatives, SMMPA's future capacity shortfall is expected to occur during the winter season rather than the summer. According to MISO's December 2023 Attributes Roadmap, utilizing the recent FERC approved DLOL methodology, solar capacity credit in 2032 is forecasted to be 4% for summer, and 2% for winter in 2032. The same report forecasts a wind capacity credit of 7% summer and 14% winter in 2032.

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3. Load Forecast

GENERAL DISCUSSION

The load forecast that underpins the IRP discussed herein is based on SMMPA's 2023 long-term Load Forecast, which was developed with the assistance of nFront Consulting, LLC (nFront Consulting), a consulting firm that provides resource planning, economic evaluation, and business strategy services to the utility industry. The following sections provide a brief overview of the forecast approach, data sources and assumptions, and results. For a more detailed description of the models, data, and methodologies used in developing the forecast, SMMPA's 2023 Load Forecast Report can be made available.

The forecast is primarily based on an econometric approach, wherein forecasting equations are developed that explain variations in energy requirements and peak demand as a function of a series of explanatory variables, which are then simulated with future values of the explanatory variables to generate load forecasts for SMMPA and its member systems. This is essentially the same methodology used in previous SMMPA IRP filings.

FORECAST APPROACH

The following steps define the process used to arrive at SMMPA's forecasted demand and energy requirements:

1. The annual retail load served across the members is forecasted by combining econometric forecasts of residential customer counts and average energy use and adding the resulting estimate of residential sales to similar forecasts of total retail sales to commercial and industrial customers and other customers, such as lighting classes and government facilities. As described further in the section below entitled, "Adjustments for Demand-side Management Conservation," the forecasts of total retail sales by class are adjusted upward for the historical impact of DSM-Conservation programs on the growth rates projected by the econometric models.
2. After adjusting for distribution losses, the resulting total represents the total delivered energy requirements across all SMMPA's members.
3. Total delivered energy requirements are then allocated to the members based on a separate econometric forecast of total delivered energy requirements for each member (referred to herein as the "Ratio Forecasts").

4. The contribution of each member's load to SMMPA's peak demand (i.e., coincident peak, from the member's perspective) is forecasted based on an econometric forecast of load factor, combined with the forecasted member energy requirements. In the load forecast and this IRP, the use of the terms coincident peak, coincident peak demand or CP demand refer to SMMPA's peak load, which is the coincident peak demand of SMMPA's 17 members and a portion of the load of a former SMMPA member now served by Great River Energy, which purchases from SMMPA to meet most of the former member's load. These terms do not refer to SMMPA's peak load coincident with the MISO total system peak load.

These load determinants reflect the gross power requirements that would need to be served from supply- and/or demand-side resources.

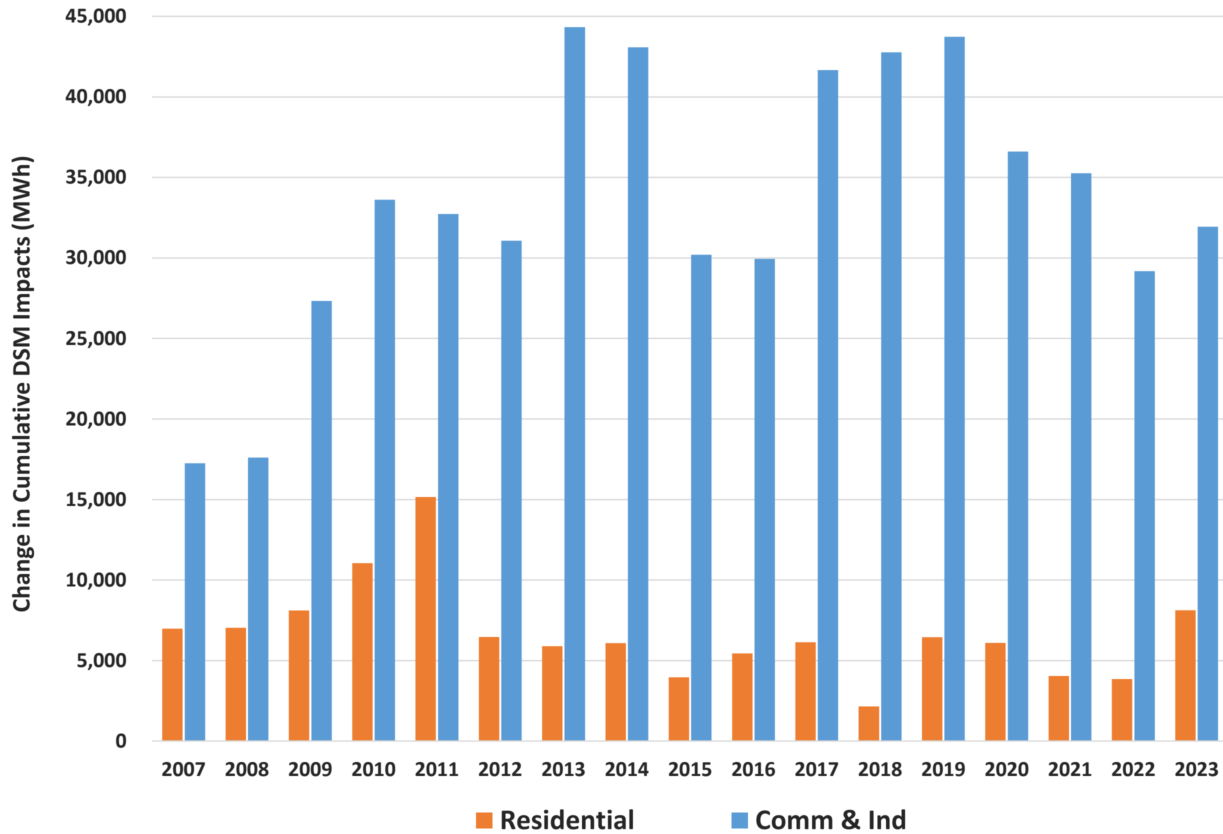
Adjustments for Demand-side Management Conservation

SMMPA and its members have been operating demand-side management (DSM) programs aimed at improving the efficiency of appliances and other end uses for its members' customers and attenuating peak demand for many years. This activity has resulted in reduced energy consumption and peak demands across SMMPA's members and, importantly, reduced growth in these measures of load. Accordingly, had it not been for this activity, the growth in SMMPA's load over the last several years would have been greater and the load level today, higher.

In order to account for the impact of this activity on the load forecast analysis, the average change in DSM-Conservation impacts on the residential class and commercial and industrial classes over 2005-2023 were added to the growth rates that were forecasted directly from historical sales by class. In this way, the forecast is adjusted upward for the impact on load growth of incremental DSM-Conservation efforts. Chart 3-1 below depicts the historical DSM-Conservation impacts specific to the retail customers across SMMPA's members. Data below excludes efforts to improve distribution infrastructure. In addition, as behavioral programs and energy-related impacts of load management programs are assumed to not persist and are implemented in each year, the values below understate the *incremental* DSM-Conservation efforts undertaken by SMMPA.[1] The average change in cumulative DSM-Conservation impacts over 2008-2022 totals approximately 41,000 GWh at the retail meter.

[1] The values in Chart 3-1 reflect the annual change in cumulative DSM-Conservation impacts rather than incremental DSM-Conservation impacts. For this reason and as a result of the exclusions discussed above and minor classification differences, these values may be somewhat different than incremental DSM-Conservation impacts reported elsewhere herein.

Chart 3-1
Historical Annual Change in Cumulative DSM-Conservation



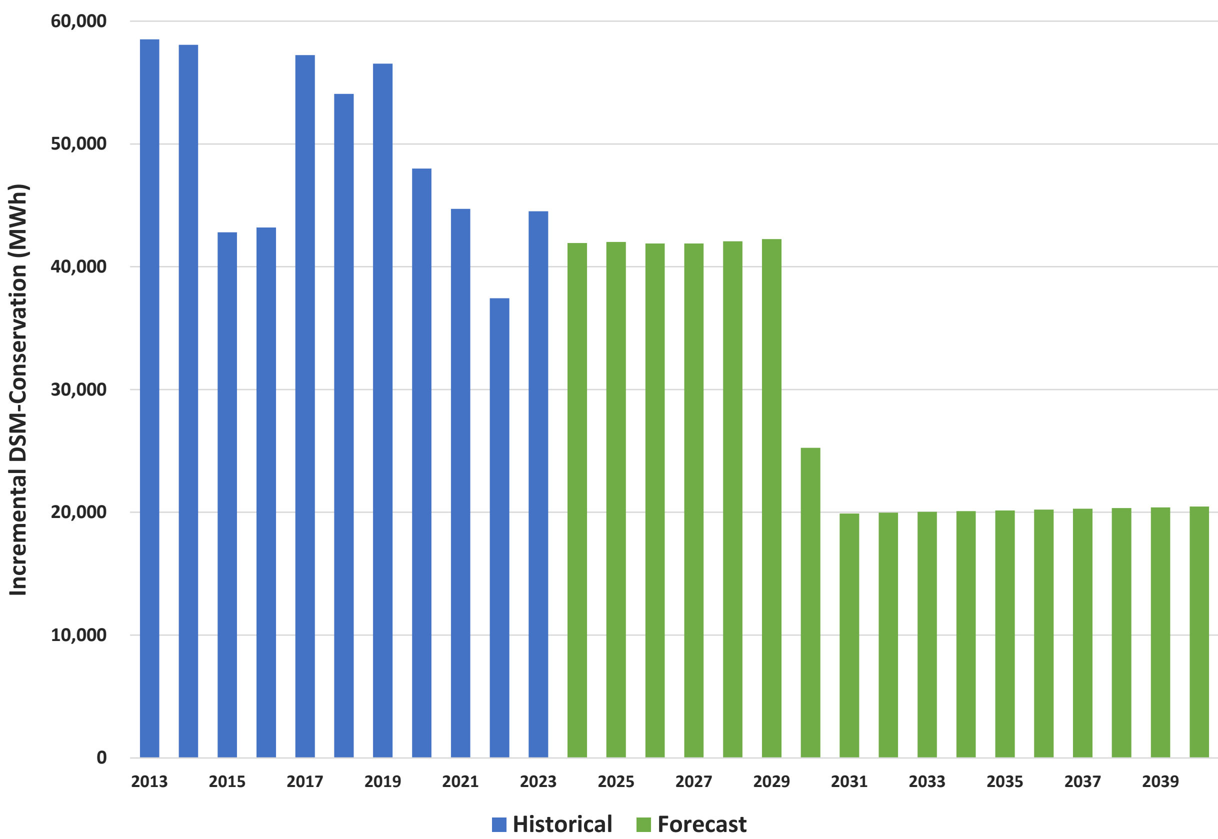
Based on the average change in cumulative DSM-Conservation impacts, the forecasted growth of aggregate retail sales across SMMPA's members developed directly from the forecast equations (i.e., the "baseline" forecast) was adjusted upward in each year to result in a forecast of the potential aggregate retail sales across SMMPA's members, assuming no further DSM-Conservation activity is undertaken.

However, the forecasted Inlet to Member Systems (IMS) energy requirements and peak demand resulting from the retail forecasts developed above are also adjusted *downward* for the projected impacts of future assumed DSM-Conservation activity. Future incremental DSM-Conservation impacts are based on energy impacts equal to 1.5 percent of average IMS energy over the three year period ending in the year two years prior to any given year (consistent with the state's 1.5 percent CIP/ECO energy savings goal).[2] Annual peak demand impacts are derived from the projected energy impacts and load factors based on an

[2] This calculation is explicitly carried through 2035. Thereafter, cumulative DSM impacts by member are assumed to increase in a linear fashion. For ease of computation, the load forecast process reflects a detailed calculation of DSM impacts on a by-member basis, which is then imposed on the gross forecast. While the resulting DSM impacts as a percentage of net energy are calculated to meet the CIP/ECO goal, the process does not reflect iterative calculations to exactly meet the 1.5 percent goal in all years.

average over the most recent five years, or approximately 75 percent, trended down to 55 percent, SMMPA's approximate average system load factor, over 2024-2030. This assumed transition down to 55 percent reflects the assumption that the energy efficiency opportunities in lighting and other generally off-peak end uses will gradually saturate, forcing DSM activity to move to lower load factor end uses. Monthly impacts are then shaped from these annual values based on blended monthly profiles reflecting a combination of SMMPA's overall load shape and a flat profile. Chart 3-2 below depicts the historical and projected annual incremental impacts of DSM-Conservation activity (at IMS level), including impacts of SMMPA's behavioral and load management programs. The dramatic reduction in projected DSM-Conservation impacts beginning 2030 is a result of the then-expected expiration of SMMPA's power sales contracts with the cities of Austin and Rochester on April 1, 2030.[3]

Chart 3-2
Historical and Projected Incremental DSM-Conservation (IMS Level)



[3] Subsequent to the development of the projections that underpin this IRP, Austin and SMMPA agreed to extend the power sales agreement to 2050.

Electric Vehicles

As electric vehicles have continued to gain market share and have the potential to significantly increase the IMS energy and peak demand of SMMPA's members, the 2023 Load Forecast reflected an upward adjustment to the baseline forecast developed above to capture the potential impact on future SMMPA loads related to EV adoption for light duty vehicles (LDV).

Historical total LDV registrations for Minnesota and EV registrations for SMMPA's member service areas were obtained from the MN Department of Transportation. From this data, estimates of EV penetration were developed for SMMPA member service areas. This historical trend was then extrapolated into the future based on projections drawn from the 2023 Annual Energy Outlook, published by the EIA, for the West North Central Census region. The resulting counts of EVs were combined with estimated charging energy requirements and peak demand contribution (i.e., coincident peak demand) based on estimates developed in Minnesota's Technical Reference Manual (TRM) for purposes of CIP/ECO and charging profiles produced using NREL's EVI-Pro Lite tool and added to the baseline forecast developed above. The assumed annual charging energy and coincident peak demand per EV is approximately 3,500 kWh and 0.4 kW, respectively, (at the retail meter). Table 3-1 below provides the resulting estimates of EV counts, total charging energy, and annual coincident peak demand impacts over a recent historical period and for representative years over the forecast horizon.

Table 3-1

Historical and Projected Electric Vehicle Estimates

		PEV Penetration (%)	PEV Stock (#)	Charging Energy (MWh)	Peak Demand (MW)
Historical / Estimated	2013	0.0%	89	354	0.0
	2014	0.0%	105	418	0.0
	2015	0.1%	117	467	0.0
	2016	0.1%	149	596	0.1
	2017	0.1%	193	771	0.1
	2018	0.1%	286	1,144	0.1
	2019	0.2%	406	1,626	0.2
	2020	0.2%	510	2,040	0.2
	2021	0.3%	725	2,900	0.3
	2022	0.4%	1,052	4,208	0.4

		PEV Penetration (%)	PEV Stock (#)	Charging Energy (MWh)	Peak Demand (MW)
Projected	2023	0.5%	1,344	5,376	0.5
	2030	1.3%	3,405	13,619	1.4
	2040	2.5%	6,833	27,331	2.7

SMMPA intends to continue monitoring this developing trend and updating this forecast of EV growth and its impact on loads, including consideration of the potential impacts from other types of vehicles (e.g., medium- and heavy-duty transportation vehicles) and other vehicles transiting the members' service areas.

SMMPA Wholesale Forecast

SMMPA's members serve a portion of their load requirements from a variety of resources other than generation resources operated by SMMPA, including the following:

- Demand-side management (DSM) conservation measures
- Direct load control
- Interruptible load (mostly industrial customer arrangements)
- Western Area Power Administration (WAPA) capacity and energy allocations
- Generation resources located behind the wholesale meter (i.e., load-side generation), including hydro resources operated by the member or resources at large customer sites

In addition, two of SMMPA's members, Austin Utilities (AU) and Rochester Public Utilities (RPU), operate under partial requirements arrangement under which SMMPA and these members have agreed to Contract Rates of Delivery (CROD) of 70 MW and 216 MW, respectively. Under the CROD arrangement, SMMPA serves loads only up to the CROD, resulting in any load growth for the member in question above the CROD value gradually increasing the amount of demand and energy being subtracted from its gross requirements in computing the net requirements to be served by SMMPA.

In order to forecast the wholesale billing demands and charges of the members, the capacity and generation from these other resources is netted away from the gross IMS forecast, and CROD is assumed to gradually limit the demand and energy requirements of AU and RPU over the forecast horizon.[4] This

[4] While RPU's IMS CP Demand is already well above CROD in most summer months, AU's IMS CP Demand is generally below its CROD and is expected to remain so over the forecast horizon, assuming normal weather conditions.

results in net IMS forecasts for energy and CP demand that form the basis for SMMPA's wholesale budget.

For purposes of the power supply analyses discussed further herein, the wholesale budget forecast is adjusted upward for the assumed impacts of WAPA resources, which are incorporated as supply-side resources of SMMPA.

DATA SOURCES AND ASSUMPTIONS

The forecast relies on historical utility system data provided to SMMPA by its member utilities and load data maintained by SMMPA. This data includes historical data regarding (i) retail billing data by major customer classification, (ii) system metered energy requirements, (iii) system metered peak demands, including both the peak of each member system and the contribution of each member system to SMMPA's peak, and (iv) the timing of the system peak demands mentioned in (iii). SMMPA also maintains or develops historical and projected data regarding demand-side management impacts, including both DSM-Conservation and load management impacts, load-side generation, and WAPA entitlements.

Historical and projected economic and demographic data were provided by Woods & Poole Economics (Woods & Poole), a nationally recognized provider of such data. Population projections were also obtained from the Minnesota Management and Budget office (MMB). The MMB projections reflect a somewhat more conservative outlook for population growth across the SMMPA service territories than the W&P projections. nFront Consulting developed consensus projections of economic and demographic data based on the data from these two providers. The population projections for the two data providers were generally blended by averaging the annual growth rates. All other economic and demographic data provided by Woods & Poole were adjusted by the resulting percentage difference from the Woods & Poole population projections to arrive at a similar blended outlook for these variables. This reflects the idea that population can be viewed as the key underlying indicator across all these variables (e.g., employment variations imply similar population variations, barring temporary economic fluctuations due to the economic cycle).

For purposes of the Base Case forecast described herein, this projected economic and demographic data was perturbed from this consensus to represent a slightly less optimistic forecast to recognize the fact that previous vintages of economic projections used in prior load forecasts had, in retrospect, been significantly optimistic. The amount by which the data was adjusted downward was based on an analysis of historical errors in Woods & Poole's projections and was intended to reflect approximately the 30th percentile of potential outcomes. As discussed later herein, additional scenarios were produced to represent a more expansive range of potential outcomes, spanning a 90 percent confidence interval, based on the same dataset regarding historical errors.

Historical data regarding the retail cost of electricity to SMMPA's ultimate retail customers were taken from the retail billing data reported by SMMPA's members, adjusted for inflation. Historical data regarding the cost of other fuels was taken from data maintained by the Energy Information Administrative (EIA). Projections assume that the real cost of electricity will remain essentially flat over the forecast horizon. Projections regarding the cost of competing fuels were based on the EIA's 2023 Annual Energy Outlook, which reflected that the average cost are expected to decline by approximately 0.8 percent per year over the forecast horizon.

Historical weather data was provided by the National Oceanic and Atmospheric Administration (NOAA) for weather stations in Duluth, Rochester, and Saint Cloud, to which each member was assigned. For purposes of peak demand analyses, daily weather data was obtained from NOAA for Rochester only. Future monthly weather conditions were assumed to reflect normal data as reported by NOAA and representative of the 1991-2020 period. Future peak day weather conditions reflect averages over 1995-2023.

The forecast is based upon the following additional assumptions:

- The future influence on energy sales of the economic, demographic, and weather factors, on which the econometric models are based, was assumed to be similar to that estimated over the period 1980 through 2023.
- The future influence on load factors of weather variables, electricity prices, and seasonal factors was assumed to be similar to the estimated influence of such factors generally over the period 1995 through 2023.
- Although the econometric models implicitly account for the historical relationships between energy usage and the following factors to the extent they have occurred in the past, this Load Forecast does not explicitly reflect extraordinary potential future effects of: (a) increases in appliance design efficiency or building insulation standards; (b) development of substitute energy sources, or load-side generation; (c) consumers switching to traditional or new types of electrical

end-uses from other alternatives (e.g., electric vehicles), except as explicitly reflected as discussed herein; (d) consumers switching from electrical appliances to other alternatives; or (e) variations in load that might result from legal, legislative, or regulatory actions.

- Recent hourly load patterns for the members were assumed to be reasonable representations of future load patterns, particularly for use in forecasting the energy amounts that are above CROD for AU and RPU and the percent of on-peak versus off-peak energy.

FORECAST RESULTS

The sections below summarize the projections that form the basis for this IRP and the various adjustments discussed previously.

Retail Forecasts

As mentioned previously, the load forecast begins with a forecast of retail energy sales by major customer classification across SMMPA's members. The following describes the forecast equations and resulting projections for the residential, commercial, and industrial classes.

For the residential class, the analysis of electric sales was separated into residential usage per customer and the number of customers, the product of which is total residential sales. This process is common for relatively homogenous customer groups. For other rate classifications, the total sales series is the primary forecasted variable.

The number of residential customers is projected on the basis of the estimated historical relationship between the number of residential customers of the members and the number of households in the surrounding counties. The econometric equation includes household counts and an adjustment variable to account for the recent housing boom and bust over 2004-2007, during which customer counts increased somewhat across the members without an accompanying increase in household counts.

