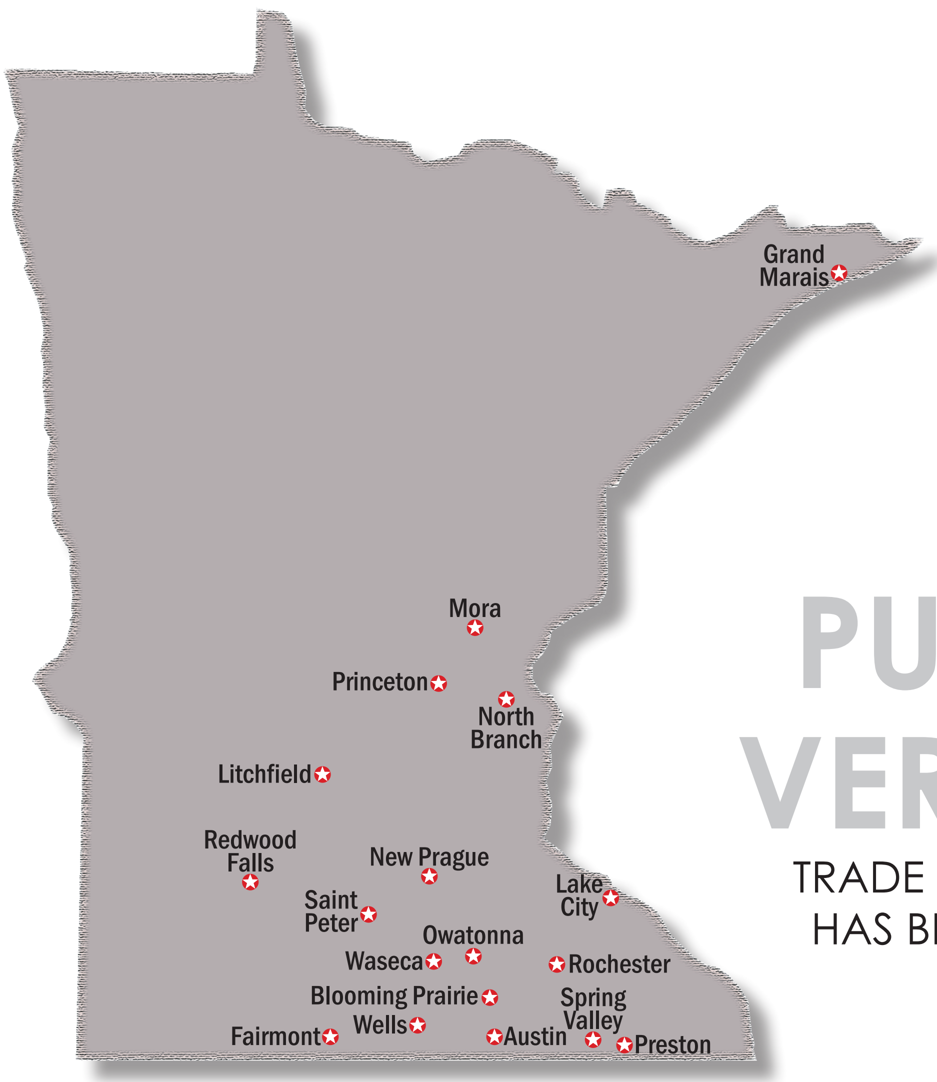
SOUTHERN MINNESOTA MUNICIPAL POWER AGENCY

2018-2032 Integrated Resource Plan

Submitted to Minnesota Public Utilities Commission

December 1, 2017

Docket No. ET9/RP-17-753



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TRADE SECRET DATA HAS BEEN EXCISED

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

SOUTHERN MINNESOTA
MUNICIPAL POWER AGENCY

Bringing power to your life.

November 27, 2017

Daniel P. Wolf
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 2018 – 2032 INTEGRATED RESOURCE PLAN: DOCKET NO. ET9/RP-17-753**

Dear Mr. Wolf:

Southern Minnesota Municipal Power Agency (SMMPA) is a municipal joint action agency serving eighteen 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-13-1104), SMMPA respectfully submits this 2017 IRP covering the years 2018-2032. This IRP has been filed by e-filing with Minnesota Public Utilities Commission on November 27, 2017 as shown in the attached Certificate of Service.

Exhibit 1 of this IRP contains trade secret data and has been so marked pursuant to MN Statute §13.37 and MN Rule 7829.0500. Attached is a statement justifying SMMPA's determination of certain 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,

Mark S. Mitchell

Mark S. Mitchell
Director of Operations and COO

Attachments
cc: Dave Geschwind

MSM:cs:2k17006

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Docket No. ET9/RP-17-753

Statement of Southern Minnesota Municipal Power Agency Regarding Designation of Trade Secret Data in its 2017 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 Exhibit 1 to its 2017 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

Nancy Lange	Chair
Dan Lipschultz	Commissioner
Matt Schuerger	Commissioner
Katie Sieben	Commissioner
John Tuma	Commissioner

In the Matter of Southern Minnesota Municipal Power Agency's 2017 Resource Plan
Docket No. ET9/RP-17-753

Initial Filing

CERTIFICATE OF SERVICE
I, Christopher P. Schoenherr, hereby certify that I have this day served a copy of the following, or a summary thereof, on Daniel Wolf 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, 2017**
/s/ CHRISTOPHER P. SCHOENHERR
Christopher P. Schoenherr
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507-292-6440

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Docket No. ET9/RP-17-753

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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 8, page 1
	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 3-6
	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 f.
	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.	N/A
	Subd. 6	Utility should state if it intends to site or construct a large energy facility.	Section 7, page 3
§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 8
	Subp. 3A	Include a list of resource options considered.	Section 2 and Exhibit 2
	Subp. 3B	Description of the process and analytical techniques used in developing the plan.	Section 2
	Subp. 3C	Include a 5-year action plan with a schedule of key activities and regulatory filings.	Section 7
	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 7, pages 4-7
	Subp. 4	Include a non-technical summary, not to exceed 25 pages in length, describing resource needs.	Section 1

Recommendations from DOC Letter Issued March 27, 2014

Requirement	Section Reference
SMMPA to adjust its IRP so that it achieves annual energy savings of 1.5% of retail sales.	Section 5
Calculate SMMPA's annual capacity requirements based on its coincident peak demand and a reserve requirement of 7.3 percent.	Section 2, page 2
Calculate resource needs based on the non-coincident peak (or system) peak, rather than the coincident peak (or the demand at time of MISO peak).	Section 2, page 2

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 eighteen member municipal utilities for the period of 2018 through 2032. It clearly demonstrates that SMMPA is well positioned to meet its members' requirements over the next fifteen years in a reliable, environmentally responsible, and economical manner without the need for additional resources. The only new resources the Agency will add during this period, and has already committed to, are to meet its renewable portfolio standard requirements.

This is the first SMMPA IRP that extends beyond 2030, a date that marks a significant change in the Agency's power supply requirements. Sixteen of the Agency's eighteen 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.

Load growth on the SMMPA system over the last several years has been significantly lower than historical growth rates. Primary drivers for this are the considerable success the Agency and its members have had with Demand Side Management and Conservation (DSM) programs, and the economic downturn. The load forecast used in this IRP shows an average annual decline in demand requirements of 0.1 percent and an average annual increase in energy requirements of 0.5 percent over the study period. This, coupled with the contractual load reduction in 2030, results in the Agency having more than sufficient resources to meet ongoing needs.

We believe this IRP is consistent with, and meets all of 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.

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 United Minnesota Municipal Power Agency in 1984. As with other joint action agencies, the initial cities joined together to create economies of scale to allow them to more cost-effectively meet their growing generation and transmission needs. 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.

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 SMMPA 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 17 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 has also worked 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 has also contracted for the addition of a new 100 MW wind project slated for commercial operation in 2020. This project, in combination with SMMPA's existing renewable resources, will allow the Agency to meet its obligations under the state's renewable portfolio standard well beyond the period of this IRP.

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 actually 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 1.74 percent of their energy sales through their DSM programs. SMMPA has also received four federal Environmental Protection Agency ENERGY STAR® Awards; in 2003, 2004, and 2010 for Excellence in Energy Efficiency, and in 2016 as an ENERGY STAR Partner of the Year. SMMPA is committed to continuing to meet 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 kV to 345 kV. The Agency's $200 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 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 all of 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 eighth 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, 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 18 members, 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 continues that trend with a projected annual decline in peak demand of 0.1 percent for several years and a slight annual increase in energy requirements of 0.5 percent.

RESOURCES

SMMPA owns and contracts for a diverse fleet of generating resources. Its largest resource is its 41% 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, and the new 2020 wind purchase mentioned above. SMMPA also contracts with its members for gas, dual fuel (fuel oil and natural gas) and straight fuel oil generators that provide important capacity for SMMPA and increased reliability in many of the member communities.

SMMPA uses this fleet of resources in its participation in the MISO market. SMMPA's generation serves as a hedge against high market prices as it offers its resources for sale into 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 an important 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 so far, and are on track to do so again in 2017. 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 7 percent in 2010 and steps up in increments until it reaches 25 percent in 2025. The current requirement is 17 percent. SMMPA is currently at 17 percent, and has been in compliance every year.

The Agency has taken a portfolio approach to procure 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 addition of the new wind resource in 2020 will allow the Agency to remain compliant with the standard well beyond the term of this IRP.

PREFERRED PLAN

The preferred plan resulting from this IRP analysis is simple and straight forward. SMMPA's existing fleet of generation meets or exceeds its current peak demand. And with a load forecast showing a slight decline in peak demand until 2030 when the Agency's load will be reduced by more than 50 percent due to the expiration of its power supply contracts with two of its largest members, the Agency will not need any resource additions for the foreseeable future, barring the loss of existing generation or significant changes in laws or regulations. Even when evaluating high load growth scenarios, the only potential resources needed are short term capacity purchases in a few of the out years.

SENSITIVITY CASES

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. To understand the potential impact of unexpected changes, SMMPA ran a number of sensitivity cases. Variables used in these cases include low, base, and high forecasts for load, energy prices, and natural gas prices; low and high externality costs; sudden addition of load; sudden loss of a generator; and changes in DSM and renewable resources.

None of these sensitivity cases suggest deviating from the preferred plan, and only a few of them resulted in the need for any additional resources. The cases calling for additional resources only required short-term capacity purchase in the out years prior to 2030.

ENVIRONMENTAL STEWARDSHIP

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. SMMPA has been actively engaged at the state and national level to develop plans for compliance with the Clean Power Plan. However, given the uncertainty related to if and when a replacement rule will be proposed by EPA to address carbon emissions, and the nature of such a rule, SMMPA is not currently engaged in developing potential compliance strategies until such time as these uncertainties have been addressed.

Minnesota has established a greenhouse gas reduction goal for entities to reduce their greenhouse gas emissions by 15 percent by 2015, 30 percent by 2025, and 80 percent by 2050 when compared against 2005 emissions. SMMPA is pleased to report it has achieved this goal for the year 2015 and is forecasted to achieve the 2025 reduction goal as well.

2. Plan Development

GENERAL DISCUSSION

This is SMMPA's eighth 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 in order to provide adequate, reliable, and cost-effective electric power.

PLANNING MODEL

SMMPA uses the AURORAxmp Electric Market Model developed by EPIS, Inc. 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 form 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. A capacity reserve margin of 7.8 percent based on current MISO requirements.
b. The study period includes the 15 years from 2018 through 2032. A 28-year extension period is used for the AURORA optimization analysis to account for end-effects.
c. Total present-worth costs are expressed in 2018 dollars, and are calculated by discounting annual costs with SMMPA's cost of money.
d. Projected future demand and energy forecasts were developed by nFront Consulting.
e. The model considers the Agency's future 100 MW wind power purchase agreement as a prerequisite resource starting in 2020 because this contract has already been executed by both parties. The model also considers the Agency's future 3 MW community solar project as a prerequisite resource beginning in 2018.
f. As required by Minnesota Statute 216B.2422 Subd.3, the model includes the cost of environmental externalities issues by the Minnesota Public Utility Commission on June 16, 2017, when optimizing future resource options.
g. The model uses the Agency's peak demand for determining resource requirements, not the MISO coincident peak, as submitted to MISO.
h. The model reflects the expiration of the power sales contracts of Rochester Public Utilities and Austin Utilities with the Agency on March 31, 2030.
i. The MISO UCAP rating (Unforced Capacity, or generation capacity after considering forced outage rate) for each generator for the 2017/2018 planning year was used.

MODEL INPUTS

The model requires a large amount of specific data inputs in order to perform its forecasts and optimizations. Of course, 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, LLC (nFront Consulting). nFront Consulting also provided several 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 the Exhibit 1.

The same data inputs used for existing resources are also required for all of 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 by Burns & McDonnell, an engineering firm specializing in the electric utility industry. Those options included many conventional generation options, as well as various renewable energy generator options. The future resource options which were available for the model to choose were:

- A 50 MW share of a new or upgraded coal facility
- A 50 MW share of a new or upgraded nuclear facility
- Two options for a new simple cycle combustion turbine
- A 50 MW share of a new combined cycle facility
- A 40 MW reciprocating engine plant
- A 25 MW wind generation facility
- A 5 MW solar facility.

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

Finally, these resource options do not include plans to reduce, sell, derate, or upgrade any existing resources. However, the preferred plan includes the assumed termination of existing contracts with members for various generation facilities in 2030 when the SMMPA demand decreases due to the expiration of its power sales contracts with Rochester Public Utilities and Austin Utilities. The Agency would not terminate these existing generation contracts as long as the market price for capacity economically justifies maintaining them.

3. Load Forecast

GENERAL DISCUSSION

The load forecast that underpins the IRP discussed herein is based on SMMPA's 2017 long-term Load Forecast, which was developed with the assistance of nFront Consulting, LLC (nFront Consulting), a utility industry consulting firm based out of Orlando, Florida. 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 2017 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 load as a function of a series of explanatory variables, which are then simulated with future values of the explanatory variables to generate forecasts of load determinants. 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 of 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 18 members. 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.

