PUBLIC DOCUMENT
NOT-PUBLIC DATA HAS BEEN EXCISED

Direct Testimony and Schedules
Kimberly A. Randolph

Before the Minnesota Public Utilities Commission
State of Minnesota

In the Matter of the Application of Northern States Power Company
for Authority to Increase Rates for Electric Service in Minnesota

Docket No. E002/GR-20-723
Exhibit___(KAR-1)

Energy Supply

November 2, 2020

PUBLIC DOCUMENT
NOT-PUBLIC DATA HAS BEEN EXCISED

Table of Contents

Table of Contents (continued)

PUBLIC DOCUMENT
NOT-PUBLIC DATA HAS BEEN EXCISED

Schedules

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND OCCUPATION.

A. My name is Kimberly A. Randolph. I am the Vice President of Energy Supply Projects for Xcel Energy Services Inc. (XES), which is the service company affiliate of Northern States Power Company, a Minnesota corporation (NSPM or the Company) and an operating company of Xcel Energy Inc. (Xcel Energy).

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I joined Xcel Energy in 2017. In my current position as Vice President of Energy Supply Projects, I am responsible for all capital projects executed by Energy Supply across our diverse portfolio of generation plants. Prior to joining Xcel Energy, I served as a Projects Director for IHI E&C International Corporation. In that position, I was responsible for the development and execution of engineering projects related to natural gas, biomass, and other fuel facilities. My statement of qualifications is attached as Exhibit___(KAR-1), Schedule 1.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I present and support the Company's capital and Operations and Maintenance (O&M) budgets for the Energy Supply business unit for purposes of determining the revenue requirements and final rates in this proceeding. I also provide information with respect to the performance of our generation fleet and steps we are taking to continually improve performance and operate this fleet more efficiently.

Q. WHAT ARE THE KEY RESPONSIBILITIES OF THE ENERGY SUPPLY ORGANIZATION?

A. Energy Supply's primary responsibility is to operate and maintain the Company's non-nuclear generation portfolio in a safe, reliable, cost-effective, and environmentally-sound manner. We are also responsible for managing major construction projects, overseeing environmental compliance, and supporting the coordination of generating unit dispatch with the Midcontinent Independent System Operator, Inc. (MISO).

Q. PLEASE PROVIDE AN OVERVIEW OF KEY FACTORS THAT WILL DRIVE ENERGY SUPPLY'S INVESTMENTS FOR THE NEXT THREE YEARS.

A. Five years ago, in our 2015 Integrated Resource Plan (IRP) approved by the Minnesota Public Utilities Commission (Commission) in January 2017, we set course to change our generation mix to one more reliant on renewable generation and less reliant on coal generation.[1] Key components of the 2015 IRP included the addition of at least 1,000 MW of wind resources by 2019 and the retirement of Sherco Units 2 and 1 in 2023 and 2026 respectively.[2]

On July 1, 2019, the Company filed its 2020-2034 Upper Midwest IRP with the Commission and supplemented the filing in June 2020.[3] This IRP continued on the course set by the 2015 IRP and outlined the Company's preferred

[1] *In the Matter of Xcel Energy's 2016-2030 Integrated Resource Plan*, Docket No. E002/RP-15-21, ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE RESOURCE PLAN FILINGS (Jan. 11, 2017).
[2] *Id.* at 3.
[3] *See* Docket No. E002/RP-19-368. The Company provided a supplement to its 2020-2034 IRP on June 30, 2020 as required by the Commission's November 12, 2019 ORDER SUSPENDING PROCEDURAL SCHEDULE AND REQUIRING ADDITIONAL FILINGS.

generation resource plan that includes one of the most ambitious carbon reduction goals of any U.S. utility. Specifically, this IRP includes plans to reduce the Company's carbon emissions 80 percent by 2030 and states Xcel Energy's intention to provide 100 percent carbon-free energy by 2050.[4]

The Company's Energy Supply function will be at the forefront of helping the Company achieve these long-term carbon reduction goals. Achievement of these goals will require a significant transformation of the Company's generation resources. Over the next three years, we will continue to see that transformation take shape as the Company shifts to more renewable energy generating facilities while at the same time further reducing our reliance on coal-fired generation.

Specifically, the Commission has already approved our development and construction of a number of wind facilities, including Blazing Star I & II,[5] Crowned Ridge,[6] and Jeffers and Community Wind North.[7] These renewable investments will contribute to our ability to achieve the Company's and the State's policy goals over the long term. In fact, almost 90 percent of Energy Supply's capital investments during this multi-year rate plan (MYRP) will be in advancing our carbon-free goals by adding material amounts of wind to our system.

[4] *In the Matter of Xcel Energy's 2020-2034 Upper Midwest Integrated Resource Plan*, UPPER MIDWEST INTEGRATED RESOURCE PLAN 2020-2034 at 1, Docket No. E002/RP-19-368 (July 1, 2019).
[5] *See* Docket No. E002/M-16-777.
[6] *See* Docket No. E002/M-16-777.
[7] *See* Docket No. E002/PA-18-777.

Additionally, during the term of this multi-year rate plan, we will continue our efforts to wind down coal operations by utilizing seasonal dispatch for Sherco Unit 2 and Allen S. King as recently approved by the Commission,[8] leading up to the retirement of Sherco Unit 2, at the end of 2023.

Our continued investments in dispatchable natural gas generation on our system will be vital to our ability to manage the retirement of these coal-fired generation units while maintaining reliability. Our natural gas units will also facilitate our ability to successfully integrate large amounts of renewables, because we can ramp the output of these resources up or down in response to the variability of this renewable generation. In light of these generation shifts, our capital investments in our coal plants will begin to decline sharply during this multi-year rate plan, while capital investment in our other plants will begin to increase.

These investments will also necessitate a shift in our O&M spending into the future to accommodate these new investments and recognize the pending retirement of our coal fleet. Over the course of this multi-year rate plan, the Company will see its O&M spending on coal-fired generation decline and its spending on wind generation increase, such that overall O&M on wind will eclipse that for our coal fleet in 2022.

[8] *In the Matter of the Petition of Northern States Power Company for Approval of a Plan to Offer Generating Resources into the MISO Market on a Seasonal Basis*, Docket No. E002/M-19-809, ORDER APPROVING PLAN AND REQUIRING FILING (July 15, 2020). The projected capital and O&M savings included in the Company's petition for approval of seasonal dispatch for these units have been included in our capital and O&M budgets for this case.

Q. DOES THE SHIFT TO A MORE CARBON-FREE FUTURE IMPACT ENERGY SUPPLY'S CORE PRIORITIES?

A. No. The Company's Energy Supply function remains committed to maintaining the safe operation of the Company's non-nuclear generating fleet. Even as we work to transform our generation fleet, we must continue to support our generation facilities through necessary capital additions to keep our plants in good working order as well as undertaking required O&M tasks to ensure they are operated and maintained effectively. These costs are necessary to provide our customers with economical energy they can rely on. We also support new and existing resources necessary to meet demand and keep the Company well-positioned to comply with environmental regulations and the Company's and State's energy policy goals.

Over the next three years, Energy Supply will continue to focus on keeping our plants running safely and efficiently. In order to do that, each year we must make investments in Reliability/Performance Enhancement projects. We must also undertake Environmental Improvement projects to control and reduce the emissions from our existing plants. These reliability, performance enhancement, and environmental improvements form the bulk of the routine work performed by Energy Supply to keep our generation plants running.

Q. PLEASE PROVIDE A SUMMARY OF YOUR TESTIMONY.

A. In my Direct Testimony, I provide an overview of the Energy Supply business area and the value it provides to customers. Next, I describe Energy Supply's capital budget planning and oversight. I also describe Energy Supply's capital investment program for 2021, 2022, and 2023, followed by a similar discussion

for our O&M expenses. Lastly, I discuss the operating performance of our key assets and operating model initiatives.

Q. PLEASE SUMMARIZE THE COMPANY'S CAPITAL ADDITIONS DURING THE 2021 TEST YEAR AND 2022 AND 2023 PLAN YEARS.

A. Over the next three years we anticipate higher capital additions in 2021 reflecting our investment in new wind generation, balanced by lower capital additions in 2022 to 2023 when our focus shifts to maintaining our existing gas fleet to meet customer needs for reliable, safe, and cost-effective service.

While our investments in wind generation resources are beneficial for customers in that they reduce carbon emissions and have zero fuel costs, the reliability of the system requires that these resources must be backed with natural gas generation. Without such natural gas back-up, the reliability of our system could be in jeopardy, as seen in ordered blackouts in California in the summer of 2020. These blackouts served as important reminder that, for all the growth in renewables, natural gas is required in the near term to keep the grid stable and ensure resource adequacy. As a result, our investments in our natural gas fleet are critical component of the overall generation portfolio.

In 2021, we plan to place in service a total of $739.4 ($536.2) million in new renewable capital additions related to the completion of the Freeborn and Dakota Range wind projects. Throughout my testimony, I note that dollar amounts are first presented on an NSPM basis followed by the State of Minnesota Electric Jurisdiction amount in parenthesis, unless otherwise noted. The Company will seek recovery of these two wind projects through the

Renewable Energy Standard (RES) Rider. Company witness Mr. Benjamin C. Halama will discuss the RES Rider in greater detail. In addition to the major investments we are making in our system, in 2021 we also plan to place in service significant capital projects at our Sherco and Riverside Units 7, 9 and 10 as part of our ongoing commitment to maintain reliability and performance of our assets and make environmental improvements that are valuable to our customers. Additionally, we are planning to implement other projects at our plants to ensure their long-term safe and reliable operation. These capital additions at our existing plants total approximately $108.5 ($78.7) million for NSPM in 2021. Consequently, our total capital additions for 2021 are expected to total $847.9 ($614.8) million.

In 2022, we plan to place into service capital additions at our existing plants of approximately $69.6 ($50.4) million. The vast majority of these additions, $64.5 ($47.1) million, are Reliability/Performance Enhancement investments, which are needed to maintain our generation fleet in good working order. This includes projects at Black Dog Units 5 and 2, Angus Anson Unit 4, Sherco Unit 3, Inver Hills Unit 3, and Blue Lake Units 7 and 8.

In 2023, we plan to place into service capital additions at our existing plants of approximately $59.9 ($43.4) million. The vast majority of these additions, $50.8 ($37.0) million, are Reliability/Performance Enhancement investments. This includes projects at Black Dog Units 5 and 2, Angus Anson Unit 4, Sherco Unit 3, Inver Hills Unit 3, and Blue Lake Unit 7.

Q. PLEASE SUMMARIZE ENERGY SUPPLY'S O&M BUDGETS FOR THE 2021 TEST YEAR AND 2022 AND 2023 PLAN YEARS.

A. As I mentioned above, our O&M budgets are tracking the transformation of our generation fleet, which means the O&M spend associated with our coal generation is decreasing while the O&M spend associated with the maintenance of our growing wind fleet is increasing.

In support of our overall mission to maintain a safe and reliable generation fleet, we have budgeted $159.1 ($115.4) million for O&M expenses in 2021. The primary drivers of our 2021 O&M budget are additional costs for Blazing Star I, Blazing Star II , Community Wind North, Crowned Ridge II, Jeffers Wind, and Mower County Wind, employee wage increases, and select planned overhauls.

In 2022, we have budgeted $162.5 ($117.8) million for O&M expenses. The primary drivers of our 2022 O&M budget are additional costs for the wind farms being placed into service in 2021, new O&M costs for the Dakota Range wind farm and Freeborn Wind being placed into service in 2021, employee wage increases, and select planned overhauls.

In 2023, we have budgeted $167.7 ($121.6) million for O&M expenses. The primary drivers of our 2023 O&M budget are additional costs associated with a full year of the Dakota Range and Freeborn wind farm operation in addition to the wind fleet's annual wind farmland easement payments and operating service contracts, employee wage increases, and select planned overhauls.