The forecast equation for residential average use reflects that usage is best explained by a combination of the following:

- Real personal income per household (using a 3-year moving average)
- Real electricity prices (using a 3-year moving average)
- Real natural gas prices (using a 4-year moving average)

- Energy efficiency index (reflecting the influence of end use energy efficiency standards)
- Locational prevalence in the home (i.e., Google's "mobility" data)
- Heating and cooling degree-days

The forecasts of the commercial and industrial classes are driven by the following variables:

- Real total personal income
- Total employment
- Real electricity prices (using a two-year moving average)
- Heating and cooling degree-days
- Binary variables to address class migration or simply the vagaries of class definitions across time and the extraordinary impacts over 2008-2009 of the recent recession, as well as reductions in load to major industries, partially driven from load-side generation, that are inadequately explained by the economic data

Table 3-2 contains historical and projected values of residential customer counts and sales across the customer classes modeled, as well as representative growth rates. For this purpose, the expected departure of two large SMMPA members effective April 2030 is not reflected.

Table 3-2

Historical and Projected Residential Customer Counts and Baseline Energy Sales

		Energy Sales (MWh)[5]					Residential
	Residential Customers	Residential	Commercial	Industrial	Other	Total	Average Use (kWh)
Historical							
2008	96,323	768,015	1,100,562	1,123,530	40,980	3,033,087	7,973
2013	99,198	788,854	1,089,089	1,060,781	42,865	2,981,589	7,952
2014	99,614	776,859	1,080,730	1,060,354	43,552	2,961,495	7,799
2015	100,225	755,886	1,076,784	1,064,002	43,733	2,940,405	7,542
2016	101,461	771,866	1,089,444	1,060,125	44,748	2,966,183	7,608
2017	103,029	755,951	1,136,279	994,747	43,402	2,930,379	7,337
2018	104,097	805,367	1,150,525	992,900	42,973	2,991,765	7,737
2019	105,975	788,004	1,112,577	1,006,000	37,521	2,944,102	7,436
2020	107,432	823,727	1,046,179	985,857	36,562	2,892,325	7,667

[5] There has been some migration of customers between the commercial and industrial classes shown, which impacts the historical growth rates of these classes as well as the 2023 values. Data for 2023 (available since the 2023 Load Forecast was finalized) have been adjusted upward to be consistent with the forecast dataset based on estimated data for North Branch, which is no longer a member of SMMPA.

	Residential Customers	Energy Sales (MWh)[5]					Residential Average Use (kWh)
		Residential	Commercial	Industrial	Other	Total	
2021	108,816	838,242	1,070,216	992,599	43,398	2,944,454	7,703
2022	109,453	832,208	1,070,711	987,593	41,631	2,932,143	7,603
2023	110,696	835,697	1,079,731	974,650	42,081	2,932,158	7,550
Projected							
2024	110,720	845,839	1,062,500	1,020,537	39,750	2,968,625	7,639
2025	111,435	843,702	1,064,467	1,025,884	39,499	2,973,553	7,571
2026	112,120	846,379	1,068,413	1,033,185	39,423	2,987,399	7,549
2027	112,769	850,981	1,072,439	1,040,692	39,399	3,003,512	7,546
2028	113,389	858,233	1,078,365	1,050,420	39,392	3,026,410	7,569
2029	113,958	862,742	1,080,627	1,055,995	39,390	3,038,754	7,571
2030	114,481	869,712	1,084,751	1,063,708	39,389	3,057,560	7,597
2031	114,977	876,716	1,088,868	1,071,295	39,389	3,076,267	7,625
2032	115,437	885,307	1,094,850	1,080,957	39,389	3,100,503	7,669
2033	115,868	890,425	1,097,073	1,086,302	39,389	3,113,189	7,685
2038	117,794	924,549	1,117,373	1,122,772	39,389	3,204,083	7,849
Cumulative Avg. Growth Rates:							
2008-2023	0.9%	0.6%	-0.1%	-0.9%	0.2%	-0.2%	-0.4%
2013-2023	1.1%	0.6%	-0.1%	-0.8%	-0.2%	-0.2%	-0.5%
2024-2033	0.5%	0.6%	0.4%	0.7%	-0.1%	0.5%	0.1%
2024-2038	0.4%	0.6%	0.4%	0.7%	-0.1%	0.5%	0.2%

DSM Conservation Adjustment

As described previously, the growth in energy consumption exhibited by the baseline forecasts of residential and non-residential sales are adjusted upward by the average impact of non-behavioral DSM Conservation programs over the 2005-2022 period. This corrects the dampening effect on the forecast equation parameters of the DSM Conservation programs.

Table 3-3 below shows the baseline and adjusted projection of residential and non-residential sales, as above without reflecting the expected departure of two large members effective April 2030. Resulting compound average growth rates are shown for the forecasted periods before and after that expected departure for consistency with downstream tables.

Table 3-3

Baseline vs. Adjusted Member Retail Energy Sales (MWh)

	Baseline Forecast			Adjusted Forecast		
	Residential	Non-residential	Total	Residential	Non-residential	Total
2024	845,839	2,122,786	2,968,625	855,676	2,177,033	3,032,709
2025	843,702	2,129,851	2,973,553	858,457	2,211,222	3,069,679
2026	846,379	2,141,020	2,987,399	866,053	2,249,515	3,115,567
2027	850,981	2,152,531	3,003,512	875,573	2,288,149	3,163,722
2028	858,233	2,168,177	3,026,410	887,744	2,330,919	3,218,663
2029	862,742	2,176,012	3,038,754	897,171	2,365,877	3,263,048
2030	869,712	2,187,848	3,057,560	909,060	2,404,837	3,313,897
2031	876,716	2,199,552	3,076,267	920,981	2,443,664	3,364,646
2032	885,307	2,215,196	3,100,503	934,491	2,486,432	3,420,923
2033	890,425	2,222,764	3,113,189	944,527	2,521,124	3,465,652
2034	897,302	2,234,277	3,131,579	956,323	2,559,760	3,516,084
2035	904,156	2,245,772	3,149,928	968,096	2,598,379	3,566,474
2036	912,716	2,261,252	3,173,968	981,574	2,640,982	3,622,557
2037	917,739	2,268,390	3,186,129	991,516	2,675,245	3,666,760
2038	924,549	2,279,535	3,204,083	1,003,243	2,713,513	3,716,756
Compound Avg. Growth Rates:						
2024-2029	0.4%	0.5%	0.5%	1.0%	1.7%	1.5%
2031-2038	0.8%	0.5%	0.6%	1.2%	1.5%	1.4%

IMS Energy and Peak Demand Forecast

The forecast of total retail sales above is translated into total IMS energy by adding an estimate of distribution losses, based on the average distribution loss percentage over the period 2013-2022, or 3.4 percent. As mentioned previously, the total SMMPA IMS energy is allocated to the members based on the Ratio Forecasts developed based on separate econometric forecasts of monthly IMS energy, which rely on similar economic, demographic, and weather variables as the retail forecast equations.

The forecast of IMS energy is combined with an econometric forecast of monthly load factor to arrive at monthly IMS peak demands. The load factor forecast equations across the members include some combination of the following variables, with their influence or polarity noted in parentheses (note that, as these equations explain load factor, rather than actual peak demand, their polarity may be confusing—a negative polarity on the intensity of peak day weather conditions corresponds to higher peak loads):

- Average daily heating and cooling degree days (+)
- The amount by which peak day high temperature is greater than the base of 78 degrees Fahrenheit (dF) (-)

- The amount by which peak day low temperature is greater than the base of 50 dF (-)
- The amount by which peak day high temperatures are less than the base of 50 dF (-)
- One or more variables regarding weather conditions on the day prior to the peak, similar to the above peak day weather variables (-)
- Humidity (for summer months only) (-)
- Real electricity prices (-)
- Several binary variables to capture residual seasonal variation and one-time deviations that are otherwise unexplained by the remaining variables

The resulting forecasts of IMS Energy and Peak Demand are then reduced by projected impacts of DSM-Conservation and load management programs.

Table 3-4 below provides projected impacts of expected DSM activity of SMMPA's members, including incremental end use efficiency measures, behavioral programs, and load management impacts. As the latter two categories are assumed to have no impact beyond the year of activity, they do not accumulate in time as do the incremental EE measures. Hence, cumulative values are computed by adding each year's annual impacts to the prior year's cumulative value and subtracting the sum of the prior year's behavioral and load control impacts, other than for 2030-31, which reflects the then-expected departure of two large members from SMMPA.[6]

Table 3-4
Projected Impacts on System Energy of Expected DSM Programs (MWh)

	Incremental EE Impacts	Behavioral Program	Load Control	Annual Impacts	Cumulative Impacts
2024	39,776	1,665	492	41,934	41,934
2025	39,854	1,665	501	42,020	81,796
2026	39,721	1,665	511	41,896	121,527
2027	39,703	1,665	520	41,888	161,239
2028	39,881	1,665	528	42,074	201,128
2029	40,049	1,665	537	42,251	241,186
2030	23,197	1,665	383	25,245	126,930
2031	17,889	1,665	337	19,891	144,773
2032	17,962	1,665	343	19,969	162,740
2033	18,023	1,665	348	20,036	180,769
2034	18,084	1,665	353	20,102	198,858

[6] As of the timing of the 2023 Load Forecast, two large members were expected to leave SMMPA effective April 2030. The 2030 value for Cumulative Impacts reflects an approximate blending of three months with those members' cumulative impacts included and the remainder of the year excluding such cumulative impacts. Values for 2031 and beyond revert to cumulative values for the remaining members. Subsequent to the development of that load forecast, Austin and SMMPA agreed to extend the power sales agreement to 2050.

	Incremental EE Impacts	Behavioral Program	Load Control	Annual Impacts	Cumulative Impacts
2035	18,132	1,665	359	20,156	216,996
2036	18,200	1,665	364	20,229	235,202
2037	18,256	1,665	370	20,291	253,463
2038	18,311	1,665	375	20,351	271,780

Table 3-5 below contains projected values for SMMPA Gross IMS Energy and Peak Demand, which represents the summation of these values across the members before other Member resources and reductions for load of Austin and Rochester above CROD are taken into account. Values are shown both gross and net of DSM resources. As two of SMMPA's members are expected to leave the agency effective April 2030, values for 2030 and beyond are considerably lower than preceding years. Representative growth rates are shown for the period preceding this departure, as well as for the entire 15-year horizon.

Table 3-5
Base Case Gross IMS Energy and Peak Demand

	Gross of Projected DSM		Cumulative Projected DSM Impacts		Net of Projected DSM	
	Energy (MWh)	Peak Demand (MW)	Energy (MWh)	Peak Demand (MW)	Energy (MWh)	Peak Demand (MW)
2024	3,142,840	667.3	85,445	32.8	3,057,396	634.5
2025	3,180,935	677.4	124,886	39.3	3,056,050	638.1
2026	3,228,238	688.1	164,199	45.9	3,064,039	642.1
2027	3,277,849	699.2	203,499	52.9	3,074,350	646.2
2028	3,334,480	709.3	242,975	60.3	3,091,505	649.0
2029	3,380,124	720.6	282,620	68.2	3,097,504	652.5
2030	1,993,769	327.5	188,870	41.8	1,804,899	285.6
2031	1,571,325	332.1	163,510	45.5	1,407,814	286.6
2032	1,594,977	336.2	181,063	49.1	1,413,914	287.1
2033	1,614,034	341.2	198,677	52.8	1,415,357	288.4
2034	1,635,336	345.7	216,351	56.5	1,418,986	289.2
2035	1,656,561	350.1	234,072	60.2	1,422,488	290.0
2036	1,676,719	353.9	248,862	63.8	1,427,857	290.1
2037	1,694,697	359.0	265,661	67.5	1,429,036	291.5
2038	1,715,466	363.4	283,383	71.2	1,432,083	292.2
Compound Avg. Growth Rates:						
2024-2029	1.5%	1.5%			0.3%	0.6%
2031-2038	1.3%	1.3%			0.2%	0.3%

After netting away projected impacts of future DSM activity, projected Gross IMS Energy and Peak Demand values further reduced by mostly hydro generation resources operated by the members and the impact of CROD for Austin and Rochester. This results in the final forecast of Net IMS Energy and Peak Demand shown in Table 3-6 below.[7]

Table 3-6
Base Case Net IMS Energy and Peak Demand

	Energy (MWh)	Peak Demand (MW)
2024	2,918,185	561.5
2025	2,917,574	563.1
2026	2,926,402	564.2
2027	2,937,258	565.5
2028	2,954,947	566.4
2029	2,961,304	568.1
2030	1,774,431	285.7
2031	1,409,102	286.7
2032	1,415,510	287.2
2033	1,417,272	288.5
2034	1,421,227	289.4
2035	1,425,067	290.2
2036	1,430,781	290.3
2037	1,432,315	291.7
2038	1,435,723	292.5
Compound Avg. Growth Rates:		
2024-2029	0.3%	0.2%
2031-2038	0.3%	0.3%

Alternative Forecast Scenarios

While a forecast that is derived from projections of the driving variables, obtained from reputable sources, provides a sound basis for planning, there is significant uncertainty in the future level of such variables. To the extent that economic, demographic, weather, or other conditions occur that are different from those assumed or provided, the actual member load can be expected to vary from the forecast. For planning purposes, it is important to understand the amount by which the forecast can be in error and the sources of error.

An important source of load forecast error is the uncertainty in future economic and demographic variables, which can trend very differently than projected. The Base Case forecast relies on a set of assumptions, developed from projections provided by Woods & Poole and the Minnesota Management and Budget office, regarding future population and economic activity in the counties that comprise the service areas of the members. However, such projections are unlikely to exactly match the resulting data

[7] These values differ from SMMPA's wholesale budget forecast in that WAPA resources are included, as they are dispatched by SMMPA rather than the members and simply credited to the members separately.

as future periods become history. In order to estimate this source of error, we have relied on statistics published by Woods & Poole regarding the error in its projections over the years. Woods & Poole publishes several statistics that define the average amount by which various projections they have prepared over 1984 through 2022 are different from actual results. We have utilized these statistics to develop ranges of the future trends of economic activity and population representing approximately 90 percent of potential outcomes (i.e., 1.7 standard deviations).

Table 3-7 below provides the amount by which the economic and demographic projections were adjusted from the Base Case assumptions through 2042 to develop the High and Low Economic Cases. Other dollar-denominated economic data, such as retail sales and gross domestic product, were assumed to vary by the same degree as income.[8]

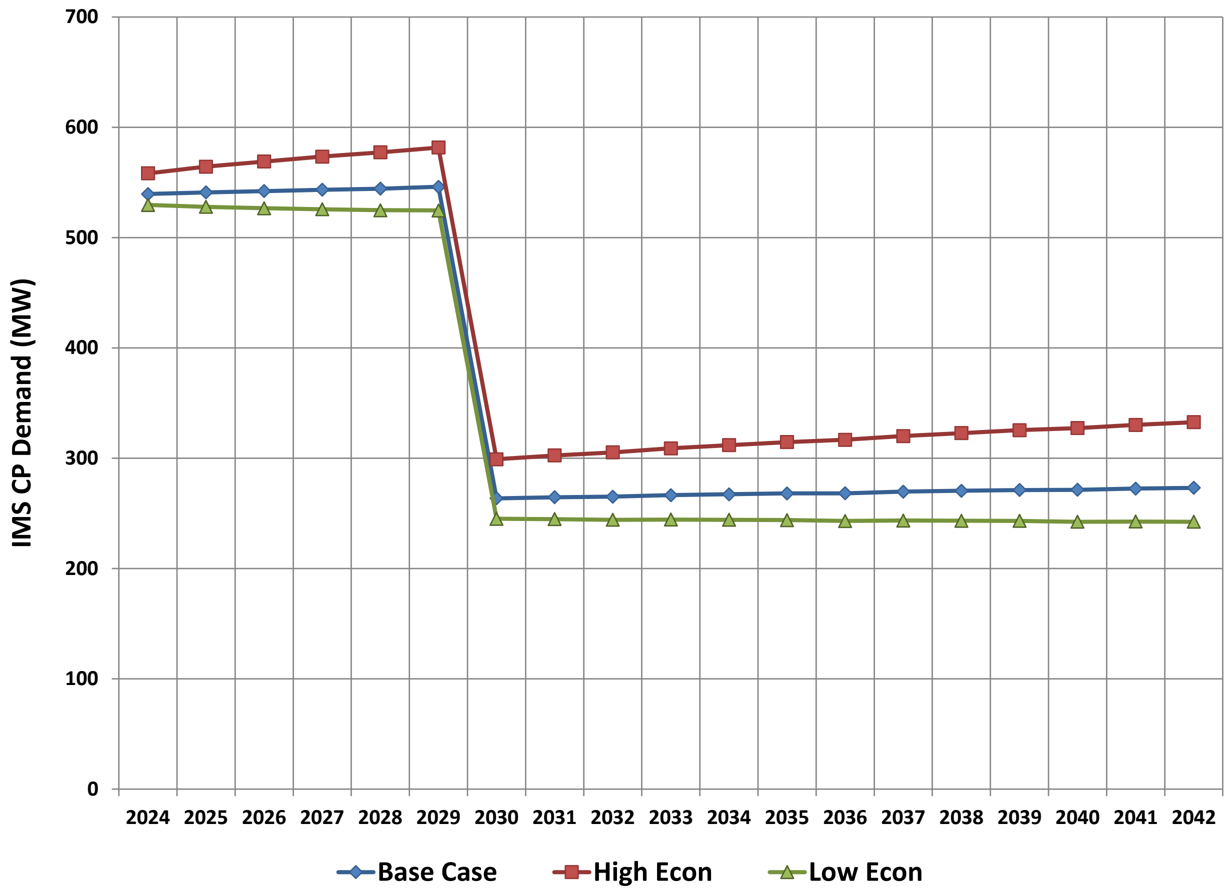
Table 3-7
Assumed Variation in Selected Socioeconomic Variables

	Population	Employment	Income	Income Per Capita
2023	1.2%	2.4%	3.2%	2.4%
2024	1.9%	3.6%	4.6%	3.3%
2025	2.5%	4.5%	5.6%	4.0%
2026	3.0%	5.3%	6.5%	4.6%
2027	3.5%	6.0%	7.3%	5.1%
2028	3.9%	6.7%	8.0%	5.5%
2029	4.3%	7.3%	8.6%	6.0%
2030	4.7%	7.9%	9.2%	6.3%
2031	5.1%	8.4%	9.8%	6.7%
2032	5.4%	8.9%	10.3%	7.0%
2033	5.8%	9.4%	10.8%	7.3%
2034	6.1%	9.9%	11.3%	7.6%
2035	6.4%	10.4%	11.7%	7.9%
2036	6.7%	10.8%	12.2%	8.1%
2037	7.1%	11.3%	12.6%	8.4%
2038	7.4%	11.7%	13.0%	8.6%
2039	7.6%	12.1%	13.4%	8.8%
2040	7.9%	12.5%	13.8%	9.1%
2041	8.2%	12.9%	14.2%	9.3%
2042	8.5%	13.3%	14.6%	9.5%

[8] All dollar-denominated series utilized in the forecast reflect constant dollars.

Chart 3-3 below depicts the forecast of SMMPA IMS Peak Demand from the High and Low Economic Scenarios as compared to the Base Case forecast.

Chart 3-3
Range of Adjusted IMS Peak Demand Forecasts



The High and Low Scenarios reflect differences to the Base Case of approximately positive 36 MW (7 percent) and negative 21 MW (4 percent), respectively, by 2029 (i.e., approximately five years into the forecast horizon) and positive 45 MW (17 percent) and negative 23 MW (9 percent), respectively, by 2034 (i.e., ten years into the forecast horizon), the latter MW values being reduced slightly by the then-expected departure of the two SMMPA members in 2030 (though one of these reflects no variation in summer CP demand served by SMMPA as its summer CP demand is well above CROD). These differences are non-symmetrical as a result of the fact that the Base Case reflects somewhat less optimistic projections of economic and demographic growth across SMMPA's members' service areas than the consensus, which forms the basis of the high and low bounds of the confidence interval.

While weather uncertainty is an important contributor to year-to-year variations in both energy and peak demand, the use of these scenarios herein was arrived at based on the long-term nature of the IRP and the expectation that the impact of the uncertainty in weather on the forecasts of load determinants would be small relative to the economic uncertainty within several years into the forecast horizon.

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4. Resources

GENERAL DISCUSSION

SMMPA and its members operate entirely within the footprint of the Midcontinent Independent System Operator (MISO). Operating within the MISO market, SMMPA is required to own or control enough generating capacity to serve its forecasted load, plus a reserve requirement percentage determined by MISO. However, SMMPA does not run its own generation to serve its load. Instead, the Agency offers all of its generating resources into the MISO market. The generation is dispatched by MISO based on economics and operational needs of the entire MISO system, without direct consideration of SMMPA's load requirements. The Agency, in turn, purchases all of the energy needed to serve its members' load from the MISO market.

The Agency owns a fleet of resources, described herein, that help support reliable operation of the electric grid, but that also provide an economic hedge against price increases in the MISO market. While SMMPA owns or controls sufficient generating resources to serve its total load, much of the time, MISO is not calling on SMMPA generation to run at that level. One can think of SMMPA serving its load with a combination of its own generation that is being run by MISO, and purchases from other generators being run by MISO.

Chart 4-1 shows the diversity of SMMPA's current generation capacity portfolio by resource type, and Chart 4-2 shows an approximation of the combination of Agency resources and market purchases used to meet SMMPA's energy needs in 2023, including energy consumption eliminated by Demand Side Management (DSM) – see section 5 for a discussion of SMMPA's DSM programs. Again, SMMPA is actually purchasing its total energy requirements from MISO.