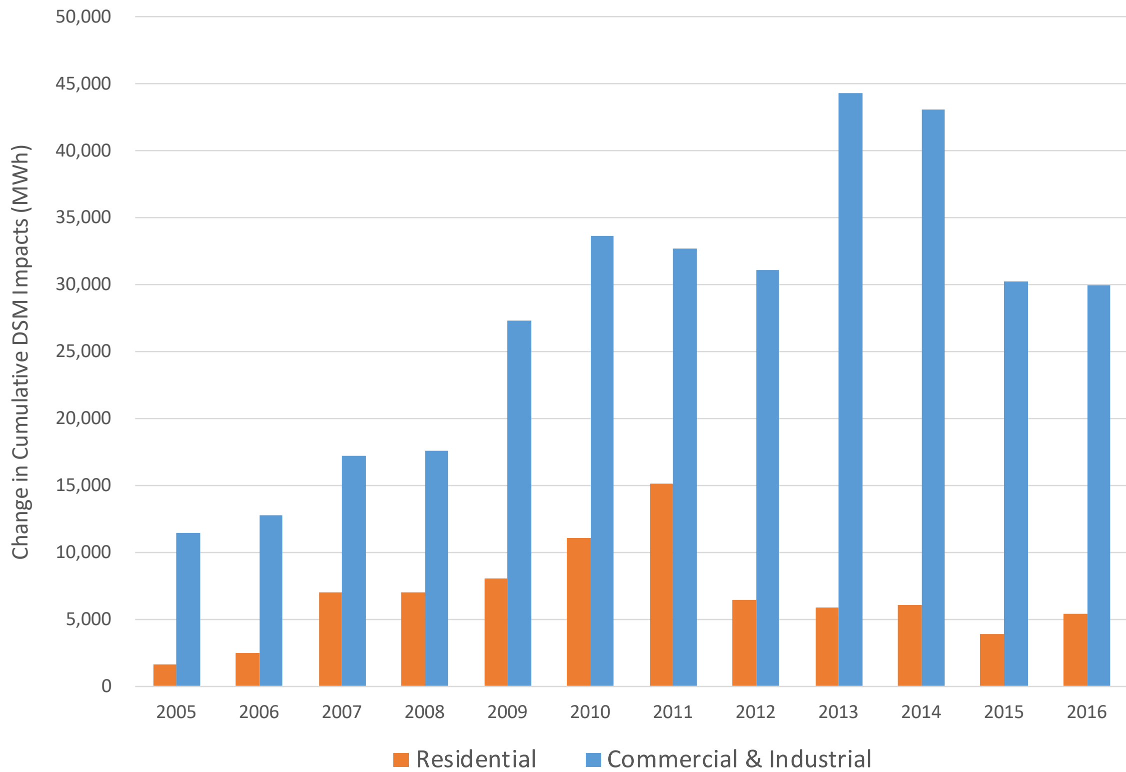
Adjustments for Demand-side Management Conservation

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 2005-2016 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 2005-2016 totals 34,321 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



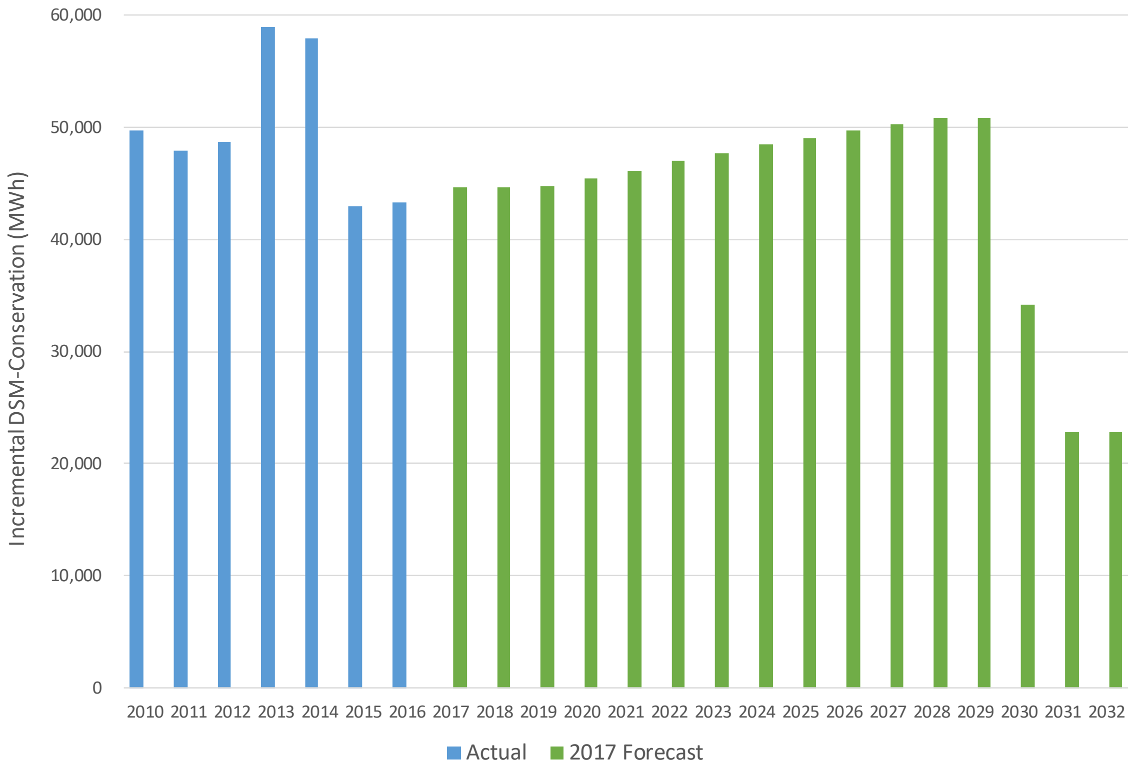
Based on the average change in cumulative DSM-Conservation impacts, the forecasted growth of aggregate retail sales across SMMPA's members developed directly from the forecast equations (i.e., the "baseline" forecast) was adjusted upward in each year to result in a forecast of the potential aggregate 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 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% CIP energy savings goal).[2] Annual peak demand impacts are derived from the projected energy impacts based generally on load factors

[2] This calculation is explicitly carried through 2028, the end year of SMMPA's most recent DSM Potential Study. 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 checked to ensure that impacts meet the CIP goal, the process does not reflect iterative calculations to exactly meet the 1.5% goal.

derived from SMMPA's 2013 DSM Potential Study. Monthly impacts are then shaped from these annual values based on SMMPA's overall load shape. 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.[3] For periods beyond 2028, cumulative DSM-Conservation impacts by member are extrapolated, and the values shown below reflect the implied incremental impacts. The dramatic reduction in projected DSM-Conservation impacts beginning 2030 is a result of the expiration of SMMPA's power sales contracts with Austin Utilities and Rochester Public Utilities on April 1, 2030.

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



SMMPA Wholesale Budget 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:

[3] In order to accurately include the impact of SMMPA's behavioral and load management programs in incremental DSM-Conservation, the load forecast is adjusted slightly upward for the impact of these programs in the last historical year, as the forecast would otherwise effectively double-count these programs, which were active in the historical period but were not included in the initial adjustment from the baseline forecast discussed above.

- 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. This 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 IHS Global Insight (Global Insight) and Woods & Poole Economics (Woods & Poole), both nationally recognized providers of such data. nFront Consulting developed consensus projections of economic and demographic data based on the data from these two providers. However, for purposes of the Base Case forecast described herein, this 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 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 30^{th} 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 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 1981-2010 period. Future peak day weather conditions reflect averages over 1995-2016.

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 2016.
- 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 2016.
- 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); (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
- Real electricity prices (using a 3-year moving average)
- Natural gas prices (using a 4-year moving average)
- 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 3-1 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 3-1

Historical and Projected Residential Customer Counts and Baseline Energy Sales

		Energy Sales (MWh)[4]					
	Residential Customers	Residential	Commercial	Industrial	Other	Total	Residential Average Use
Historical							
2002	88,514	725,727	1,019,809	920,247	49,074	2,714,858	8,199
2007	96,054	795,035	1,105,306	1,042,560	42,592	2,985,492	8,277
2008	96,323	768,015	1,100,562	1,043,510	40,980	2,953,067	7,973
2009	96,694	752,497	1,074,349	911,689	39,611	2,778,145	7,782
2010	97,000	792,593	1,097,272	928,956	39,680	2,858,501	8,171
2011	98,260	791,268	1,093,258	942,685	54,064	2,881,275	8,053
2012	98,748	777,501	1,080,078	945,265	49,794	2,852,639	7,874
2013	99,198	788,854	1,089,089	943,130	42,865	2,863,938	7,952
2014	99,614	776,859	1,080,730	940,584	43,552	2,841,725	7,799
2015	100,225	755,886	1,076,784	946,989	43,733	2,823,392	7,542
2016	101,461	771,866	1,089,444	940,030	44,748	2,846,088	7,608
Projected							
2017	102,766	787,912	1,092,928	945,624	44,289	2,870,753	7,667
2018	103,863	793,129	1,099,146	955,768	44,137	2,892,180	7,636
2019	105,041	802,832	1,106,667	966,370	44,087	2,919,955	7,643
2020	106,199	813,132	1,110,143	979,411	44,070	2,946,756	7,657
2021	107,323	818,055	1,110,331	986,788	44,065	2,959,239	7,622
2022	108,362	823,432	1,113,595	1,012,710	44,063	2,993,800	7,599

[4] There has been some migration of customers between the commercial and industrial classes shown, including a considerable reclassification of customers from industrial to commercial in 1999, which impacts the historical growth rates of these classes.

Energy Sales (MWh)[4]

	Residential Customers	Residential	Commercial	Industrial	Other	Total	Residential Average Use
2023	109,337	828,266	1,116,292	1,023,209	44,062	3,011,829	7,575
2024	110,294	835,610	1,123,538	1,036,427	44,062	3,039,637	7,576
2025	111,220	840,938	1,127,300	1,043,218	44,062	3,055,518	7,561
2026	112,123	848,025	1,130,655	1,053,714	44,062	3,076,455	7,563
2031	116,379	888,937	1,163,156	1,099,801	44,062	3,195,956	7,638
Cumulative Avg. Growth Rates:							
2002-2016	1.0%	0.4%	0.5%	0.2%	-0.7%	0.3%	-0.5%
2007-2016	0.6%	-0.3%	-0.2%	-1.1%	0.6%	-0.5%	-0.9%
2017-2026	1.0%	0.8%	0.4%	1.2%	-0.1%	0.8%	-0.2%
2017-2031	0.9%	0.9%	0.4%	1.1%	0.0%	0.8%	0.0%

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 2005-2016 period. This corrects the dampening effect on the forecast equation parameters of the DSM Conservation programs.

Table 3-2 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.

Table 3-2

Baseline vs. Adjusted Member Retail Energy Sales (MWh)

	Baseline Forecast			Adjusted Forecast		
	Residential	Non-residential	Total	Residential	Non-residential	Total
2017	787,912	2,082,842	2,870,753	794,611	2,110,464	2,905,075
2018	793,129	2,099,052	2,892,180	806,527	2,154,296	2,960,823
2019	802,832	2,117,124	2,919,955	822,930	2,199,990	3,022,920
2020	813,132	2,133,624	2,946,756	839,929	2,244,112	3,084,041
2021	818,055	2,141,184	2,959,239	851,552	2,279,294	3,130,847
2022	823,432	2,170,368	2,993,800	863,629	2,336,100	3,199,729
2023	828,266	2,183,563	3,011,829	875,162	2,376,917	3,252,079
2024	835,610	2,204,027	3,039,637	889,205	2,425,004	3,314,209
2025	840,938	2,214,580	3,055,518	901,233	2,463,178	3,364,411
2026	848,025	2,228,431	3,076,455	915,019	2,504,651	3,419,670
2027	855,186	2,243,375	3,098,561	928,880	2,547,217	3,476,097
2028	864,793	2,262,607	3,127,400	945,186	2,594,071	3,539,257
2029	871,622	2,273,509	3,145,131	958,715	2,632,595	3,591,310
2030	879,993	2,289,688	3,169,681	973,784	2,676,396	3,650,181

	Baseline Forecast			Adjusted Forecast		
	Residential	Non-residential	Total	Residential	Non-residential	Total
2031	888,937	2,307,019	3,195,956	989,428	2,721,350	3,710,778
2032	900,132	2,329,592	3,229,724	1,007,323	2,771,544	3,778,867
Cumulative Avg. Growth Rates:						
2017-2026	0.8%	0.8%	0.8%	1.6%	1.9%	1.8%
2017-2032	0.9%	0.7%	0.8%	1.6%	1.8%	1.8%

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 2007-2016, of 4.6%. 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 3-3 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 through 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, which reflects the expected departure of two large members from SMMPA.

Table 3-3
Projected Impacts on System Energy of Expected DSM Programs

	Incremental EE Impacts	Behavioral Program	Load Control	Annual Impacts	Cumulative Impacts
2017	40,778	3,458	441	44,677	44,677
2018	42,245	1,935	449	44,629	85,407
2019	42,429	1,935	457	44,821	127,844
2020	42,995	1,935	464	45,393	170,846
2021	43,686	1,935	473	46,093	214,541
2022	44,563	1,935	481	46,979	259,112
2023	45,306	1,935	490	47,730	304,427
2024	46,040	1,935	497	48,472	350,474
2025	46,637	1,935	507	49,079	397,121
2026	47,317	1,935	516	49,768	444,448
2027	47,860	1,935	525	50,319	492,316
2028	48,401	1,935	532	50,868	540,725
2029	48,408	1,935	532	50,875	589,133
2030	32,223	1,629	375	34,227	371,236 [5]
2031	20,926	1,533	325	22,785	310,627 [5]
2032	20,926	1,533	325	22,785	331,553

Table 3-4 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.