The O&M jurisdictional values in my testimony do not reflect the interchange offsets to Northern States Power Company-Wisconsin (NSPW); those values are shown in Exhibit___(KAR-1), Schedule 2.

Q. HOW IS THE REMAINDER OF YOUR DIRECT TESTIMONY ORGANIZED?

A. The remainder of my Direct Testimony is organized as follows:

- *Section II* – Energy Supply Functions and Activities
- *Section III* – Capital Budget
- *Section IV* – O&M Budget
- *Section V* – Operating Performance
- *Section VI* – Conclusion

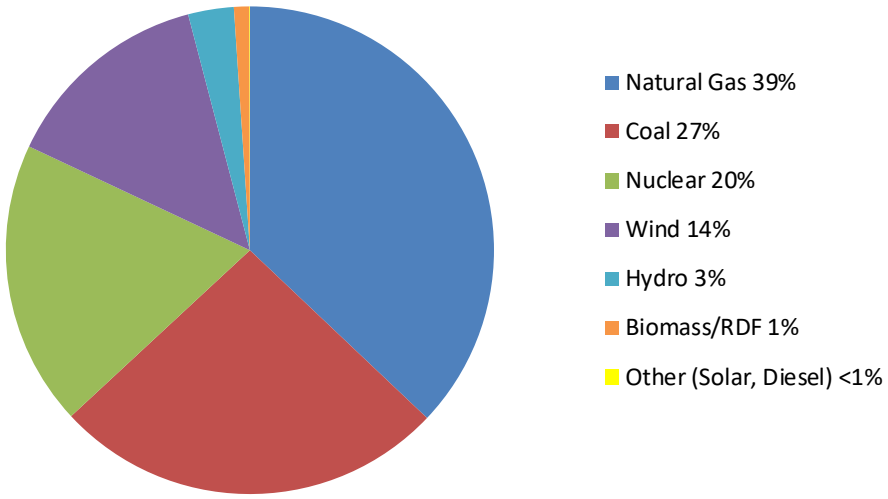
II. ENERGY SUPPLY BUSINESS UNIT

Q. PLEASE PROVIDE AN OVERVIEW OF THE NSP GENERATION PORTFOLIO.

A. The NSP Companies–NSPM and NSPW–own, operate, and maintain the NSP System that serves over 1.6 million electric customers in Minnesota, North Dakota, South Dakota, Wisconsin, and Michigan. Together, the NSP Systems' generating plants have a net maximum capacity of almost 9,190 megawatts (MW). Our generating facilities use a variety of fuel sources including natural gas, coal, nuclear fuel, water (hydro), wind, biomass, refuse, solar, and oil. Figure 1 below shows the NSP System fuel mix as a percent of July 2020 owned accredited capacity.

Figure 1

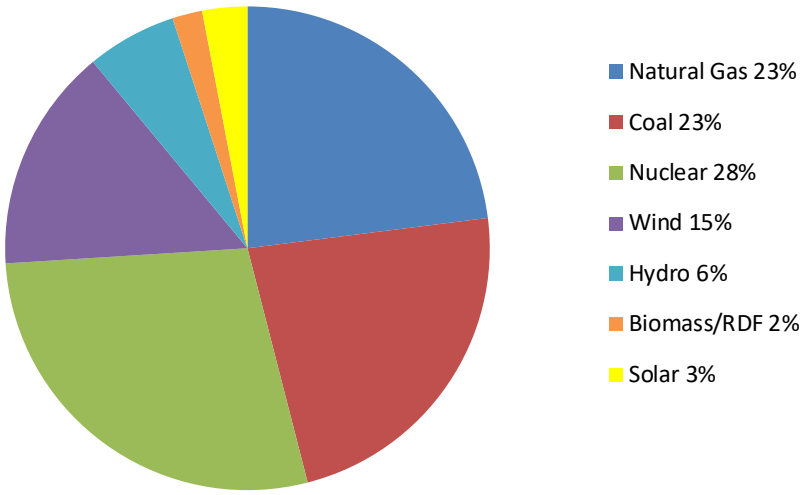
NSP System Fuel Mix by Accredited Capacity (MW) - July 2020



In addition to the owned accredited capacity view of our generation facilities, I provide another representative view of how we are meeting customer needs, the actual generation view of our electricity production. While the focus of my testimony is limited to the generation that is owned by the Company, we also serve customer needs with power purchased pursuant to long-term Power Purchase Agreements (PPAs). We recover our energy costs (and some associated capacity costs) associated with our purchased power resources through a combination of base rates and the Fuel Clause Adjustment Rider, which is annually reviewed by the Commission in other proceedings. Figure 2 below shows the fuel mix as a percent of actual 2019 generation including PPAs.

Figure 2

NSP System Energy by Generator Type (MWH)



Q. HOW HAS THE COMPANY'S GENERATION PORTFOLIO EVOLVED OVER TIME?

A. Our generation portfolio has evolved as a result of state and federal energy policies and regulations and Company-driven efforts to improve efficiencies and environmental performance. Underlying all of that is customer preference, which continues to trend toward a preference for a generation mix that more heavily relies on renewable resources.

For example, we have added material amounts of renewable energy to the NSP System from 2017-2019, including wind and solar resources. The 2020 bridge year and 2021 test year will also see significant investment in new wind facilities. I discuss these investments later in my testimony.

Q. DO YOU EXPECT THE RESOURCE MIX TO CONTINUE TO EVOLVE OVER THE NEXT SEVERAL YEARS?

A. Yes. As discussed in our current Integrated Resource Plan, we expect our resource mix to continue to shift away from coal resources and incorporate higher levels of renewable and natural gas resources. This is a response to several factors, including our commitment to carbon-free energy, the declining cost of renewable energy and natural gas, customer preference, and the age of some of our existing generation units. Our proposed framework for meeting future generation needs is further outlined in our 2020-2034 Upper Midwest Resource Plan submitted to the Commission July 1, 2019 in Docket No. E002/RP-19-368 and the subsequent Supplemental filing submitted June 30, 2020.

Q. HOW DOES ENERGY SUPPLY SUPPORT THE COMPANY'S GENERATION PORTFOLIO DESCRIBED ABOVE?

A. Energy Supply makes capital investments and incurs O&M costs to support existing generation plants, maintain and update generation facilities, and invest in new resources where appropriate. As a general matter, we must make investments each year to keep our plants running safely and efficiently to support our customers' needs and reduce future financial risk to our customers. However, large new generation resources tend to be the largest drivers of our capital budget, while overhauls of existing plants tend to drive O&M and contribute to capital maintenance programs and timing. I discuss our capital investments and O&M trends in more detail below.

III. CAPITAL INVESTMENTS

A. Overview

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. In this section, I discuss how the Energy Supply business unit develops its annual capital budget, and explain how Energy Supply identifies, prioritizes, and manages capital projects within the confines of the capital budget. I also discuss recent capital budget trends for Energy Supply.

Q. GENERALLY SPEAKING, WHAT TYPE OF CAPITAL INVESTMENTS ARE MADE BY THE ENERGY SUPPLY ORGANIZATION?

A. Energy Supply makes capital investments to bring new generation assets online and keep our existing generation assets in good working order. Our capital investments in our existing assets are usually related to replacing degraded equipment or to ensure compliance with changing state or federal environmental regulations.

Q. WHAT ARE THE BASIC CATEGORIES OF ENERGY SUPPLY'S CAPITAL BUDGET?

A. At the highest level, the capital budget can be described as consisting of base capital and major capital. Base capital projects are considered a part of the normal plant operation cycle necessary to preserve and maintain operation of our existing plants. Major capital projects are large, unique projects that have special regulatory requirements and are initiated in support of strategic corporate goals for addition of generation capacity or significant extension of the operational life of a generation asset in support of the Resource Plan.

Q. HOW DOES ENERGY SUPPLY FURTHER BREAK DOWN ITS CAPITAL ADDITIONS?

A. Our capital projects fall into three capital budget groupings: 1) Renewable and New Generation, 2) Reliability/Performance Enhancement, and 3) Environmental Improvement. In my testimony, I discuss the capital budget from both the capital budget grouping perspective and the individual plant or generation resource perspective for 2021 through 2023.

Q. PLEASE DESCRIBE THE TYPES OF INVESTMENTS THAT FALL INTO THE FIRST CAPITAL BUDGET GROUPING, RENEWABLE AND NEW GENERATION PROJECTS.

A. Various circumstances such as changing system requirements, policy goals, or the opportunity for customer savings may necessitate the construction of new generation units or the decommissioning of old generating units. In this case, the Company is forecasting material investment in renewable generation that will further our and the State's carbon-reduction goals. Additionally, the decommissioning and removal of the coal-fired units at our Black Dog plant facilitated the construction of a combustion turbine at the plant with Black Dog Unit 6.

Q. PLEASE DESCRIBE THE TYPES OF INVESTMENTS THAT FALL INTO THE SECOND CAPITAL BUDGET GROUPING, RELIABILITY/PERFORMANCE ENHANCEMENT PROJECTS.

A. Our generating stations are large, complex machines that require regular maintenance to ensure that they are operating reliably and efficiently, consistent with their design. Many of our capital additions take the form of routine investments that may involve replacing worn or obsolete parts of our generating

units. We also routinely make safety repairs and improvements at our plants to maintain a safe working environment for our employees and satisfy new codes and regulations. We consider these types of capital additions the baseline of our capital spend, and they make up the majority of our base capital budget.

We also undertake Reliability/Performance Enhancement projects that are intended to improve the functioning of existing plants. An example of a Reliability/Performance Enhancement project is air heater heat transfer surface section replacements at Sherco. As heat transfer surfaces "baskets" fail, heat transfer decreases and the unit heat rate subsequently suffers, which in turn increases the amount of fuel required to create the same electrical output. By replacing these basket sections, the Company enhances performance with more efficient equipment, ultimately providing more efficient production to meet our customers' needs.

Q. PLEASE DESCRIBE THE TYPES OF INVESTMENTS THAT FALL INTO THE THIRD CAPITAL BUDGET GROUPING, ENVIRONMENTAL IMPROVEMENT PROJECTS.

A. Our plants may require new systems and components to continue to operate reliably and consistently with new regulatory requirements. This type of capital addition can include replacing degraded environmental components or the addition of new environmental technology such as mercury sorbent injection and other emissions controls. Such capital projects are generally larger than routine maintenance projects and are planned over a longer period. Many of our capital additions serve multiple purposes, but for budgeting purposes, we classify the capital project according to its primary purpose.

B. Energy Supply Capital Budget Development

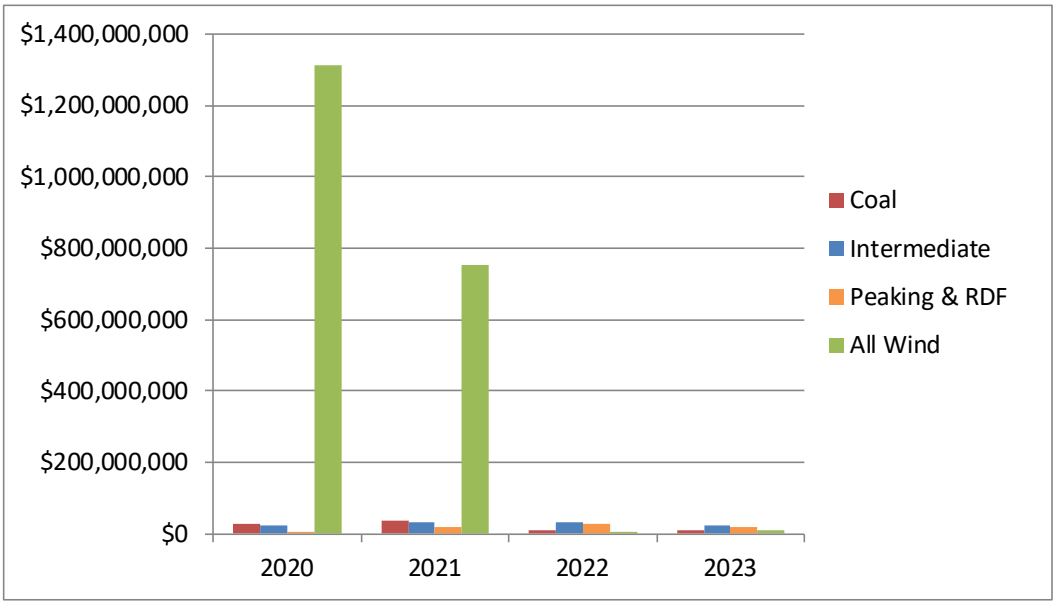
Q. PLEASE MAKE THE BUSINESS CASE FOR THE ENERGY SUPPLY CAPITAL PROGRAM.