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Chart 4-1

Current Resource Capacity Mix

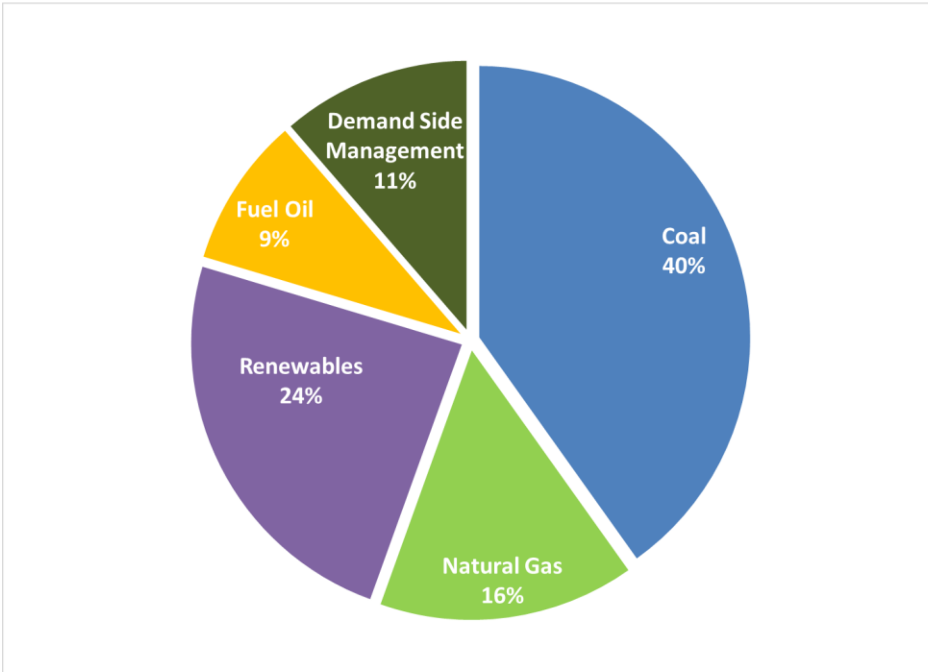
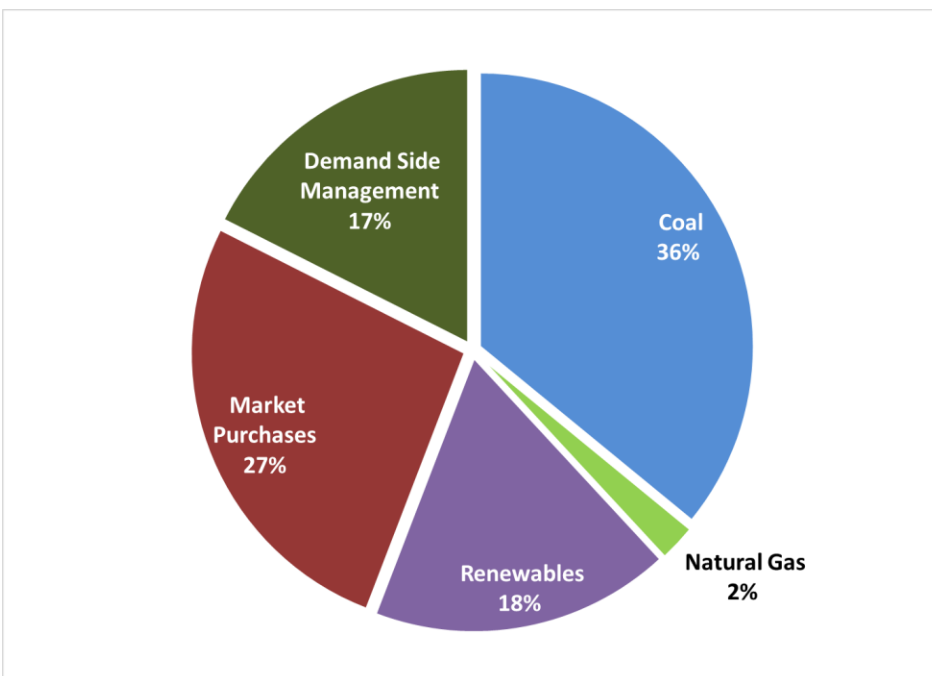


Chart 4-2

2023 Energy Mix



GENERATION PORTFOLIO

SMMPA has a variety of existing resources available to both reliably and economically meet the energy needs of its members. These resources consist of base load, intermediate, peaking, and renewable facilities.

BASE LOAD FACILITIES

Sherburne County Unit 3

Sherburne County Generating Station Unit 3 (Sherco 3) is jointly owned by SMMPA and Xcel Energy (Xcel), with Xcel operating the plant on behalf of both owners. SMMPA owns 41 percent of Sherco 3 and Xcel owns the remaining 59 percent. Sherco 3 is one of the Agency's lowest cost generation resources and produces more annual energy than any other SMMPA resource. The plant is a pulverized coal power plant with a state-of-the-art air quality control system (AQCS). The AQCS consists of eight dry scrubber modules and a downstream bag house. With this technology, the AQCS is capable of removing over 70 percent of the sulfur dioxide and 98 percent of the particulate matter from the flue gas. With the use of an activated carbon injection system installed in 2010, the AQCS system is capable of removing approximately 90 percent of mercury emissions. In 2008, the boiler was equipped with low-NOx burners for limiting the formation of nitrous oxides.

While Sherco 3 has been, and continues to be, an important resource for SMMPA, in recent years it has become challenging to economically operate large coal units such as this as base load resources in the MISO market. Long range plans developed by both SMMPA and Xcel resulted in the recommendation to retire Sherco 3 by the end of 2030.

While Sherco 3 is slated for retirement in 2030, it is important to ensure the unit is well maintained and ready to operate safely, efficiently, and reliably when called upon. In addition to routine annual maintenance and repairs, Sherco 3 continues to be scheduled for a planned major outage for repairs every three years. The most recent planned outage took place in the spring of 2023. The next maintenance outage is scheduled for spring of 2026, and there may be one additional planned major maintenance outage in 2029 before the unit's retirement. SMMPA and Xcel coordinate decisions related to the unit through a formal Management Committee.

INTERMEDIATE LOAD FACILITIES

Table 4-1 shows the most recent natural gas generation added by SMMPA. In 2013, the Agency completed the construction of four new generating units in Fairmont, MN, with a total nameplate capability of 26 MW. An additional four new units with 38.8 MW of total nameplate capability went into commercial operation in Owatonna, MN in 2018. These natural gas-fired, high-efficiency reciprocating internal combustion engine units replaced older, less efficient steam boilers and turbines at both locations. Although internal combustion generating plants are generally considered as peaking resources, these high-efficiency units are up to 20 percent more efficient than traditional internal combustion engines or combustion turbines and are therefore dispatched by MISO as intermediate load units. Because these units can be started very quickly and can change output levels quickly, they are often used to help balance the variable output of wind and solar generation in the region. In addition, these generators are run by MISO to help provide voltage support in the area when transmission congestion exists.

Table 4-1

SMMPA Generating Capacity – Intermediate Resources

			Year Installed	Unit Capacity (MW)	Plant Total (MW)
Fairmont	Unit	1	2013	6.5	
	Unit	2	2013	6.5	
	Unit	3	2013	6.5	
	Unit	4	2013	6.5	26.1
Owatonna	Unit	1	2018	9.7	
	Unit	2	2018	9.7	
	Unit	3	2018	9.7	
	Unit	4	2018	9.7	38.8

PEAKING FACILITIES

The mix of peaking facilities within the SMMPA system consists of two SMMPA-owned 6 MW dual fuel (natural gas and fuel oil) reciprocating internal combustion engines in Fairmont, MN, one member-owned combustion turbine, and 56 member-owned natural gas and oil fired reciprocating internal combustion engines. The member-owned generation totals approximately 149 MW. Of the seventeen members in the SMMPA system, twelve have generating capacity under contract with the Agency. North Branch also has a generating plant that is under contract with the Agency. Having this generation located in the member communities substantially improves system reliability for the member cities and the neighboring communities. Each member can use this generation to maintain electric service to their customers when the local transmission lines are out of service. MISO can use this distributed generation to maintain grid voltage in the local area when transmission congestion exists.

These units have also proven to be important emergency generators for the grid in extreme weather events and system emergencies. During the polar vortex event in 2019 and winter storm Uri in 2021, these units were called upon by MISO and ran for multiple days consecutively. Because many of these units can be run on straight diesel fuel oil which is stored on site, they are able to continue running and provide grid support when natural gas supplies may be curtailed. Under normal conditions, these units run very little and therefore contribute very little to overall emissions, but they serve critical functions for member communities and the grid in times of emergencies.

Member-Owned Combustion Turbine

SMMPA has one combustion turbine in its resource mix. The Owatonna Unit 7 is a Pratt-Whitney FT4 engine rated at approximately 16.5 MW. This combustion turbine was installed by Owatonna Public Utilities in 1982, was completely overhauled in 2019, and continues to provide peaking service for SMMPA.

Member- and SMMPA-Owned Reciprocating Engines

There are currently 58 natural gas- and oil-fired reciprocating engines located at SMMPA member cities, including the SMMPA-owned dual fuel units, totaling approximately 144 MW. These units provide valuable capacity to SMMPA and serve as a backup power supply for the communities and the grid in times of emergency. Member-owned units are operated and maintained by the members that own them. SMMPA has full-time staff to address ongoing maintenance concerns and coordinate the operations and maintenance (O&M) activities of the various member plants. SMMPA conducts on-going training sessions for all member plant personnel. In addition, regular exercise and maintenance procedures have been established to monitor and ensure that the units are in good operating condition.

In 2013, SMMPA retrofitted 27 of the member-owned generators, plus the two SMMPA-owned dual fuel engines, with new carbon monoxide (CO) catalytic reduction systems in compliance with the new federal Maximum Available Control Technology (MACT) requirements for reciprocating internal combustion engines (RICE). That project cost approximately $3.3 million. Table 4-2 shows the dual fuel (natural gas and fuel oil), straight fuel oil, and natural gas combustion turbine member-owned peaking generators under long-term contract to the Agency, as well as the SMMPA-owned peaking resources in Fairmont.

Table 4-2

SMMPA Generating Capacity – Peaking Resources

Station	Fuel Type	Plant Total (MW)
Blooming Prairie	Oil	6.8
Fairmont (SMMPA-owned)	Dual Fuel	12.0
Grand Marais	Oil	6.0
Litchfield	Dual Fuel	4.2
	Oil	15.8
Mora	Dual Fuel	6.1
	Oil	6.8
New Prague	Dual Fuel	18.0
North Branch	Oil	10.0
Owatonna	Natural Gas	16.5
Preston	Oil	4.1
Princeton	Oil	12.1
Redwood Falls	Dual Fuel	6.1
	Oil	8.3
Saint Peter	Oil	12.0
Spring Valley	Dual Fuel	3.3
	Oil	4.0
Wells	Dual Fuel	7.2
	Oil	1.8
Total Peaking Capacity		**161.1**

RENEWABLE RESOURCES

SMMPA's generation portfolio currently consists of more than 217 MW of renewable resources including wind, biomass, small hydro, and solar. Some of this generation is owned by SMMPA or one of its members, and some it obtained through power purchase agreements (PPA). Table 4-3 shows the renewable resources owned and contracted for by the Agency. Additional information about these renewable assets and the Agency's approach to meeting the requirements of the state's renewable portfolio standard can be found in the Renewable Resources section of this IRP.

Table 4-3

SMMPA Generating Capacity – Renewable Resources

Station & Unit Number	Type	Structure	Year Installed	Unit Capacity (MW)
Fairmont Phase I	Wind	Owned	2003	1.9
Fairmont Phase II	Wind	Owned	2004/2005	3.3
Redwood Falls Phase II	Wind	Owned	2004/2005	3.3
Redwood Falls Hydro	Hydro	Member	N/A	0.5
OWEF	Biomass	PPA	2006	1.0
Wapsipinicon	Wind	PPA	2009	100.5
Mora Landfill Gas	Biomass	Owned	2012	1.6
Bio-diesel Fuel	Biomass	Members	N/A	N/A
Lemond Solar	Solar	PPA	2017	5.0
Stoneray	Wind	PPA	2020	100.0
Total				**217.1**

MISO MARKET OPERATIONS

SMMPA's approach to wholesale power marketing has evolved over time. It has gone from the MAPP days of generating to serve SMMPA's load and making bilateral wholesale sales, to the sophistication of the formal MISO energy and ancillary services markets. The Agency recognized the MISO market offered not only opportunities to optimize the efficient use of its generating assets, but also provided access to other low-cost resources which could help to lower overall costs to its members. In addition to opportunities presented by active involvement in MISO, the Agency also recognized the need for help navigating the complexities of the market. Accordingly, in late 2005, the Agency and The Energy Authority (TEA) entered into an agreement whereby TEA would assist the Agency in wholesale power marketing activities. TEA has a highly trained, capable staff of analysts, engineers, marketers, and traders, and provides power marketing services for public power utilities across the country in multiple regional transmission markets. Working with TEA gives SMMPA access to a level of market sophistication and expertise that would be difficult for SMMPA to achieve on its own.

TRANSMISSION ASSETS

SMMPA is a Transmission Owning member of MISO. As such, the Agency has turned over operational control of its high-voltage transmission assets to MISO. Reliability compliance oversight of the Agency's assets and operations is provided by the Midwest Reliability Organization (MRO).

The Agency is committed to ensuring there is adequate transmission for reliable operation of the grid, as well as for access to new generating resources, including wind and solar. SMMPA participates in joint planning through MISO activities and through working directly with other utilities in the region. The Agency actively participates with the Minnesota Transmission Owners (MTO) group in order to comply with the Minnesota biennial transmission reporting requirements. The MTO group consists of American Transmission Company, Dairyland Power Cooperative, East River Electric Power Cooperative, Great River Energy, Hutchinson Utilities Commission, ITC Midwest, L&O Power Cooperative, Marshall Municipal Utilities, Minnesota Power, Minnkota Power Cooperative, Missouri River Energy Services, Otter Tail Power Company, Rochester Public Utilities, SMMPA, Willmar Municipal Utilities, and Xcel Energy.

TRANSMISSION DEVELOPMENT

Grid North Partners

The Agency is an active member of the Grid North Partners (formerly CapX 2020) transmission analysis and planning effort, having joined the group in 2006. Through the efforts of the Grid North Partners participants, more than $2 billion has been invested in transmission construction and upgrades in and around the state of Minnesota to ensure electric reliability for Minnesota and the surrounding region in the future, and to provide access to new energy resources. SMMPA is a 13 percent owner in the CapX 2020 345 kV line that runs from Hampton, MN, to Rochester, MN, and on to La Crosse, WI. In addition, the Agency is a 6.5 percent participant in a 345 kV extension of that line from La Crosse to Madison, WI, through its Wisconsin subsidiary, SMMPA Wisconsin LLC.

As SMMPA and other utilities in the region implement aggressive decarbonization plans that include retirement of centralized coal plants and the addition of significant levels of disbursed renewable resources, the utilities responsible for operating the electric grid to reliably, safely, and affordably serve end use customers must understand how to operate with a different set of tools than they have historically relied upon. SMMPA has worked with Grid North Partners to help identify the range of challenges utilities will face and to educate and enlist the help of all stakeholders to identify solutions that will allow us to successfully transition to a low-carbon future. SMMPA believes this will require significant investment in new and upgraded transmission lines and substation, along with the deployment of other tools and technologies, some of which have yet to be developed. Identifying the future challenges now will allow the industry and stakeholders to begin to develop solutions before they are needed.

Transmission Facilities

The Agency's members are located in the balancing authority areas of the Agency, Xcel, Great River Energy (GRE) and Alliant Energy. SMMPA members are connected to the electric transmission systems of SMMPA, Xcel, Dairyland Power Cooperative, GRE, and ITC Midwest. SMMPA owns transmission assets in these other systems and has entered into shared transmission service agreements and joint pricing zone agreements that allow it to cost-effectively deliver energy across these transmission systems to serve its members' loads.

In addition to SMMPA's percentage ownership in CapX 2020 facilities, Table 4-4 lists the mileage of other transmission lines owned by SMMPA in Minnesota. All of these lines are overhead lines except for 6.9 miles of underground cable in the 69 kV class.

Table 4-4

Circuit Miles of Transmission by Voltage

Voltage (kV)	Circuit length (Miles)
230	17.09
161	123.68
115	11.85
69	149.80

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5. Demand-Side Management Resources

INTRODUCTION

Energy efficiency programs encourage customers to use electricity more efficiently and allow SMMPA to defer the acquisition and expense of new resources. Energy efficiency is relatively low cost and has proven to be SMMPA's best defense against climate change. Since 2005, the estimated lifetime impact of SMMPA's rebates on energy-efficient products has reduced carbon-dioxide emissions nearly 9 million tons - the equivalent of removing 1.9 million passenger vehicles from the road for one year.

Encouraging customers to use energy wisely through energy efficiency and conservation creates a cascade of economic benefits. Rebates help retailers and contractors make more sales. Customers save money on their investment in energy-efficient products and on their electric bills. Businesses grow more productive, competitive, and profitable.

This Plan continues SMMPA's long-standing commitment to DSM. Although DSM activities in other states around the country have ebbed and flowed over time, SMMPA has maintained a consistent and high level of commitment to DSM. This long-standing commitment and dedication to excellence in running cost-effective conservation programs places SMMPA among the nation's top municipal utilities and joint action agencies in terms of breadth of innovative efficiency programs offered.

This section provides an overview of the importance of SMMPA's energy efficiency programs in its resource planning. We begin with a historical look at SMMPA's energy efficiency accomplishments, and then discuss how future investments in comprehensive energy services, including traditional electric efficiency and newer beneficial electrification programs, will help to ensure that SMMPA is prepared to meet customer demand for electricity and the State's energy savings goals and emissions reduction targets.

HISTORICAL DSM PERFORMANCE

SMMPA and its members have a long-standing commitment to DSM-Conservation programs. Beginning in 1993, the Agency started developing a range of conservation/high-efficiency initiatives for its members. As the years have progressed, so has SMMPA's commitment to DSM-Conservation. SMMPA's energy efficiency programs have been ongoing for almost three decades and will continue to take a prominent and strategic resource planning role as SMMPA looks to the next 15 years and beyond.

SMMPA is committed to enhancing, developing, and implementing comprehensive, cost-effective, and innovative energy efficiency programs for members' customers. An indicator of this commitment is that SMMPA has added ten new energy efficiency measures to its suite of programs since the last IRP filing in late 2020. Another is the fact that SMMPA and its member utilities received their fifth ENERGY STAR® Award from the U.S. department of Energy and Environmental Protection Agency for their efforts to raise awareness about the benefits of using ENERGY STAR qualified products in homes and businesses:

- 2003 ENERGY STAR Award for Leadership in Energy Efficiency
- 2004 ENERGY STAR Award for National Campaign Promotion
- 2010 ENERGY STAR Award for Excellence in ENERGY STAR Promotion
- 2016 ENERGY STAR Partner of the Year Award - Energy Efficiency Program Delivery
- 2024 ENERGY STAR Partner of the Year Award - Energy Efficiency Program Delivery

As a whole, SMMPA members have a proven track record of strong DSM-Conservation performance. The Next Generation Energy Act of 2007 (MN Statute § 216B.242) established an aggressive Conservation Improvement Program (CIP) annual energy savings goal of 1.5 percent starting in 2010, along with an annual CIP spending requirement of 1.5 percent of gross operating revenues. For SMMPA members, the 1.5 percent savings goal was more than double their historic annual energy saving achievements. But they approached that challenge head-on by refining their DSM program strategy and expanding upon their proven program offerings. As shown in Chart 5-1 and Table 5-1 below, SMMPA's member utilities have collectively exceeded the CIP savings goal and CIP spending requirement every year except the last two and are on track to do so again in 2024. SMMPA's average annual CIP energy savings from 2010 to 2023 was 1.73 percent, and their average CIP spending over that period was 2.52 percent (Exhibit 3 shows a list of the 2023 CIP savings by member).