[5] The cumulative value in 2030 and 2031 cannot be directly computed from this data as a result of the expected departure of two large members from SMMPA. This value captures the cumulative DSM impacts for the January through March period for all members and those for the remaining members over April through December. The 2031 value reflects the cumulative DSM for the remaining members only back to 2017.

Table 3-4
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)
2017	3,052,076	636.9	44,677	26.3	3,007,399	610.6
2018	3,110,519	650.0	85,407	41.7	3,025,112	608.4
2019	3,175,617	663.4	127,844	52.6	3,047,773	610.9
2020	3,239,694	674.8	170,846	63.3	3,068,848	611.5
2021	3,288,762	688.2	214,541	74.1	3,074,221	614.0
2022	3,360,974	701.5	259,112	85.3	3,101,862	616.2
2023	3,415,855	714.3	304,427	96.7	3,111,428	617.6
2024	3,480,988	727.2	350,474	108.3	3,130,514	618.8
2025	3,533,617	741.3	397,121	120.1	3,136,496	621.2
2026	3,591,547	754.2	444,448	131.8	3,147,099	622.4
2027	3,650,702	767.6	492,316	142.4	3,158,386	625.2
2028	3,716,916	779.8	540,725	154.4	3,176,191	625.4
2029	3,771,485	794.1	589,133	166.5	3,182,352	627.6
2030	2,202,353	342.4	371,236	88.8	1,831,117	253.5
2031	1,728,323	347.4	310,627	94.1	1,417,696	253.3
2032	1,756,304	352.0	331,553	99.3	1,424,750	252.6
Cumulative Avg. Growth Rates:						
2017-2026	1.8%	1.9%			0.5%	0.2%
2017-2032	-3.6%	-3.9%			-4.9%	-5.7%

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 3-5 below.[6]

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

	Energy (MWh)	Peak Demand (MW)
2017	2,949,908	543.4
2018	2,967,068	539.0
2019	2,989,387	539.9
2020	3,010,217	539.4
2021	3,014,515	539.3
2022	3,041,629	539.7
2023	3,050,778	539.4

[6] 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.

	Energy (MWh)	Peak Demand (MW)
2024	3,069,059	538.3
2025	3,074,607	538.6
2026	3,084,324	538.2
2027	3,095,074	539.0
2028	3,112,750	538.2
2029	3,117,856	538.5
2030	1,816,623	253.3
2031	1,414,817	253.0
2032	1,421,871	252.3
Cumulative Avg. Growth Rates:		
2017-2026	0.5%	-0.1%
2017-2032	-4.7%	-5.0%

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 Global Insight and Woods & Poole, 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 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 2015 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 3-6 below provides the amount by which the economic and demographic projections were adjusted from the Base Case assumptions through 2035 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.[7]

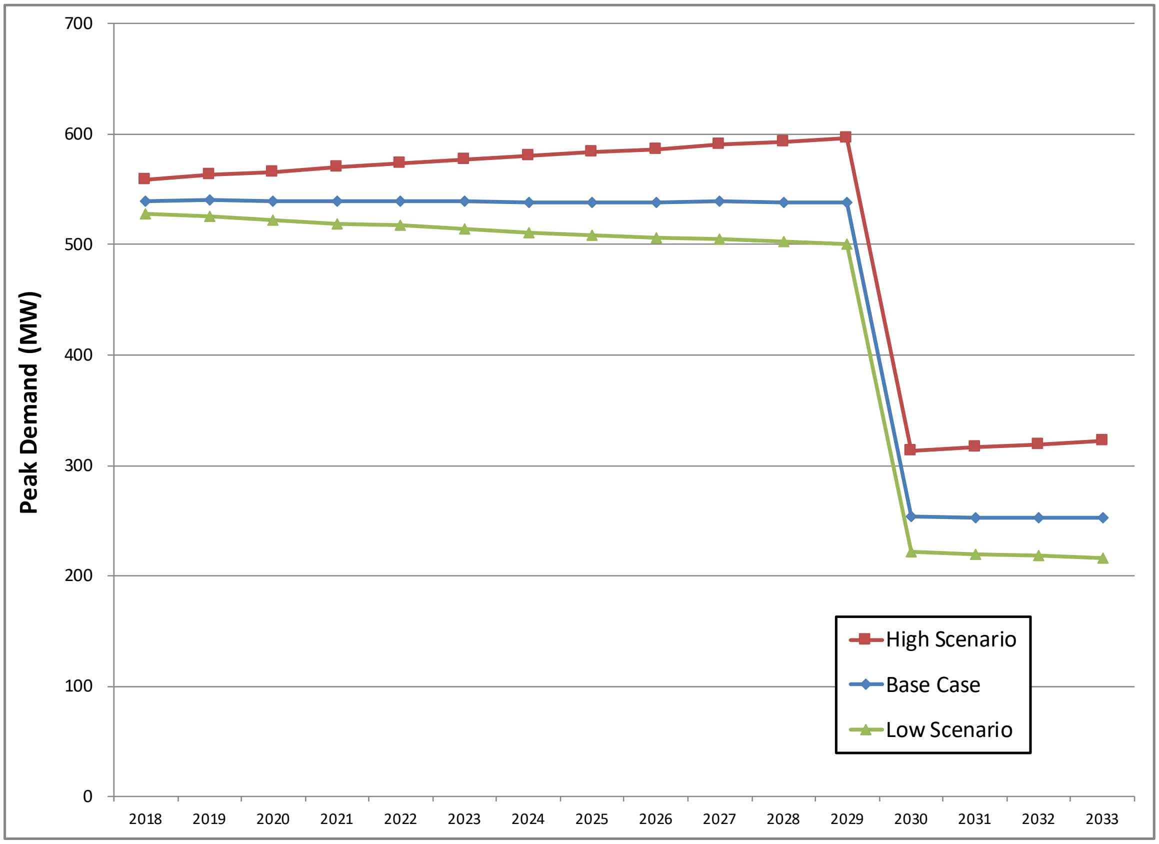
Table 3-6
Assumed Variation in Selected Socioeconomic Variables

	Population	Employment	Income	Income Per Capita
2018	4.3%	7.8%	9.0%	6.3%
2019	5.2%	9.2%	10.5%	7.3%
2020	6.0%	10.4%	11.9%	8.2%
2021	6.8%	11.5%	13.1%	8.9%
2022	7.5%	12.5%	14.2%	9.7%
2023	8.1%	13.4%	15.2%	10.3%
2024	8.8%	14.3%	16.2%	10.9%
2025	9.4%	15.2%	17.1%	11.5%
2026	9.9%	16.0%	18.0%	12.0%
2027	10.5%	16.8%	18.9%	12.6%
2028	11.1%	17.5%	19.7%	13.1%
2029	11.6%	18.2%	20.5%	13.5%
2030	12.1%	18.9%	21.3%	14.0%
2031	12.6%	19.6%	22.0%	14.4%
2032	13.1%	20.3%	22.7%	14.9%
2033	13.6%	20.9%	23.5%	15.3%
2034	14.1%	21.6%	24.1%	15.7%
2035	14.6%	22.2%	24.8%	16.1%

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.

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

Chart 3-3
Range of Adjusted IMS Peak Demand Forecasts



The High and Low Scenarios reflect differences to the Base Case of approximately positive 34 MW (6.3%) and negative 23 MW (4.2%), respectively, by 2022 (i.e., five years into the forecast horizon) and positive 52 MW (9.6%) and negative 34 MW (6.3%), respectively, by 2027 (i.e., ten years into the forecast horizon). 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.

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 generally serve its total load, in reality 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 2016, including energy consumption eliminated by DSM. Again, SMMPA is actually purchasing its total energy requirements from MISO.

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Chart 4-1

Current Resource Capacity Mix

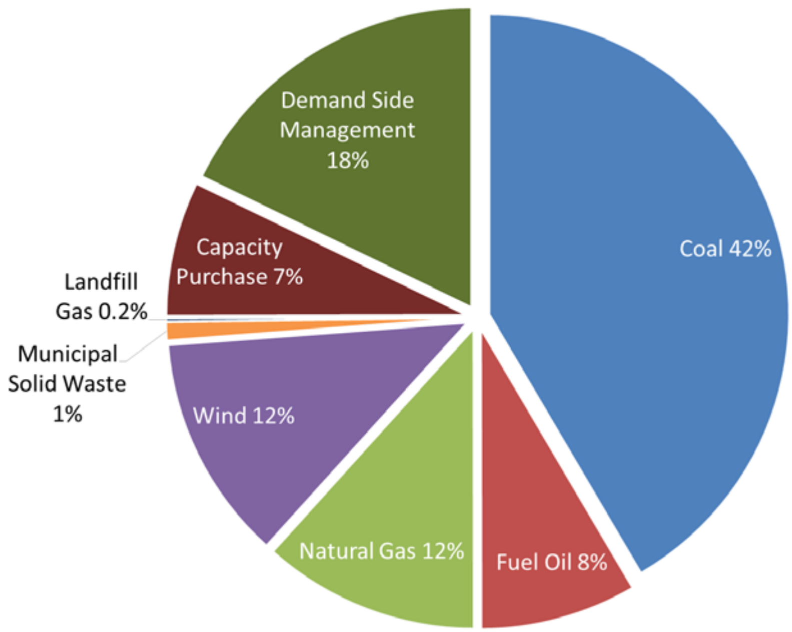
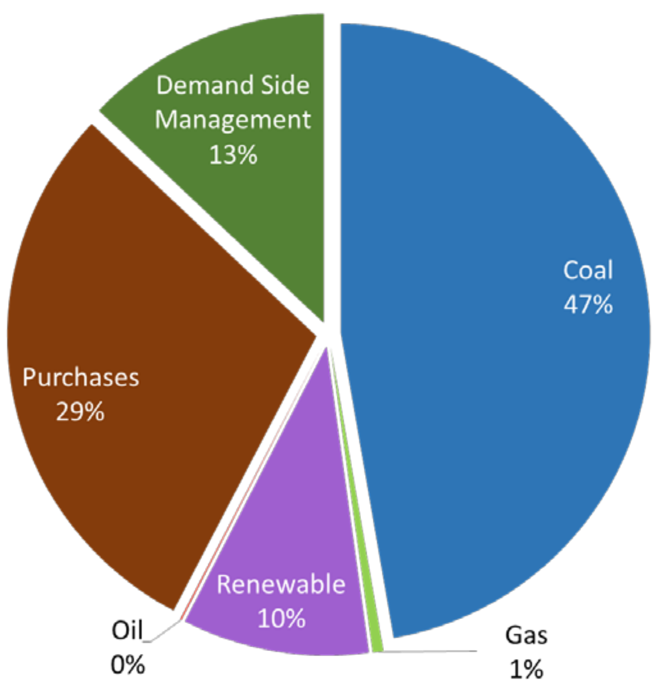


Chart 4-2

2016 Energy Mix



SMMPA 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 the Agency's lowest cost generation resource 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.

SMMPA and Xcel are committed to maintaining Sherco 3 in excellent operating condition. In addition to routine annual maintenance and repairs, Sherco 3 is scheduled for a planned major outage for repairs every three years. The most recent planned outage took place in the spring of 2017. The next maintenance outage is scheduled for spring of 2020. Because of the joint ownership of Sherco 3, neither party can unilaterally make decisions regarding future improvements or changes in the operations of the unit. 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, are currently being installed in Owatonna, MN and are scheduled to go into service in late 2017. These new natural gas fired high-efficiency reciprocating internal combustion engine units will replace the older, less efficient steam boilers and turbines recently retired at those two locations. Although internal combustion generating plants are generally considered as peaking resources, these new high-efficiency units are up to 20 percent more efficient than a traditional internal combustion engines or combustion turbines, and are therefore dispatched by MISO as intermediate load units. These generators are also 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	2017	9.7	
	Unit	2	2017	9.7	
	Unit	3	2017	9.7	
	Unit	4	2017	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 54 member-owned natural gas and oil fired reciprocating internal combustion engines. The member-owned generation totals approximately 141 MW. Of the eighteen members in the SMMPA system, thirteen have generating capacity under contract with the Agency. Having this generation located in the member communities substantially improves system reliability for the member city 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 exits.

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 and continues to provide peaking service for SMMPA.

Member-owned Reciprocating Engines

There are currently 54 natural gas and oil fired reciprocating engines located at SMMPA member cities totaling approximately 125 MW. These units provide valuable capacity to SMMPA and serve as a backup power supply for the communities in times of emergency. These 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.

During 2013, SMMPA retrofitted 27 of these 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.

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Table 4-2

SMMPA Generating Capacity – Peaking Resources

Station	Fuel Type	Plant Total (MW)
Blooming Prairie	Oil	6.3
Fairmont (SMMPA-owned)	Dual Fuel	12.0
Grand Marais	Oil	6.0
Litchfield	Dual Fuel	4.2
	Oil	10.0
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
Total Peaking Capacity		153.0

RENEWABLE RESOURCES

SMMPA's generation portfolio currently consists of more than 115 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 Energy 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
Total				117.1

MISO MARKET OPERATIONS

SMMPA's approach to wholesale power marketing has evolved over time. It has gone from 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 early 2006, the Agency and The Energy Authority (TEA) formed an alliance whereby TEA would assist the Agency in wholesale power marketing activities. TEA has a highly trained, very 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 that SMMPA could not 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 ensure 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

CapX 2020

The Agency is an active member of the CapX 2020 transmission analysis and planning effort, having joined the group in 2006. Through the efforts of the CapX 2020 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 currently under construction from La Crosse to Madison, WI, through its Wisconsin subsidiary, SMMPA Wisconsin LLC.

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 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	123.58
115	11.80
69	138.54

5. Demand-Side Management Resources

GENERAL DISCUSSION

Demand-side management (DSM) 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 an important role in meeting customer demand and energy needs. DSM-Conservation programs help to counter or minimize energy and demand growth thereby delaying the need to build more physical generation assets, they have positive environmental impacts, and they are advantageous for economic development.