A. Energy Supply's capital program during the 2021 test year and 2022 and 2023 plan years is built around the implementation of Commission-approved projects and those projects pending Commission approval to propel us into our carbon-free future. The remainder of our capital program supports one of the most fundamental activities of an electric utility: the safe and reliable generation of electricity.

Nearly 90 percent of our capital investments from 2020-2023 is devoted to placing in service 1,270 MW of new wind projects. Figure 3 below shows this dramatic capital investment in wind generation that is particularly pronounced in 2020 and 2021.

Figure 3

Annual Capital Additions by Fuel Type



These wind resources benefit customers through reduced fuel costs and reduced carbon emissions and have already been approved by the Commission. Energy Supply's remaining capital investments are necessary because operating electric generation resources is a complex and capital-intensive process. Generation resources need continual oversight, maintenance, and improvement. As resources age, the needs of the plant change, often shifting to investments in maintaining the plant. We also make the capital investments necessary to remain compliant with all environmental and legal mandates.

We recognize that it is critical to provide our customers with cost-effective electricity. As I discuss below, we manage our capital investments accordingly, by timing investments where possible to keep costs reasonably level over time. I will also discuss processes we have employed to ensure the costs of any given project are reasonable. While we cannot control the timing of investments in every circumstance, we maintain a disciplined capital planning and investment process to support the provision of reliable and safe energy at cost-effective prices.

Q. PLEASE DESCRIBE THE PROCESS THE COMPANY USES TO DETERMINE ITS CAPITAL INVESTMENT PLAN FOR ENERGY SUPPLY.

A. The appropriate annual capital budget for Energy Supply is based on the relationship between corporate management of overall finances and the business needs Energy Supply identifies in order to maintain our power plants and address new generation needs. Company witness Ms. Melissa L. Ostrom explains how the Company establishes overall business area capital spending guidelines and budgets based on financing availability, specific needs of business

areas, and overall needs of the Company. Within Energy Supply, we use a rigorous planning process to determine which projects to undertake and when. Multiple factors drive our capital requirements, including the in-service dates of new generation, safety, customer demand, environmental regulations, and unit operational condition. Each year, our plants submit proposed capital projects for the next year based on the requirements, needs, and goals of each plant and planned new generating stations to help us achieve our carbon-free future.

The proposed projects are then evaluated and ranked according to their financial and operational merits, such as costs, benefits, and impact on Unplanned Outage Rate. Evaluated projects include those that may be completed in a single year, as well as those that will require multiple years to execute and complete. The result of this review process is a ranked list of potential projects for a given year, which is evaluated against the available capital budget for that year, planned new generation, as well as the planned unit outage schedule for the next several years and known regulatory factors, such as new environmental regulations. In years when major capital additions are planned, capital additions that can be deferred are deferred where possible to minimize the effect on customers while maintaining an acceptable risk profile. Examples of capital additions that could be deferred in a particular year may include parking lot repairs, roof repairs, or vehicle replacements.

Q. WHAT HAPPENS IF THE NUMBER OR TYPE OF PROJECTS ENERGY SUPPLY BELIEVES ARE IMPORTANT OUTPACES THE AVAILABLE FUNDING?

A. Often the desired initial budget exceeds the spending guidelines, which then requires review meetings with Company leaders to assess the requested budget

and determine a different course of action. Because this happens throughout the Company, a higher or lower percentage of the Company's overall resources may be allocated to Energy Supply in any given year, depending on the priority of needs of the Company. To determine the urgency of the need for projects not specifically required for compliance, we often rely on performance data, engineering studies, and equipment age to identify the equipment that presents the greatest risk of failure.

Ultimately, the needs of our generation plants and Company goals with respect to new future generation resources are balanced against the overall funding available to arrive at an appropriate budget for the Energy Supply business area.

Q. PLEASE EXPLAIN THE PROCESS YOU FOLLOW TO MANAGE PROJECT COSTS DURING THE IMPLEMENTATION OF A CAPITAL PROJECT.

A. Capital budgets are finalized at least one year prior to their execution. Part of the project development process includes the identification of key schedule dates and budgetary milestones. Once a capital project has been approved for execution, it is assigned to a Project Manager (PM), typically three to six months in advance of the first planned activity required to commence the project. The PM is responsible for working with the plant to review and more fully develop the schedule and monthly cash flow requirements for the assigned project. The PM will typically contact vendors and contractors to gather cost and schedule data for the anticipated scope of the project, and begin engineering and purchasing activities. If the PM identifies specific information related to changes in cost or the schedule, he or she advises management and recommends options for consideration. Management then responds as appropriate.

Q. PLEASE EXPLAIN THE PROCESS ENERGY SUPPLY FOLLOWS TO MANAGE PROJECT PROCUREMENT COSTS.

A. Part of the responsibilities of the PMs is to work with our Supply Chain function to procure the goods and services we require to meet Energy Supply's mission through competitive supply contracts. Our policies require that all purchases of goods or services greater than $50,000 must be competitively bid. There is an allowance on rare occasions for sole source procurement, but justification for such actions is limited, and we require approval of such sole source contracts at the Director level. The use of competitively-bid Master Services Agreements (MSAs) and other competitively-bid contracts helps to ensure that we receive the best value from our suppliers, which benefits our customers.

Q. WHAT DOES ENERGY SUPPLY DO TO ADAPT TO CHANGING CONDITIONS THAT MAY OCCUR DURING A PARTICULAR YEAR?

A. As described earlier, when the need to implement unbudgeted projects arises, we try to find ways to fund these needs by deferring comparable but less urgent capital projects. If there are instances where we have an unexpected need to undertake a large project that we cannot offset but which would benefit our customers, a capital budget target adjustment may be requested and reviewed by our Financial Counsel and Board of Directors prior to approval to move forward.

In short, with rare exceptions that must be managed within overall Company limitations, Energy Supply is required to manage to our capital budget in each year, and we do.

C. Capital Investment Trends for 2017 to 2019

Q. FOR 2017-2019, WHAT WERE ENERGY SUPPLY'S KEY STRATEGIC GOALS AND FOCUS AREAS THAT DROVE CAPITAL INVESTMENTS?

A. For 2017-2019, our capital addition levels were primarily driven by the completion of several wind generation facilities such as the Courtenay wind farm in 2016-2017, $297.3 ($216.8) million, Black Dog Unit 6 in 2018, $87.3 ($64.5) million, Lake Benton wind farm in 2019, $156.3 ($113.3) million, and Foxtail wind farm in 2019, $252.3 ($182.9) million. We continued a steady execution of our investment plan with a focus on overall plant maintenance and support. In total, our 2017-2019 average annual capital additions were approximately $230.9 ($167.4) million. Our 2017-2019 average annual capital additions at existing facilities were approximately $67.6 ($49.0) million.

Q. FOR 2017-2019, CAN YOU PROVIDE A SUMMARY OF HOW YOUR INVESTMENTS FELL INTO ENERGY SUPPLY'S THREE CAPITAL BUDGET GROUPINGS?

A. Yes. Table 1 below shows the breakdown of costs by each capital budget grouping for 2017-2019.

Table 1

2017–2019 Actual Capital Additions (With AFUDC)

Northern States Power Company - MN ($ Millions)			
	2017	**2018**	**2019**
Renewable and New Generation	$ 2.6	$ 89.1	$ 420.8
Reliability/Performance Enhancement	$ 48.1	$ 84.6	$ 32.3
Environmental Improvement	$ 1.9	$ 10.9	$ 2.4
Total:	**$ 52.6**	**$ 184.6**	**$ 455.5**

Q. PLEASE EXPLAIN WHAT IS DRIVING THE INCREASE IN CAPITAL ADDITIONS IN 2019?

A. Our increased capital additions in 2019 were due to Renewable and New Generation capital additions to complete Blazing Star I, Foxtail, and Lake Benton wind farms.

Q. PLEASE EXPLAIN WHY THE PERCENTAGES OF YOUR INVESTMENTS IN THESE GROUPINGS CHANGED OVER THESE THREE YEARS?

A. Energy Supply must balance the need to make investments to propel us into a carbon-free future, the needs of our existing plants to operate safely and reliably, available capital within the Company, and the overall impact of our capital spend pattern on customers. As I discuss further below, our investments in existing plants so that they continue to operate safely and reliable is generally steady, and we can manage to the budget by prioritizing necessary projects. That said, our larger investments in new generating facilities can be less consistent in that we make significant capital additions when in-servicing new plants or replacing assets when they reach end of serviceable life. To account for these significant capital additions, we often need to reallocate other work. Consequently, the Company's investments in capital budget groupings vary somewhat by year, and include some amount of work that was deferred from previous years.

Q. PLEASE DISCUSS ENERGY SUPPLY'S FORECASTED CAPITAL ADDITIONS FOR 2020?

A. In 2020, we are forecasting total capital additions of $1.36 ($0.99) billion dollars. Our forecasted Renewable and New Generation capital additions of $1.31

($0.95) billion in 2020 are for the Blazing Star I & II, Crowned Ridge, Mower, Jeffers, and Community Wind North wind farm projects. Reliability/Performance Enhancement and Environmental Improvement capital additions are forecasted at $54.7 ($39.7) million. These include Reliability/Performance Enhancement projects for combustion turbine major overhauls at High Bridge Unit 7 and Riverside Unit 9 as well as projects completed during the planned Sherco Unit 3 overhaul. These Sherco Unit 3 projects are: replacement of the 37-1&2 high-pressure feedwater heaters and replacement of the 31&32 secondary air heater heat transfer baskets. We have also undertaken Environmental Improvement projects primarily for Sherco Units 1, 2, and 3 by replacing the bottom ash pond to comply with new Environment Protection Agency (EPA) Coal Combustion Residuals (CCR) requirements by the compliance date of April 11, 2021.

Q. HAS THE COVID-19 PANDEMIC AFFECTED ENERGY SUPPLY'S CAPITAL INVESTMENTS IN 2020 AND BEYOND?

A. COVID-19 has impacted Energy Supply's capital investments in that projects have experienced schedule delays due to supply chain issues. The largest impact has been the delay of the completion of the Freeborn wind farm project from 2020 to 2021 due to wind turbine delivery delays.[9] Energy Supply has updated our financial budgets for 2020 and beyond to reflect our best estimate of these financial impacts, and will continue to adjust as more COVID-19 information is available. This is consistent with the approach we would take related to any of the various ways our business may evolve during a given period.

[9] *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, COMPLIANCE FILING-QUARTERLY REPORT, Docket No. E002/M-16-777 (July 31, 2020).