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Chart 5-1
2010-2039 Historical and Projected DSM Energy Savings

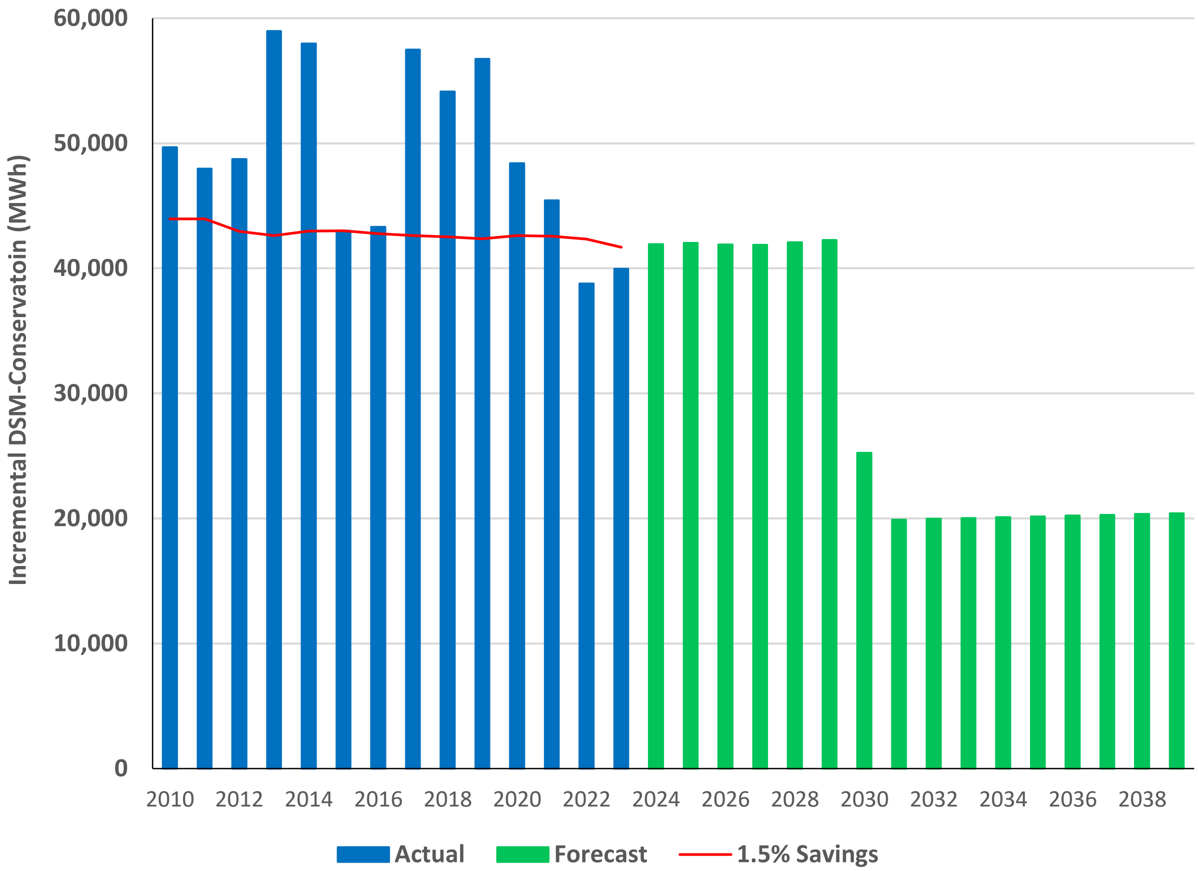

Table 5-1
2010-2039 Historical and Projected DSM Costs and Savings

Year	Annual Incremental Savings (MWh)	% CIP Savings	Annual CIP Spending	% CIP Spending	Aggregated Savings Lifetime (Years)	First-Year Cost per MWh	Lifetime Cost per MWh
2010	49,674	1.70%	$7,576,516	3.08%	12.3	$153	$12.42
2011	47,969	1.64%	$6,936,670	2.82%	11.9	$145	$12.11
2012	48,748	1.70%	$7,288,381	2.67%	11.9	$150	$12.57
2013	58,984	2.08%	$6,921,396	2.45%	13.0	$117	$9.03
2014	57,965	2.02%	$7,190,963	2.55%	12.2	$124	$10.14
2015	43,009	1.50%	$7,549,819	2.66%	11.6	$176	$15.15
2016	43,317	1.52%	$7,684,214	2.71%	11.6	$177	$15.35
2017	57,501	2.02%	$8,007,023	2.80%	11.7	$139	$11.86
2018	54,138	1.91%	$8,025,409	2.74%	12.2	$148	$12.16
2019	56,754	2.01%	$7,898,734	2.61%	12.2	$139	$11.43
2020	48,411	1.70%	$7,054,649	2.34%	12.0	$146	$12.18

Year	Annual Incremental Savings (MWh)	% CIP Savings	Annual CIP Spending	% CIP Spending	Aggregated Savings Lifetime (Years)	First-Year Cost per MWh	Lifetime Cost per MWh
2021	45,436	1.60%	$5,878,064	1.95%	11.9	$129	$10.85
2022	38,782	1.37%	$6,049,294	2.00%	12.0	$156	$13.01
2023	39,965	1.44%	$6,355,202	2.10%	12.0	$159	$13.23
2024	41,934	1.50%	$6,386,978	2.14%	12.1	$152	$12.64
2025	42,020	1.50%	$6,418,913	2.17%	12.1	$153	$12.67
2026	41,896	1.50%	$6,451,007	2.20%	12.1	$154	$12.78
2027	41,888	1.50%	$6,483,262	2.23%	12.1	$155	$12.84
2028	42,074	1.50%	$6,515,679	2.27%	12.1	$155	$12.85
2029	42,251	1.50%	$6,548,257	2.30%	12.1	$155	$12.86
2030	25,245	1.50%	$3,877,240	2.33%	12.1	$154	$12.74
2031	19,891	1.50%	$3,037,837	2.37%	12.1	$153	$12.67
2032	19,969	1.50%	$3,044,087	2.41%	12.1	$152	$12.65
2033	20,036	1.50%	$3,050,111	2.44%	12.1	$152	$12.63
2034	20,102	1.50%	$3,054,312	2.48%	12.1	$152	$12.61
2035	20,156	1.50%	$3,061,381	2.52%	12.1	$152	$12.60
2036	20,229	1.50%	$3,066,615	2.55%	12.1	$152	$12.58
2037	20,291	1.50%	$3,071,406	2.59%	12.1	$151	$12.56
2038	20,351	1.50%	$3,074,492	2.63%	12.1	$151	$12.53
2039	20,401	1.50%	$3,080,558	2.67%	12.1	$151	$12.53

SMMPA's historical and projected DSM demand savings are shown in Table 5-2. Similar to the data in Table 5-1, the historical 2010-2023 data in Table 5-2 reflects the demand savings reported in the respective CIP filings for those years, and the projected 2024-2039 data reflects the estimated DSM demand savings used in SMMPA's 2023 Load Forecast and IRP modeling. Note that since SMMPA's 2023 Load Forecast was used for IRP modeling, the projected 2023 DSM savings from that forecast were used for that modeling. However, SMMPA's actual 2023 DSM data is shown in this section since that was reported to the State this year.

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Table 5-2
2010-2039 Historical and Projected DSM Demand Savings

Year	Incremental DSM-Conservation Savings (MW)	Incremental Member Direct Load Control Savings (MW)	Incremental Energy Management Program Savings		Incremental Member Other Peak Shaving (MW)	TOTAL Annual Incremental Peak Demand Savings (MW)
			SMMPA's Program (MW)	Members' Programs (MW)		
2010	14.6	23.7	0.0	9.8	NA	**48.1**
2011	14.5	25.2	0.0	9.9	NA	**49.6**
2012	14.2	32.5	0.0	9.7	NA	**56.5**
2013	13.8	27.9	0.0	11.3	NA	**53.0**
2014	13.0	13.7	0.0	4.8	3.8	**35.4**
2015	6.7	12.9	0.0	5.7	3.8	**29.2**
2016	5.9	12.4	0.0	5.2	3.8	**27.3**
2017	10.0	10.9	0.0	0.3	3.8	**25.0**
2018	7.8	12.3	0.0	7.0	3.8	**30.9**
2019	8.4	13.3	0.0	3.8	2.8	**28.4**
2020	6.8	13.3	0.0	4.4	3.8	**28.4**
2021	5.7	13.4	0.0	4.6	3.8	**27.5**
2022	5.8	13.4	0.0	6.1	3.8	**29.1**
2023	7.7	13.2	NA	5.1	3.8	**29.8**
2024	5.9	13.5	NA	8.7	3.8	**31.9**
2025	6.2	13.5	NA	8.7	3.8	**32.2**
2026	6.5	13.5	NA	8.7	3.8	**32.4**
2027	6.8	13.5	NA	8.7	3.8	**32.8**
2028	7.2	13.5	NA	8.7	3.8	**33.1**
2029	7.6	13.5	NA	8.7	3.8	**33.6**
2030	3.5	8.4	NA	5.1	3.8	**20.8**
2031	3.5	8.4	NA	5.1	3.8	**20.8**
2032	3.5	8.4	NA	5.1	3.8	**20.9**
2033	3.5	8.5	NA	5.1	3.8	**20.9**
2034	3.5	8.5	NA	5.1	3.8	**20.9**
2035	3.5	8.5	NA	5.1	3.8	**20.9**
2036	3.6	8.5	NA	5.1	3.8	**20.9**
2037	3.6	8.5	NA	5.1	3.8	**20.9**
2038	3.6	8.5	NA	5.1	3.8	**20.9**
2039	3.6	8.5	NA	5.1	3.8	**20.9**

The dramatic reduction in SMMPA's projected DSM-Conservation impacts beginning in 2030 is a result of the expected departure of Austin Utilities and Rochester Public Utilities from the Agency, effective April 2030.[1]

SMMPA started using the State's deemed savings in the Technical Reference Manual (TRM) for determining CIP savings in 2009. However, formal deemed savings algorithms for load control measures, such as air conditioner and water heater cycling, weren't included in the TRM until 2014. Implementing those TRM savings algorithms resulted in a large reduction in SMMPA's calculated/reported load control savings starting in 2014 compared to previous years. Additionally, a few members discontinued their direct load control programs around that time.

PROJECTED DSM PERFORMANCE

As shown in Table 5-1, SMMPA's goal is to continue to achieve at least 1.5 percent of total retail energy savings in each year of the planning period, but the current energy efficiency environment is rapidly evolving in ways that will continue to present new challenges to meeting the CIP savings goals over the 15-year planning period. Changing baselines, new efficiency codes and standards, uncertain economic conditions, and decreased opportunities with certain technologies, will all impact SMMPA's ability to meet those savings goals. Additionally, long-term energy savings require customers to take specific actions year after year, which introduces uncertainty regarding whether or not those savings will materialize.

Over the past ten years or so, cost-effective, efficient LED lighting products and projects across all customer sectors made their way to the forefront of SMMPA's CIP programs. LED lighting measures became an obvious and easy energy saving option for customers to identify and adopt, especially as they also became increasingly cost-effective for consumers. Customer awareness and acceptance increased as LEDs became the primary option on the market. These factors, in combination with strategic program design and marketing, resulted in lighting projects providing the majority of SMMPA's DSM savings for several years.

However, with changing efficiency codes and standards impacting lighting measure baselines, significant market penetration of commercial efficient lighting, and currently no alternative lighting technology more

[1] Subsequent to the development of these DSM projections, Austin and SMMPA agreed to extend the power sales agreement to 2050.

efficient than LEDs, SMMPA has seen participation in and savings from lighting projects decrease as most customers have now adopted that technology. Additionally, new federal lighting standards have caused us to eliminate our incentives for general purpose LED bulbs.

SMMPA will need to find new ways to continue meeting its CIP/ECO savings goal. The Agency intends to develop new demand-side programs and marketing strategies, while also obtaining energy efficiency savings through supply-side efficiency initiatives and beneficial electrification/efficient fuel-switching measures. Those technologies may be more costly, contractors may be hesitant to support newer technologies, and customers may not be as ready (or financially able) to adopt without significant education and higher incentives to do so. Therefore, SMMPA recognizes that increased education and outreach will be critical to delivering their projected DSM savings.

Converting vehicles and other equipment from fossil fuels to electricity is vital to the nationwide effort to reduce carbon emissions. That switch is known as beneficial electrification or efficient fuel-switching because the electric alternatives are more efficient, produce fewer emissions, and increasingly are powered by generation with little or no carbon emissions. A growing number of SMMPA members' customers are interested in the technologies that support the efficient electrification of end uses, such as electric vehicles (EVs) and efficient electric space and water heating. Plus, the Energy Conservation and Optimization (ECO) Act that was signed into law in 2021 allows utilities to claim CIP savings for those types of measures under certain conditions.

EVs have proven that they can save consumers money and reduce emissions, while also enhancing the operation of the power grid. Charging EVs overnight during off-peak hours costs less than the equivalent of $1 per gallon of gasoline and EV carbon emissions are already up to two-thirds lower than gasoline-powered vehicles - and will continue to decline as the electricity SMMPA provides becomes increasingly cleaner. SMMPA currently offers incentives that encourage participation in member time-of-use (TOU) rates for off-peak EV charging.

Heat pumps are also considered to be a beneficial electrification technology. They are a high-efficiency electric alternative to heating space and water with natural gas, propane, or fuel oil. By simply transferring heat from one place to another instead of generating heat directly, air-source heat pumps can lower costs by 30 to 55 percent compared to propane or electric resistance heat. Models developed for cold climates can now operate efficiently when outside temperatures are as low as -20°F.

SMMPA was one of five utilities to join a collaborative with the Center for Energy and Environment in 2020 to promote air-source heat pumps for home heating and cooling. The group aims to make air-source heat pumps the first choice for replacing heating systems and air conditioners. SMMPA has seen a steady increase of heat pump installations in member communities since joining the collaborative.

SMMPA plans to continue working with the State and other utilities to develop resources that will help utilities claim CIP savings for additional efficient fuel-switching/beneficial electrification measures and promote those efficient technologies to its members' customers.

These beneficial electrification measures are just some of the ways SMMPA plans to achieve 1.5% CIP savings over the 15-year planning period.

ENERGY EFFICIENCY PROGRAMS

SMMPA's strong commitment to DSM-Conservation is based on its interest in developing a least-cost resource base, its commitment to sound environmental practices, and its knowledge of the role energy efficiency and the wise use of electricity can play in helping customers reduce their bills and control energy costs. SMMPA, in conjunction with its members, provides many energy efficiency programs to members' end-use customers. Energy efficiency programs are designed for all customer classes and address specific energy end-uses. SMMPA views those offerings as an integral part of its strategy in helping customers control their energy costs and meet the challenges of an increasingly competitive marketplace.

The following DSM-Conservation programs are currently provided to SMMPA members' customers:

- Business Retrofit and New Construction Lighting Program
- Business High-Efficiency Cooling Programs (including Roof-Top Units, Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Mini-Split AC, Chillers, Air Source Heat Pumps, Ground Source Heat Pumps, and Water Source Heat Pumps)
- Business AC Tune-Up Program
- Business Chiller Tune-Up Program
- Business Heat Pump Programmable Thermostats Program
- Business Refrigeration Equipment Programs (including Efficient Evaporator Fan Motors in Refrigeration Cases, Efficient Motors on Refrigeration Compressors or Condenser Fans, Anti-Sweat Heater Controls, Floating Head Pressure Controls, Adding Doors to Open Multi-Deck

Cases, Efficient Multi-Deck Case Doors, and Walk-in Freezer Electric Demand Defrost Controls)

- Business High-Efficiency Motor Programs (including Efficient HVAC Fan Motors and Efficient Water Circulator Pumps)
- Business High-Efficiency HVAC Fans and Clean Water Pumps
- Business Efficient Furnace Fan Motor Program
- Business Adjustable Speed Drive Program
- Business Compressed Air Equipment Programs (including Variable Speed Drive (VSD) Air Compressors < 50 HP, Air Storage/Receiver Tanks, Pressure/Flow Controllers, No Loss Condensate Drains, Low Pressure Drop Filters, Refrigerated Cycling Air Dryer, and Engineered Nozzles)
- Business Compressed Air Leak Correction Program
- Lodging Guestroom Energy Management System Program
- Business Anti-Sweat Heater Controls Program
- Business VendingMiser and SnackMiser Program
- Commercial Food Service Program (including 12 different qualifying equipment types)
- Business Off-Peak/Time-of-Use EV Charging
- Business Custom Efficiency Program
- Business Recommissioning Program (Pilot)
- Building Operator Certification Training
- Residential Behavioral Program (Household Energy Use Comparisons)
- Residential Off-Peak/Time-of-Use EV Charging
- Residential Electric Lawn Equipment Program
- Residential ENERGY STAR Appliance Program
- Residential ENERGY STAR LED Bulb, Fixtures, and Ceiling Fans with Lighting Programs
- Residential Cooling Programs (including Central AC, Mini-Split AC, Air Source Heat Pumps, and Ground Source Heat Pumps)
- Residential Central AC and Air Source Heat Pump Tune-Up Program
- Residential Efficient Furnace Fan Motor Program
- Residential Smart Thermostat Program
- Residential Heat Pump Water Heaters Program
- Residential Efficient Water Circulator Pump Program
- Residential LED Holiday Lighting Program
- Low-Income Program

MEMBER DIRECT LOAD CONTROL

SMMPA's member utilities have developed extensive Direct Load Control (DLC) Programs. Members began installing DLC systems in 1985 predominantly as a means of managing the cost of their wholesale power supply by reducing their peak/billing demands. Today, members still own, operate, and maintain their own direct load control systems. SMMPA notifies its members during potential coincident peak demand periods so they can operate their systems to lower their demand (Exhibit 4 contains a list of the dates and times when SMMPA notified its members of coincident peak demand periods in 2023 and 2024 year-to-date). Member efforts are typically based upon air conditioner cycling and, to a lesser extent, electric hot water heater cycling.

Ten SMMPA members currently utilize DLC systems to manage peak demands. That number may increase over time since some members have started incorporating Advanced Metering Infrastructure (AMI) into their systems. AMI provides SMMPA members with increased metering accuracy, better energy theft protection, easier outage management, and additional direct load control opportunities.

Member utilities, with their close working relationships with their customer base, have achieved significant penetration into the number of available central air conditioners that are under control. This penetration has been based upon a mix of voluntary and incentive-based participation. It is the member municipal utility's strong direct contact efforts that have led to such significant participation (Exhibit 5 shows 2023 DLC participation by member).

In an effort to maximize the benefits of DLC initiatives, some members require the installation of load control switches in all new construction installations or service upgrades. Programs are mainly for residential customers, but persistent contact over the years has resulted in significant participation among some commercial customers as well. Additionally, some members control municipal loads, such as municipal water and/or wastewater pumping loads during peak demand periods.

ENERGY MANAGEMENT PROGRAMS

SMMPA's Energy Management (EM) Program was designed as a commercial and industrial interruptible program in 1995. The program was similar in nature to the load-shed cooperatives found around the country, such as those developed by Boston Edison, Commonwealth Edison, and Southern California Energy Coalition. Under the program, SMMPA purchased a specified amount of interruptible capacity during brief summer peak electric periods from interested member utility customers who could turn off at least 70 kW or operate at least 25 kW of load with their backup generator.

The Agency operated its EM program to reduce load when MISO declared a North American Electric Reliability Corporation (NERC) Energy Emergency Alert (EEA)-Level 3 during a MISO Max Gen Event. SMMPA had not operated its EM Program since 2005 because MISO did not declare any NERC Energy Emergency Alert-Level 3 events since that time.

SMMPA paused its EM program in 2022 to investigate revising the program to meet the new criteria/requirements of MISO's Demand Response (DR) Program. Since then, MISO has continued to revise the requirements of its DR program. SMMPA plans to continue watching MISO's program to determine if it can be leveraged to benefit its members.

Four SMMPA members, Austin Utilities, Owatonna Public Utilities, New Prague Utilities, and Waseca Utilities, operate Energy Management (EM) Programs designed as commercial and industrial interruptible programs for their respective utilities. Rochester Public Utilities (RPU) also operates their own curtailment program given the fact that RPU has established a Contract Rate of Delivery (CROD) at 216 MW (RPU is responsible for providing their own resources during hours in which their load exceeds 216 MW). The demand savings from member EM programs are listed separately in Table 5-2.

Under these programs, members purchase a specified amount of interruptible capacity during brief summer peak electric periods from interested customers who can curtail load or operate backup generator.

Since those members manage and operate their programs independent of SMMPA, the Agency does not have any details regarding the times or durations of individual member EM Program curtailments. However, given SMMPA's coincident peak billing structure, there should be a very high probability of reducing the SMMPA system load as these members seek to lower their own summer billing peaks.

Member EM programs serve as an excellent way to encourage customers to use interruptible options as a strategy for managing their energy costs and provides SMMPA with an additional line of defense to maintain system reliability.

OTHER MEMBER CURTAILMENTS

There are some resources which SMMPA considers to be curtailments to load. In general, these are resources to which SMMPA does not have ownership rights, but the resources do reduce the power and energy SMMPA must provide to its members. The Agency works with its members and their customers to try to ensure that these curtailments are being dispatched in a cost-effective manner so that they lower the cost to not only the owners, but also to SMMPA. The Agency has three resources it considers curtailments - Western Area Power Administration allocations to members, retail customer-owned distributed generation, and member-owned hydroelectric plants.

Some SMMPA members also operate municipal facilities' emergency generation for load reduction during peak periods. The estimated demand reductions from those activities are shown in the "Member Other Peak Shaving" column in Table 5-2 since those demands are included in SMMPA's 2023 Load Forecast and IRP modeling.

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6. Renewable Resources

GENERAL DISCUSSION

In 2007, the Minnesota Legislature amended the renewable energy objective statute, creating a Renewable Energy Standard (RES). The standard set requirements for Minnesota utilities, including SMMPA, to serve a percentage of their retail sales from qualifying renewable resources. For 2024, the standard requires SMMPA to provide 20 percent of its energy from renewable sources. The benchmark increases to 25 percent in 2025. The Agency has maintained compliance since commencement of the standard.

SMMPA has implemented a portfolio approach to procure qualifying renewable resources. This strategy utilizes multiple technologies and various ownership structures. Chart 6-1 is a graphical depiction of how SMMPA has and will comply with the renewable energy standard. The chart shows the yearly credit retirements required by the standard, along with the historical and projected credit production from the Agency's portfolio. Note that, due to step increases within the standard and the economies of scale provided by larger projects, a credit banking and depletion strategy filled the gaps in years 2016 through 2019 and will also be used in 2029 and 2030 when the renewable need outpaces the renewable generation production.

In 2023, the Minnesota Legislature passed legislation creating the Carbon-Free Standard (CFS). The standard includes requirements for utilities to generate or procure electricity from carbon-free sources sufficient to provide for the energy needs of its customers. The legislation will require municipal utilities, including SMMPA, to reach carbon-free goals of 60 percent in 2030, 90 percent in 2035 and 100 percent in 2040. At the time that this submission was prepared, the Minnesota Public Utilities Commission had opened a docket to seek comments on any needed clarifications to the law before it is implemented.