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 our members. Members saw DSM as a way to keep their municipal consumption under control, deferring the need for obtaining additional power supply, and helping to manage their cost of power.

As the years have progressed, so has SMMPA's commitment to DSM-Conservation. Their energy efficiency programs have been ongoing for over two 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 their members' customers. An indicator of this commitment is the fact that SMMPA and its member utilities were recipients of a National ENERGY STAR® Award by the Environmental Protection Agency for a fourth time in 2016.

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 18 members have collectively exceeded the CIP savings goal and CIP spending requirement every year so far, and are on track to do so again in 2017 (Exhibit 3 shows a list of the 2016 CIP savings by member).

SMMPA's average annual CIP energy savings from 2010 to 2016 was 1.74 percent, and their average CIP spending over that period was 2.70 percent.

Chart 5-1
2005-2032 Historical and Projected DSM Savings

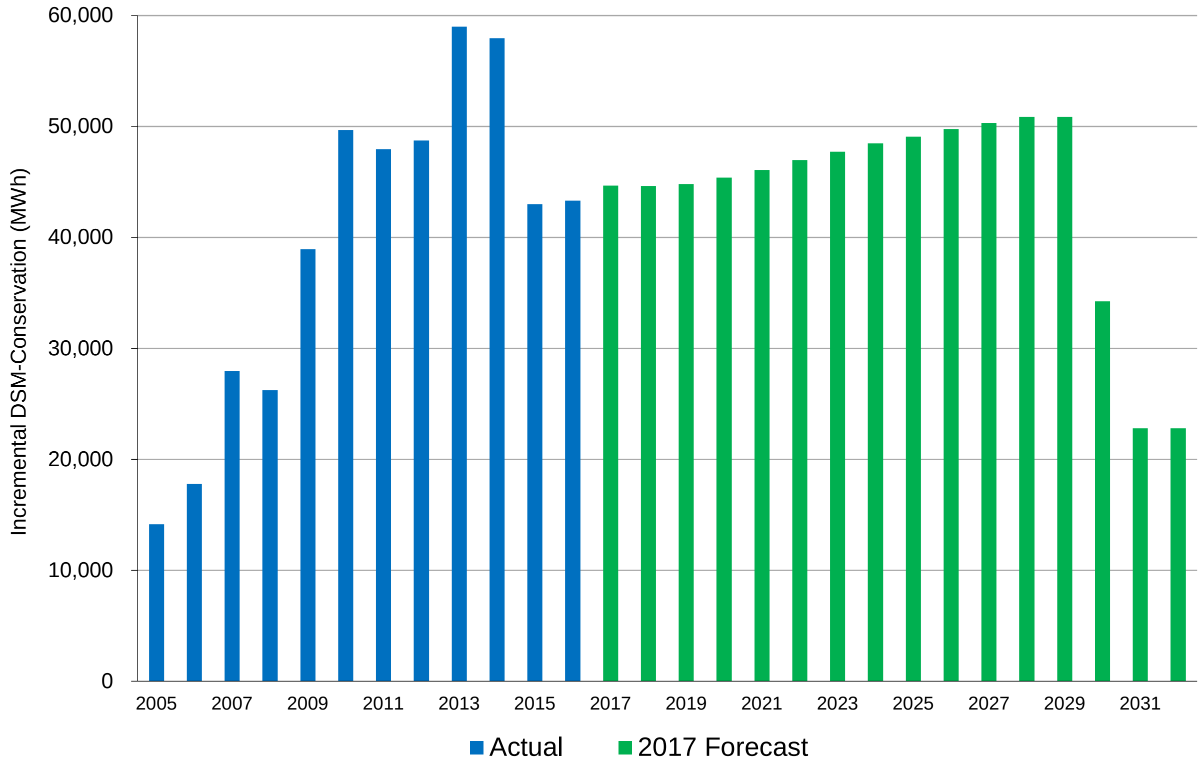

Table 5-1
2005-2032 Historical and Projected DSM Costs and Savings

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
2005	14,157	0.48%	$3,279,280	1.34%	12.2	$232	$19.05
2006	17,769	0.61%	$3,600,310	1.47%	12.2	$203	$16.63
2007	27,966	0.95%	$4,490,388	1.83%	12.2	$161	$13.19
2008	26,226	0.89%	$4,914,754	2.00%	12.1	$187	$15.55
2009	38,923	1.33%	$5,925,472	2.41%	12.2	$152	$12.50
2010	49,674	1.70%	$7,576,516	3.08%	12.3	$153	$12.42
2011	47,944	1.64%	$6,935,928	2.82%	11.9	$145	$12.11

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
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	44,677	1.50%	$7,799,477	2.75%	12.1	$175	$14.42
2018	44,629	1.50%	$7,916,469	2.79%	12.1	$177	$14.66
2019	44,821	1.50%	$8,035,216	2.84%	12.1	$179	$14.81
2020	45,393	1.51%	$8,155,745	2.88%	12.1	$180	$14.85
2021	46,093	1.52%	$8,278,081	2.92%	12.1	$180	$14.84
2022	46,979	1.54%	$8,402,252	2.96%	12.1	$179	$14.78
2023	47,730	1.56%	$8,528,286	3.01%	12.1	$179	$14.76
2024	48,472	1.57%	$8,656,210	3.05%	12.1	$179	$14.76
2025	49,079	1.59%	$8,786,053	3.10%	12.1	$179	$14.79
2026	49,768	1.60%	$8,917,844	3.15%	12.1	$179	$14.81
2027	50,319	1.61%	$9,051,612	3.19%	12.1	$180	$14.86
2028	50,868	1.62%	$9,187,386	3.24%	12.1	$181	$14.92
2029	50,875	1.62%	$9,325,197	3.29%	12.1	$183	$15.14
2030	34,227	1.62%	$6,263,511	3.34%	12.1	$183	$15.12
2031	22,785	1.62%	$4,169,566	3.39%	12.1	$183	$15.12
2032	22,785	1.62%	$4,169,566	3.44%	12.1	$183	$15.12

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, effective April 2030.

Continuing to meet the CIP energy savings goal every year during the 15-year planning period will be a challenge. 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. SMMPA and their members intend to accomplish this by continuing to develop new demand-side programs, while also obtaining energy efficiency savings through new supply-side efficiency initiatives.

However, the Agency has no certainty that such an aggressive savings goal is sustainable. In fact, over the past two years, SMMPA achieved energy savings only slightly above the 1.5 percent goal. More aggressive residential and commercial lighting standards, building codes, and equipment standards will continue to be phased in. While new codes and standards will result in energy savings, it makes it more difficult and costly for utilities like SMMPA and its members to capture any savings above and beyond those efficiency standards. Additionally, as SMMPA reaches levels of market penetration above 1.5 percent, like they have during the past seven years, the available market potential, absent any significant advances in energy efficient technologies, shrinks.

To address these challenges, SMMPA staff participates in stakeholder workgroups and advisory committees created to deal with these issues. While some progress has been made, the Agency thinks work remains to accurately account for savings from behavioral programs and from changes to codes and standards. They currently participate in the advisory committees for the statewide demand-side and supply-side potential studies that will provide insight into the amount of DSM-Conservation potential that utilities, including SMMPA, can cost-effectively achieve over the long term.

ENERGY EFFICIENCY PROGRAMS

SMMPA's strong commitment to DSM-Conservation is based on their interest in developing a least-cost resource base, their commitment to sound environmental practices, and their 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 a number of energy efficiency programs to members' end-use customers. SMMPA views those offerings as an integral part of their 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 Program (including Roof Top Units, Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Chillers, Air Source Heat Pumps, Ground Source Heat Pumps, and Water Source Heat Pumps)
- Business High-Efficiency Motor Program (including Efficient Evaporator Fan Motors in Refrigeration Cases)
- Business Efficient Furnace Fan Motor Program
- Business Adjustable Speed Drive Program
- 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 Custom Efficiency Program
- Residential Behavioral Program (Household Energy Use Comparisons)
- Residential ENERGY STAR Appliance Program
- Residential ENERGY STAR Lighting Program
- Residential Cooling Program (including Central AC, Air Source Heat Pumps, and Ground Source Heat Pumps)
- Residential Central AC/Air Source Heat Pump Tune-Up Program
- Residential Efficient Furnace Fan Motor Program
- Residential LED Holiday Lighting Program
- Habitat for Humanity 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 demands. Today, members still own, operate, and maintain their own direct load control systems. SMMPA notifies its members during 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 2016 and 2017 year-to-date). Member efforts are typically based upon central air conditioner cycling and, to a lesser extent, electric hot water heater cycling.

Currently twelve of the eighteen SMMPA members utilize DLC systems to manage peak demands. That number may increase over time since SMMPA and its members have started looking into Advanced Metering Infrastructure (AMI) for its members. AMI will provide 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 DLC participation by member in 2016).

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 has resulted in significant participation among 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 PROGRAM

SMMPA's Energy Management (EM) Program was designed as a commercial and industrial interruptible program in 1995. The program is 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 purchases a specified amount of interruptible capacity during brief summer peak electric periods from interested member utility customers who can turn off at least 70 kW or operate at least 25 kW of load with their backup generator.

SMMPA currently utilizes their program to maintain the reliably of the electric system. Extreme weather patterns or unexpected increases or decreases in available electric generation can affect the balance of supply and demand on the transmission system. The Midcontinent Independent System Operator (MISO) must quickly adjust to system conditions as they unfold to maintain system reliability. The Agency operates their EM program to reduce load when MISO declares a North American Electric Reliability Corporation (NERC) Energy Emergency Alert (EEA)-Level 3 during a MISO Max Gen Event.

Participation in the program is governed by an interruptible tariff and customer agreement between the member utility and their retail customer. The general terms and conditions of the tariff are listed below.

SMMPA Energy Management Program Terms and Conditions:

- Maximum Total Hours of Curtailment Per Year 54
- Maximum Hours of Curtailment in Any Day 6
- Maximum Number of Curtailments Per Year 9
- Curtailment Season (June – September)
- Maximum Consecutive Days of Interruption 3
- Advance Notification 1 Hour Minimum
- Curtailment Window (12:00 P.M. – 6:00 P.M.; fixed)

An average baseline usage is calculated annually for each of the participants for the respective curtailment window. Firm service levels are established based upon the equipment the customer elects to place in the program, or the amount of load connected to their backup generator. Participants receive $2.50/kW per summer month for the capacity they commit to the program. Monthly payments are made to the customer during the four summer months regardless of whether or not an actual curtailment occurs during the month. Demand alert monitors are installed at participating customer sites to allow customers to monitor their load and ensure that they do not exceed their firm service level during the curtailment.

Customers are expected to be 100 percent compliant with all curtailments and there are deductions for non-compliance. However, those deductions cannot exceed the amount the participant would have received in monthly credits.

In 2003, two SMMPA members, Austin Utilities and Owatonna Public Utilities, elected to operate their own EM programs for their respective utilities. In 2004, New Prague Utilities also started running their own program. 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. 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).

Participation in SMMPA's EM program during the summer of 2017 ranged from small manufacturers and commercial establishments with less than 100 kW to large manufacturers with as much as 2,000 kW committed to the program. Currently, six SMMPA members (not including Austin Utilities, Owatonna Public Utilities, New Prague Utilities, and Rochester Public Utilities) had a total of 12 customers participating in the Agency's EM program with a potential of 4.6 MW of controllable load.

The 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 resource does reduce the power and energy SMMPA must provide to its members. They work with their 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 they consider curtailments - Western Area Power Administration allocations to members, retail customer-owned distributed generation, and member-owned hydroelectric plants.

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 forth requirements for Minnesota utilities, including SMMPA, to serve a percentage of their retail sales from qualifying renewable resources. Currently the standard requires SMMPA to provide 17 percent of its energy from renewable sources. The benchmark increase to 20 percent in 2020, and 25 percent in 2025. Since commencement of the standard, the Agency has maintained compliance.

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 fills the gaps in years 2016-2019, 2027, and 2028 where the renewable need outpaces the renewable generation production.