D. Overview of Capital Investments for 2021 to 2023

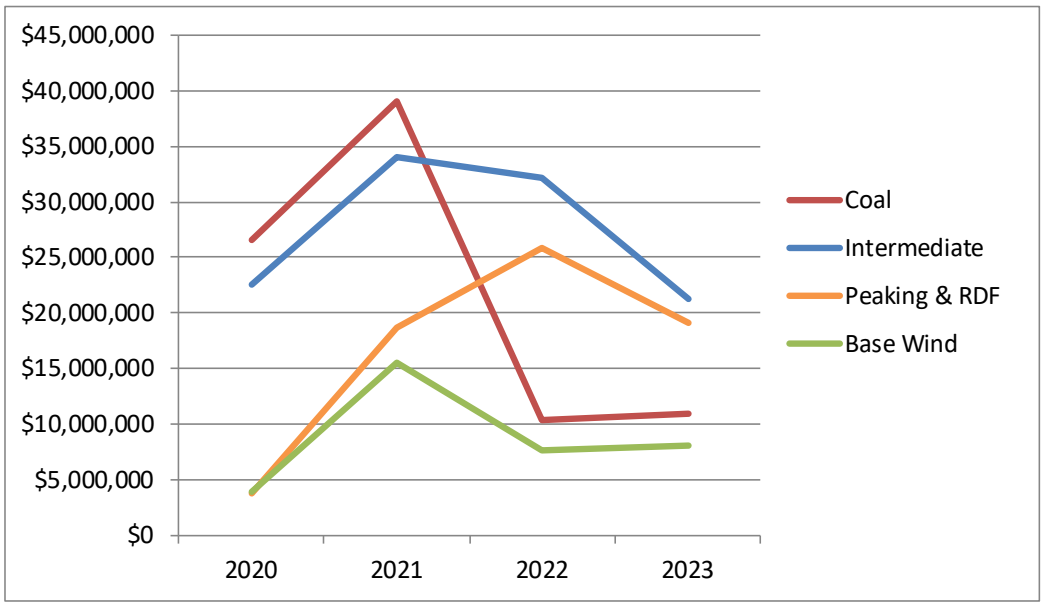
Q. LOOKING AHEAD, WHAT ARE YOUR CAPITAL BUDGETS FOR 2021-2023 BY CAPITAL BUDGET GROUPING?

A. For the next year (2021), our capital spend will increase with respect to base investments. A reduction in base capital was made to somewhat offset additional costs related to major capital Renewable and New Generation additions that were placed in service in 2020.

However, many Reliability/Performance Enhancement projects cannot be deferred indefinitely because issues will have to be addressed eventually. As such, we anticipate base capital spending will increase in 2021-2022 at our natural gas facilities and then return to lower levels in 2023. I discuss each of the key capital projects we anticipate for 2021 through 2023 later in my testimony. Further, after 2020, our capital investments at our coal facilities decline as we prepare for the retirement of Sherco Units 1 and 2 in 2026 and 2023, respectively. Figure 4 below depicts these capital spending trends that I discussed.

Figure 4

(Excluding Investment in New Wind Farms)



Q. HOW DO ENERGY SUPPLY'S CAPITAL ADDITIONS FOR 2021 TO 2023 FIT INTO THE BUDGET CATEGORIES YOU MENTIONED?

A. Table 2 below illustrates that, overall, our 2021-2023 average capital additions break down into approximately $254.1 ($184.3) million for Renewable and New Generation, $64.9 ($47.1) million for Reliability/Performance Enhancement and $7.0 ($5.1) million for Environmental Improvement.

Table 2

2021 – 2023 Forecasted Capital Additions (With AFUDC)

Northern States Power Company - MN ($ Millions)			
	2021	**2022**	**2023**
Renewable and New Generation	$ 753.9	$ 0.5	$ 8.0
Reliability/Performance Enhancement	$ 79.5	$ 64.5	$ 50.8
Environmental Improvement	$ 14.5	$ 4.6	$ 1.1
Total:	**$ 847.9**	**$ 69.6**	**$ 59.9**

Q. PLEASE EXPLAIN THE HIGHER LEVEL OF CAPITAL ADDITIONS IN 2021 COMPARED TO 2022 AND 2023?

A. Virtually all of our Renewable and New Generation capital additions in 2021 are associated with two Commission-approved wind farms that we are adding to our system, Freeborn, and Dakota Range. As I noted, the capital investments related to these wind farms are being recovered through the RES Rider, as discussed in greater detail by Mr. Halama. When these wind farm projects were approved, efforts were made to delay or cancel non-essential capital projects that were budgeted in 2020 to 2021 or later. Approximately $50 million of projects were moved out of 2020 to minimize the effect on customers of the renewable additions. This effort reduced costs but also means that we will need to address the deferred capital projects in 2021 and 2022.

Our 2021 planned Reliability/Performance Enhancement budget reflects our efforts to plan for projects that need to be completed in 2021, as well as projects that could have been completed earlier but were deferred. An example of a base capital project that we would typically have completed earlier, but which was deferred until 2021, is Sherco Unit 3 landfill cell 4 construction. Additional projects are discussed later in my testimony.

Our 2022-2023 capital additions budgets reflect the impact of the material investments we are making and a return to a more typical investment pattern with minimal new capacity additions or replacements of retiring assets.

Q. PLEASE PROVIDE AN OVERVIEW OF ENERGY SUPPLY'S BUDGETED CAPITAL ADDITIONS FOR 2021?

A. In 2021, we are budgeting a total amount of capital additions of $847.9 ($614.9) million dollars. Our forecasted Renewable and New Generation capital additions of $753.9 ($546.7) million in 2021 are mainly for the Freeborn and Dakota Range wind farms. Reliability/Performance Enhancement and Environmental Improvement capital additions are $94.0 ($68.1) million. These include Reliability/Performance Enhancement projects for combustion turbine major overhauls at Riverside Unit 10 as well as replacement auxiliary boilers at the Sherco plant. We have also undertaken Environmental Improvement projects primarily for construction of landfill cell 4 and Air Quality Control System (AQCS) fabric filter baghouse bag replacement for Sherco Unit 3 and a stormwater management pond for the Sherco site.

Q. PLEASE PROVIDE AN OVERVIEW OF ENERGY SUPPLY'S BUDGETED CAPITAL ADDITIONS FOR 2022?

A. In 2022, we are budgeting a total amount of capital additions of $69.6 ($50.4) million dollars. Reliability/Performance Enhancement and Environmental Improvement capital additions are $69.1 ($50.1) million. These include Reliability/Performance Enhancement projects for Hot Gas Path replacements at Black Dog Unit 5 and Angus Anson Unit 4. We have also undertaken Environmental Improvement projects, a Black Dog road erosion wall, and Wilmarth Unit 2 AQCS fabric filter baghouse bag replacement.

Q. PLEASE PROVIDE AN OVERVIEW OF ENERGY SUPPLY'S FORECASTED CAPITAL ADDITIONS FOR 2023?

A. In 2023, we are forecasting a total amount of capital additions of $59.9 ($43.4) million dollars. Reliability/Performance Enhancement and Environmental Improvement capital additions are $51.9 ($37.7) million. These include a series of Reliability/Performance Enhancement projects such as the combustion turbine major overhauls at Angus Anson Unit 2 and High Bridge Unit 8. Our forecasted Renewable and New Generation capital additions of $8.0 ($5.8) million in 2023 are mainly for gearbox replacements at Grand Meadows, Nobles and Pleasant Valley wind farms.

Q. WHAT KEY PROJECTS WILL YOU BE INVESTING IN OVER THE TERM OF THIS MULTI-YEAR RATE PLAN?

A. The investment in Renewable and New Generation projects, namely, the Freeborn and Dakota Range wind farms drives our overall capital investment strategy. In 2021, we anticipate placing the new Freeborn and Dakota Range wind farms in service (approximately $722.0 million with AFUDC). The remainder of our costs is largely driven by base investments required to keep our generation fleet operating safely and reliably producing electricity, and overhauls required to complete repairs.

Q. WHAT OTHER CAPITAL PROJECTS DO YOU EXPECT TO DRIVE YOUR INVESTMENTS OVER THESE YEARS?

A. Our capital additions are largely dependent on individual unit overhaul cycles. Equipment and systems that comprise a generating unit have life expectancies and inspection/replacement cycles defined by their manufacturers. These

cycles may be defined by different measurable criteria, *i.e.,* hours and starts. At intervals throughout the equipment life, inspections are performed to gauge if the actual degradation is following the calculated trend. When the equipment degradation trend approaches end of life, a replacement project is budgeted for the next opportunity that does not affect availability. For most major equipment components, these repairs and inspections must take place during an overhaul when the unit is offline and equipment can be safely disassembled.

Depending on the type of generating unit, the costs will vary. Overhauls at coal generation plants are a mix of O&M costs and capital costs because it is often necessary to clean areas of the plants (an O&M cost) before undertaking the capital upgrades. Overhauls at Intermediate plants are largely capital costs, due to the replacement of combustion turbine parts. The turbine parts, as part of the inherent design of these plants, are exposed to extremely high temperatures and lots of thermal cycles, and therefore have shorter life expectancies and are more prone to thermal fatigue failure than those in our baseload fleet.

Q. HOW DO ENERGY SUPPLY'S CAPITAL INVESTMENTS FOR 2021 TO 2023 COMPARE TO HISTORICAL TRENDS?

A. Tables 3 and 4 below show Energy Supply's actual and planned capital expenditures and plant additions for 2017 to 2023. As these tables illustrate, our capital additions in 2021 are higher than 2017 to 2019 due to the in-servicing of the Dakota and Freeborn wind farms, but lower than 2020 when even more wind projects were completed. Our capital additions for 2022 and 2023 are lower than all years except 2017 due to the absence of any major projects.

Table 3

2017-2023 Capital Expenditures (Excludes AFUDC)

Northern States Power Company - MN ($ Millions)	2017	2018	2019	2020	2021	2022	2023
ES - Except Major	$ 63.0	$ 78.7	$ 36.2	$ 77.4	$ 99.1	$ 91.2	$ 67.6
MN Jurisdiction	$ 46.4	$ 58.2	$ 26.4	$ 56.5	$ 72.3	$ 66.6	$ 49.4
ES - Major Renewable	$ 13.4	$ 314.5	$ 635.0	$ 1,148.3	$ 296.2	$ (7.2)	$ -
MN Jurisdiction	$ 9.8	$ 228.9	$ 460.7	$ 833.1	$ 214.9	$ (5.2)	$ -
ES - Major Thermal	$ 36.8	$ 8.6	$ 4.90	$ 4.0	$ 9.9	$ 39.7	$ 55.2
MN Jurisdiction	$ 27.1	$ 6.4	$ 3.60	$ 2.9	$ 7.2	$ 29.0	$ 40.2
Total	**$ 113.3**	**$ 401.8**	**$ 676.2**	**$ 1,229.7**	**$ 405.2**	**$ 123.8**	**$ 122.9**
Total MN Jurisdiction	**$ 83.3**	**$ 293.5**	**$ 490.7**	**$ 892.5**	**$ 294.4**	**$ 90.4**	**$ 89.6**

Table 4

2017-2023 Capital Additions (With AFUDC)

Northern States Power Company - MN ($ Millions)	2017	2018	2019	2020	2021	2022	2023
ES - Except Major	$ 53.4	$ 129.5	$ 37.8	$ 47.1	$ 108.5	$ 76.7	$ 59.9
MN Jurisdiction	$ 39.3	$ 95.7	$ 27.6	$ 34.4	$ 79.2	$ 56.0	$ 43.7
ES - Major Renewable	$ -	$ -	$ 417.7	$ 1,316.9	$ 739.4	$ (7.2)	$ -
MN Jurisdiction	$ -	$ -	$ 303.0	$ 955.4	$ 536.4	$ (5.2)	$ -
ES - Major Thermal	$ -	$ 108.3	$ -	$ -	$ -	$ -	$ -
MN Jurisdiction	$ -	$ 80.0	$ -	$ -	$ -	$ -	$ -
Total	**$ 53.4**	**$ 237.8**	**$ 455.5**	**$ 1,364.0**	**$ 847.9**	**$ 69.6**	**$ 59.9**
Total MN Jurisdiction	**$ 39.3**	**$ 175.7**	**$ 330.6**	**$ 989.8**	**$ 615.6**	**$ 50.8**	**$ 43.7**

Q. WHAT DO THESE TABLES ILLUSTRATE REGARDING CAPITAL EXPENDITURES VERSUS CAPITAL ADDITIONS?

A. Tables 3 and 4 illustrate that our overall capital expenditures in existing plants typically remain within a range of $80 to $110 million (2018, 2020, 2021 and 2022) but for the years in which we make major capital investments to add new renewable generation – Blazing Star I in 2019, Foxtail in 2019, Lake Benton in 2019, Crowned Ridge in 2020, Blazing Star II in 2020, Mower Wind in 2020, Jeffers Wind in 2020, and Community Wind North in 2020. Our investments

at our thermal facilities in 2022 and 2023 relate to the ramp in spending related to the Sherco Combined Cycle project, which will be completed in 2026.