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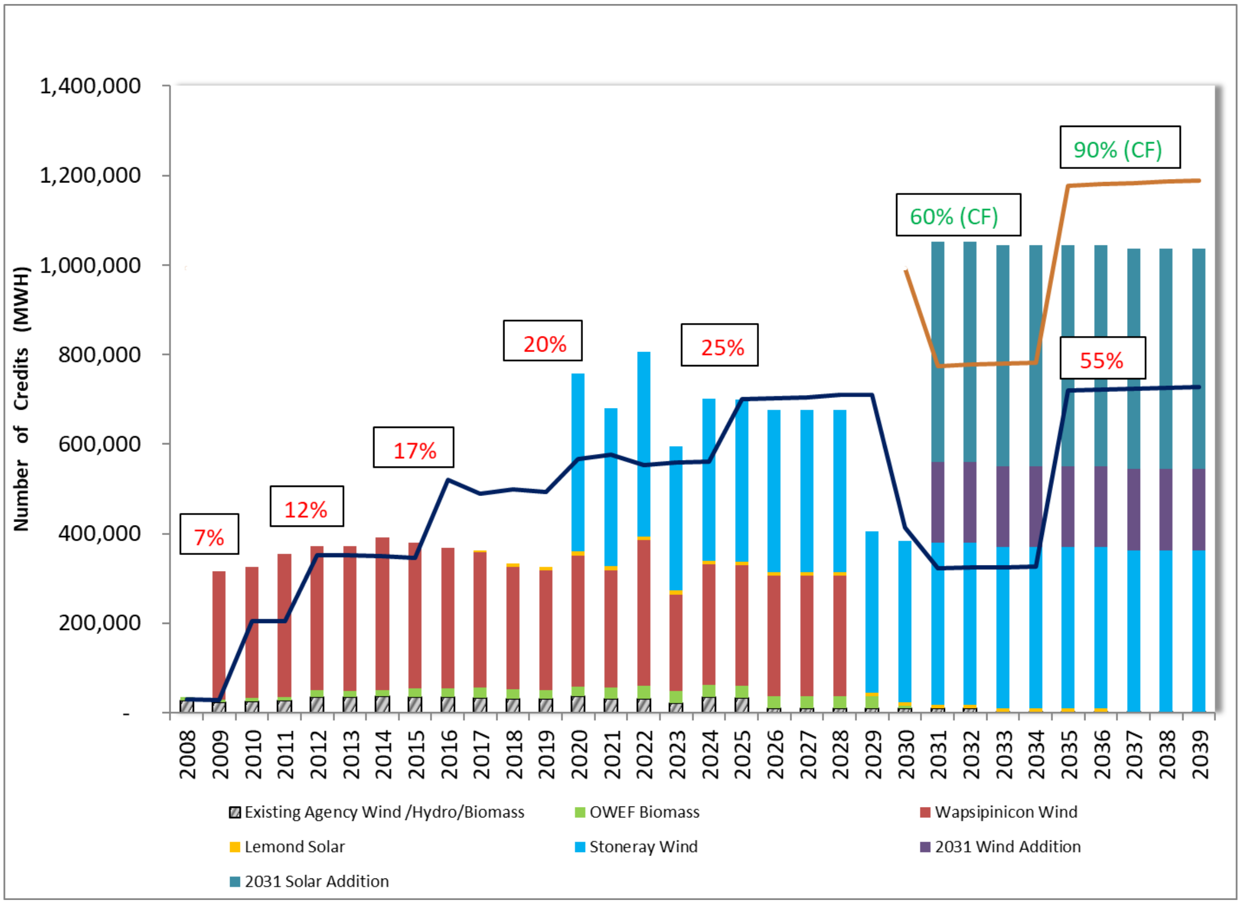
Chart 6-1

SMMPA Renewable Energy Standard Compliance



Existing Agency Wind/Hydro/Biomass

This aggregation shown in Chart 6-1 includes the production from several small-scale Agency and member-owned (under contract to SMMPA) qualifying renewable resources located within the state of Minnesota. These resources include:

- 8.5 MW of SMMPA-owned wind turbines
- 1.6 MW of SMMPA-owned landfill gas generation
- 500 kW member-owned hydro unit

Olmsted County Waste to Energy Facility Biomass

Olmsted County Waste to Energy Facility (OWEF) is an 8.7 MW combined heat and powered facility, located in Rochester, MN, that is owned and operated by Olmsted County. The facility utilizes municipal solid waste to produce steam for electric generation. The facility's electrical output and environmental attributes are contractually sold to SMMPA and Rochester Public Utilities (RPU). SMMPA claims all renewable credits from the facility in the Midwest Renewable Energy Tracking System (M-RETS) and annually transfers to RPU the credits attributed to their offtake of energy from the facility. Only SMMPA's credits are depicted in Chart 6-1.

Wapsipinicon Wind

Wapsipinicon Wind Project is a 100.5 MW electric generating wind facility owned and operated by EDF Renewable Energy. The facility is located in Mower County, MN. The facility's energy output and environmental attributes are sold to SMMPA under a 20-year power purchase agreement that expires in 2029.

Lemond Solar

Lemond Solar Center is a 5 MW AC / 6.58 MW DC solar facility owned and operated by Enerparc Inc. The facility is located near Owatonna, MN, and was commissioned in 2017. SMMPA is the sole off-taker from the facility under a 20-year power purchase agreement. SMMPA sold a small percentage (5.6 percent) to Central Minnesota Power Agency/Services under an agreement that terminated June 2021. In addition to using the facility for capacity and energy in MISO, the Agency used it as a springboard for their community solar program called Solar Choice, which is explained later in this section.

Stoneray Wind

Stoneray Wind Project is a 100 MW facility built, owned, and operated by EDF Renewable Energy. SMMPA entered into a 20-year power purchase agreement with EDF Renewable Energy for the energy and environmental attributes of the facility starting in 2020. The facility is located in Pipestone and Murray counties in Minnesota.

Renewable Energy Standard

The Renewable Energy Standard represents the renewable energy credit retirements required to comply with the Minnesota objective/standard for each year.

SOLAR CHOICE PROGRAM

In 2016, SMMPA and its member utilities began investigating the development of a community solar program. After considering smaller solar arrays located in individual communities, SMMPA and its members opted to go with one large solar array that supports the program across potentially all member communities. The program, called Solar Choice, provides customers an alternative to rooftop solar by allowing residential and business customers the opportunity to subscribe to the output of panels in this large solar garden and receive credit for solar generation on their energy bills each month.

Each member can design their program differently, but in general, customers enroll for between 50 percent and 100 percent of their average monthly electrical usage over the past twelve months and subscribe to the output of a set number of solar panels. In exchange for an up-front subscription payment, customers receive a monthly credit on their electric bill for the output from the subscribed panels. Terms generally range from five to ten years. Each 335-watt (DC) panel is anticipated to average 485 kilowatt-hours (kWh) of output annually over the 25-year expected life of the panels. Energy for the program is provided by the 5 MW Lemond Solar Center near Owatonna, MN, that is contracted to SMMPA for twenty years, and began operations on June 30, 2017.

SMMPA member communities Austin and Saint Peter are currently offering new subscriptions to the Solar Choice program, and a third member community intends to begin offering subscriptions in 2025. As of August 1, 2024, there were approximately 1,300 active panel subscriptions of varying terms in the member communities of Austin, Princeton, Rochester, and Saint Peter.

COMPLIANCE FILINGS

Consistent with the Minnesota Public Utilities Commission (MPUC) order, all renewable resources used for the purpose of meeting the Minnesota RES are registered with M-RETS. SMMPA annually retires enough renewable energy credits through M-RETS to fulfill its obligations under the RES and files an RES compliance report with the MPUC in compliance with 216B.1691 Subd.3. SMMPA biannually files a report with the MPUC stating the status of its renewable energy mix relative to the standard, its efforts to meet the standard, any obstacles encountered or anticipated for meeting the standards, and any solutions to overcome those obstacles.

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7. Sensitivity Cases

GENERAL DISCUSSION

SMMPA and its members have the potential to be impacted by sudden or unexpected events, changes in environmental regulations, changes in tax laws, and other events over which it has little or no control. This section details those situations that SMMPA feels have the potential to have noticeable effects on its resource alternatives.

BASE CASE ALTERNATIVES

Seven different base case alternatives were developed for this analysis. These base case alternatives are designated as cases P1 through P7 on Table 7-1a and 7-1b. These tables show the new resources added under each of the base case alternatives, as well as the cumulative net present value (NPV) of each alternative under various sensitivities. It also shows the relative difference in NPV for each option as compared to the P1 – "Optimized Case". All cases assume that Sherco 3 retires at the end of 2030. Although the retirement of Sherco 3 will result in a loss of approximately 365 MW of MISO accredited capacity, SMMPA is also expected to lose more than 280 MW of load due to the departure of the Rochester and Austin in 2030.[1]

The first base case scenario was determined by performing a long-term optimization run using the Aurora planning model. This identified the optimized resource mix with the lowest overall cost. This Optimized Case resulted in a generation addition of 70 MW of dispatchable natural gas fired generation and 14 MW of dispatchable oil-fired diesel generation to replace the retirement of Sherco and to cover generation shortfall caused by MISO's transition to a DLOL accreditation methodology. Since the model did not choose any new renewable generation, the Optimized Case meets the State of Minnesota's carbon-free requirements using the existing fleet of carbon free generation supplemented with the purchase of renewable energy credits (RECs). Chart 7-1 shows the resource portfolio by year under the Optimized Case.

The P1 – "Optimized Case" developed for this IRP yields a significantly different generation build out than SMMPA's 2021 IRP. The previous IRP called for the addition of 225 MW of new solar generation

[1] Subsequent to the development of these base case alternatives, Austin and SMMPA agreed to extend the power sales agreement to 2050.

and 14 MW of oil-fired diesel generation post-Sherco 3 retirement. This dramatic change is due to significant price escalations in the cost of solar generation since 2021, and the implementation of the MISO DLOL accreditation methodology which provides little to no capacity accreditation for solar generation during the winter season.

Table 7-1a

Base Case and Sensitivity Analysis at Normal Loads

2031 Additions	Optimal Case (Base)	60% Carbon Free in 2031 60 Solar/40 Wind	80% Carbon Free in 2031 60 Solar/40 Wind	Renewable Only Option (166% CF)	80% CF Capacity Only Battery Sherco Site	80% CF Capacity Only Battery Member Site	80% Carbon Free NREL Battery
Case #	P1	P2	P3	P4	P5	P6	P7
New Gas (MW)	70	65	55			49	
New Oil (MW)							
New QS (MW)	14	14	14			14	
New Wind (MW)			50	500	50	50	50
New Solar (MW)		175	225		225	225	225
New Battery (MW)					90	10	90
Base Case	IRP1	IRP2	IRP3	IRP4	IRP5	IRP6	IRP7
Accumulated NPV 2050	1,448,285	1,508,357	1,539,887	1,593,798	1,545,916	1,545,155	1,587,857
(Better)/Worse from "Base"	-	60,072	91,602	145,513	97,631	96,870	139,572
High REC Prices - 50% High	IRP1	IRP2	IRP3	IRP4	IRP5	IRP6	IRP7
Accumulated NPV 2050	1,465,995	1,517,221	1,542,051	1,569,779	1,548,080	1,547,319	1,590,021
(Better)/Worse from "Base"	-	51,226	76,056	103,785	82,085	81,324	124,027
Low REC Prices - 50% Low	IRP1	IRP2	IRP3	IRP4	IRP5	IRP6	IRP7
Accumulated NPV 2050	1,430,576	1,499,493	1,537,724	1,617,816	1,543,753	1,542,992	1,585,694
(Better)/Worse from "Base"	-	68,917	107,148	187,240	113,176	112,415	155,118
High LMPs - 50% High	IRP8	IRP9	IRP10	IRP11	IRP12	IRP13	IRP14
Accumulated NPV 2050	1,511,681	1,507,531	1,510,281	1,540,365	1,562,552	1,520,575	1,584,852
(Better)/Worse from "Base"	-	(4,150)	(1,400)	28,684	50,871	8,894	73,171
Low LMPs - 50% Low	IRP15	IRP16	IRP17	IRP18	IRP19	IRP20	IRP21
Accumulated NPV 2050	1,250,344	1,377,825	1,444,662	1,559,197	1,441,229	1,448,892	1,502,765
(Better)/Worse from "Base"	-	127,481	194,318	308,852	190,885	198,548	252,421
High LMPs & NG - 50% High	IRP22	IRP23	IRP24	IRP25	IRP26	IRP27	IRP28
Accumulated NPV 2050	1,609,226	1,601,560	1,597,285	1,588,524	1,610,706	1,603,340	1,633,033
(Better)/Worse from "Base"	-	(7,666)	(11,941)	(20,702)	1,480	(5,886)	23,807
Low LMPs & NG - 50% Low	IRP29	IRP30	IRP31	IRP32	IRP33	IRP34	IRP35
Accumulated NPV 2050	1,242,218	1,370,130	1,437,542	1,554,781	1,436,759	1,442,071	1,498,236
(Better)/Worse from "Base"	-	127,912	195,324	312,564	194,541	199,853	256,018
High PPA - 25% High	IRP36	IRP37	IRP38	IRP39	IRP40	IRP41	IRP42
Accumulated NPV 2050	1,448,285	1,563,782	1,628,801	1,770,240	1,634,817	1,634,061	1,676,704
(Better)/Worse from "Base"	-	115,497	180,515	321,955	186,532	185,775	228,419
Low PPA - 25% Low	IRP43	IRP44	IRP45	IRP46	IRP47	IRP48	IRP49
Accumulated NPV 2050	1,448,211	1,452,771	1,450,769	1,417,314	1,456,914	1,456,029	1,498,814
(Better)/Worse from "Base"	-	4,560	2,558	(30,897)	8,703	7,818	50,603
High Externality	IRP64	IRP65	IRP66	IRP67	IRP68	IRP69	IRP70
Accumulated NPV 2050	1,528,130	1,587,746	1,618,416	1,667,675	1,619,793	1,623,219	1,661,693
(Better)/Worse from "Base"	-	59,616	90,286	139,544	91,663	95,089	133,562

*Note: Gold Boxes above designate lowest cost option.

All scenarios meet the future MN Carbon Free Requirements through mixtures of resource additions and REC purchases.

Table 7-1b

High and Low Load And No Market Capacity Sensitivity Cases

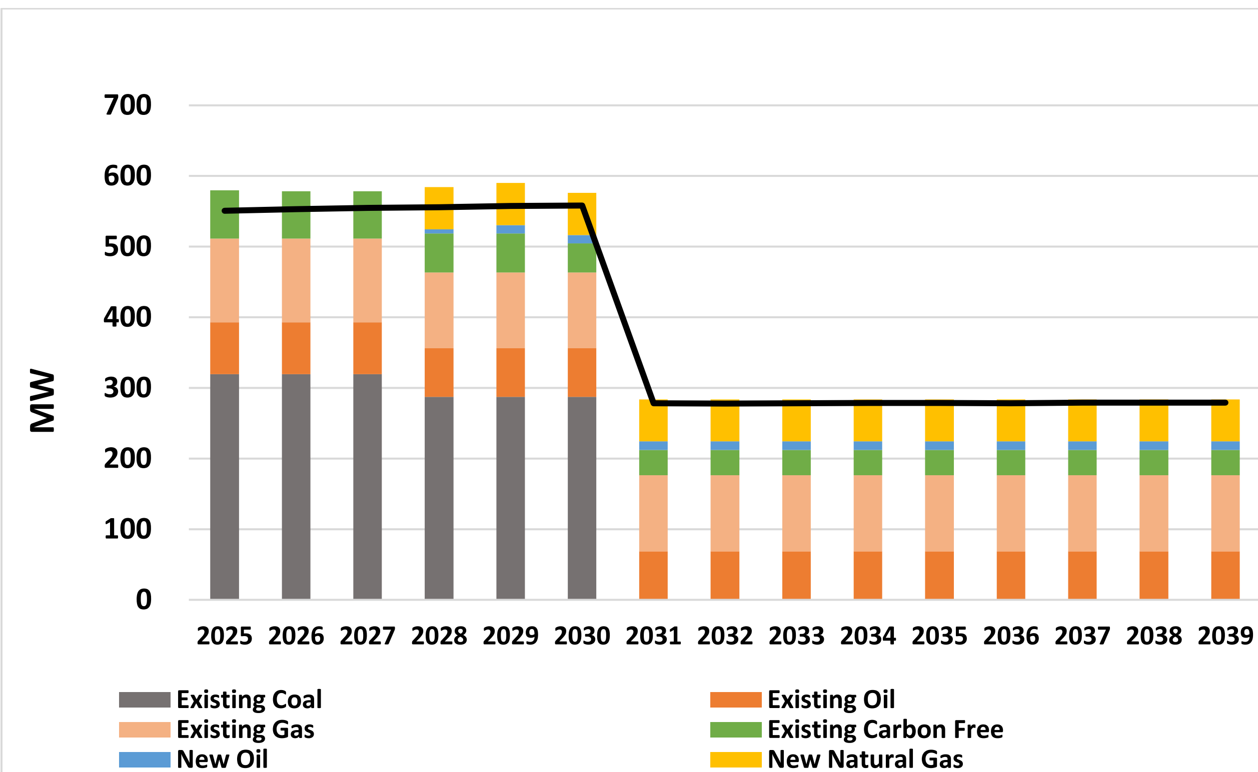
2031 Additions	Optimal Case (Base)	60% Carbon Free in 2031 60 Solar/40 Wind	80% Carbon Free in 2031 60 Solar/40 Wind	Renewable Only Option (166% CF)	80% CF Capacity Only Battery Sherco Site	80% CF Capacity Only Battery Member Site	80% Carbon Free NREL Battery
Case #	P1	P2	P3	P4	P5	P6	P7
High Load - 5% High	IRP50	IRP51	IRP52	IRP53	IRP54	IRP55	IRP56
Accumulated NPV 2050	1,513,023	1,573,088	1,604,609	1,658,557	1,610,673	1,609,861	1,652,573
(Better)/Worse from "Base"	-	60,064	91,585	145,534	97,650	96,838	139,550
Low Load - 5% Low	IRP57	IRP58	IRP59	IRP60	IRP61	IRP62	IRP63
Accumulated NPV 2050	1,383,398	1,443,463	1,474,984	1,528,932	1,481,048	1,480,236	1,522,948
(Better)/Worse from "Base"	-	60,064	91,585	145,534	97,650	96,838	139,550
Large New Member - 25% High Load	IRP71	IRP72	IRP73	IRP74	IRP75	IRP76	IRP77
Accumulated NPV 2050	1,705,997	1,791,191	1,811,056	1,993,168	1,850,081	1,838,631	1,938,503
(Better)/Worse from "Base"	-	85,193	105,059	287,170	144,084	132,634	232,505

*Note: Gold Boxes above designate lowest cost option.

All scenarios meet the future MN Carbon Free Requirements through mixtures of resource additions and REC purchases.

Chart 7-1

Case P1 – Optimized Case Resource Portfolio



The Optimized Case meets approximately half of the State's 2030 carbon free requirements with existing generation. The other half is achieved by purchasing RECs, assuming a cost of $3 per credit. Since there is a risk associated with relying on the REC market for such a large portion of the carbon free requirements, a case was run which forced the Aurora model to build new generation to meet the 60 percent carbon free requirement by 2030. This case is labeled as P2 – ”60% Carbon Free in 2031” in Tables 7-1a and 7-1b. This case is approximately $60 million more expensive than the Optimized Case over the study period, which makes it the most economical case after the Optimized Case. The 60 percent carbon free level was achieved by adding 175 MW of new solar generation in 2031. The model still chose 14 MW of new dispatchable oil-fired generation and 65 MW of new dispatchable natural gas-fired generation in order to meet the MISO capacity requirements during the winter seasons. In order to maintain an apples-to-apples comparison between the various cases, purchased RECs were used after 2030 to meet the higher carbon free requirements in future years.

In February 2020, SMMPA announced a strategic initiative, referred to as SMMPA 2.0, to retire its share of the Sherco 3 coal unit in 2030 and to add substantial amounts of wind and solar generation to its fleet. The plan will result in a 90 percent reduction in carbon emissions in 2030 compared to 2005 levels and a generation mix that is 80 percent carbon free going forward. A third case titled P3 – “80% Carbon Free in 2031” was run in order to determine the additional cost impact associated with pursuing this 80 percent carbon free target. Since the Aurora Model did not choose to install any renewable resources due to their high costs, the model was forced to build enough new carbon free resources to meet this 80 percent goal. The model chose 225 MW of new solar generation and 50 MW of new wind generation. However, it also chose 14 MW of new dispatchable oil-fired generation and 55 MW of new dispatchable natural gas-fired generation in order to meet the capacity requirements in MISO. This case is approximately $90 million more expensive than the Optimized Case over the study period.

A fourth case, P4 - “Renewable Only Option”, was run to determine the cost impact to SMMPA if no new dispatchable generation was built. Under this scenario, the model chose 500 MW of wind generation. This was needed to satisfy the capacity requirements in MISO during the winter season. This case resulted in a 166 percent carbon free portfolio and was $145 million more expensive than the Optimized Case. That high level of surplus generation creates other problems not accounted for by the model. Non-dispatchable renewable energy production in excess of a utility’s load can create price risk exposure similar to having unhedged load. Generation and load paired together generally offset swings in market prices. If prices increase, the load pays the higher price, and the generation is paid the higher price. If prices decrease, the load pays less, and the generation is paid less. However, load not paired with generation and generation not paired with load are both unhedged price takers exposed to changes in market prices. Generation purchased under a non-dispatchable power purchase agreement in excess of a utility's load is exposed to economic losses if the market price is less than the cost of the contract price. Reducing the potential for excess non-dispatchable generation reduces economic risk.

Cases P5 and P7 were run to identify the cost impacts associated with replacing all of the conventional dispatchable generation in the Optimized Case with battery storage. Case P5 includes a 90 MW battery that provides capacity value in the MISO market but no energy value. This would be accomplished through a Purchase Power Agreement (PPA) with a third-party Independent Power Producer (IPP). The PPA would allow the IPP to keep the benefits created though the energy storage and energy production which would be used to reduce the cost of the capacity benefits provided by the battery. Case P7 includes a 90 MW battery that provides both capacity and energy value in the MISO market. The capacity cost of the P7 battery is significantly higher than the P5 battery. The energy revenues from the P7 battery could be used to offset the higher cost capacity. However, the total cost of P7 is still approximately $40 million more than P5.

Since battery storage technology is still relatively expensive and not yet mature, a sixth case, P6 – "80% Carbon Free, Capacity Only Battery, Member Site", was developed as an effort to allow the Agency to experiment with battery storage in smaller amounts. These small amounts of battery generation could be installed on a member's distribution system which would avoid the congestion of the MISO generation queue.