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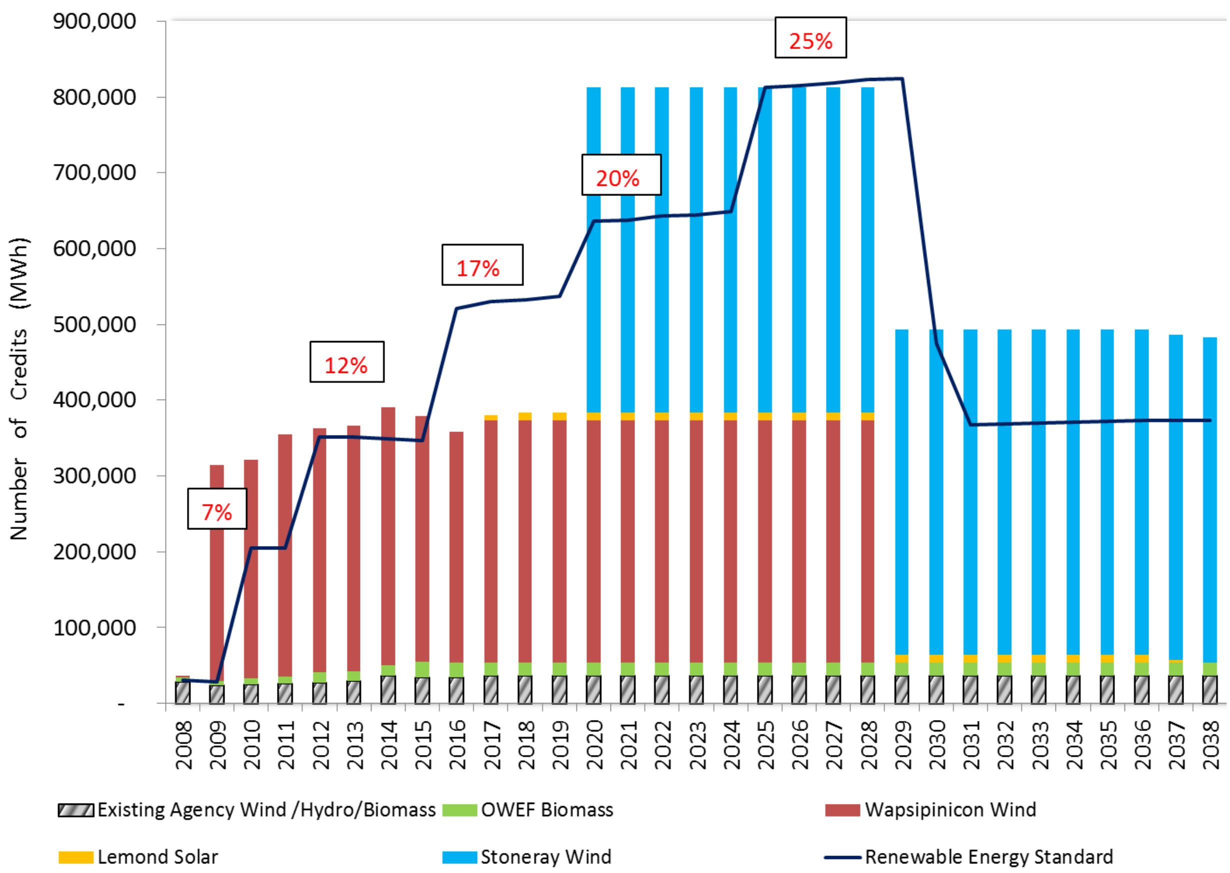
Chart 6-1

SMMPA Renewable Energy Standard Compliance



Existing Agency Wind/Hydro/Biomass

This aggregation shown in Chart 6-1 represents 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 hydro unit owned by a municipal member
- Renewable production derived from the blending of bio-diesel in member-owned diesel generators

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 the credits attributed to their offtake of energy from the facility to RPU. 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, Minnesota. The facility's energy output and environmental attributes are sold to SMMPA under a 20-year power purchase agreement running through 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, but has contracted with Central Minnesota Power Agency/Services to sell them a small percentage (5.6 percent) of the project. SMMPA also utilizes the facility as a springboard for a community solar program called Solar Choice which is explained later in this section.

Stoneray Wind

Stoneray Wind Project is a planned 100 MW electric generating facility to be built, owned, and operated by EDF Renewable Energy. SMMPA has 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 will be located in the Pipestone and Murray counties.

Renewable Energy Standard

Renewable Energy Standard represents the renewable energy credit retirements required 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 will support 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 can 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 range from five years to twenty-five 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.

Initially the solar energy will come from the five-megawatt Lemond Solar Center near Owatonna, MN, that is contracted to SMMPA for twenty years, and began operations on June 30, 2017. SMMPA will contract for an additional three megawatts of solar energy from a new facility if at least 25 percent of the new facility (2,481 panels) is subscribed to by retail customers of participating SMMPA members for the full twenty-five year term of the anticipated purchase power agreement by October, 2018. The exact timing and location of this project is pending. The new solar array, if constructed, is anticpated to generate 5.8 million kWh of renewable energy each year and result in 10.4 million fewer pounds of carbon dioxide (CO_2) released to the atmosphere.

The communities of Austin, Preston, Princeton, Rochester, and Saint Peter are currently offering the Solar Choice program. Marketing of the program began in early summer of 2017 and as of November 15, the equivalent of approximately two hundred 335-watt panels had been subscribed for the potential twenty-five year term of the proposed three megawatt solar facility. For purposes of calculating the 25 percent threshold, panels subscribed for terms of less than twenty-five years are prorated.

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.

7. Preferred Plan

GENERAL DISCUSSION

This section of the filing is intended to identify and describe the Agency's preferred plan for meeting is capacity and energy obligations into the future. A very large part of this plan is to first identify the need. This is done by performing a demand and energy forecast into the future. The Agency's 2017 load forecast shows the energy need increasing by only 0.5 percent well into the future. The load forecast also shows the Agency's demand slightly decreasing over the next 15 years by 0.1 percent per year. The details of this forecasting process and the results can be seen in the Load Forecast section of this document.

Chart 7-1 below displays the Agency's forecasted demand requirements (ie. Base Load Forecast) compared to its current generation resources. There is a significant surplus of generating capacity for the 2018/2019 timeframe due to capacity purchases made back in 2014 that are scheduled to terminate after 2019. The ten years following this period also shows the Agency to have surplus capacity. The details of requirements and resources can be found in Exhibit 6.

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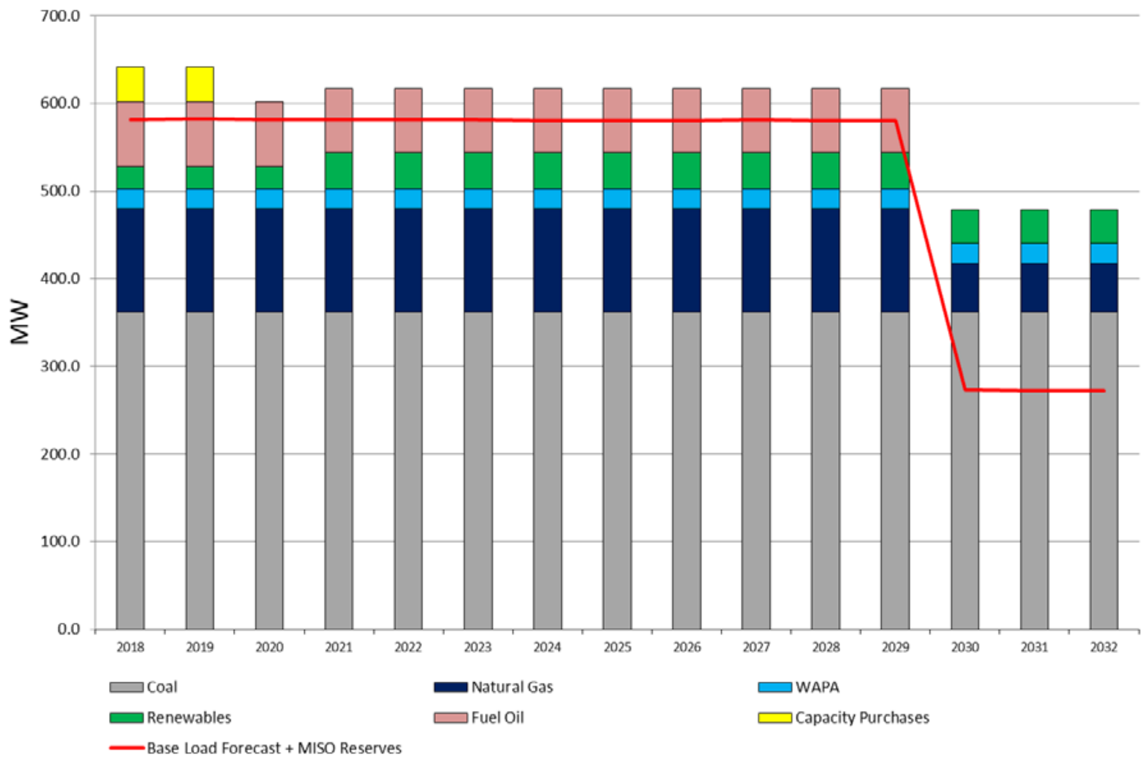
Chart 7-1

Resource and Capacity Requirements – Preferred Plan



The Agency plans to have some level of surplus capacity due to the uncertainties in the process MISO uses to calculate the 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 the previous year
- the performance of each non-dispatchable resource during the previous year's peak
- the transmission loss determination
- the utility's demand coincident with MISO's peak
- a change in the load forecast
- the pool reserve requirement value from MISO

SMMPA estimates this uncertainty to be approximately 15 MW for its system.

FIVE YEAR PLAN

The slight decline in SMMPA's forecasted demand demonstrates that there is no need for new resources well into the future. As a result, the short term action plan is simply to continue to operate and maintain the Agency's existing fleet of generation resources as safely, cleanly, reliably, and cost-efficiently as possible while continuing to offer demand-side management (DSM) and energy conservation programs in order to meet Minnesota's Conservation Improvement Program (CIP) annual energy savings goal of 1.5 percent.

The Agency feels that its generation fleet is well positioned to meet the future needs of its members. Sherco 3 provides a good economic hedge in the energy market for a majority of SMMPA members' energy needs. There are no major, or costly projects planned at Sherco over the next five years. Many of its major components have already been replaced as a result of the turbine failure that occurred in 2011. The two primary concerns for Sherco 3 moving forward is accessibility of an economical fuel supply given the uncertainty of coal mines in the future, and the possible impacts of future environmental regulations as they develop.

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 retire or replace any of its existing resources. The two new natural gas-fired plants at Fairmont and Owatonna should perform reliably and cost effectively well into the future.

The continued expansion of the Agency's renewable resources will continue to help it meet its renewable targets outlined in the Renewable Energy section of this IRP, as well as help serve future energy growth, albeit very small. The planned addition of the 100 MW Stoneray wind facility will help to offset reliance on coal in the future and thereby help reduce associated risk.

LONG RANGE PLAN

As Chart 7-1 shows, there continues to be no assumed load growth for SMMPA well into the long term, so no additional resources are needed within the next 15 years. As a result, SMMPA will continue its short term strategies into the future. A large part of the Agency's generation fleet is fairly new and will not require any major projects or investments over the long term. Of course, situations can always change making this preferred plan insufficient. The Agency's plans for addressing some of these possible changes is discussed in the Sensitivity Cases section.

The most significant change in the long range plan over that of the short term is the expiration of the Agency's power sales contracts with Austin Utilities (AU) and Rochester Public Utilities (RPU) on March 31, 2030. Their departure cuts 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 is able to add more members, it is highly unlikely those additions would create a need for the Agency to add more resources.

Aside from the option of adding new members, SMMPA's need for future generation declines significantly after 2030. SMMPA plans to manage this load loss by selling its surplus capacity bilaterally or in the MISO capacity market. If the needs of the capacity market are insufficient to absorb enough of the Agency's surplus capacity, a strategic termination of generation contracts with SMMPA members could be implemented. Since the member generators are rather small in size, these terminations can be done in small increments until the proper mix is obtained.

PLAN IS IN THE PUBLIC INTEREST

Although the SMMPA preferred plan does not include the addition of any new generation assets, SMMPA believes that this plan 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.

Although this preferred plan does not add any future resources, SMMPA and its members are commitment to maintaining the same high degree of reliability for its customers as it has in the past. The Agency's strategy of dispersing its generation resources in small increments throughout the state rather than relying solely on large centralized generating plants results in an extra degree of reliability in member communities that most utilities do not have. These generators not only provide backup to the members' systems if the transmission system fails, they also provide added reliability to the surrounding communities by providing voltage support for MISO in congested areas of the state.

(B) Keep the customers' bills and the utility's 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 the SMMPA Board of Directors, which is comprised of representatives from seven member cities. Each of these individuals, as well as the other 11 members, also report to their own utilities 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 a practical. The Agency's strong financial position, as demonstrated by A+ 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 Agency wholesale rates have tracked closely with the rate of inflation over recent years and are projected to be below the rate of inflation for at least the first five years of this plan (see Chart 7-2), and are comparable to the rates of other wholesale suppliers in the region, demonstrates the reasonableness of the rates to its members.

(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 demonstrated by: a) SMMPA's commitment to renewable energy as shown in the Renewable Energy section of this IRP, 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 and their four ENERGY STAR Awards as covered in the DSM section of this IRP.

(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 that 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 member communities who don't have in-house staff to do that. 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 makers.

As noted in (B) above, the Agency's rates are set by its Board of Directors and the Board 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.

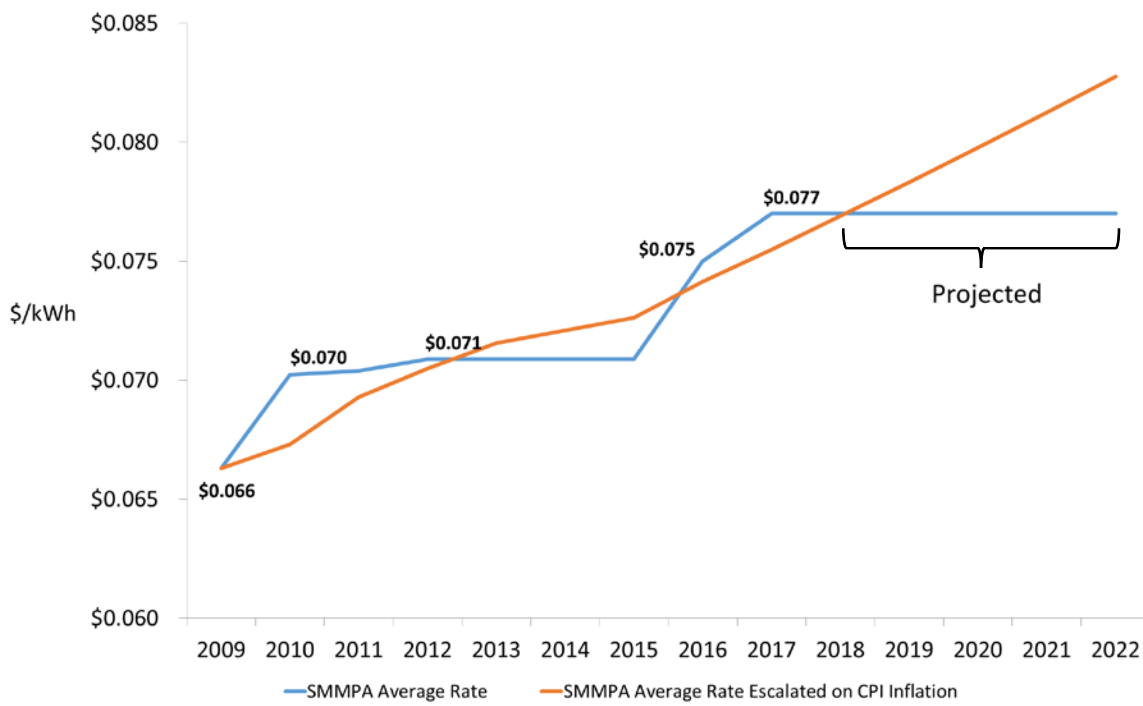
(E) Limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.