Q. WHAT KINDS OF CHANGES COULD OCCUR THAT MAY LEAD TO A RE-PRIORITIZATION OF YOUR INVESTMENTS AND CHANGE THE PERCENTAGES THAT YOU INVEST IN EACH CAPITAL BUDGET GROUPING?

A. As discussed by Ms. Ostrom, we must manage our business unit to our capital budget. The most important budget management tool is good project planning. However, despite good planning, unexpected events can, and do, occur. For example, if there is an unexpected failure of a large component at an existing plant, we must address it when it occurs. When that happens, we determine whether we can re-prioritize or defer budgeted projects.

Q. WHY IS THE ABILITY TO CHANGE THESE INVESTMENT PERCENTAGES IMPORTANT TO THE COMPANY AND YOUR CUSTOMERS?

A. Since capital funds are limited, when the need to implement unbudgeted capital emerges, we fund these needs by reprioritizing comparably less urgent capital projects in a way that preserves safety and reliability. For example, in 2019-2020, Reliability/Performance Enhancement projects were deferred to make room for Environmental Improvement required to comply with regulations. By doing this, we are generally able to stay within our annual capital budget and continue to safely and reliably operate our plants.

Similarly, to the extent additional analysis of our capital projects indicates that we should delay one project in lieu of another project of similar scope, timing and cost, we perform these like-kind project replacements to more efficiently

deploy our capital budgets and ensure we are meeting our generation plants' needs.

Q. IS IT NECESSARY FOR ENERGY SUPPLY TO ADJUST ON A REGULAR BASIS THE CAPITAL PROJECTS PLANNED TO BE WORKED ON?

A. Yes, for the reasons noted above. As a further example, Reliability/ Performance Enhancement capital projects on the intermediate plant turbines and generators are dictated by the number of hours, or starts, the machine experiences. If market conditions change as regional generation assets change, the frequency and duration of operation for these plants will also differ from historical trends and future modeling. This may cause the acceleration of projects like combustion turbine Combustion Inspections (CI), Hot Gas Path (HGP), or Combustion Turbine (CT) major overhaul work and steam turbine major overhauls.

Q. SHOULD CUSTOMERS BE CONCERNED THAT SPECIFIC CAPITAL PROJECT PLANS EVOLVE?

A. No. It is in our customers' interests for Energy Supply to apply the funding available to the highest-priority projects based on risk and urgency. We make adjustments to our capital investment plan during the course of a year to better serve our business's most pressing needs in a cost-effective way. When the need arises to accelerate a project, we assess the situation to make sure we are doing so for the right reasons and in a prudent way. Similarly, we assess potential project delays or cancellations to make sure we are still meeting business and customer needs in a reasonable way.

Q. EVEN IF YOUR INVESTMENT GROUPING PERCENTAGES CHANGE FROM THE CURRENT FORECAST, WILL ENERGY SUPPLY STILL MANAGE ITS OVERALL CAPITAL INVESTMENTS TO ITS OVERALL BUDGET?

A. Yes. Ultimately, we will invest as necessary to meet our overall goals of safe, reliable and environmentally sustainable power generation for our customers.

E. Major Planned Investments for 2021 to 2023

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY?

A. The multi-year rate plan statute, Minn. Stat. § 216B.16, subd. 19, requires that a utility provide "a general description of the utility's major planned investments over the plan period." This section of my testimony discusses the major planned investments Energy Supply anticipates completing in 2021 through 2023.

Q. HOW DID ENERGY SUPPLY IDENTIFY THE PROJECTS THAT FALL WITHIN THIS CATEGORY OF INVESTMENTS?

A. In general, we consider a project to be a major planned investment if it is a unique project that will require a greater than normal quantity of Energy Supply resources to complete. Most often, major capital projects for Energy Supply involve investments in new generation assets. These could be replacements at existing sites where older equipment is being retired, new equipment that is replacing the capacity/energy, or new build sites for capacity/energy additions.

Q. WHAT MAJOR PLANNED INVESTMENTS DOES ENERGY SUPPLY ANTICIPATE COMPLETING OVER THE PERIOD OF THIS MULTI-YEAR RATE PLAN?

A. We anticipate undertaking two major planned investments: the Freeborn and Dakota Range wind farms. Both of these wind farms have been approved by the Commission, and both will be placed in service in 2021. I note that both of these wind farms will be recovered through the RES Rider. I am including these projects here as they also qualify as major planned investments during the plan period. Mr. Halama will provide additional information on RES Rider recovery for these projects.

These two major planned investments, as well as the additional key capital projects we anticipate completing in 2021, 2022, and 2023, are discussed in more detail below.

F. 2021 Key Capital Additions

Q. PLEASE DESCRIBE THE CAPITAL ADDITIONS ENERGY SUPPLY IS PROPOSING TO MAKE IN 2021.

A. For 2021, we are forecasting approximately $847.9 ($614.9) million of plant additions. The majority of the 2021 capital additions are related to completion of the Freeborn and Dakota Range wind farm projects which total approximately $722.0 ($523.6) million in capital additions including AFUDC, and the costs associated with these wind farms will be recovered through the RES Rider. Other significant capital plant additions in 2021 include:

- Auxiliary boiler replacements at Sherco,
- Combustion Turbine Major overhaul on Riverside Unit 10, and
- L-1 rotor blade replacement on Riverside Unit 7.

Further, we are seeking to make approximately $35.9 ($26.1) million in capital additions related to smaller projects (under approximately $1 million) at our various other plants. Exhibit___(KAR), Schedule 3 provides a list of all capital projects that we are seeking to include in rate base for 2021, their capital addition costs, and their estimated in-service dates. Exhibit___(KAR), Schedule 4 provides a project description and information regarding why the project is needed. I discuss all of our major capital projects and most of our larger capital projects (above approximately $1 million) in further detail below in my discussion regarding each generating plant.

1. Baseload Generation Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE SHERCO PLANT IN 2021?

A. Yes. We are planning approximately $31.9 ($23.1) million in plant additions in 2021 for projects at Sherco Units 1, 2 and 3. In 2021, there is a scheduled overhaul for Sherco Unit 1 consistent with its regular three-year overhaul schedule. These projects primarily relate to maintaining environmental compliance, reliability and efficiency of these units. Included in Schedules 3 and 4 is a description of each individual project, its costs, in-service date, and the need for the project. The schedules also identify and describe each of the capital additions at Sherco that we plan to include in rate base for the 2021 test year.

Q. PLEASE DISCUSS THE SIGNIFICANT 2021 CAPITAL PROJECTS AT SHERCO.

A. We are planning four significant capital projects for Sherco in 2021. These include:

- Auxiliary boiler replacements,
- Landfill cell 4 on Unit 3,
- Stormwater management pond, and
- 11&12 air heater heat transfer surfaces on Sherco Unit 1.

Q. DESCRIBE THE AUXILIARY BOILER REPLACEMENT PROJECT.

A. This project involves the replacement of two Auxiliary Boilers (ABs) at the Sherco plant to provide a reliable source of steam supply for unit cold startup for the existing power plant and building heating. The existing ABs are in poor condition. The #1 AB was removed from service and permanently decommissioned a number of years ago due to control issues and tube leaks. The boiler Authorized Inspector (AI) has removed this AB from operation. The #2 AB is serviceable and runs for a few hours each year to help ensure it will operate if needed; however, it has been unreliable and requires extensive efforts each time to start. #2 AB is over 40 years old and parts are not readily available to fix the unit. #2 AB is also not sized adequately to start Unit 3. The original #1&2 ABs were built with Units 1 and 2 and sized accordingly. Consequently, we must replace the ABs with larger capacity boilers to ensure reliable operation of Sherco Units 1 and 3 through the end of their useful lives.

A reliable source of steam for startup and building heating becomes increasingly important in the future, since there will be times where no coal unit will be operating to supply heat or startup steam to any other unit. Steam supply from the new ABs will decrease our dependence on Units 1 and 2 for cold start requirements in preparation of the retirement of these units. This provides more flexibility related to any economic outages or for seasonal operation in the

event that Units 1 and 2 are economically dispatched by MISO (instead of their current must-run status). This project has total capital additions of $9.9 ($7.2) million in 2021.

Q. PLEASE DESCRIBE THE LANDFILL CELL 4 PROJECT.

A. This project involves the construction of a 24-acre, GCL/HDPE composite lined, ash landfill cell, cell 4, located south of cell 3 at Sherco Unit 3. The project includes an additional sump pump station, extension of fence and permitting (renewal for cell 4 and inclusion of cell 5). The new cell is necessary for the continued disposal of Air Quality Control System (AQCS) ash from Sherco Unit 3. Without this additional cell, we would need to find an offsite location to dispose of ash generated from operations and pay to have it shipped to and disposed of at that location, which is a more expensive and less optimal solution. This project has total plant additions of $3.6 ($2.6) million in 2021.

Q. DESCRIBE THE STORMWATER MANAGEMENT POND PROJECT.

A. This project is to install a stormwater management pond to collect and divert stormwater away from the Recycle Basin and Scrubber Pond at the Sherco plant. Reducing water flow into the Recycle Basin will reduce the volume of water transferred to the Scrubber Solids Pond. Water that has contacted ash can never be removed from the station site per EPA Effluent Limitation Guideline (ELG) rules. Any remaining ash contact water would need to be evaporated to close the scrubber solids ponds shortly after the final coal unit retires. This project will reduce the amount and cost of water treatment that will be needed at end-of-life of Sherco Units 1, 2, and 3. The project has total plant additions of $3.0 ($2.2) million in 2021.

Q. DESCRIBE THE AIR HEATER HEAT TRANSFER SURFACES PROJECT.

A. This project involves the replacement of all three layers of air heater transfer surface "baskets" in both Unit 1 air heaters as well as the cold end grating. The basket layers include the hot end layer, intermediate layer, and the cold end layer. To replace the baskets, the circumferential seals must first be removed in order to remove the baskets. During this operation, inspections will be made on the radial seals, circumferential seals or bypass seals, and the rotor post seals. If it is determined at that time to replace the seals, they will be procured and replaced. Heating-element baskets are replaced when the degradation and wear from years of use starts to impact the efficiency of heat transfer. When that degradation occurs, we start to see pressure drop through the system, because the hot end basket material is breaking apart and migrating down to the other layers. If these baskets are not replaced, the material breaking off will lay on the layers below and create a domino effect of breaking off. Failure to replace these air heater transfer surfaces could result in additional plant outages. We have budgeted $2.1 ($1.5) million in 2021 capital additions to replace Sherco Unit 1 11&12 air heater heat transfer surfaces.