SENSITIVITY CONDITIONS

Several potential events or conditions that deviate from the base case assumptions were evaluated to determine their impact on the alternatives. Variables considered in the sensitivity analysis included:

- 50% Higher Costs of Renewable Energy Credits
- 50% Lower Costs of Renewable Energy Credits
- 50% High locational marginal prices (LMP)
- 50% Low LMPs
- 50% High LMP with 50% High Natural Gas Prices
- 50% Low LMP with 50% Low Natural Gas Prices
- 5% Low load forecast
- 5% High load forecast
- 25% High load forecast (New Member Scenario)

- High externality costs
- High renewable contract prices
- Low renewable contract Prices

Each of the seven base case alternatives were rerun under each of the sensitivity conditions identified above. The cumulative NPV for each of these cases was then compared to the NPV of the Optimized Model case under these same sensitivity conditions. The results of this analysis are shown in Tables 7-1a and 7-1b.

HIGH AND LOW RENEWABLE ENERGY CREDIT (REC) PRICES

The cost of purchasing RECs was adjusted up and down by 50 percent in order to determine if changing REC prices would alter the choice of optimized case. In both the high and low REC price sensitivities, Case P1 remained the Optimized Case. (See Table 7-1a).

HIGH AND LOW MARKET (LMP) PRICES

The purpose of this sensitivity case was to determine what impact a change in LMPs would have on the Agency's costs. For the high LMP scenario, MISO LMPs were increased by 50 percent. The amount of member load was kept constant for this case. Table 7-1a shows that under a high LMP scenarios, the 60% and 80% carbon free scenarios become more economical since the solar and wind energy production in these two scenarios receive increased revenue from MISO. However, under a low LMP sensitivity (50 percent decrease in LMPs), the 60% and 80% carbon free cases become very uneconomical compared to the Optimized Case. This demonstrates that the selection of the best plan is highly influenced by market prices.

HIGH AND LOW MARKET AND NATURAL GAS PRICES

The LMPs in MISO have been low in recent years. This has been driven primarily by low natural gas prices along with increased wind generation on the system. Although further decreases in natural gas prices are unlikely, significant price increases are certainly possible. A rise in natural gas prices would also drive an increase in LMPs. The purpose of this sensitivity case was to determine what impact a change in natural gas prices would have on the Agency's costs. For this scenario, both natural gas and MISO LMP's were increased by 50 percent. All other parameters were kept constant for this case. Table 7-1a shows that under a high LMP and Natural Gas scenario, the P4 - "Renewable Only" case becomes the lowest cost option at a savings of $20 million over the study period. However, under the Low Natural

Gas and LMP scenario, this option becomes the highest cost of all scenarios at a cost of $312 million over the study period, making this option very risky

HIGH PURCHASE PRICE FOR CARBON-FREE RESOURCES

The selection of the best plan is also dependent on the cost of installing and operating new wind and solar generation resources. The adverse impact of increased cost of renewables is, of course, greater as the percentage of renewable resources increases. The sensitivity of the seven base case alternatives to the cost of renewables was tested by increasing and decreasing the cost of new renewable resources by 25 percent for each alternative. The results of this sensitivity study, as seen in Table 7-1a, show that the P4 - "Renewable Only Option" case becomes the least-cost alternative if the cost of installing new renewables were to decrease by 25 percent. However, this same option becomes the highest price alternative if the costs of building or purchasing renewable energy projects increase by 25 percent.

HIGH EXTERNATILIES

The high and very high externality sensitivity cases have almost no impact on the Optimized Case or Preferred Plan cases (see Table 7-1a). Although all of the cases have some amount of existing conventional generation, this conventional generation runs very little in the model. Since there is little energy produced by these conventional generators, there is very little difference in externality costs between those cases.

HIGH AND LOW LOAD GROWTH SCENARIO

The High and Low Load Growth scenarios were developed by increasing and decreasing the load by five percent. The New Member case increases the load by 25 percent. Table 7-1b shows that under all of these scenarios, the Optimized Case is still the lowest cost option.

The membership status of the City of Austin was still unknown at the time that these various case sensitivities were developed. Although the New Member case does not precisely match the energy and demand profiles for the City of Austin, this case still provides a good approximation of the impact that a contract extension would have on the Agency.

FUTURE CAPACITY CREDIT FOR WIND, SOLAR, AND BATTERY STORAGE

In the previous IRP filed by SMMPA in 2021, a statement was made that "The MISO Independent Market Monitor (IMM) has indicated that future wind and solar generation resource additions may not provide any capacity benefit after some point when the grid becomes oversaturated with renewable generation, and therefore may not qualify for any capacity credit. If this were to occur, SMMPA would need to add 50 to 75 MW of conventional generation to each of the base case alternative in order to meet MISO's capacity reserves requirements." This has proven to be the case. Since 2021, MISO has been working on several initiatives that have resulted in extremely low, and possibly even zero, capacity accreditation for future solar generation. MISO is also forecasting the capacity value of battery storage resources to decrease significantly over time to as low as 40 percent. Since battery storage technology is still limited to short periods of time (for example, four-hour runs), multiple battery installations would be required to cover multi-day emergency conditions such as the recent cold weather emergencies that have occurred. As a result, the Aurora model chose dispatchable oil and gas-fired generation to meet the MISO capacity requirements.

FAILURE OR SUDDEN RETIREMENT OF GENERATION RESOURCE

Sherco 3 is the Agency's single largest generation resource. Possible impact from the loss of Sherco 3 prior to its 2030 retirement depends greatly on the LMP market at the time of the loss. If market prices remain low, the impact would be minimized. However, if market prices were to increase, the Agency could experience significant cost increases since Sherco 3 is currently the Agency's primary hedge against large increases in market prices.

The Agency faced this scenario in 2011 when Sherco 3 suffered a catastrophic failure. At that time, the Agency was able to successfully replace this loss via a series of strategic capacity and energy purchases. If that were to occur again, depending on the timeframe, the Agency would most likely implement similar capacity and energy hedge purchases until the unit could be restored or retired. The Agency could also accelerate the implementation of its Preferred Plan by installing new solar and wind resources in advance of 2030.

All other Agency natural gas and oil-fired resources are relatively small, ranging from 1 MW to 16.5 MW. Loss of capacity from one of these resources could be addressed by making short-term capacity purchases until the unit could be returned to service. Because most of these units operate infrequently in the market, the Agency could make bilateral energy purchases to hedge the market price risk or could elect to assume the risk until the unit returned to service, depending on the unit that failed.

8. Preferred Plan

GENERAL DISCUSSION

This section identifies and describes the Agency's Preferred Plan for meeting its future capacity and energy obligations. A large part of this plan is to first identify the need. This was done by performing a demand and energy forecast. The Agency's 2023 load forecast shows the energy need increasing by 0.3 percent annually through 2029, and then dropping by nearly 50 percent in 2030 due to the expiration the Agency's power sales contracts with Austin Utilities and Rochester Public Utilities.[1] After 2030, the projected growth rate remains at 0.3 percent annually. The load forecast also shows the Agency's demand increasing 0.2 percent per year until 2029, then dropping by nearly 50 percent in 2030 and the projected growth rate increasing slightly to 0.3 percent annually through the duration of this IRP. The details of the forecasting process and results can be found in the Load Forecast section of this document.

Chart 8-1 shows the Agency's forecasted demand requirements (i.e., Base Load Forecast) compared to its current generation resources. There is a shortfall of capacity of 37 MW in 2028 due to MISO's change to a Direct Loss of Load (DLOL) process for determining capacity accreditation for generators. After Sherco 3's retirement in 2030, the Agency only needs to replace 66 MW of capacity, rather than its approximately 360 MW share of Sherco 3 due to the expiration of the Agency's contracts with Austin and Rochester.[1] The detailed requirements and resources for the Preferred Plan can be found in Exhibit 7.

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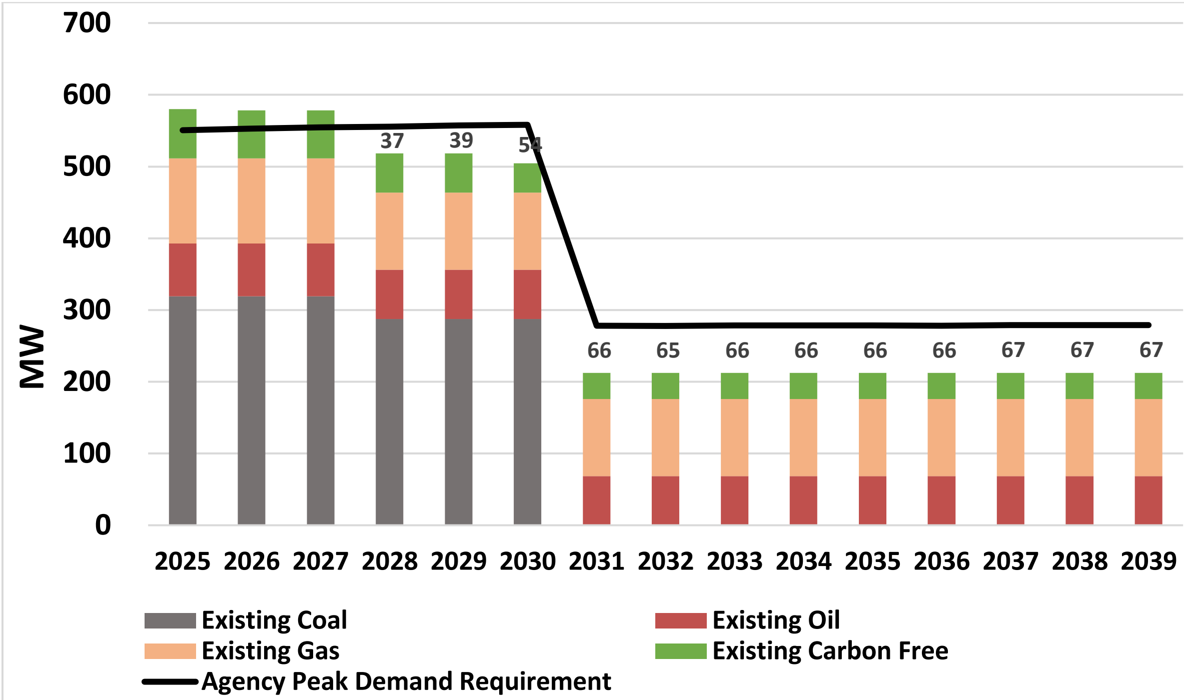
[1] Subsequent to the development of the load forecast, Austin and SMMPA agreed to extend the power sales agreement to 2050.

Chart 8-1

Resource and Capacity Requirements – Before Additions



The demand requirements in Chart 8-1 include approximately a two percent surplus or margin above the MISO requirement. This is intentional and is due to the uncertainties in the process used by MISO to calculate future reserve requirements. MISO calculates each utility's reserve requirement each year based on the following:

- the annual capability test run by each dispatchable generator
- the forced outage rate of each generator over the previous three years
- the performance of each non-dispatchable resource during the previous three-years' peaks
- the transmission loss determination
- the utility's demand coincident with MISO's peak
- changes in the load forecast
- the pool reserve requirement value from MISO

SMMPA estimates this uncertainty to be approximately two percent for its system.

CHOICE OF PREFERRED PLAN

Tables 7-1a and Table 7-1b in the previous section show that Aurora's Optimized Case is the lowest-cost option among the base case alternatives, and the lowest cost alternative in ten of the thirteen sensitivity conditions. Case P2 - "60% Carbon Free" is the second most-economical alternative at approximately $60 million more expensive than the Optimized Case. Case P2 does become less expensive than the Optimized Case under the high LMP sensitivities, but it becomes approximately $120 million more expense under the low LMP sensitivities.

It is important to note that both Case P1 and P2 meet the State's future carbon-free requirements, the only difference is how the requirements are met. Case P1, the Optimized Case, meets the State requirements mostly through the purchase of renewable energy credits (RECs), whereas P2 meets the State's carbon-free requirements by installing new generation assets to cover the first 60 percent, and the remainder of those requirements through the purchase of RECs.

Case P2, however, does not meet the Agency's "SMMPA 2.0" goal of 80 percent renewable after the retirement of Sherco 3 in 2030. Case P3 "80% Carbon Free", does meet the Agency's future renewable goals, however, it is $90 million more expensive than the least-cost case P1. Case P3 does become less expensive than the least-cost case under the High LMP sensitivities, but it is $180 to $195 million more expensive than the least-cost alternative under the Low LMP sensitivities. Nonetheless, the Agency has still opted to choose this case as its "Preferred Case" at this time. Case P3 does meet the State's future requirement for carbon free generation through the installation of new generating assets for the first 80 percent, and the remainder through the purchase of RECs.

The Agency chose Case P3 - "80% Carbon Free" as its Preferred Plan for this IRP for three reasons. First, it maintains alignment with its "SMMPA 2.0" goal of 80 percent carbon free after Sherco 3 retires. Second, it reduces any possible financial risks associated with relying too heavily on the REC market. Third, it provides a physical asset hedge against MISO market prices that is not present in the least cost alternative.

The Agency realizes that many things can happen between now and 2030 that could force the Agency to deviate from this plan.

At the time of constructing this IRP, market pricing for renewable projects is significantly higher than anticipated in the 2021 IRP filing. Some of the projects are double the estimated 2021 costs. While SMMPA is currently staying on the SMMPA 2.0 path to 80 percent renewable energy by 2030, the Agency is also keenly aware of its financial responsibility to its members. Market pressures may well create an environment where implementation timing will need to be adjusted to avoid undue financial hardship for our membership. We will continue to monitor all pertinent factors to make an informed decision on renewable levels by 2030.

Chart 8-2 illustrates the resource mix of the Preferred Plan, including:

- Retirement of Agency-owned wind turbines in 2025
- Expiration of Wapsipinicon wind contract in 2029
- Sherco 3 retirement in 2030
- Expiration of Olmsted Waste to Energy Facility contract in 2030
- Retirement of Mora landfill gas generator in 2032
- All existing gas and oil plants remaining in service through the study period
- Addition of 14 MW emergency diesel engines prior to 2030
- Addition of 49 MW of dispatchable natural gas-fired generation in 2028
- 225 MW of new solar resources in 2031
- 50 MW of new wind resources in 2031

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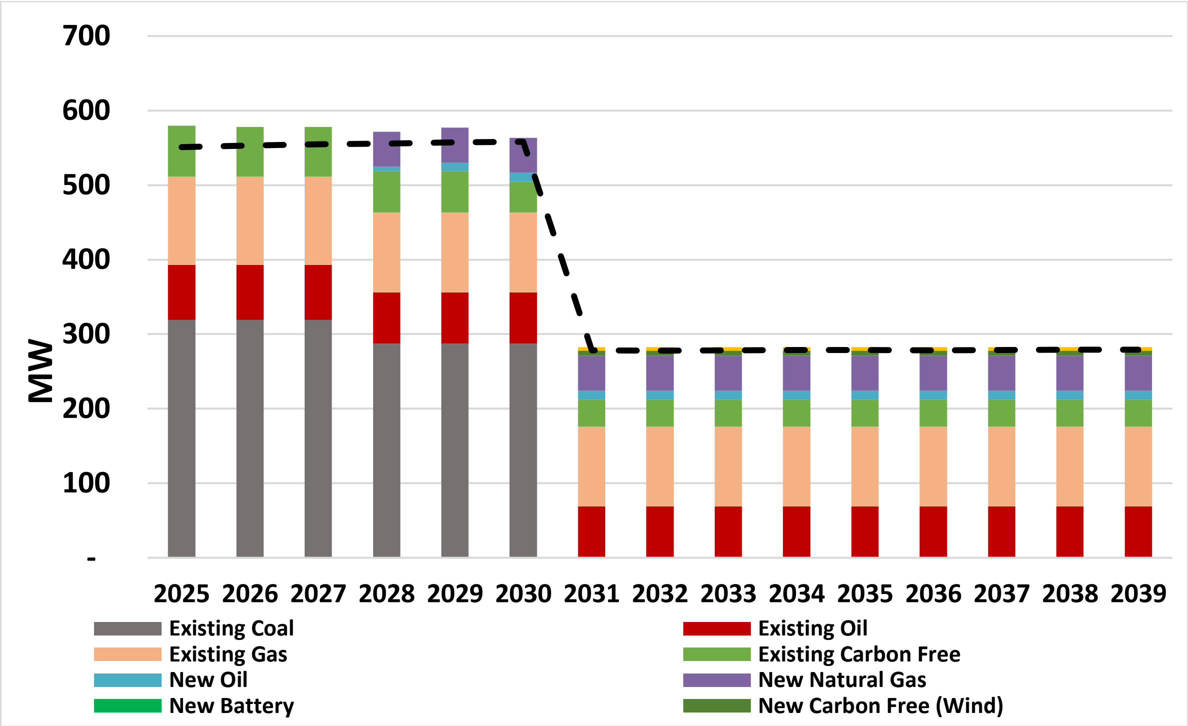
Chart 8-2

Resource and Capacity Requirements – Preferred Plan

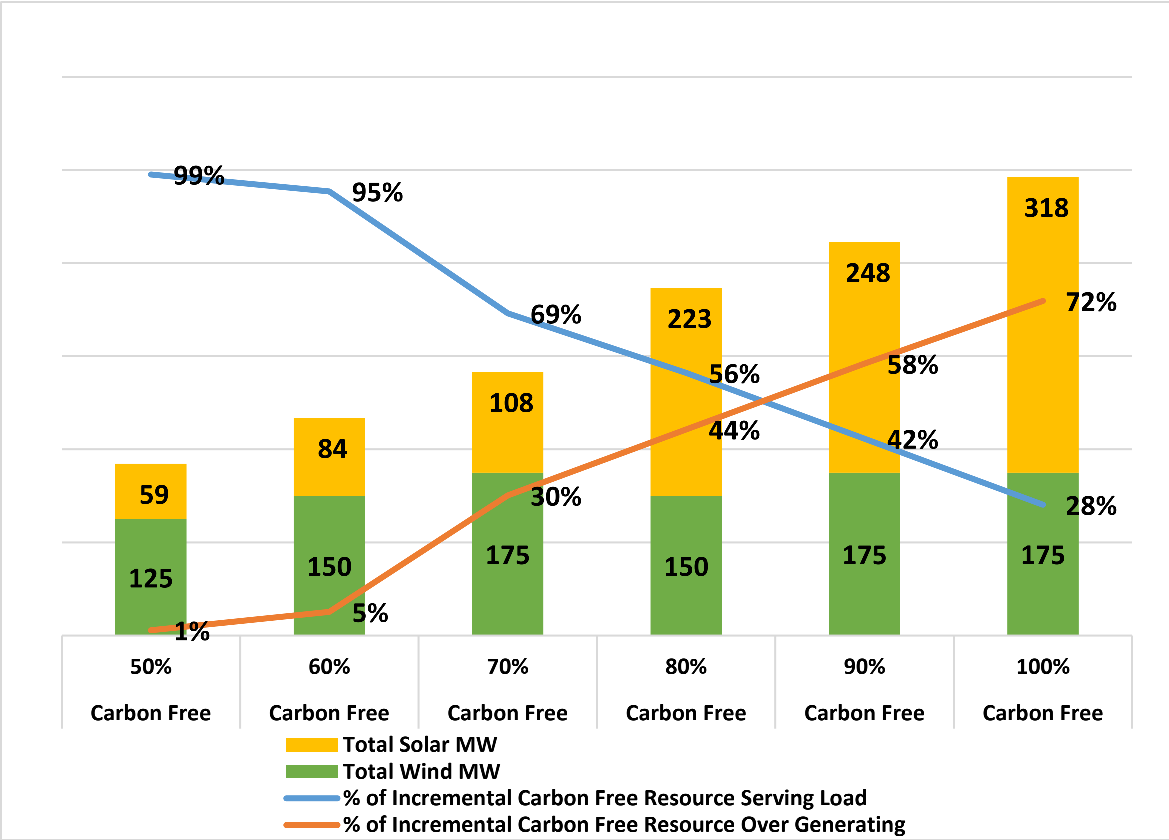


While the P4 "Renewable Only" Case is less expensive than the Preferred Case in certain scenarios, the Agency chose not to pursue this option because it produces excessive amounts of unhedged energy. SMMPA has performed numerous studies to determine the best amount and mix of wind and solar resources to balance providing an energy price hedge for the Agency's load while minimizing excess renewable generation that can increase cost risk as discussed below. Some amount of excess energy production is unavoidable when meeting a goal of significant levels of carbon-free generation. The challenge is finding the right balance to meet the carbon-free goal and minimize unnecessary economic risk.

Chart 8-3 shows that when the carbon-free percentage of the resource portfolio is less than 60 percent, more than 95 percent of the energy produced by these carbon-free resources goes toward serving the Agency's load and only a small portion is excess generation. The energy that goes toward serving load translates to a hedge against high market prices. When moving from a 60 percent to a 70 percent carbon-free portfolio, the amount of energy from the incremental wind and solar resources going toward serving load begins to decrease to approximately 69 percent, and the amount of excess energy increases to approximately 30 percent.

Chart 8-3

Percentage of Load Hedged and Over-Hedged at Various Levels of Renewables



As the Agency's portfolio of carbon-free energy approaches 80 percent, the amount of energy from those incremental resources that goes toward serving Agency loads is 56 percent. As the percentage of carbon-free resources approaches 100 percent, only about 28 percent of the energy from those additional resources goes toward serving load. In other words, more of the energy from those additional resources results in more excess generation than energy to serve load. Excess generation can pose a risk to the Agency very similar to load that is unhedged. Since excess generation has no offsetting load, it is exposed to market prices which can be less than the cost of generation and can even be negative at times, resulting in substantial cost risk to SMMPA's members. Therefore, absent the ability to store any over-generated energy, moving toward a "Renewable Only" portfolio would weaken the Agency's hedge position overall.

Energy storage in the form of batteries was studied as part of this IRP and it was determined to be cost-prohibitive at this time. A typical battery storage system can only store and discharge energy to cover from one to four hours of need. The polar vortex event in January of 2019 lasted 36 hours. Winter storm Uri in February 2021 lasted for several days. A utility would have to install multiple battery systems to cover these types of events. Additionally, a single battery system itself is quite expensive as compared to a conventional peaking plant. Having to install multiple systems would be cost-prohibitive.