Change and risk in the utility industry have seemed to become more frequent in recent years as the industry struggles with issues like the introduction of Independent System Operators (ISO), the uncertainly in environmental policy due to changing regulations and seemingly continual litigation, and the numerous changes due to deregulation in general. SMMPA's approach to minimizing these impacts is by diversification wherever possible and tackling issues in small increments rather than trying to use a broad brush approach.

Our portfolio approach to renewable energy does just that. It does not lock us into a specific technology or specific ownership structure. Adding generation in small increments at multiple locations throughout the state reduces the risk of changing congestion within MISO. Also, placing generation in member communities where the load exists protects the Agency from spikes in the locational marginal pricing (LMP) market by offsetting spikes in the cost to serve the load with increases in the revenue obtained for the generation. Finally, the Agency has reduced its reliance on coal by the addition of renewables and new high-efficiency natural gas fueled generation.

Chart 7-2

SMMPA Average Wholesale Rates vs. Inflation



8. 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 of the filing details those situations that SMMPA feels have the potential to cause noticeable effects to its members and members' customers. These potential events or circumstances that deviate from the base case assumptions were evaluated to determine their impact on the plan discussed in the Preferred Plan section of this IRP. Variables considered in the sensitivity analysis included:

- Load forecast – base, low, high
- Externality costs – low, high
- Locational marginal prices (LMP) – base, low, high
- Natural gas prices – base, low, high
- No future demand-side management (DSM)
- No renewable resources
- No future renewable resources
- Sudden loss of a generating resource
- Sudden large load addition

All sensitivity cases were compare against the base case in terms of net present value cost to SMMPA. Table 8-1 shows the results of this analysis. The more significant scenarios are discussed in more detail below. No cases were performed for meeting 50% and 75% of future resource needs with renewable energy since no future resources are needed.

Table 8-1

Supply-Side and Demand-Side Integration Sensitivity Analysis Results

AURORA Case Number	Case Description	W/O EXT PW Costs in 2018 Dollars (Million $)	WITH EXT PW Costs in 2018 Dollars (Million $)	Future Wind (100 MW)	Renewable Resources Future Wind (25 MW)	Future SOLAR (3MW)	Future SOLAR (5MW)	Peaking Purchases (10 MW)	Simple Cycle Combustion Turbine (50 MW)	Natural Gas Firing Reciprocating Engines (38.8 MW)
	Base Load Forecast									
Base	Low Externality Costs									
	Base LMP Prices	$1,189	$1,495	2020		2018				
	Base Natural Gas Prices			2041						
	1.5% DSM									
	Base Load Forecast									
Case 1	High Externality Costs									
	High LMP Prices	$1,714	$2,195	2020		2018				
	High Natural Gas Prices			2041						
	1.5% DSM									
	High Load Forecast									
Case 2	High Externality Costs									
	High LMP Prices	$1,841	$2,392	2020		2018		18		
	High Natural Gas Prices			2041						
	1.5% DSM									
	Low Load Forecast									
Case 3	Low Externality Costs									
	Base LMP Prices	$1,144	$1,427	2020		2018				
	Base Natural Gas Prices			2041						
	1.5% DSM									
	Base Load Forecast									
Case 4	Low Externality Costs									
	High LMP Prices	$1,209	$1,460	2020		2018				
	High Natural Gas Prices			2041						
	1.5% DSM									
	NO FUTURE DSM									
	Base Load Forecast	$1,256	$1,614	2020		2018	1-2048	36		
Case 5	Low Externality Costs			2041			1-2049			
	Base LMP Prices						1-2050			
	Base Natural Gas Prices									

Table 8-1 (continued)

Supply-Side and Demand-Side Integration Sensitivity Analysis Results

AURORA Case Number	Case Description	W/O EXT PW Costs in 2018 Dollars (Million $)	WITH EXT PW Costs in 2018 Dollars (Million $)	Renewable Resources: Future Wind (100 MW)	Renewable Resources: Future Wind (25 MW)	Renewable Resources: Future SOLAR (3MW)	Renewable Resources: Future SOLAR (5MW)	Peaking Purchases (10 MW)	Simple Cycle Combustion Turbine (50 MW)	Natural Gas Firing Reciprocating Engines (38.8 MW)
	NO RENEWABLE RESOURCES									
	Base Load Forecast									
Case 6	Low Externality Costs	$1,069	$1,382					10		
	Base LMP Prices									
	Base Natural Gas Prices									
	1.5% DSM									
	NO FUTURE RENEWABLE RESOURCES									
	Base Load Forecast									
Case 7	Low Externality Costs	$1,193	$1,505							
	Base LMP Prices									
	Base Natural Gas Prices									
	1.5% DSM									
	SUDDEN LOSS 2020 OWAT 7									
	Base Load Forecast									
Case 8	Low Externality Costs	$1,187	$1,493	2020		2018				
	Base LMP Prices			2041						
	Base Natural Gas Prices									
	1.5% DSM									
	SUDDEN LARGE LOAD ADDITION									
	20 MW Increase Load Forecast									
Case 9	Low Externality Costs	$1,215	$1,533	2020		2018		1		
	Base LMP Prices			2041						
	Base Natural Gas Prices									
	1.5% DSM									
	High Load Forecast									
Case 10	Low Externality Costs	$1,276	$1,627	2020		2018		18		
	Base LMP Prices			2041						
	Base Natural Gas Prices									
	1.5% DSM									

HIGH LOAD GROWTH SCENARIO

The load forecast for the High Load Growth scenario was developed by nFront Consulting. This sensitivity case starts with a capacity level 6 percent higher than the base case, and an energy production level 4 percent higher than the base case. These increases grow to 26 percent and 23 percent by year 2032 due to the compounding effect (see Tables 8-2 and 8-3).

Table 8-2

Base Case vs High Forecast Capacity

Year	Base Case Capacity MW	High Forecast Capacity MW	% Increase
2018	539.0	558.9	4%
2019	539.9	563.3	4%
2020	539.4	566.0	5%
2021	539.3	569.9	6%
2022	539.7	573.9	6%
2023	539.4	577.2	7%
2024	538.3	579.9	8%
2025	538.6	583.5	8%
2026	538.2	586.6	9%
2027	539.0	590.8	10%
2028	538.2	593.4	10%
2029	538.5	596.8	11%
2030	253.3	313.6	24%
2031	253.0	316.4	25%
2032	252.3	318.6	26%

Table 8-3

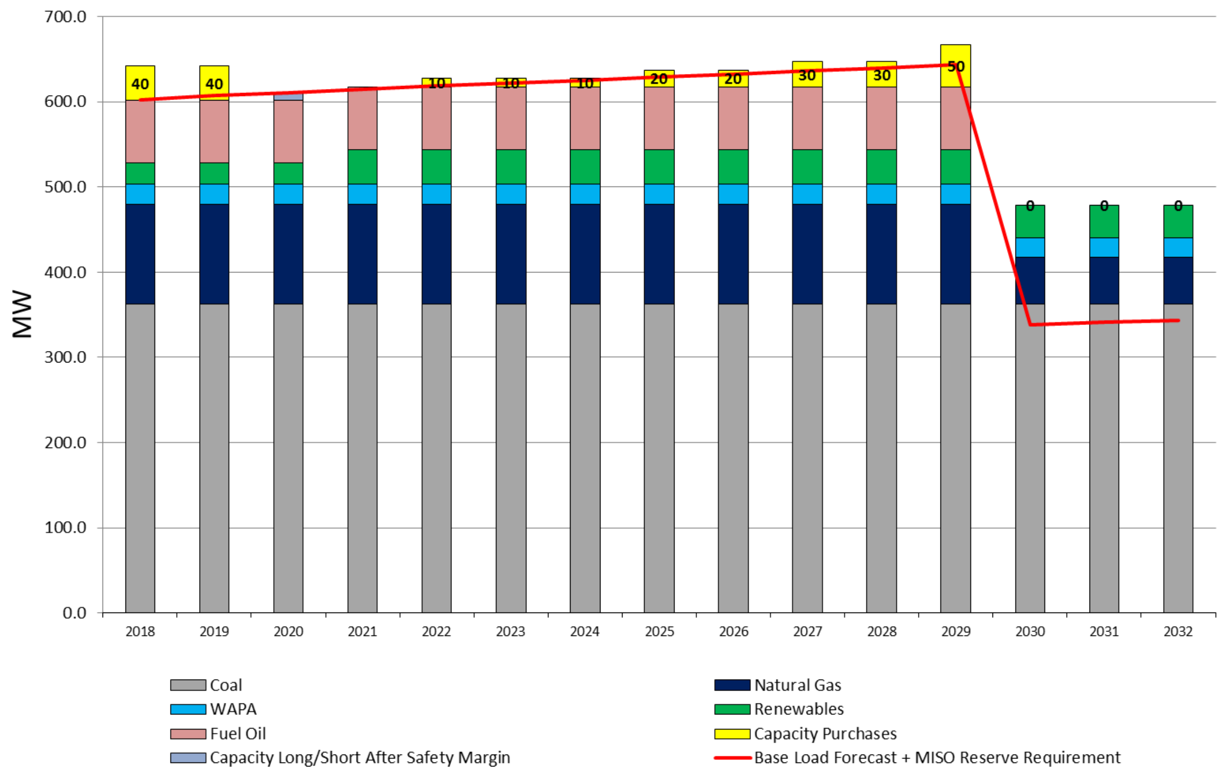
Base Case vs High Forecast Energy

Year	Base Case Energy MWh	High Forecast Energy MWh	% Increase
2018	2,967,068	3,151,229	6%
2019	2,989,387	3,225,627	8%
2020	3,010,217	3,292,830	9%
2021	3,014,515	3,337,162	11%
2022	3,041,629	3,403,120	12%
2023	3,050,778	3,448,844	13%
2024	3,069,059	3,502,930	14%
2025	3,074,607	3,541,261	15%
2026	3,084,324	3,582,993	16%
2027	3,095,074	3,625,709	17%
2028	3,112,750	3,675,831	18%
2029	3,117,856	3,709,526	19%
2030	1,816,623	2,202,252	21%
2031	1,414,817	1,729,652	22%
2032	1,421,871	1,752,228	23%

The results of this high load forecast case shows the need to add a small amount of capacity in 2022, growing to about 50 MW in 2029. The model serves much of this increased demand from the Agency's existing capacity surplus. This leaves only a small portion to be covered by adding capacity. The model served this remaining need by purchasing short-term capacity rather than the installation of a new resource, as displayed in Chart 8-1 below. This is due to the significant drop in demand beginning in 2030 due to the expiration of the Agency's power sales contracts with Austin Utilities (AU) and Rochester Public Utilities (RPU).

Chart 8-1

Resource and Capability Requirements – High Load Growth Scenario



The model realizes that the need for additional resources goes away after 2029. Therefore, installing a new resource with a life of 20 to 30 years, was found to be uneconomical. So the model determined that the lowest cost resource option would be to cover this short-term need with short-term purchased capacity.

SMMPA has two options for acquiring this short-term capacity if it were to be needed. SMMPA can purchase power from the annual MISO capacity auction. The downside of this option is that this market value could become very expensive if there is insufficient supply meet the market need in any given year. The other option would be to purchase capacity directly from another party in a bilateral transaction.

The increased energy requirements in this scenario (shown in Table 8-2) are served by increased purchases from MISO or decreased sales to MISO. This is because the only change to this sensitivity case was an increase in load. All other parameters remained the same. As a result, the amount of energy produced by Agency resources also remains unchanged because both cases are dispatching the resources into the exact same LMP market. Consequently, an increase in energy requirements must be made up by purchasing more energy from the market, or selling less.

The MISO LMPs have been very low in recent years and are expected to remain low for quite some time. This is mainly due to the continued low natural gas price forecast. The MISO energy prices are typically driven by the natural gas prices. As a result, the cost impact to SMMPA of this high load growth scenario is fairly low. Given that the increase in energy requirements is driven by either new customers or increased consumption by existing customers, SMMPA's increased market energy costs will be offset by increased sales to its members.

HIGHER THAN EXPECTED LMP

The LMPs in MISO have been fairly low in recent years. This has been driven primarily by low natural prices and increases in wind generation on the system. Although further decreases in natural gas prices are unlikely, significant increases in prices are certainly possible. A rise in natural gas prices would also drive an increase in LMPs.

The purpose of this sensitivity case is to determine what impact a rise in LMPs would have on the Agency. For this scenario, MISO LMPs were increased by 50 percent. The price of natural gas was also increase by 50 percent due to its tight correlation with LMPs. The amount of member load was kept constant for this case.

The results of this sensitivity analysis demonstrated that a large increase in MISO energy market prices has very little impact on the Agency. As market prices were increased, the amount of Agency generation dispatched into the market also increased. Higher market prices result in more energy being produced by SMMPA resources which results in fewer net market purchases by the Agency.

The study results show that, in the base case, energy production from Agency resources is approximately 84 percent of the Agency's energy need. In the high LMP case, the Agency's energy production was equivalent to nearly 100 percent of the Agency's energy needs. Although this scenario involved a step increase in market prices of 50 percent, the Agency would have sufficient generation to economically run at a production level equivalent to its load, and therefore not be exposed to the higher energy prices. This scenario demonstrates the value of the energy price hedge provided by SMMPA generation fleet.

Although in this scenario, the total cost to serve SMMPA's members does increase, the increase is basically capped at the cost to self-supply. In addition, the increased market price actually drove MISO to dispatch Agency generation in excess of Agency needs by approximately five percent. The revenue derived from the increased sales into the market reduced the impact on SMMPA from higher energy prices.