Q. WHY IS THE COMPANY PROCEEDING WITH THESE PROJECTS WHILE THE FUTURE OPERATION OF SHERCO UNITS 2 AND 1 IS LIMITED, DUE TO THEIR RESPECTIVE RETIREMENT DATES OF 2023 AND 2026?

A. These investments are needed to preserve the reliable operation of these units in the near term, and to help ensure safe, reliable and environmentally-compliant operations for our customers until their retirement. Thus, it is important that these units are well-maintained until such time as they are removed from service. That said, we are managing spending in recognition of

the retirement dates. For instance, Sherco Unit 2, which is scheduled to retire at the end of 2023, has only $2.1 ($1.5) million of capital additions over the remaining investment years of 2021-2023 and Sherco Unit 1 has only $8.4 ($6.1) million of capital additions over the same time period. This represents a material reduction in the capital spend that is usually necessary to keep a coal unit in good working order.

Q. ARE THERE ANY CAPITAL PROJECTS PLANNED FOR THE ALLEN S. KING PLANT IN 2021?

A. Yes. We are planning total capital plant additions of approximately $7.3 ($5.3) in 2021. In 2021 there is a scheduled overhaul for the Allen S. King plant consistent with its regular three-year overhaul schedule. These projects primarily relate to maintaining environmental compliance, reliability and efficiency of these units. Schedules 3 and 4 identify all of our capital plant additions at the Allen S. King plant.

Q. PLEASE DISCUSS THE SIGNIFICANT 2021 CAPITAL PROJECTS AT THE ALLEN S. KING PLANT.

A. We are planning two significant capital projects for the Allen S. King plant in 2021. These include:

- Selective Catalytic Reduction (SCR) catalyst layer replacement, and
- Distributed Control System (DCS) upgrade.

Q. DESCRIBE THE SELECTIVE CATALYTIC REDUCTION CATALYST LAYER REPLACEMENT PROJECT.

A. This project involves replacing one row of the Allen S. King Unit 1 SCR catalyst. Specifically, we plan to replace the middle layer (143 modules) of the SCR with a new catalyst during the 2021 spring outage. Each catalyst module has dimensions of 64" x 75" x 38" and weighs 2,900 pounds each. The scope of the project includes the procurement and installation of new catalyst, removal and proper disposal of the existing catalyst, and ammonia injection tuning after installation. The expected life of the catalyst is six years for any particular layer. Our catalyst management plan requires replacement of one of the three layers every other year and has been completed several times at this plant. This particular layer was first installed in April 2014 and is due for replacement.

Three layers are required to be in operation to maintain emissions within permit limits. If a layer is allowed to fall under desired chemical activity levels, the unit must derate. By undertaking this project, we can continue to operate the Allen S. King plant at full capacity while maintaining compliance requirements. Failure to do so would require us to derate the unit so that emissions fall within required tolerances. We have budgeted $2.4 ($1.8) million in 2021 capital additions for this project.

Q. DESCRIBE THE DISTRIBUTED CONTROL SYSTEM UPGRADE PROJECT.

A. This project will install new hardware and software to support the DCS that is used to operate the Allen S. King plant equipment. The Allen S. King DCS is an Emerson Ovation product, and this project is part of our Ovation Evergreen MSA. The goal of this MSA is to allow us to continue to keep pace with

advancements in technology by replacing obsoleting technology. This customer support module provides a way to keep our Ovation system continuously up to date. The Evergreen program allows us to avoid a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new IO and security features. We have budgeted $1.8 ($1.3) million in 2021 capital additions to upgrade the DCS that at the Allen S. King plant.

2. Intermediate Plants

Q. IS THE COMPANY MAKING ANY CAPITAL ADDITIONS AT ITS INTERMEDIATE FACILITIES IN 2021?

A. Yes. We are planning plant additions of approximately $34.0 ($24.7) million at our Intermediate plants. These projects are mainly related to maintaining reliability and environmental performance of these plants. These projects additions are scheduled during the overhaul at Riverside. Schedules 3 and 4 provide additional information on these capital additions.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE RIVERSIDE PLANT.

A. We are planning six significant capital project additions at our Riverside plant for 2021:

- Major CT overhaul on Unit 10,
- Steam turbine L-1 blades on Unit 7,
- CT compressor overhaul on Unit 10,
- Plant DCS upgrade,

- CT controls upgrade Unit 9, and
- CT controls upgrade Unit 10.

Q. DESCRIBE THE UNIT 10 MAJOR CT OVERHAUL PROJECT.

A. The Riverside Unit 10 major CT overhaul is being performed per the Original Equipment Manufacturer (OEM) recommended overhaul schedule based on equivalent operating hours. During a major overhaul, all combustion parts are replaced, all turbine blades and vanes are replaced. The rotor is also pulled out of the CT, disassembled and restacked. Significant inspections are also completed at this time to assess the health of the asset and look for signs of long-term issues initiating. These overhauls are necessary to perform as recommended to help ensure continued safe and reliable operation of the CT. We have budgeted $6.7 ($4.9) million in 2021 capital additions to perform the Riverside Unit 10 major CT overhaul.

Q. DESCRIBE THE UNIT 7 STEAM TURBINE L-1 BLADE REPLACEMENT PROJECT.

A. This project is to replace the L-1 blading on both ends of the Unit 7 steam turbine Low Pressure (LP) rotor. The L-1 blading is original to the unit and reached the end of its design life of 30 years in 2017. There is also a service bulletin from the OEM, Siemens, related to a known defect with the existing blading design that has caused failures on other units during operation. The service bulletin recommends replacing the existing blading with redesigned blading to reduce operational risk and improve reliability. In addition to the erosion damage that occurs on the leading edge of the blading, the blading material has a finite life and normal operating conditions slowly degrade the material over time. This degradation makes the blading more susceptible to

cracking, which has the potential to lead to a catastrophic turbine failure. The blading should be replaced to minimize operational risk to the unit and plant personnel. We have budgeted $4.4 ($3.2) million in 2021 capital additions to replace the Unit 7 steam turbine L-1 blades.

Q. DESCRIBE THE UNIT 10 CT COMPRESSOR OVERHAUL PROJECT.

A. This project involves replacing parts of the Riverside Unit 10 CT compressor to improve reliability while the unit is in overhaul. Five rows of rotating vanes (S-0 through S-4) and the fixed exhaust guide vanes will be replaced as part of our parts exchange Master Material Agreement (MMA) with PSM. The work will be completed at the same time as the Unit 10 major CT overhaul to minimize costs. We have budgeted $4.4 ($3.2) million in 2021 capital additions to replace parts of the Riverside Unit 10 CT compressor.

Q. DESCRIBE THE DCS UPGRADE PROJECT.

A. This project is part of our Emerson Ovation Evergreen program. This is similar to the project in 2021 at Allen S. King, and all of our plants with Emerson Ovation are part of the Evergreen program as part of our efforts to standardize or reduce costs and risks. We have budgeted $1.5 ($1.1) million in 2021 capital additions to upgrade the DCS that is used to operate the plant equipment.

Q. DESCRIBE THE UNIT 9 CT CONTROLS UPGRADE PROJECT.

A. This project involves upgrading the Unit 9 CT control system by replacing the existing aging hardware and software that was installed in 2009. The CT control system is what controls the combustion turbine performance and integrates with the plant DCS. The existing Mark VI controls are operating on the

Windows XP operating system, for which Microsoft is no longer supporting or issuing licenses. Without a timely upgrade, there is a higher risk of failure of this existing software and potential long-term outage. The CT control system hardware needs to be replaced, as the new software will not operate on the existing outdated hardware. The project scope includes updating servers, Human Machine Interfaces (HMIs), switches, obsolete control cards as well as converting software to Emerson Ovation. This upgrade will facilitate and simplify control of the units by having the integrated Balance Of Plant (BOP) and CT controls. We have budgeted $1.3 ($1.0) million in 2021 capital additions to upgrade the Unit 9 CT control system.

Q. DESCRIBE THE UNIT 9 CT CONTROLS UPGRADE PROJECT.

A. We have budgeted $1.3 ($1.0) million in 2021 capital additions to upgrade the Unit 10 CT control system. This project is the same scope as the previous project for Unit 9

3. Peaking and Refuse Derived Fuel Plants

Q. IS THE COMPANY PLANNING ANY CAPITAL ADDITIONS TO ITS PEAKING AND REFUSE DERIVED FUEL PLANTS IN 2021?

A. Yes. We are planning $18.7 ($13.6) million in 2021 plant additions at our peaking and refuse derived fuel plants. These projects are mainly related to maintaining reliability and environmental performance. These project additions are scheduled during the overhauls on Red Wing, Blue Lake, and Wilmarth overhauls. Schedules 3 and 4 provide details on these projects.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE RED WING PLANT.

A. We are planning two significant capital project additions at our Red Wing plant for 2021:

- Generator rewind on Unit 1, and
- EPA 316(b) Traveling Screens

Q. DESCRIBE THE UNIT 1 GENERATOR REWIND PROJECT.

A. This project will replace the original 1948 General Electric generator stator windings. Activities associated with this project will include winding removal; stator frame and core cleaning and inspection; inspect, clean, and tighten associated clamping hardware; new winding installation; and applicable testing. The 2007 Turbine Generator Major Overhaul Inspection and 2010 Life Extension Study both recommend a generator rewind based on age and condition of the generator. The current stator winding is 65 years old while median life expectancy is 40 years. The Inspection and Life Extension Study reports indicate a generator rewind is required for operation through 2027. We have budgeted $1.9 ($1.4) million in 2021 capital additions to rewind the Unit 1 generator.

Q. DESCRIBE THE EPA RULE 316(B) TRAVELING SCREENS PROJECT.

A. This is a mandated environmental project by the Minnesota Pollution Control Agency to ensure we are compliant with EPA regulation 316(b) of the Clean Water Act. Section 316(b) requires that National Pollutant Discharge Elimination System permits be obtained by any facility that contains a cooling water intake structure to ensure that the engineering design of the structure minimizes impacts on the environment.

The new screens will include a fish handling and return system with sufficient water flow to avoid harming the fish flowing back into the source water. The design may include dual flow screens with smooth mesh to continuously protect fish from descaling or rotary screens with a low-pressure vacuum return to remove fish prior to any high-pressure sprays that may otherwise harm the creatures. We have budgeted $1.3 ($0.9) million in 2021 capital additions to replace river intake traveling screens at the Red Wing plant.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE WILMARTH PLANT.

A. We have budgeted $1.6 ($1.1) million in 2021 capital additions to replace the baghouse fabric filter bags on Unit 1. These bags are the filtration media that remove particulates from the flue gas as part of our AQCS system. The project consists of six modules (1260 total) of baghouse bags and cages. This replacement work is required to comply with our air permit.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE BLUE LAKE PLANT.

A. We are planning three significant capital project additions at our Blue Lake plant for 2021:

- CT control system on Unit 7,
- CT control system on Unit 8, and
- Exhaust silencer on Unit 8.

Q. DESCRIBE THE CT REPLACEMENT SYSTEM PROJECTS ON UNIT 7 AND UNIT 8.

A. These projects involve the replacement of the current Speedtronic Mark V CT control system hardware and software. GE Drives and Controls, Inc. ceased normal production of the Speedtronic Mark V turbine control system on March 31, 2004. As with many products, and particularly with electronics, the Mark V has exceeded its supportable life as parts and components become unavailable and technology resources become scarce. This makes it increasingly difficult to guarantee timely availability/reparability of parts for an extended period of time. Undertaking this project now will provide us with the ability to ensure that we have the necessary replacement parts to make any necessary repairs of this equipment. We have budgeted $1.6 ($1.2) million in 2021 capital additions to replace the Unit 7 CT control system. We have budgeted $1.6 ($1.2) million in 2021 capital additions to replace the Unit 8 CT control system.