Another reason for not moving from the P3 - "80% Carbon Free" alternative to the P4 - "Renewable Only" alternative is because the latter is much more volatile under the various sensitivity scenarios studied. Table 8-1 shows that the lowest Net Present Value (NPV) cost among the 13 sensitivity scenarios for the "Renewable Only" case is a savings of approximately $31 million compared to the Optimized Case. The highest NPV difference for the "Renewable Only" case compared to the Optimal Case is approximately $322 million. This is a difference of $353 million. The "80% Carbon Free" alternative has a difference of $207 million. Therefore, the "80% Carbon Free" alternative produces costs that are less volatile than the "Renewable Only" case under the given sensitivities - making it the lower risk alternative.

Table 8-1

Variability of Net Present Value Between Alternatives

		Difference in Cumulative NPV of Alternatives vs. Optimal Model		
Case Number	**New Resources**	**Low**	**High**	**Low to High Difference**
P1	Optimized Case	$0	$0	$0
P2	60% Carbon Free	($7,666)	$127,912	$135,578
P3	80% Carbon Free	($11,941)	$195,324	$207,265
P4	Renewable Only (166% Carbon Free)	($30,897)	$321,955	$352,852
P5	80% Carbon Free, 90 MW Battery (Capacity Only)	$1,480	$194,541	$193,062
P6	80% Carbon Free, 10 MW Battery (Member Site)	($5,886)	$199,853	$205,739
P7	80% Carbon Free, 90 MW Battery (Capacity & Energy)	$23,807	$256,018	$232,211

Note: Negative value means case is less expensive than Optimal Case; positive value means case is more expensive. Low to High Difference represents volatility of the case.

FIVE-YEAR PLAN

The Agency's capacity projections show a need for approximately 40 MW in the near term (Chart 8-1). This is due primarily to changes that MISO plans to implement in the resource planning and accreditation rules in the 2028 timeframe. SMMPA's peak load forecast grows slightly over that period. The Aurora model has determined that the most economical method of meeting that need is the addition of 14 MW of emergency diesel generation and 49 MW to 70 MW of natural gas-fired dispatchable resources. The model shows that the additional dispatchable generation will produce very little energy since it would only be run primarily during peak and emergency situations. Therefore, it has virtually no impact on the Agency's percentage of carbon-free energy generated. Aside from this small need for capacity, the Agency's short term action plan is to continue to operate and maintain the Agency's existing fleet of generation resources as safely, cleanly, reliably, and cost-effectively as possible while continuing to offer demand-side management and energy efficiency programs to meet Minnesota's Conservation Improvement Program annual energy savings goal of 1.5 percent.

The Agency's generation fleet is well positioned to meet the needs of its members in the next five years. Sherco 3 provides a good economic hedge in the energy market for the majority of SMMPA members' energy needs. There are no major, or costly, projects planned at Sherco 3 over the next five years. The two primary concerns for Sherco 3 prior to its retirement in 2030 are accessibility of an economical fuel supply given the uncertainty of coal supply sources in the future, and the potential impacts of future environmental regulations.

The Agency has retired more than 100 MW of its oldest generating plants since 2005 and replaced them with newer, more efficient, generation. As a result, the Agency does not foresee the need to retire or replace any of its existing conventional resources in the near term. SMMPA's two natural gas-fired plants at Fairmont and Owatonna should remain reliable and cost-effective well into the future.

The Agency will also continue to watch for opportunities to expand its existing fleet of carbon-free resources in the short term. SMMPA currently has over 200 MW of wind generation and less than 10 MW of solar generation, so any near-term additions would most likely be solar. Partnering with large industrial customers on small regional solar facilities or other community-based solar projects are areas of possible interest. The Agency also continues to evaluate partnering with other utilities on large utility-scale solar projects as opportunities arise.

LONG-RANGE PLAN

As Chart 8-1 shows, there continues to be very little projected load growth for SMMPA well into the future, so no additional resources beyond those in the Preferred Plan are currently anticipated.

The most significant changes in the long-range plan over that of the short term are the planned retirement of Sherco 3 and the expiration of the Agency's power sales contracts with Austin Utilities (AU) and Rochester Public Utilities (RPU) in 2030.[2] Their departure will reduce the Agency's load by more than 50 percent beginning April 1, 2030. SMMPA is interested in the possibility of adding new members in a manner that is mutually beneficial to existing and new members. With RPU being the largest municipal utility in the state and AU being one of the larger utilities, even if the Agency added more members, it is highly unlikely those additions would create a need for the Agency to add any significant amounts of new resources.

PLAN IS IN THE PUBLIC INTEREST

SMMPA believes that its Preferred Plan as outlined in this IRP is in the public interest, and meets the objectives established for Commission review of resource plans outlined below:

(A) Maintain or improve the adequacy and reliability of utility service.

SMMPA is committed to maintaining the same high degree of reliability for its members and their customers as it has in the past. The Agency's strategy of dispersing its generation resources in smaller increments throughout the state and near the members rather than relying solely on large centralized generating plants results in increased reliability in member communities. These generators not only provide backup to the members' systems if the transmission system fails, but they also provide added reliability to the surrounding communities by providing voltage support for MISO in congested areas of the state and serve to support grid reliability and resiliency in times of emergency.

[2] Subsequent to the development of these plans, Austin and SMMPA agreed to extend the power sales agreement to 2050.

(B) Keep the customers' bills and the members' rates as low as practicable, given regulatory and other constraints.

SMMPA works to keep its members' rates as low as possible. All major decisions, including rate setting, are managed and approved by SMMPA's Board of Directors, which is comprised of representatives from seven member cities. Each of those individuals, as well as those from the other ten members, also report to their own utility commissions, boards, or city councils, and ultimately to their retail customers. The SMMPA board members have a fiduciary duty to ensure the financial viability of the Agency and are simultaneously motivated by their relationships with their local utilities commissions and customers to keep rates as low as practical. The Agency's strong financial position, as demonstrated by AA- bond ratings and adequate financial reserves to weather unforeseen economic and operational circumstances, show the Board's willingness to ensure rates are adequate to meet Agency needs. And the fact that the Agency's wholesale rates have tracked at or below the rate of inflation over recent years, are projected to be below the rate of inflation for at least the first five years of this plan (see Chart 8-4) and are comparable to the rates of other wholesale power suppliers in the region, demonstrates the reasonableness of the rates to its members.

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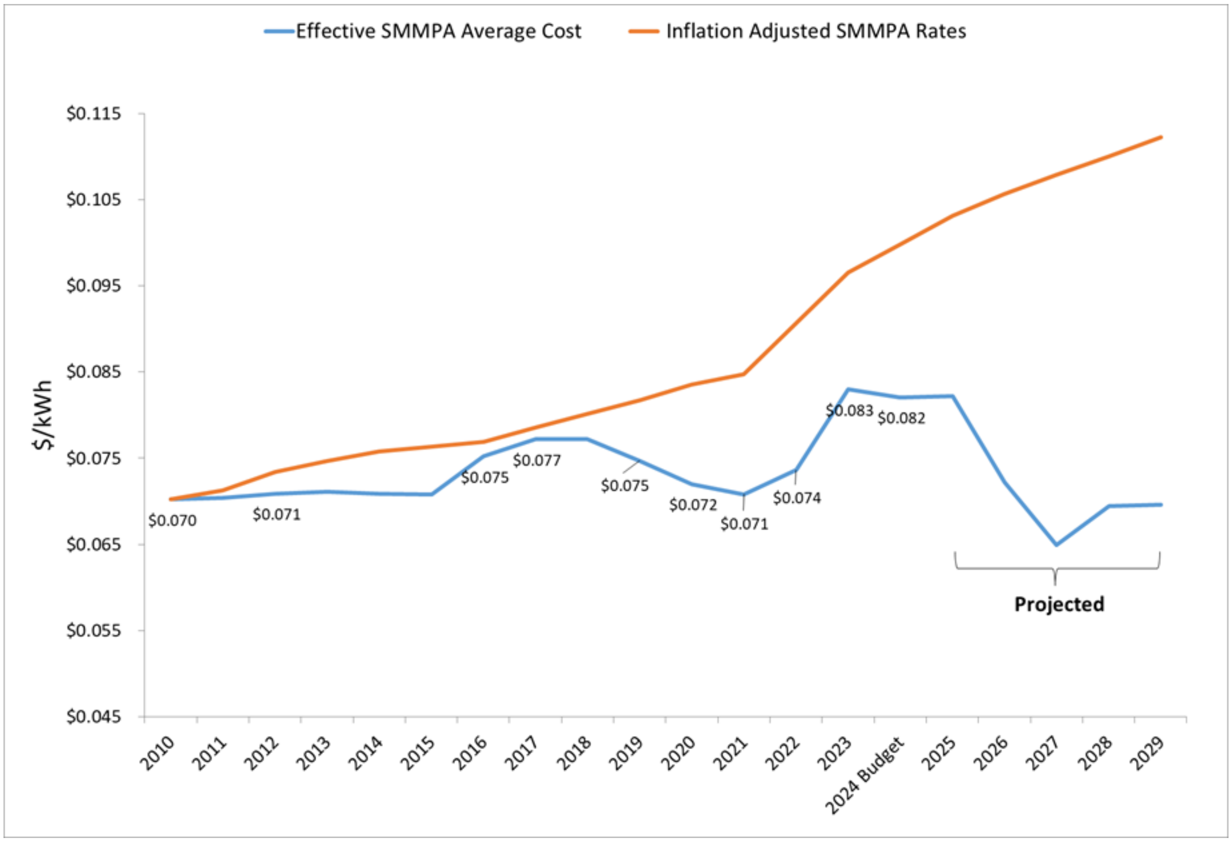
Chart 8-4

SMMPA Average Wholesale Rates vs. Inflation



(C) Minimize adverse socio-economic effects and adverse effects upon the environment.

This plan helps to reduce socio-economic adversities by managing existing resources as efficiently as possible and by helping SMMPA members' customers use energy wisely and efficiently. Commitment to this goal is demonstrated by: a) SMMPA's commitment to retire Sherco 3 and replace it with carbon-free energy as needed, b) the millions of dollars spent since 2005 helping to reduce GHG emission as discussed in the Environmental section of this IRP, and c) SMMPA's commitment to DSM-Conservation as covered in the DSM Resources section of this IRP (Section 5).

(D) Enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations.

SMMPA's public power structure enhances its ability to respond quickly to change. SMMPA and its staff are much closer to the ultimate customer than a typical investor-owned utility. SMMPA members meet on a monthly basis which keeps them up to date on current issues and allows for immediate response and feedback on time-sensitive issues. This also provides a means to share important issues, ideas, and information among municipalities. Also, SMMPA staff works directly with its members' customers to implement DSM programs in 15 of its 17 member communities who don't have in-house staff to do that themselves. The other two members utilize their own in-house staff to implement those same DSM programs. Being a small organization, the Agency can react and respond to changes more quickly than a larger organization with multiple levels of management and decision making.

As noted in (B) above, the Agency's rates are set by its Board of Directors and they can respond to changing financial needs very quickly, requiring only 90 days' notice to implement a rate change. In addition, emergency rate increases can be implemented immediately, if necessary, to ensure the Agency does not violate the debt service coverage required by its bond covenants.

The Solar Choice program discussed in the Renewable Energy Standard section of this IRP shows the Agency's ability to respond to social changes in the communities it serves. This program was developed to address requests from customers in member communities to have increased access to solar energy alternatives.

The Agency's investment in natural gas generation using the latest technological improvements demonstrates a willingness and desire to implement the best available solutions as operational needs arise. In addition, the continued evolution and expansion of SMMPA's DSM and energy efficiency programs show a clear understanding of the impacts technology can have on energy consumption and utility operations.

(E) Limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.

Change and risk in the utility industry have seemed to become more frequent in recent years as the industry struggles with issues like changes in the rules of Independent System Operators (ISO), the uncertainly in environmental policy due to changing regulations and proposed legislation, and the numerous changes due to deregulation in general. The decision to retire Sherco 3 and add renewable resources will reduce the risks associated with changes in environmental regulations and policy.

Also, the Agency's portfolio approach to resource additions limits exposure to risk. It does not lock SMMPA into a specific technology or specific ownership structure. Adding generation in smaller increments at multiple locations throughout the state reduces the risks associated with changing congestion within MISO. Also, placing generation in member communities where the load exists protects the Agency from spikes in the locational marginal prices by offsetting spikes in the cost to serve the load with increases in the revenue obtained for the generation.

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9. Environmental Stewardship

GENERAL DISCUSSION

SMMPA is committed to environmental stewardship, which includes meeting all federal and state environmental regulations, and conducting business in a way that reflects the values of the communities it serves. This commitment is reflected in the work SMMPA does at its own facilities as well as those of the organizations with whom it partners.

There are a number of federal and state environmental initiatives and regulations that affect the cost and/or ability of SMMPA to provide power to its members. Among the most significant are:

- Acid Rain Program
- Cross State Air Pollution Rule
- Regional Haze Rule (phase 1 and 2)
- Mercury and Air Toxics Standards Rule
- Minnesota Next Generation Energy Act (GHG reduction goals)
- MACT for Reciprocating Engines

ACID RAIN PROGRAM

The Acid Rain Program (ARP) and Cross State Air Pollution Rule (CSAPR) were designed to be a market driven approach to the reduction of emissions where each utility was required to hold and retire sulfur dioxide (SO_2) emission allowances for each ton of SO_2 emitted. SMMPA's only generating unit impacted by these rules is Sherco 3, which is jointly owned with Xcel Energy. Sherco 3 burns sub-bituminous western coal with a sulfur content that is less than one percent. Sherco 3 is equipped with a state-of-the-art dry scrubber system which has enabled this generating unit to successfully meet both the ARP and CSAPR regulations on SO_2 without the need to purchase any SO_2 emission allowances and without requiring any major further modifications to the plant. SMMPA does not sell any of its surplus allowances.

CROSS STATE AIR POLLUTION RULE

As mentioned above, the CSAPR is a market driven approach to control SO_2. The CSAPR was also designed to reduce nitrogen oxides (NOx) via a similar market driven approach. Sherco 3 is fully compliant with the SO_2 portions of this rule as discussed above. To comply with the NOx provisions of the CSAPR, Xcel and SMMPA studied the alternatives and invested in new low-NOx burners that were installed in Sherco 3 in 2008. This has resulted in a decrease in NOx emissions of approximately 70 percent. As a result, Sherco 3 can comply with both the SO_2 and the NOx provisions of the CSAPR without the need to purchase any additional allowances.

REGIONAL HAZE RULE

The EPA published the regional haze regulations in 1999. The goal is to reduce haze, thus improving the visibility in the nation's national parks and wilderness areas. The first phase of implementation required certain plants to install Best Available Retrofit Technology (BART). That phase did not impact Sherco 3. The Minnesota Pollution Control Agency (MPCA) is required to submit its plans for phase 2 to the EPA in 2021. MPCA staff coordinated with SMMPA and Xcel on the development of its phase 2 plan as it relates to the Sherco 3. MPCA's plan requirements were simplified by commitments from SMMPA and Xcel to retire Sherco 3 by the end of 2030 which eliminated the need to perform the "four factor analysis" to address additional mitigation steps.

MERCURY AND AIR TOXICS STANDARDS RULE

During the 2006 Minnesota Legislative session, several bills were introduced to help reduce mercury emissions around the state ahead of the federal Mercury and Air Toxics Standards (MATS). Approximately 50 percent of the mercury emissions in Minnesota for the year 2005 came from coal-fired boilers. There are currently several such boilers located throughout Minnesota. In order to create clear guidance and certainty related to mercury reduction, a negotiated settlement was made between the MPCA and Minnesota's two largest public utilities. This new law, the Minnesota Mercury Emissions Reduction Act (MMERA), required Xcel Energy and Minnesota Power to reduce mercury emissions at their largest generating facilities by 90 percent by the year 2010 for dry scrubber units and 2014 for wet scrubber units. This law accelerated the then existing federal program by up to eight years and increased required removal rates from 70 percent to 90 percent. As part of the settlement, Xcel and Minnesota Power were granted an extension of their emission rate rider which allows them to seek full cost recovery of any cost associated with mercury removal, plus provides performance-based incentives.

Even though the 2006 MMERA was specifically written to target only Xcel and Minnesota Power, SMMPA is similarly impacted due to its joint ownership of Sherco 3. However, SMMPA does not have an emission rate rider, nor does it benefit from the performance-based incentives in place for Xcel and Minnesota Power.

Despite not being a formal party to the aforementioned settlement, SMMPA supports reasonable reductions in mercury emissions.

MINNESOTA NEXT GENERATION ENERGY ACT

Minnesota Statute 216B.2422, Subd 2c requires utilities to report in their IRP filing their progress in helping the state achieve its greenhouse gas reduction goals established in section 216H.02 subd 1. It is the state's goal to reduce statewide greenhouse gas (GHG) emissions across all sectors to a level at least 15 percent lower than 2005 levels by 2015, at least 30 percent below 2005 levels by 2025, and at least 80 percent below 2005 levels by 2050. Table 9.1 shows that the Agency came very close to meeting the 2015 goal. This was achieved primarily through the retirement of older, less-efficient coal and natural gas-fired steam plants replaced with new high-efficiency natural gas-fired reciprocating engines. The Agency is not forecasted to meet the target for 2025 primarily due to the dispatch of Sherco 3 in the MISO market. Although the Agency has installed a significant amount of carbon-free generation to serve its customer loads, SMMPA has very little control over how much Sherco 3 is dispatched by MISO to serve MISO load. However, SMMPA is forecasted to meet the 2050 reduction goal as early as 2031 after Sherco 3 is retired.

Table 9-1

Carbon Dioxide Emissions

Year	Energy Production (GWh)	CO2 Emissions (Tons)	CO2 Emission Rate (lb/MWh)	Percent Reduction from 2005
2005	2,216,513	2,384,015	2,151	
2015	2,311,325	2,080,686	1,800	13%
2025	2,829,928	2,207,152	1,560	7%
2031	1,170,118	64,735	111	97%

SMMPA has taken the following steps to aid in the reduction of CO_2 emissions from 2005 to 2024. Although these efforts were not done solely to reduce CO_2 emissions, each contributed to the total reduction achieved.

1. In 2009, SMMPA entered into a power purchase agreement (PPA) for a 100 MW wind project in southeastern Minnesota. The energy from this facility is estimated to have reduced SMMPA's carbon dioxide emissions by approximately 10 percent.

2. The Agency's DSM-Conservation programs have played a major role in helping to reduce GHG emissions. Since 2005, the estimated lifetime impact of SMMPA's rebates on energy-efficient products has reduced carbon-dioxide emissions nearly 9 million tons.
3. In 2011, SMMPA, in partnership with Xcel Energy, replaced the high pressure and intermediate pressure steam turbines on Sherco 3 which improved its overall fuel efficiency by approximately one percent, which in turn resulted in a reduction of approximately 20,000 tons of carbon dioxide emissions annually.
4. Between 2005 and 2017, SMMPA retired over 100 MW of older, inefficient, generators, including 30 MW of coal-fired generation, and replaced them with 64 MW of high-efficiency natural gas units. Retirement of the coal plant alone reduced SMMPA's annual CO_2 emissions by 180,000 tons, or about five percent.
5. Since 2005, SMMPA has installed 8.5 MW of Agency-owned wind generation and a 1.6 MW landfill gas generator resulting in another 20,000 tons of annual CO2 emission reductions.
6. In 2017, the Agency entered into a PPA for 5 MW of solar generation, located in Owatonna, Minnesota, resulting in an annual reduction in CO_2 emissions of approximately 5,200 tons.
7. The Agency added an additional 100 MW of wind generation in 2020 through a twenty-year PPA. CO_2 reductions resulting from that contract are projected to be approximately 5 million tons through the term of the contract.

As described earlier in this filing, the SMMPA 2.0 strategic initiative is designed to result in SMMPA being 80 percent carbon-free in 2030, resulting in more than 95 percent reduction in CO_2 emissions compared to 2005 levels. These ambitious reductions are the result of retiring the Sherco 3 coal plant and replacing it primarily with a combination of wind and solar facilities and a continued commitment to DSM-Conservation efforts.

CARBON-FREE GENERATION

Table 9.2 shows the forecast percentage of load served by carbon free resources based on the P3 - "Preferred Plan" in this IRP. While developing this initiative, the Agency spoke to neighboring utilities, environmental stakeholders, and Department of Commerce staff to help determine a calculation methodology. Based on those discussions, the Agency, for SMMPA 2.0 and for this IRP, used a methodology that accounts for carbon emissions from all Agency-owned or contracted generation resources, but does not try to account for carbon emissions associated with energy purchased from the market.

Table 9.2

Percent Carbon Free – Generation and Load

Year	Carbon Based Generation (MWh)	Carbon Free Generation (MWh)	Percent of Generation Carbon Free	Customer Load (MWh)	Percent Load Carbon Free
2025	2,143,683.85	806,353.00	27%	2,889,555	28%
2026	2,002,451.35	804,038.68	29%	2,898,377	28%
2027	2,187,018.42	804,062.60	27%	2,909,227	28%
2028	2,197,891.10	807,482.63	27%	2,926,911	28%
2029	1,928,513.37	589,160.66	23%	2,933,262	20%
2030	2,117,760.68	496,229.92	19%	1,746,384	28%
2031	136,333.19	1,158,971.28	89%	1,381,050	84%
2032	88,477.30	1,162,536.26	93%	1,387,451	84%
2033	92,550.57	1,159,463.93	93%	1,389,207	83%
2034	98,729.57	1,160,548.36	92%	1,393,156	83%
2035	104,562.58	1,160,478.30	92%	1,396,989	83%
2036	106,033.58	1,162,321.54	92%	1,402,696	83%
2037	110,882.28	1,151,334.53	91%	1,404,224	82%
2038	116,653.46	1,151,394.33	91%	1,407,624	82%
2039	116,272.83	1,151,835.95	91%	1,411,084	82%

In 2023, the Minnesota Legislature established a new carbon-free standard for electric utilities. The standard for investor-owned utilities calls for 80 percent carbon free by 2030, increasing to 90 percent by 2035, and reaching 100 percent by 2040. The standard for municipal and cooperative electric utilities calls for 60 percent carbon free by 2030, 90 percent by 2035, and 100 percent by 2040. This new rule differs from the carbon-free calculation methodology above since this new State goal also allows the utilities to count the load served by carbon free generation from the external electric grid (i.e. MISO). After including the carbon free attributes associated with energy from MISO and with the ability to purchase additional Renewable Energy Credits (RECs) if needed, the Agency should meet the State goals of 90 percent by 2035 and 100 percent by 2040.