SUDDEN LARGE LOAD ADDITION

The impact to the Agency in the introduction of a new large load addition is very similar to the impacts of the high load growth scenario. Depending on the magnitude of this new load, much of the capacity increase could be met with the Agency's existing capacity surplus. If the load increase exceeded the surplus, capacity could be purchased in the bilateral market or from the MISO auction.

Assuming in this sensitivity case that the MISO LMPs remain the same as the base case, the additional energy needs of a new load would be met through additional purchases from MISO. If the LMPs are unchanged, the energy production from SMMPA's resources will remain unchanged, regardless of how much load is added.

As in the high load growth scenario, the increase in load results in increased sales by SMMPA to its members, and the increased sales revenue will offset the cost of increased market purchases.

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 depends greatly on the LMP market at the time of its outage. If market prices remain low, the impact would be minimized. However, if market prices were to increase, the Agency could experience significant harm since Sherco 3 is the Agency's only hedge or protection from a large increase in the market prices as demonstrated in the "higher than expected LMP" scenario above.

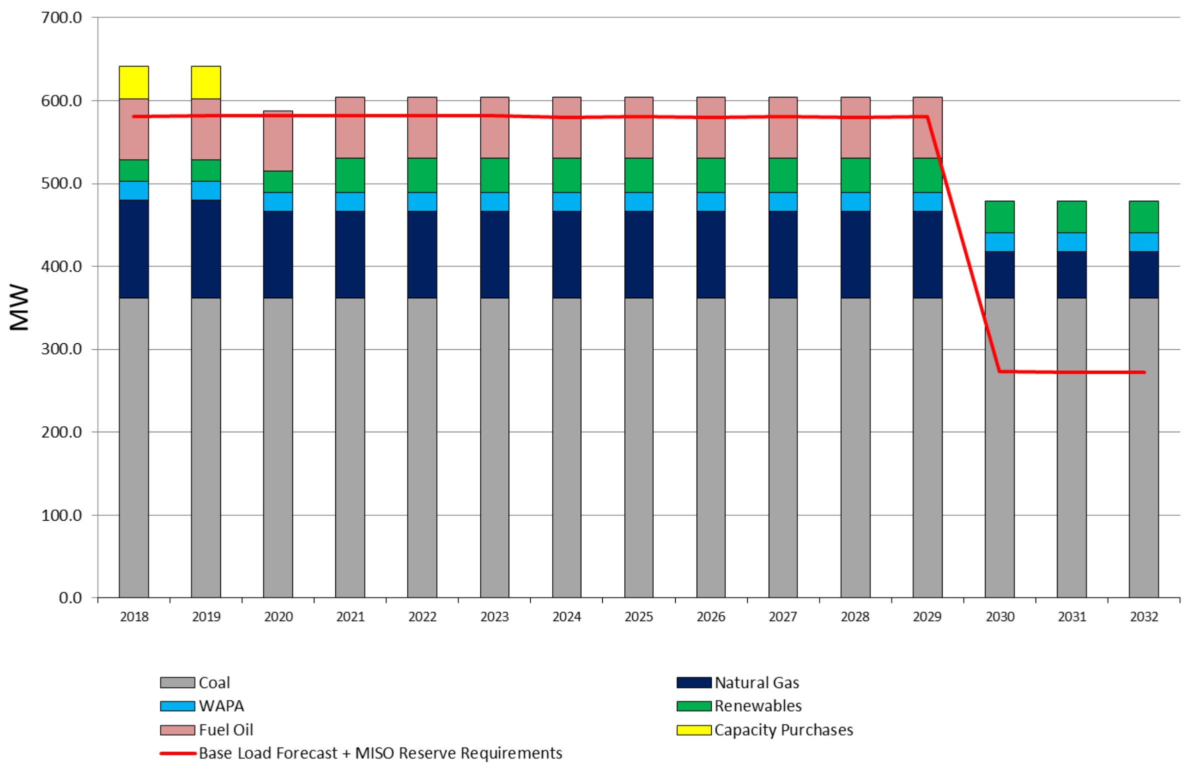
Wind resources are modular such that the loss on one turbine would have virtually no effect on SMMPA. Even the loss of an entire wind farm would have no adverse impacts as the cost of these resources are greater than the cost to purchase from MISO.

All other Agency gas and oil fired generation resources are fairly small in size ranging from 1 to 16.5

MW. The single largest generating unit (aside from Sherco 3) is Owatonna Unit #7 which is approximately 16.5 MW. Given current conditions, a loss of Owatonna #7 could be absorbed under the Agency's current surplus capacity. Therefore, from a capacity standpoint, this loss would have no adverse impact on the Agency as shown in Chart 8-2.

Chart 8-2

Resource and Capability Requirements – Sudden Loss of Resource Scenario



Owatonna #7 is a peaking unit. This facility, along with all other Agency peaking resources, currently runs very little due to low market prices in MISO. However, those units provide a valuable hedge if, or when, MISO prices increase. Under current and forecasted market prices, the impact on the Agency of losing a single smaller resource will have little impact on the Agency and its members.

NO FUTURE DEMAND SIDE MANAGEMENT RESOURCES

If Agency's DSM activities were discontinued, costs to the Agency and its members would increase. In the absence of DSM, the Agency's capacity and energy requirements would increase. The increasing capacity requirements could be met initially with the Agency's capacity surplus for a period of time and then with short-term capacity purchases. No new long-term resources would need to be added due to the significant load decrease in 2030. The increased energy requirements would be met by additional purchases from the MISO market.

NO NEW RENEWABLE RESOURCES

The Agency ran a sensitivity case to see how costs would be impacted if no renewable resources had been added to the SMMPA portfolio. This is useful in understanding how renewable resources have impacted costs. The results show that renewable resources added to the SMMPA system have increased cost over the energy market alternative. That is not surprising given the vintage and price of those resources.

The more interesting results are the sensitivity case looking at no new renewable resources. A key assumption in this case is that the wind purchase planned to be in service in 2020 does not happen. That is an unlikely event given that the power purchase agreement has been signed, but this is an interesting scenario none the less. This case shows that not adding this future wind resource results in an increase to the Agency's overall cost, meaning the cost of the wind generation is lower than the forecasted LMPs. This is a clear demonstration of how the price of wind resources has come down in recent years.

9. Environmental Stewardship

GENERAL DISCUSSION

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 values of the communities we serve. This commitment is reflected in the work we do at our own facilities as well as those of the organizations with whom we partner.

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 (ARP)
- Cross State Air Pollution Rule (CSAPR)
- Regional Haze rule (phase 1 and 2)
- Mercury and Air Toxics Standards rule (MATS)
- Clean Power Plan
- 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 1 percent. Sherco 3 is also 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 was 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

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) must submit its plans for phase 2 to the EPA in 2021. There is no information available yet as to the impact of phase 2 on Sherco 3. The Agency will continue to monitor the development of the MPCA's phase 2 plan.

MERCURY AND AIR TOXICS STANDARDS

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 a 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. As of this writing, the MPCA has not yet set a final mercury emission level for Sherco 3. In setting this level, SMMPA strongly suggests that the potential for a shift to a different future coal supply be carefully considered. The retirement of coal plants is resulting in the closure of coal mines, a trend that is expected to continue. Setting a mercury emission limit based on the current coal supply at Sherco without regard to the future availability of coal with these same emissions profiles is most troubling, potentially impacting both the price and reliability of electric supply to SMMPA members.

CLEAN POWER PLAN

SMMPA has been an active member of the stakeholder group that developed comments on Section 111(d) of the Environmental Protection Agency's (EPA) proposed Clean Air Act, also known as the Clean Power Plan, and subsequent stakeholder group efforts to begin the process to create a state implementation plan. With President Trump's executive order directing the EPA to review, and if appropriate, withdraw the Clean Power Plan and the EPA's notice of proposed rulemaking to repeal the rule published in the Federal Register on October 16, 2017, efforts by the MPCA on a state implementation plan have been suspended. As addressed below, through a combination of the addition of new renewable energy sources, a robust demand-side management (DSM) program, and a diversification of SMMPA's generation portfolio to include more natural gas-fired generation, SMMPA continues to make progress in reducing its carbon footprint. However, given the uncertainty related to if and when a replacement rule will be proposed by EPA to address carbon emissions, and the nature of such a rule, SMMPA is not currently engaged in developing potential compliance strategies until these uncertainties have been addressed.

GREENHOUSE GAS REDUCTION EFFORTS

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. SMMPA is pleased to report it has achieved this goal for the year 2015, and is forecasted to achieve the 2025 reduction goal by 2025. Table 9-1 shows the Agency's carbon dioxide (CO_2) emissions levels in 2005 and 2015, as well as its projected level in 2025.

Table 9-1
Carbon Dioxide Emissions

Year	Energy Production GWh	CO2 Emissions Tons	CO2 Emission Rate lb/MWh	Percent Reduction
2005	2,866,214	2,941,479	2,053	0%
2015	2,782,183	2,384,505	1,714	19%
2025	2,957,290	2,013,386	1,362	32%

SMMPA has taken the following steps to aide in the reduction of CO_2 emissions from 2005 to 2015. Although these efforts were not done solely to reduce CO_2 emission, each played a part in 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 played a major role in helping to reduce GHG emissions. Programs implemented from 2005 through 2015 will have estimated lifetime CO_2 emission reductions of over 5.3 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 1 percent, which in turn results in a reduction of approximately 20,000 tons of carbon dioxide emission annually.
4. Between 2005 and 2017, SMMPA has 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 emission by 180,000 tons, or about 5 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.

The Agency's ability to reduce GHG emissions in the future is more challenging, given the Agency does not have a need for any future generation resources as discussed in the Preferred Plan section of this IRP.

This is a testament to the success of the Agency's DSM programs and an already diversified generation portfolio. Nonetheless, the Agency is still forecasting to exceed the 30 percent reduction goal by 2025.

1. From 2016 through 2025, the Agency and its members anticipate the continuation of the various DSM-Conservation programs to reduce CO_2 emissions another 4.6 million tons over the estimated lifetime of the energy efficiency measures.
2. The Agency will add an additional 100 MW of wind generation beginning in 2020 through a twenty-year power purchase agreement. This contract has already been executed and construction is scheduled to begin next year. CO_2 reductions resulting from that contract are projected to be approximately 5 million tons through the term of the contract.
3. If sufficient subscriptions are secured through the Solar Choice community solar programs being offered by a number of Agency members, a twenty-five year power purchase agreement for another 3 MW of utility-scale solar generation could be signed by the Agency in the near future. The exact timing and location of this potential project is pending.

GHG REDUCTION CALCULATION METHODOLOGY AND RESULTS

In general terms, SMMPA calculated its GHG emissions for 2005, 2015, and 2025 by;

1. totaling the GHG emission from all SMMPA generation resources for each year
2. subtracting all GHG emissions associated with energy sales made for the year
3. adding in the GHG emission associated with all energy purchases made for that same year.

A summary of this calculation is shown in Table 9-2 and the details are discussed below.

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Table 9-2

GHG Emission Reductions

	Energy Production GWh	CO2 Emissions Tons	CO2 Emission Rate lb/MWh	Percent Reduction
2005				
Resources	2,216,513	2,388,749	2,155	
Sales	208,698	224,915	2,155	
Purchase Energy	858,399	781,933	1,822	
Total Customer	2,866,214	2,945,767	2,056	0%
2015				
Total Resources	2,311,325	2,080,924	1,801	
Sales	80,698	72,654	1,801	
Purchase Energy *	551,556	376,465	1,365	
Total Customer	2,782,183	2,384,735	1,714	19%
2025				
Total Resources	2,345,351	1,728,673	1,474	
Sales	84,885	62,566	1,474	
Purchase Energy	696,824	348,412	1,000	
Total Customer	2,957,290	2,014,519	1,362	32%

* eGrid Data was not available for 2015 so 2014's report was used instead.

1. The actual GHG emissions from Agency resources for 2005 and 2015 were calculated using the known emission rates for each generation resource multiplied by its MWh production for that year. The GHG emissions from Agency generation in 2025 was forecasted using Aurora, SMMPA's long-range forecasting model.
2. The actual GHG emissions for 2005 and 2015 from energy sales (made generally to MISO) were calculated by multiplying the amount of energy sold times the average emission rate of all SMMPA generation resources for that year. The emissions associated with energy sales in 2025 were projected by multiplying the amount of sales forecasted for 2025 in the Aurora model times the average emission rate from all generation resources for that year.
3. The GHG emissions for year 2005 and 2015 associated with energy purchases (primarily from MISO) were calculated by multiplying the quantity of energy purchased times the average emission rate of the MRO West pool of generation as reported in the EPA eGrid report for that

year. The GHG emissions for the year 2025 were projected by multiplying the estimated amount of energy that will be purchased that year times the estimated emission rate of the MRO West pool. Given the retirement of coal generation and the addition of significant amount of wind, SMMPA expects this emission rate to be well below 1000 lbs per MWh, however SMMPA used a rate of 1000 lbs/MWh for this analysis.

MACT 40, CFR 63 FOR RECIPROCATING ENGINES

The EPA has established new standards for stationary reciprocating internal combustion engines (RICE). Many municipal utilities have chosen to retire their RICE generation resources rather than incur the costs of implementing these new standards. SMMPA relies very heavily on its fleet of RICE resources and chose to make the investments necessary to meet these new standards for all of its member generators under contract to SMMPA, for which SMMPA has 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 in excess of 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 operating and maintenance procedures designed to optimize the operation of the engines thereby minimizing any emissions. SMMPA has always had a very strong operation and maintenance 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, SMMPA coordinated the planting of 29 monarch gardens by community groups in 14 member cities in 2016 and another nine sites in five member communities in 2017. 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 member utilities distributed more than 5,000 free packets of pollinator seeds for customers to create pollinator habitat on their own property. SMMPA is investigating a larger pollinator habitat site at its new Owatonna Generating Station.