Q. DESCRIBE THE UNIT 8 EXHAUST SILENCER REPLACEMENT PROJECT.

A. This project involves replacing the Unit 8 exhaust silencer on the exhaust stack which is made up of internal baffles or panels. The existing stainless-steel panels are melting and breaking up consistent with normal wear and tear. The internal stack panels are used to reduce the exhaust decibels coming out the stack of the CT. Keeping noise levels down is a necessary condition of our operating permits and consequently we must perform this project to remain in compliance. We have budgeted $1.5 ($1.1) million in 2021 capital additions to replace the Unit 8 exhaust silencer.

4. Renewable Facilities

Q. IS THE COMPANY PLACING ANY NEW PLANTS INTO SERVICE IN 2021?

A. Yes. We will be placing two wind farm projects in service in 2021: the Freeborn wind farm and the Dakota Range wind farm. As noted earlier, the costs for both of these wind farms will be recovered through the RES Rider.

Q. DESCRIBE THE FREEBORN WIND FARM.

A. This is a 200 MW wind farm currently being constructed in Freeborn County, Minnesota and Worth County, Iowa. The wind farm includes 10 V110 2.0 MW and 90 V120 2.2 MW Vestas turbines, a collector system, operations and maintenance building, access roads, collector substation, and transmission line. The Commission approved this project on September 1, 2017 in Docket No. E002/M-16-777 as part of the 1,550 MW wind generation portfolio.[10]

Q. DESCRIBE THE DAKOTA RANGE WIND FARM.

A. This project is to construct a 300 MW wind farm in Grant and Codington Counties, South Dakota. The wind farm includes 64 V136 Vestas Turbines rated at 4.3 MWs each, 7 V136 Vestas Turbines rated at 3.8 MWs each, 1 V120 Vestas Turbine rated at 2.0 MWs, a collector system, O&M building, access roads, and collector substation. The Commission approved this project in Docket No. E002/M-17-694.[11]

[10] *Order Approving Petition and Granting Variance, and Requiring Compliance Filing*, IN THE MATTER OF THE PETITION OF XCEL ENERGY FOR APPROVAL OF THE ACQUISITION OF WIND GENERATION FROM THE COMPANY'S 2016-2030 INTEGRATED RESOURCE PLAN, Docket NO. E002/M-16-777 (Sept. 1, 2017).
[11] *In the Matter of the Petition of Northern States Power Company, d/b/a Xcel Energy, for Approval of the Acquisition of the 302.4 MW Dakota Range I and II Wind Project*, ORDER APPROVING PETITION, ESTABLISHING RATEPAYER PROTECTIONS, AND GRANTING VARIANCE, Docket No. E002/M-17-694 (May 17, 2018).

Q. ARE THERE ANY CAPITAL PROJECTS PLANNED FOR THE COMPANY'S OTHER WIND FARMS IN 2021?

A. Yes. We are forecasting approximately $14.5 ($10.5) million in 2021 plant additions for our existing wind facilities that consist mainly of gearbox replacement and environmental performance projects. Schedules 3 and 4 provide additional information.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE COMPANY'S EXISTING WIND FARMS.

A. We are planning one significant capital project addition at our wind farms for 2021:

- Capacitor banks installation at Courtenay.

We have budgeted $2.5 ($1.8) million in 2021 capital additions to install capacitor banks at Courtenay at the associated substation. Additional capacitor banks are needed to increase the capability of the wind farm to meet the requirements of the Voltage Letter Agreement with the transmission owner (Ottertail). The current arrangement cannot hold the voltage within the required range. The scope of the project will include the capacitors, racks, installation, reconfiguration of some substation elements, and control system modifications to enable the wind farm to meet voltage requirements.

G. 2022 Capital Additions

Q. WHAT CAPITAL PLANT ADDITIONS IS THE COMPANY PROPOSING TO PLACE IN SERVICE IN 2022?

A. For 2022, we are requesting to place in rates the costs associated with

approximately $69.6 ($50.8) million of plant additions. Significant capital plant additions include:

- HGP Black Dog Unit 5, and
- HGP Angus Anson Unit 4.

Further, we are seeking to make approximately $35.9 ($26.1) million in 2022 capital additions related to smaller projects (under approximately $1 million) at our various other plants. Schedule 3 provides a list of all capital projects that we are seeking to include in rate base for 2022, their capital addition costs, and their estimated in-service dates. Schedule 4 provides a project description and information regarding why the project is needed. I discuss all of our major capital projects and most of our larger capital projects (above approximately $1 million) in further detail below in my discussion regarding each generating plant.

1. Baseload Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE SHERCO PLANT IN 2022?

A. Yes. We are planning approximately $7.2 ($5.2) million in plant additions in 2022 for projects at Sherco Units 1, 2 and 3. These projects primarily relate to maintaining environmental compliance, reliability, and efficiency of these units. In 2022, there is a scheduled overhaul for Sherco Unit 2 consistent with its regular three-year overhaul schedule. With Sherco Unit 2 retirement at the end of 2023, we have materially limited the overhaul scope and planned additions addressing only the turbine control valves and coal mill projects that are critical to keep the unit operating through its remaining life. Included in Schedules 3 and 4 is a description of each individual project, its costs, in-service date, and the need for the project.

Q. PLEASE DISCUSS THE SIGNIFICANT 2022 CAPITAL PROJECT AT SHERCO.

A. We have budgeted $1.1 ($0.8) million in 2022 capital additions to replace the rotary plow feeder for conveyor 53 in the coal yard. The rotary plow feeder is used to reclaim coal stored in the coal barn and transport it into the plant. The existing rotary plow feeders have poor performance history and if the rotary plow feeders are not operational, coal is trapped in the barn and hot spots can form that start fires.

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE ALLEN S. KING PLANT IN 2022?

A. Yes. We are planning total capital plant additions of approximately $3.1 ($2.2) in 2022. In 2022 there is no scheduled major overhaul for the Allen S. King Plant, and there are no significant (*i.e.,* over $1 million) capital additions. Schedules 3 and 4 identify all of our capital plant additions at the Allen S. King plant.

2. Intermediate Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE COMPANY'S INTERMEDIATE PLANT IN 2022?

A. Yes. We are planning capital additions of approximately $32.2 ($23.5) million at our Intermediate plants. These projects are mainly related to maintaining reliability and environmental performance. These project additions are scheduled during the overhauls on Black Dog Unit 5/2. Schedules 3 and 4 provide additional information on these capital additions.

Q. PLEASE DISCUSS THE SIGNIFICANT 2022 CAPITAL PROJECTS AT BLACK DOG.

A. We are planning six significant capital project additions at Black Dog for 2022:

- CT Major overhaul Unit 5,
- Plant entrance road erosion wall,
- Steam turbine L-0 blades Unit 2,
- Plant DCS upgrade Unit 5,
- 480V load centers, and
- Automated trap bypass valve Unit 2.

Q. DESCRIBE THE COMBUSTION TURBINE MAJOR OVERHAUL PROJECT.

A. The combustion turbine major overhaul is being performed per the OEM-recommended equivalent operating hours. During a major overhaul, all combustion parts are replaced, all turbine blades and vanes are replaced. The rotor is also pulled out of the CT disassembled and restacked. Significant inspections are also completed at this time to assess the health of the asset and look for signs of long-term issues initiating. We have budgeted $8.8 ($6.4) million in 2022 capital additions to purchase parts and perform HGP Inspection.

Q. DESCRIBE THE BLACK DOG PLANT ENTRANCE ROAD EROSION WALL PROJECT.

A. This project involves installing an erosion wall to protect Black Dog Road from erosion issues caused by flooding of the Minnesota River. This project includes installation of sheet pile wall or alternative means of correcting and preventing erosion on Black Dog Road and the Minnesota River between Lyndale Gates and the main plant entrance. It is estimated that approximately 600 linear feet of river wall will be required, subject to final engineering and design. We have budgeted $2.7 ($1.97) million in 2022 capital additions to install this erosion wall.

Q. DESCRIBE THE STEAM TURBINE L-0 PROJECT.

A. This project involves the replacement of Unit 2 steam turbine L-0 blades. The current L-0 blades were installed in 1987 and will have 35+ years of operation during the next steam turbine major overhaul. These blades typically have a life expectancy of between 20-40 years, or 160,000 - 320,000 equivalent operating hours, depending on operating conditions. This unit is more susceptible to water droplet erosion because of the lower main steam temperature than design, especially during winter months. Recent inspections on these blades have shown evidence of more rapid moisture erosion than would be expected with this operating history. Failure of these blades would result in a significant unplanned outage to repair or replace. We have budgeted $2.4 ($1.8) million in 2022 capital additions to replace the Unit 2 steam turbine L-0 blades.

Q. DESCRIBE THE DCS UPGRADE PROJECT.

A. This project is part of our Emerson Ovation Evergreen program. This is similar to the project in 2021 at Allen S. King, and all of our plants with Emerson Ovation are part of the Evergreen program as part of our efforts to standardize or reduction of costs and risks. We have budgeted $1.2 ($0.9) million in 2022 capital additions to perform Emerson Ovation Evergreen DCS upgrades.

Q. DESCRIBE THE 480V LOAD CENTER PROJECT.

A. This project involves replacing the 480V load centers. Low voltage load centers 101, 102, and 103 are in need of replacement due to age and parts availability. They are 1950s and 1960s vintage equipment and are at end of life. In addition, these load centers have energized bus exposed when racking equipment and from below this equipment. This configuration poses additional safety

concerns when frequent maintenance is required. We have budgeted $1.1 ($0.8) million in 2022 capital additions to replace the 480V load centers.

Q. DESCRIBE THE AUTOMATED TRAP BYPASS VALVE PROJECT.

A. This project involves installing an automated trap bypass valve on the Unit 2 steam turbine. More specifically, this project includes installation of automated bypass valves of existing steam traps off the high-pressure steam, low-pressure steam, gland steam, extraction steam, and turbine drain systems to ensure condensate is removed from these systems during startup, operation, and shutdown. With frequent unit cycling, these automated bypasses are critical for ensuring that condensate is drained from steam lines to prevent turbine water induction and other operational issues that could cause significant equipment damage and extended forced outages. We have budgeted $1.1 ($0.8) million in 2022 capital additions to install and automated trap bypass valve on Unit 2 steam turbine.

Q. PLEASE DISCUSS THE SIGNIFICANT 2022 CAPITAL PROJECT AT RIVERSIDE.

A. This project involves replacing the water treatment system. The existing system's serviceability has decreased to the point of requiring replacement. The scope of this project is to install one new Reverse Osmosis (RO) water treatment system within the existing building and reusing ancillary systems from the existing RO system. This water is used for generating steam in the Heat Recovery Steam Generators (HRSG). We have budgeted $2.4 ($1.7) million in 2022 capital additions to replace the water treatment system

3. Peaking and Refuse Derived Fuel Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE PEAKING AND REFUSE DERIVED FUEL PLANTS IN 2022?

A. Yes. We are planning $25.9 ($18.9) million in 2022 plant additions at our peaking and refuse derived fuel plants. These projects are mainly related to maintaining reliability and environmental performance. These project additions are scheduled during the overhauls on Angus Anson, Inver Hills Blue Lake, and Wilmarth overhauls. Schedules 3 and 4 provide details on these projects.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE ANGUS ANSON PLANT.

A. We are planning two significant capital project additions at our Angus Anson plant for 2022:

- HGP on Unit 4, and
- CT control system on Unit 4.

Q. DESCRIBE THE HOT GAS PATH PROJECT.

A. The project includes replacement of the following standard hot gas path parts on Unit 4 per the PSM parts contract; transitions, liners, liner end caps, fuel nozzle assemblies, stage 1 buckets/nozzles/shroud blocks, stage 2 buckets/shroud blocks. The project also includes replacing the R0 (1st stage) compressor blades to mitigate a design issue with the OEM blades. The exhaust frame flex seals will be replaced with a set of Inconel seals. The HGP inspection is required at 24,000 operating hours or 900 starts per the OEM and the PSM parts contract. We have budgeted $4.8 ($3.5) million in 2022 capital additions to perform an HGP on Unit 4.