MACT 40, CFR 63 FOR RECIPROCATING ENGINES

The EPA established new standards for stationary reciprocating internal combustion engines (RICE). Many municipal utilities chose to retire their RICE generation resources rather than incur the costs of implementing these new standards. SMMPA relies on its fleet of RICE resources and chose to make the investments necessary to meet the new standards for all of its member generators under contract to SMMPA, for which SMMPA has operation and maintenance (O&M) responsibility. For member generators under contract to the Agency for which the member has O&M responsibility, those members also chose to make the upgrades necessary to meet the new standards.

In general, the upgrades required to meet the new standards included three primary components. The largest expense was to install oxidation catalysts on each engine which removes more than 70 percent of carbon monoxide (CO) emissions. Because these oxidation catalysts are generally integral to the engine's exhaust silencer, adding this new catalyst also required replacing the silencer and exhaust stacks. The second change was to add crankcase ventilation systems to all units which filters and returns any oil fumes back into the engines rather than venting to atmosphere. Third was to implement formal O&M procedures designed to optimize the operation of the engines, thereby minimizing any emissions. SMMPA has always had a very strong O&M program for its fleet of RICE generators, so this last phase of implementation was relatively easy. The entire cost of these upgrades was approximately $3.3 million.

OTHER

Pollinator Habitat

Understanding that utility infrastructure can impact pollinator habitat, over the last seven years, SMMPA has coordinated the planting of more than 75 monarch gardens by community groups in 14 member cities. These efforts help restore habitat for monarch butterflies and other pollinators critical to the food supply. Loss of habitat has lowered the eastern U.S. population of the iconic butterfly an estimated 90 percent. Each site includes milkweed plants, the main food source for monarch caterpillars, flowering nectar plants to nourish butterflies and bees, and educational signage. SMMPA members have distributed more than 14,000 free packets of pollinator seeds for customers to create pollinator habitat on their own property.

Electric Vehicles

Starting in 2019, SMMPA and its members began an effort to establish the "SMMPA Member Electric Vehicle (EV) Charging Network". With the goal of helping to reduce "range anxiety" – a major barrier to greater adoption of EVs – SMMPA and its members worked to deploy a total of fifteen 50 kW DC Fast Chargers and thirty dual-port 11.5 kW/port Level 2 chargers in member communities across out-state Minnesota. SMMPA provided the chargers, and the member utilities managed the charger siting and installation. SMMPA believes this effort will contribute to an increase in EV ownership in member communities resulting in additional load primarily from residential EV charging during off-peak hours.

Exhibit 1

Existing Generating Resource Data

Generating Unit Name	Year Installed	Rated Capacity (MW)	Full Load Heat Rate (Btu/kWh)	2031 Fuel Price ($/MMBtu)	2031 Variable O&M Cost ($/MWh)	2031 Fixed O&M Cost ($/Kw/Yr)	Planned Maint. (Wks/Yr)	Forced Outage Rate (%)
Sherco #3	1987							
Fairmont Spark Fired Engines	2013							
Diesels/Oil	1948-1977							
Diesels/NG	1960-2014							
Diesels/Q.S.	2003-2014							
Owatonna CT #7	1982				Confidential Trade Secret Information			
Solar Installation	2017							
Wind Farms	2003-2020							
OWEF Biomas	2006							
Mora Landfill	2009							
Owatonna Spark Fired Engines	2017							

Exhibit 2

Future Supply-Side Resource Data

Generating Resources	Rated Capacity (MW)	2031 Capital Cost ($/kW)	Full Load Heat Rate (Btu/kWh)	2031 Fuel Price ($/MMBtu)	2031 Variable O&M Cost ($/MWh)	2031 Fixed O&M Cost ($/kW/Yr)	Forced Outage Rate (%)
Peaking Purchases	1						
Solar	25						
Wind	25						
QS	2.5		Confidential Trade Secret Information				
Oil	15						
Gas	15						
4 Hour Battery	50						
4 Hour BatteryCapacity Only - Member site	5						
4 Hour BatteryCapacity Only - S3 site	50						

Exhibit 3

2023 SMMPA Member DSM-Conservation Savings

Member Utility	CIP Savings (MWh)	CIP Savings (MW)
Austin	1,660	5.7
Blooming Prairie	364	0.3
Fairmont	1,564	1.4
Grand Marais	379	0.2
Lake City	1,720	0.3
Litchfield	2,963	1.5
Mora	1,088	0.1
New Prague	680	2.7
Owatonna	4,434	6.0
Preston	352	0.1
Princeton	1,567	0.2
Redwood Falls	868	0.1
Rochester	20,273	6.1
Saint Peter	549	0.4
Spring Valley	454	0.1
Waseca	546	0.4
Wells	504	0.4
Total CIP Savings	**39,965 MWh**	**26.0 MW**

Exhibit 4

2023 and 2024 SMMPA Direct Load Control (DLC) Notification

Parameter	2023	2024 YTD
DLC Event Count	69	53
Total Hours of Control	526:58:00	400:21:00
Avg. Hours of Control	7:38:13	7:33:13
Avg. Start Time	11:02:53	9:51:13
Avg. Stop Time	18:41:07	17:24:27

Month	Start	Stop	Duration
Aug-24	8/2/2024 13:01	8/2/2024 17:04	4:03:00
	8/1/2024 13:20	8/1/2024 18:01	4:41:00
Jul-24	7/31/2024 13:25	7/31/2024 18:30	5:05:00
	7/30/2024 14:00	7/30/2024 19:30	5:30:00
	7/29/2024 14:00	7/29/2024 20:00	6:00:00
	7/28/2024 15:33	7/28/2024 18:20	2:47:00
	7/22/2024 15:48	7/22/2024 18:19	2:31:00
	7/15/2024 11:35	7/15/2024 21:01	9:26:00
	7/12/2024 13:20	7/12/2024 18:01	4:41:00
	7/11/2024 15:32	7/11/2024 18:41	3:09:00
	7/9/2024 12:15	7/9/2024 19:34	7:19:00
	7/3/2024 13:00	7/3/2024 18:35	5:35:00
Jun-24	6/24/2024 10:05	6/24/2024 19:42	9:37:00
	6/18/2024 10:00	6/18/2024 19:36	9:36:00
	6/17/2024 9:00	6/17/2024 14:21	5:21:00
	6/4/2024 10:46	6/4/2024 18:01	7:15:00
	6/3/2024 11:32	6/3/2024 19:08	7:36:00
May-24	5/20/2024 13:00	5/20/2024 19:14	6:14:00
	5/17/2024 10:00	5/17/2024 18:30	8:30:00
	5/16/2024 10:00	5/16/2024 19:11	9:11:00
	5/8/2024 10:00	5/8/2024 20:01	10:01:00
	5/7/2024 10:00	5/7/2024 17:30	7:30:00
	5/2/2024 10:06	5/2/2024 17:11	7:05:00
Apr-24	4/17/2024 8:00	4/17/2024 17:44	9:44:00
	4/4/2024 7:00	4/4/2024 13:57	6:57:00
	4/3/2024 8:00	4/3/2024 16:54	8:54:00
	4/2/2024 7:30	4/2/2024 17:01	9:31:00
	4/1/2024 8:07	4/1/2024 18:09	10:02:00
Mar-24	3/27/2024 7:00	3/27/2024 13:00	6:00:00

	3/26/2024 7:20	3/26/2024 14:40	7:20:00
	3/21/2024 7:29	3/21/2024 14:34	7:05:00
	3/20/2024 7:33	3/20/2024 12:00	4:27:00
	3/18/2024 7:34	3/18/2024 12:33	4:59:00
	3/14/2024 7:37	3/14/2024 18:20	10:43:00
	3/6/2024 7:30	3/6/2024 14:02	6:32:00
	3/5/2024 7:30	3/5/2024 14:45	7:15:00
	3/4/2024 7:29	3/4/2024 17:00	9:31:00
Feb-24	2/28/2024 8:02	2/28/2024 15:50	7:48:00
	2/16/2024 7:30	2/16/2024 14:00	6:30:00
	2/15/2024 7:31	2/15/2024 21:01	13:30:00
	2/13/2024 7:13	2/13/2024 13:10	5:57:00
	2/9/2024 10:10	2/9/2024 16:09	5:59:00
	2/8/2024 8:45	2/8/2024 16:36	7:51:00
	2/7/2024 8:32	2/7/2024 18:12	9:40:00
	2/6/2024 10:01	2/6/2024 16:19	6:18:00
	2/2/2024 7:32	2/2/2024 16:00	8:28:00
	2/1/2024 7:31	2/1/2024 15:27	7:56:00
Jan-24	1/16/2024 9:10	1/16/2024 18:41	9:31:00
	1/15/2024 9:52	1/15/2024 19:54	10:02:00
	1/8/2024 9:02	1/8/2024 19:19	10:17:00
	1/4/2024 8:27	1/4/2024 18:33	10:06:00
	1/3/2024 9:00	1/3/2024 20:04	11:04:00
	1/2/2024 9:00	1/2/2024 20:41	11:41:00
Dec-23	12/19/2023 7:32	12/19/2023 19:00	11:28:00
	12/18/2023 7:29	12/18/2023 19:35	12:06:00
	12/13/2023 7:58	12/13/2023 19:08	11:10:00
	12/12/2023 7:55	12/12/2023 19:04	11:09:00
	12/11/2023 15:20	12/11/2023 18:18	2:58:00
	12/6/2023 9:33	12/6/2023 16:26	6:53:00
	12/5/2023 9:30	12/5/2023 18:23	8:53:00
	12/4/2023 10:32	12/4/2023 18:40	8:08:00
Nov-23	11/27/2023 8:58	11/27/2023 21:01	12:03:00
	11/21/2023 13:43	11/21/2023 20:10	6:27:00
	11/20/2023 15:00	11/20/2023 21:01	6:01:00
	11/16/2023 15:27	11/16/2023 18:05	2:38:00
Oct-23	10/3/2023 14:28	10/3/2023 17:15	2:47:00
	10/2/2023 13:29	10/2/2023 18:10	4:41:00
Sep-23	9/5/2023 12:00	9/5/2023 18:52	6:52:00
	9/4/2023 12:59	9/4/2023 19:46	6:47:00
	9/3/2023 14:31	9/3/2023 19:31	5:00:00
	9/2/2023 14:15	9/2/2023 21:01	6:46:00

Aug-23	8/24/2023 11:07	8/24/2023 19:00	7:53:00
	8/23/2023 10:30	8/23/2023 20:00	9:30:00
	8/22/2023 10:35	8/22/2023 19:30	8:55:00
	8/16/2023 14:00	8/16/2023 19:00	5:00:00
	8/4/2023 12:30	8/4/2023 18:51	6:21:00
	8/3/2023 11:00	8/3/2023 21:01	10:01:00
	8/2/2023 13:20	8/2/2023 19:03	5:43:00
	8/1/2023 13:04	8/1/2023 18:33	5:29:00
Jul-23	7/28/2023 12:00	7/28/2023 21:01	9:01:00
	7/27/2023 12:00	7/27/2023 18:01	6:01:00
	7/26/2023 13:22	7/26/2023 20:07	6:45:00
	7/25/2023 11:59	7/25/2023 20:05	8:06:00
	7/10/2023 13:29	7/10/2023 20:00	6:31:00
	7/3/2023 13:54	7/3/2023 18:58	5:04:00
Jun-23	6/29/2023 13:33	6/29/2023 18:06	4:33:00
	6/23/2023 12:05	6/23/2023 19:11	7:06:00
	6/22/2023 12:02	6/22/2023 20:16	8:14:00
	6/21/2023 14:06	6/21/2023 20:12	6:06:00
	6/20/2023 14:15	6/20/2023 20:00	5:45:00
	6/19/2023 14:16	6/19/2023 20:00	5:44:00
	6/5/2023 11:00	6/5/2023 18:40	7:40:00
	6/2/2023 10:31	6/2/2023 15:30	4:59:00
	6/1/2023 12:30	6/1/2023 17:39	5:09:00
May-23	5/31/2023 13:27	5/31/2023 20:00	6:33:00
	5/30/2023 13:55	5/30/2023 19:30	5:35:00
	5/24/2023 14:18	5/24/2023 19:03	4:45:00
	5/23/2023 12:31	5/23/2023 19:33	7:02:00
	5/22/2023 11:31	5/22/2023 19:07	7:36:00
	5/16/2023 10:30	5/16/2023 18:00	7:30:00
	5/10/2023 11:34	5/10/2023 18:46	7:12:00
Apr-23	4/13/2023 11:01	4/13/2023 19:03	8:02:00
	4/12/2023 11:21	4/12/2023 21:01	9:40:00
	4/5/2023 8:16	4/5/2023 16:56	8:40:00
	4/4/2023 7:59	4/4/2023 18:00	10:01:00
Mar-23	3/17/2023 8:14	3/17/2023 11:20	3:06:00
	3/14/2023 8:00	3/14/2023 13:38	5:38:00
	3/2/2023 7:31	3/2/2023 15:32	8:01:00
Feb-23	2/3/2023 7:29	2/3/2023 14:35	7:06:00
	2/2/2023 8:07	2/2/2023 20:56	12:49:00
Jan-23	1/31/2023 7:00	1/31/2023 20:40	13:40:00
	1/30/2023 8:30	1/30/2023 20:35	12:05:00
	1/26/2023 7:30	1/26/2023 14:06	6:36:00

1/25/2023 8:30	1/25/2023 15:11	6:41:00
1/24/2023 7:44	1/24/2023 15:20	7:36:00
1/23/2023 9:22	1/23/2023 19:30	10:08:00
1/12/2023 8:01	1/12/2023 18:21	10:20:00
1/10/2023 7:30	1/10/2023 19:02	11:32:00
1/9/2023 7:31	1/9/2023 17:58	10:27:00
1/6/2023 8:30	1/6/2023 19:02	10:32:00
1/5/2023 7:59	1/5/2023 19:57	11:58:00
1/3/2023 10:42	1/3/2023 18:26	7:44:00

Exhibit 5

2023 SMMPA Member Direct Load Control (DLC) Participation

DLC Program	AU[1]	Fairmont[2]	Grand Marais	Litchfield	New Prague	OPU	Preston	RPU	Saint Peter	Waseca	Wells
Residential Air Conditioners	7069	0	0	640	1231	6736	186	7356	1864	1560	495
Residential Water Heaters	0	0	0	1290	159	0	87	607	16	7	455
Residential Dual-Fuel	0	0	100	0	0	0	0	0	0	0	0
Commercial Air Conditioners	0	0	0	147	0	249	16	79	85	120	80
Commercial Water Heaters	0	0	0	93	0	0	0	37	2	0	44
Commercial Dual-Fuel	0	0	21	0	0	0	0	0	0	0	0

[1]Austin Utilities doesn't currently track commercial vs. residential load control installations, so the number of participants shown above is their total number of DLC participants.

[2]Fairmont Public Utilities started installing an AMI system in 2023, so they didn't implement any load control last year.

Exhibit 6a

Demand and Resource Balance
Preferred Case
Winter

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Total Member Requirements	575.3	580.1	584.8	588.9	593.9	598.3	296.5	299.4	303.0	306.3	309.6	312.4	316.0	319.2	322.4
Above CROD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Installed DSM	(146.9)	(146.9)	(146.9)	(146.9)	(146.9)	(146.9)	(64.6)	(64.6)	(64.6)	(64.6)	(64.6)	(64.6)	(64.6)	(64.6)	(64.6)
Member Generation	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Existing Direct Load Control	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New DSM	(8.8)	(12.0)	(15.3)	(18.7)	(22.4)	(26.2)	(24.3)	(27.4)	(30.5)	(33.7)	(36.8)	(40.0)	(43.1)	(46.3)	(49.4)
Total Adjustments	(155.9)	(159.0)	(162.3)	(165.8)	(169.4)	(173.3)	(89.0)	(92.2)	(95.3)	(98.4)	(101.6)	(104.7)	(107.9)	(111.0)	(114.2)
Agency Requirement after Demand Side Resources	419.4	421.0	422.5	423.1	424.4	425.1	207.5	207.3	207.8	207.9	208.0	207.6	208.1	208.2	208.2
MISO Adjustments															
MISO Coincedence Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firm Capacity Sale	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Total Demand Side Resources	423.7	425.3	426.8	427.4	428.7	429.4	211.8	211.6	212.1	212.2	212.3	211.9	212.4	212.5	212.5
Tranmission Losses (2.6% pre 2031, 3.9% after)	11.0	11.1	11.1	11.1	11.1	11.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Planning Reserve Requirements (27.4%)	116.1	116.5	116.9	117.1	117.5	117.6	58.0	58.0	58.1	58.1	58.2	58.1	58.2	58.2	58.2
Total Generation Level Requirements	550.8	552.9	554.8	555.7	557.4	558.2	278.1	277.8	278.4	278.6	278.7	278.3	278.9	278.9	279.0
Supply Side Resources															
Existing Coal	319.2	319.2	319.2	287.3	287.3	287.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Existing Oil	73.5	73.5	73.5	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7	68.7
Existing Gas	118.8	118.8	118.8	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5	107.5
Existing Carbon Free	73.7	72.0	72.0	55.3	55.3	41.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2	36.2
New Natural Gas	0.0	0.0	0.0	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
New Oil	0.0	0.0	0.0	6.0	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
New Battery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Carbon Free (Solar)	0.0	0.0	0.0	0.0	0.0	0.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
New Carbon Free (Wind)	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
New Capacity Purchases															
Total Supply Side Resources	585.2	583.5	583.5	571.5	577.5	563.4	282.5	282.5	282.5	282.5	282.5	282.5	282.5	282.5	282.5
Agency Resource Status (Positive = Excess MW)	34.4	30.6	28.7	15.8	20.1	5.2	4.4	4.7	4.1	3.9	3.8	4.3	3.6	3.6	3.5

Exhibit 6b

Demand and Resource Balance
Preferred Case
Summer

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Total Member Requirements	825.1	832.9	841.0	847.9	855.8	399.8	404.4	408.6	413.6	418.2	422.6	426.4	431.6	436.0	440.5
Above CROD	(53.1)	(56.0)	(59.0)	(60.9)	(62.9)	-	-	-	-	-	-	-	-	-	-
Installed DSM	(179.6)	(179.6)	(179.6)	(179.6)	(179.6)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)	(79.0)
Member Generation	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Existing Direct Load Control	(25.7)	(25.7)	(25.7)	(25.7)	(25.7)	(17.1)	(17.1)	(17.1)	(17.1)	(17.2)	(17.2)	(17.2)	(17.2)	(17.2)	(17.2)
New DSM	(10.4)	(14.1)	(18.0)	(22.0)	(26.3)	(24.7)	(28.3)	(32.0)	(35.6)	(39.3)	(43.0)	(46.7)	(50.3)	(54.0)	(57.7)
Total Adjustments	(268.9)	(275.6)	(282.4)	(288.4)	(294.6)	(121.0)	(124.7)	(128.3)	(132.0)	(135.7)	(139.3)	(143.0)	(146.7)	(150.4)	(154.1)
Agency Requirement after Demand Side Resources	556.2	557.3	558.6	559.5	561.2	278.8	279.8	280.3	281.7	282.5	283.3	283.4	284.9	285.6	286.4
MISO Adjustments															
MISO Coincidence Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Firm Capacity Sale	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total Demand Side Resources	562.6	563.7	565.0	565.9	567.6	285.2	286.2	286.7	288.1	288.9	289.7	289.8	291.3	292.0	292.8
Tranmission Losses (2.9% pre2030, 4.4% after)	16.3	16.3	16.4	16.4	16.5	12.5	12.6	12.6	12.7	12.7	12.7	12.8	12.8	12.8	12.9
Planning Reserve Requirements (9.0%)	50.6	50.7	50.8	50.9	51.1	25.7	25.8	25.8	25.9	26.0	26.1	26.1	26.2	26.3	26.4
Total Generation Level Requirements	629.5	630.8	632.2	633.3	635.1	323.4	324.5	325.1	326.7	327.6	328.5	328.6	330.3	331.1	332.0
Supply Side Resources															
Existing Coal	326.9	326.9	326.9	323.3	323.3	323.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Existing Oil	83.1	83.1	83.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1	82.1
Existing Gas	132.9	132.9	132.9	130.5	130.5	130.5	130.5	130.5	130.5	130.5	130.5	130.5	130.5	130.5	130.5
Existing Carbon Free	64.2	64.2	64.2	58.1	46.1	35.8	35.8	35.8	35.7	35.7	35.7	35.7	34.2	34.2	34.2
New Natural Gas	0.0	0.0	0.0	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
New Oil	0.0	0.0	0.0	6.0	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
New Battery	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
New Carbon Free (Solar)	0.0	0.0	0.0	0.0	0.0	0.0	83.3	83.3	83.3	83.3	83.3	83.3	83.3	83.3	83.3
New Carbon Free (Wind)	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
New Capacity Purchases															
Total Supply Side Resources	607.1	607.1	607.1	646.7	640.6	630.3	396.3	396.3	396.2	396.2	396.2	396.2	394.7	394.7	394.7
Agency Resource Status (Positive = Excess MW)	(22.4)	(23.7)	(25.2)	13.4	5.4	306.9	71.7	71.1	69.6	68.6	67.7	67.6	64.4	63.6	62.7