Exhibit 1

PUBLIC DOCUMENT
TRADE SECRET DATA HAS BEEN EXCISED

[TRADE SECRET DATA BEGINS-

Existing Generating Resource Data

Generating Unit Name	Year Installed	Rated Capacity (MW)	Full Load Heat Rate (Btu/kWh)	2018 Fuel Price ($/MMBtu)	2018 Variable O&M Cost ($/MWh)	2018 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			
Capacity Purchases	2018							
Wind Farms	2003-2009							
OWEF Biomas	2006							
Mora Landfill	2009							
Owatonna Spark Fired Engines	2017							

-TRADE SECRET DATA ENDS]

Exhibit 2

Future Supply-Side Resource Data

Generating Resources	Years Available	Rated Capacity (MW)	2018 Capital Cost ($/kW)	Full Load Heat Rate (Btu/kWh)	2018 Fuel Price ($/MMBtu)	2018 Variable O&M Cost ($/MWh)	2018 Fixed O&M Cost ($/kW/Yr)	Maintenance Rate (%)	Forced Outage Rate (%)
WIND TURBINES	2018-2032	25.0	N/A	N/A	N/A	47.50	N/A	N/A	N/A
PEAKING PURCHASES	2018-2032	10.0	N/A	10,000	N/A	N/A	30.75	N/A	N/A
AERO GAS TURBINE	2018-2032	45.0	1,980	9,700	3.57	11.30	52.40	5.60	3.80
1XF CLASS FRAME GT	2018-2032	50.0	750	10,060	3.57	2.70	16.10	5.60	0.70
1XJ CLASS FRAME GT	2018-2032	50.0	720	9,320	3.57	3.30	12.90	5.60	0.70
2XJ CLASS CC	2018-2032	50.0	1,020	6,250	3.57	3.20	15.60	10.00	2.20
1X 600MW COAL PLANT	2018-2032	50.0	4,940	9,370	2.17	4.50	73.50	9.50	3.90
1X 1100MW NUCLEAR PLANT	2018-2032	50.0	6,410	10,400	0.60	N/A	146.60	7.30	2.90
SOLAR 5 MW PV	2018-2032	5.0	2,100	N/A	N/A	N/A	43.30	N/A	N/A
2MW/8MWH BATTERY STORAGE	2018-2032	2.0	3,100	N/A	N/A	3.70	65.70	3.00	3.00
CAT SPARK FIRED ENGINES	2018-2032	38.8	1,160	8,510	3.57	8.65	20.70	5.00	5.00

Exhibit 3

2016 SMMPA Member DSM-Conservation Savings

Member Utility	CIP Savings (MWh)
Austin	4,009
Blooming Prairie	276
Fairmont	1,652
Grand Marais	162
Lake City	901
Litchfield	725
Mora	570
New Prague	365
North Branch	172
Owatonna	5,946
Preston	178
Princeton	577
Redwood Falls	363
Rochester	25,641
Saint Peter	633
Spring Valley	269
Waseca	707
Wells	170
Total CIP Savings	43,317

Exhibit 4

2016 and 2017 SMMPA Direct Load Control (DLC) Notification

Parameter	2016	2017 YTD
DLC Event Count	45	51
Total Hours of Control	234:05:00	273:28:00
Avg. Hours of Control	5:12:06	5:21:43
Avg. Start Time	13:37:32	11:31:43
Avg. Stop Time	18:39:38	16:53:27

Month	Start	Stop	Duration
Oct-17	10/3/2017 14:21	10/3/2017 17:39	3:18:00
	10/2/2017 14:55	10/2/2017 20:15	5:20:00
Sep-17	9/22/2017 11:19	9/22/2017 18:24	7:05:00
	9/14/2017 14:00	9/14/2017 21:01	7:01:00
	9/13/2017 12:32	9/13/2017 18:50	6:18:00
	9/12/2017 12:29	9/12/2017 18:51	6:22:00
	9/1/2017 10:57	9/1/2017 16:01	5:04:00
Aug-17	8/1/2017 12:27	8/1/2017 18:45	6:18:00
Jul-17	7/12/2017 11:10	7/12/2017 17:17	6:07:00
	7/6/2017 12:41	7/6/2017 18:56	6:15:00
	7/5/2017 13:42	7/5/2017 18:45	5:03:00
Jun-17	6/13/2017 12:24	6/13/2017 20:03	7:39:00
	6/8/2017 13:27	6/8/2017 18:00	4:33:00
	6/3/2017 15:01	6/3/2017 17:12	2:11:00
	6/2/2017 11:34	6/2/2017 18:23	6:49:00
May-17	5/16/2017 9:49	5/16/2017 18:22	8:33:00
	5/15/2017 12:22	5/15/2017 16:29	4:07:00
	5/9/2017 11:16	5/9/2017 16:15	4:59:00
	5/3/2017 8:23	5/3/2017 14:31	6:08:00
	5/2/2017 8:26	5/2/2017 14:11	5:45:00
	5/1/2017 11:01	5/1/2017 16:20	5:19:00
Apr-17	4/27/2017 10:48	4/27/2017 13:11	2:23:00
	4/25/2017 10:00	4/25/2017 15:42	5:42:00
	4/24/2017 10:01	4/24/2017 14:01	4:00:00
	4/12/2017 10:44	4/12/2017 14:02	3:18:00
	4/11/2017 9:01	4/11/2017 15:07	6:06:00
	4/10/2017 10:00	4/10/2017 14:29	4:29:00
	4/6/2017 8:27	4/6/2017 14:33	6:06:00
	4/5/2017 10:25	4/5/2017 14:36	4:11:00

	4/4/2017 7:51	4/4/2017 14:15	6:24:00
	4/3/2017 7:52	4/3/2017 14:22	6:30:00
Mar-17	3/16/2017 8:38	3/16/2017 12:24	3:46:00
	3/15/2017 10:12	3/15/2017 12:21	2:09:00
	3/14/2017 8:41	3/14/2017 12:31	3:50:00
	3/13/2017 9:36	3/13/2017 15:34	5:58:00
	3/10/2017 7:39	3/10/2017 13:01	5:22:00
	3/9/2017 8:37	3/9/2017 20:16	11:39:00
	3/3/2017 8:28	3/3/2017 12:14	3:46:00
	3/2/2017 17:09	3/2/2017 19:56	2:47:00
	3/2/2017 8:28	3/2/2017 13:32	5:04:00
	3/1/2017 8:50	3/1/2017 21:01	12:11:00
Feb-17	2/9/2017 18:14	2/9/2017 19:36	1:22:00
	2/8/2017 8:30	2/8/2017 19:27	10:57:00
	2/2/2017 15:45	2/2/2017 19:31	3:46:00
	2/2/2017 9:03	2/2/2017 12:45	3:42:00
Jan-17	1/12/2017 15:28	1/12/2017 21:01	5:33:00
	1/10/2017 15:20	1/10/2017 18:34	3:14:00
	1/9/2017 15:35	1/9/2017 18:15	2:40:00
	1/5/2017 15:24	1/5/2017 20:54	5:30:00
	1/4/2017 14:23	1/4/2017 20:07	5:44:00
	1/3/2017 14:33	1/3/2017 19:38	5:05:00
Dec-16	12/15/2016 15:30	12/15/2016 21:01	5:31:00
	12/14/2016 15:38	12/14/2016 19:49	4:11:00
	12/13/2016 15:38	12/13/2016 19:26	3:48:00
	12/7/2016 15:30	12/7/2016 20:04	4:34:00
	12/6/2016 15:30	12/6/2016 20:01	4:31:00
	12/1/2016 15:29	12/1/2016 21:01	5:32:00
Nov-16	11/30/2016 15:28	11/30/2016 18:43	3:15:00
	11/29/2016 15:38	11/29/2016 18:53	3:15:00
	11/28/2016 15:34	11/28/2016 19:02	3:28:00
	11/23/2016 14:31	11/23/2016 18:09	3:38:00
	11/22/2016 14:25	11/22/2016 19:27	5:02:00
	11/21/2016 14:31	11/21/2016 18:32	4:01:00
	11/10/2016 15:44	11/10/2016 18:39	2:55:00
	11/7/2016 15:07	11/7/2016 19:01	3:54:00
	11/1/2016 9:51	11/1/2016 15:51	6:00:00
Oct-16	10/17/2016 11:23	10/17/2016 16:38	5:15:00
	10/4/2016 11:00	10/4/2016 17:32	6:32:00
	10/3/2016 11:31	10/3/2016 18:33	7:02:00
Sep-16	9/6/2016 12:57	9/6/2016 17:48	4:51:00
Aug-16	8/11/2016 11:31	8/11/2016 17:19	5:48:00

	8/10/2016 13:55	8/10/2016 18:08	4:13:00
	8/3/2016 11:31	8/3/2016 19:59	8:28:00
	8/2/2016 11:24	8/2/2016 20:06	8:42:00
Jul-16	7/21/2016 9:25	7/21/2016 18:59	9:34:00
	7/20/2016 12:36	7/20/2016 19:52	7:16:00
	7/12/2016 13:01	7/12/2016 19:23	6:22:00
	7/11/2016 13:01	7/11/2016 20:20	7:19:00
	7/5/2016 12:46	7/5/2016 18:56	6:10:00
Jun-16	6/13/2016 12:32	6/13/2016 12:39	0:07:00
	6/10/2016 10:32	6/10/2016 17:34	7:02:00
	6/1/2016 10:45	6/1/2016 17:02	6:17:00
May-16	5/26/2016 13:19	5/26/2016 18:40	5:21:00
	5/24/2016 13:30	5/24/2016 18:30	5:00:00
	5/23/2016 12:42	5/23/2016 18:09	5:27:00
	5/6/2016 11:13	5/6/2016 18:15	7:02:00
Apr-16	4/25/2016 10:30	4/25/2016 15:06	4:36:00
Mar-16	3/1/2016 16:38	3/1/2016 20:26	3:48:00
	3/1/2016 9:06	3/1/2016 13:15	4:09:00
Feb-16	2/10/2016 14:55	2/10/2016 18:31	3:36:00
	2/9/2016 15:03	2/9/2016 20:20	5:17:00
	2/8/2016 15:03	2/8/2016 19:20	4:17:00
	2/3/2016 14:12	2/3/2016 19:52	5:40:00
Jan-16	1/18/2016 15:54	1/18/2016 19:02	3:08:00
	1/12/2016 14:59	1/12/2016 21:01	6:02:00
	1/11/2016 14:41	1/11/2016 20:50	6:09:00

Exhibit 5

2016 SMMPA Member Direct Load Control (DLC) Participation

DLC Program	AU*	Fairmont	Litchfield	New Prague	OPU	Preston	Princeton	RPU	Saint Peter	Spring Valley	Waseca	Wells
Residential Air Conditioners	6542	2264	638	862	6668	216	444	7617	1739	246	1473	495
Residential Water Heaters	0	856	1305	0	0	83	0	622	16	15	7	455
Commercial Air Conditioners	0	682	152	2	273	35	0	79	88	32	108	80
Commercial Water Heaters	0	130	103	0	0	0	0	27	2	0	1	44

*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.

Exhibit 6

Demand and Resource Balance
Preferred Case

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Member Requirements	786.5	795.5	802.4	811.2	819.7	827.6	835.6	844.7	852.6	860.9	867.8	876.8	409.0	414.0	418.6
Above CROD	(56.9)	(58.5)	(59.8)	(62.4)	(64.1)	(65.9)	(68.1)	(70.3)	(71.8)	(73.8)	(74.9)	(76.8)	-	-	-
Installed DSM	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(150.3)	(66.6)	(66.6)	(66.6)
Member Generation	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Transmission Losses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Adjustments	(207.5)	(209.1)	(210.4)	(213.0)	(214.7)	(216.5)	(218.8)	(220.9)	(222.4)	(224.4)	(225.5)	(227.4)	(66.9)	(66.9)	(66.9)
Total Agency Requirement	579.0	586.4	592.0	598.3	605.0	611.1	616.8	623.8	630.1	636.5	642.3	649.5	342.1	347.1	351.7
Demand Side Resources															
Existing EMP Program	(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)	(4.6)
Existing Direct Load Control	(23.2)	(23.5)	(23.5)	(23.5)	(23.5)	(23.5)	(23.6)	(23.6)	(23.6)	(22.4)	(22.4)	(22.4)	(12.6)	(12.6)	(12.6)
New DSM	(12.1)	(18.3)	(24.6)	(30.9)	(37.2)	(43.7)	(50.4)	(57.1)	(63.7)	(70.5)	(77.2)	(83.9)	(71.6)	(76.9)	(82.1)
Total Demand Side Resources	(39.9)	(46.4)	(52.6)	(59.0)	(65.3)	(71.8)	(78.5)	(85.3)	(91.9)	(97.4)	(104.2)	(111.0)	(88.8)	(94.1)	(99.3)
Planning Reserve Requirements (7.8%)	42.0	42.1	42.1	42.1	42.1	42.1	42.0	42.0	42.0	42.0	42.0	42.0	19.8	19.7	19.7
Total Generation Level Requirements	581.1	582.0	581.5	581.4	581.8	581.4	580.3	580.6	580.2	581.1	580.1	580.5	273.0	272.8	272.0
Supply Side Resources															
Existing Supply Side Resources	599.0	599.0	599.0	599.0	599.0	599.0	599.0	599.0	599.0	599.0	599.0	582.6	452.0	452.0	452.0
Existing Capacity Purchases	40.0	40.0													
New Conventionsl Generation															
New Wind Generation			15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
New Solar Generation		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
New Capacity Purchases															
Total Supply Side Resources	639.0	640.5	615.5	615.5	615.5	615.5	615.5	615.5	615.5	615.5	615.5	599.1	468.5	468.5	468.5
Agency Resource Status (Positive = Excess MW)	57.9	58.5	34.0	34.1	33.7	34.1	35.2	34.9	35.3	34.4	35.4	18.6	195.5	195.7	196.5
Actual Reserve Margin	18.54%	18.63%	14.11%	14.13%	14.04%	14.12%	14.34%	14.28%	14.36%	14.19%	14.37%	11.26%	84.99%	85.16%	85.66%