Q. DESCRIBE THE CT CONTROL SYSTEM PROJECT ON UNIT 4.

A. This project scope is similar to the CT controls replacement projects described in the 2021 additions for Blue Lake Units 7 and 8. We have budgeted $1.4 ($1.0) million in 2022 capital additions to replace the CT control system on Unit 4.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECT AT THE INVER HILLS PLANT.

A. We have budgeted $2.4 ($1.8) million in 2022 capital additions to replace the CT control system on Unit 3. This project scope is similar to the CT controls replacement projects described in the 2021 additions for Blue Lake Units 7 and 8. Additionally, this project includes integrated balance of plant controls with a modern control system including new microprocessors, HMIs, monitors, historian, EMS-SCADA interface, network switches, dual redundant network, data links, and other relevant networking systems. The new controls will include overspeed integration to a similar project at our Wheaton plant. The project also includes modifying the fuel oil controls with position feedback. This project includes upgrading the vibration monitoring with Bentley Nevada equipment.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE BLUE LAKE PLANT.

A. We are planning two significant capital project additions at our Blue Lake plant for 2022:

- Generator Step-up Unit (GSU) transformer Capital Emergency Spare Part (CESP), and
- Exhaust silencer on Unit 7.

We have budgeted $1.9 ($1.4) million in 2022 capital additions to purchase a CESP GSU transformer, which is a spare, portable transformer that we must keep in stock in the event that a transformer fails at one of our plants. A spare transformer will allow us to more quickly replace a failed transformer thus limiting the impact of such a failure on plant operations. Without a spare transformer on hand, it would take an inordinate amount of time to replace a transformer, as these types of transformers have long lead times from the time they are ordered until they are received. The GSU transformer will be designed to be used at Angus Anson 4, Black Dog 5, Blue Lake 7 and 8, High Bridge 7 and 8, Riverside 9 and 10. The project includes the purchase of the GSU transformer and accessories as well as the preparation of layup location where the spare transformer will be stored. Our previous CESP GSU transformer of this size was mobilized and installed at Angus Anson Unit 4 when that transformer failed in 2016, and therefore it is necessary that we acquire an additional CESP GSU transformer to service our fleet.

We have budgeted $1.5 ($1.1) million in 2022 capital additions to replace the Unit 7 exhaust silencer. This project scope is the same as the 2021 additions project for Blue Lake Unit 8.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECT AT THE WILMARTH PLANT.

A. We have budgeted $1.6 ($1.2) million in 2022 capital additions to replace the baghouse fabric filter bags on Unit 2. This project scope is the same as the 2021 additions project for Wilmarth Unit 1.

4. Renewable Facilities

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE COMPANY'S WIND FACILITIES IN 2022?

A. Yes. We are forecasting approximately $7.6 ($5.5) million in 2022 plant additions for our existing wind facilities that consist mainly of gearbox, generator, and transformer replacement projects. Schedules 3 and 4 provide additional information regarding these capital projects.

Q. PLEASE DISCUSS THESE GEARBOX, GENERATOR, AND TRANSFORMER REPLACEMENT PROJECTS.

A. Gearbox, generator, and transformer failures have been occurring throughout the wind industry, and we consequently have a need to replace this equipment as failures occur. These types of capital investments can be seen in our projected capital additions at Grand Meadows, Nobles, Pleasant Valley, Border Winds and Courtenay, our older wind facilities that are no longer under warranty.

Q. WHAT STEPS HAS THE COMPANY TAKEN TO REDUCE THE NUMBER OF GEARBOX REPLACEMENTS?

A. We have installed vibration-monitoring equipment to help detect potential gearbox failures and limit the amount of damage, thereby increasing the core exchange value of the gearbox or in some cases allowing us to complete repairs as an O&M expense.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE WIND FARMS.

A. We have budgeted $2.0 ($1.5) million in 2022 capital additions to replace gearboxes at Nobles.

Q. ARE THERE ANY OTHER IMPACTS TO THE 2022 CAPITAL ADDITIONS BUDGET YOU WISH TO NOTE?

A. Yes. We are forecasting approximately $7.2 ($5.2) million in 2022 plant additions for a credit associated with the in-servicing of the Dakota Range wind farm in 2021. This is a South Dakota economic development credit that will flow through the RES Rider.

H. 2023 Capital Additions

Q. WHAT CAPITAL PLANT ADDITIONS IS THE COMPANY PROPOSING TO PLACE IN SERVICE IN 2023?

A. For 2023, we are requesting to place in rates the costs associated with approximately $59.9 ($43.7) million of plant additions. Significant capital plant additions include:

- Major CT overhaul on High Bridge Unit 8, and
- Major CT overhaul on Angus Anson Unit 5.

Further, we are seeking to make approximately $22.3 ($16.3) million in 2023 capital additions related to smaller projects (under approximately $1 million) at our various other plants. Schedule 3 provides a list of all capital projects that we are seeking to include in rate base for 2023, their capital addition costs, and their estimated in-service dates. Schedule 4 provides a project description and information regarding why the project is needed. I discuss all of our major

capital projects and most of our larger capital projects (above approximately $1 million) in further detail below in my discussion regarding each generating plant.

1. Baseload Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE SHERCO PLANT IN 2023?

A. Yes. We are planning approximately $10.1 ($7.3) million in plant additions in 2023 for projects at Sherco Units 1, 2, and 3. These projects primarily relate to maintaining environmental compliance, reliability and efficiency of these units. In 2023, there is a scheduled overhaul for Sherco Unit 3 consistent with its regular three-year overhaul schedule. Included in Schedules 3 and 4 is a description of each individual project, its costs, in-service date, and the need for the project.

Q. PLEASE DISCUSS THE SIGNIFICANT 2023 CAPITAL PROJECTS AT SHERCO.

A. We are planning two significant capital project additions at our Sherco plant for 2023:

- 36-1&2 high-pressure feedwater heaters Unit 3, and
- DCS workstation upgrade.

We have budgeted $2.1 ($1.5) million in 2023 capital additions to replace 36-1&2 high-pressure feedwater heaters on Sherco Unit 3. The high-pressure feedwater heaters use extraction steam to pre-heat water prior to being transferred to the boiler. The heaters are original equipment from 1987, and tube failures have been increasing in frequency. When a tube leak occurs, the unit must be taken offline for a forced outage to complete repairs. Replacement

of these aging feedwater heaters is needed to reduce the time and cost associated with those ongoing repairs.

We have budgeted $1.0 ($0.7) million in 2023 capital additions to upgrade the DCS workstations that are used to operate the plant equipment. This scope includes the hardware and software that makeup the computer system. The current hardware is outdated and is preventing updates to OEM supported software.

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE ALLEN S. KING PLANT IN 2023?

A. Yes. We are planning total capital plant additions of approximately $0.8 ($0.5) million in 2023. In 2023, there is no scheduled major overhaul for the Allen S. King Plant, and there are no significant (*i.e.,* over $1 million) capital additions. Schedules 3 and 4 identify all of our capital plant additions at the Allen S. King plant.

2. Intermediate Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE COMPANY'S INTERMEDIATE PLANTS IN 2023?

A. Yes. We are planning capital additions of approximately $21.3 ($15.5) million at our Intermediate plants. These projects are mainly related to maintaining reliability and environmental performance. These projects additions are scheduled during the overhaul on High Bridge Unit 8. Schedules 3 and 4 provide additional information on these capital additions.

Q. PLEASE DISCUSS THE SIGNIFICANT 2023 CAPITAL PROJECT AT HIGH BRIDGE.

A. We have budgeted $11.1 ($8.1) million in 2023 capital additions to complete a major CT overhaul on High Bridge Unit 8. A major overhaul occurs when an HGP inspection and repairs coincide with the need for a CI and also includes a compressor inspection, rotor inspection, and inspection of the auxiliaries. CT major overhauls are performed at intervals of starts (*i.e.*, how many start/stop cycles the turbine has engaged) or hours of operation defined by the OEM. During a major overhaul, all combustion parts are replaced, all turbine blades and vanes are replaced. The rotor is also pulled out of the CT, disassembled and restacked. Significant inspections are also completed at this time to assess the health of the asset and look for signs of long-term issues initiating.

I note that delaying this major inspection beyond the OEM-recommended maintenance interval would involve material risk. As these components age, they may undergo thermal mechanical fatigue, cracking, abnormal wear, foreign object damage, cooling hole damage or plugging, or other issues inherent with the high temperature operating conditions they experience. These issues could result in unit trips, extended forced outages, and possibly major equipment damage. Consequently, to keep High Bridge in good working order, we are undertaking the OEM-recommended work on the OEM's recommended schedule. Our budgeted amounts are based on the MSA we have in place for all HGP and CI projects, which cover our material supply and construction services for these types of projects.

Q. PLEASE DISCUSS THE SIGNIFICANT 2023 CAPITAL PROJECT AT BLACK DOG.

A. We have budgeted $2.1 ($1.5) million in 2023 capital additions to replace the water treatment system. This project scope is the same as the 2022 additions project for Riverside.

3. Peaking and Refuse Derived Fuel Plants

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE PEAKING AND REFUSE DERIVED FUEL PLANTS IN 2023?

A. Yes. We are planning $19.1 ($13.9) million in 2023 plant additions at our peaking and refuse derived fuel plants. These projects are mainly related to maintaining reliability and environmental performance. These project additions are scheduled during the overhauls on Angus Anson and Inver Hills. Schedules 3 and 4 provide details on these projects.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECT AT THE ANGUS ANSON PLANT.

A. We have budgeted $10.6 ($7.7) million in 2023 capital additions to complete a major CT overhaul on Angus Anson Unit 2. This project scope is the same as the 2023 additions project for High Bridge Unit 8.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECT AT THE INVER HILLS PLANT.

A. We have budgeted $2.5 ($1.8) million in 2023 capital additions to replace the CT control system on Unit 5. This project scope is the same as the 2022 additions project for Inver Hills Unit 3.

4. Renewable Facilities

Q. ARE ANY CAPITAL PROJECTS PLANNED FOR THE COMPANY'S WIND FACILITIES IN 2023?

A. Yes. We are forecasting approximately $8.0 ($5.8) million in 2023 plant additions for our existing wind facilities that consist mainly of gearbox, generator, and transformer replacement projects. Schedules 3 and 4 provide additional information.

Q. PLEASE DISCUSS THE SIGNIFICANT CAPITAL PROJECTS AT THE WIND FARMS.

A. We are planning three significant capital project additions at our wind farms for 2023:

- Gearbox replacements at Nobles,
- Gearbox replacements at Grand Meadows, and
- Gearbox replacements at Pleasant Valley.

We have budgeted $2.4 ($1.7) million in 2023 capital additions to replace gearboxes at Nobles. I have previously discussed the need for gearbox replacements at wind farms in the 2022 additions section.

We have budgeted $1.5 ($1.1) million in 2023 capital additions to replace gearboxes at Grand Meadows.

We have budgeted $1.0 ($0.7) million in 2023 capital additions to replace gearboxes at Pleasant Valley.

Q. IS THE OVERALL LEVEL OF ENERGY SUPPLY CAPITAL ADDITIONS REASONABLE AND NECESSARY IN EACH YEAR OF THIS MULTI-YEAR RATE PLAN?

A. Yes, the Energy Supply capital additions included in this rate case are reasonable and necessary to maintain the reliability and safety of our generation resources, to implement Commission orders, and to ensure compliance with environmental and other mandates. Overall, our capital additions support investments that are necessary to provide electricity to meet our customers' energy needs.

IV. O&M BUDGET

A. O&M Overview and Trends

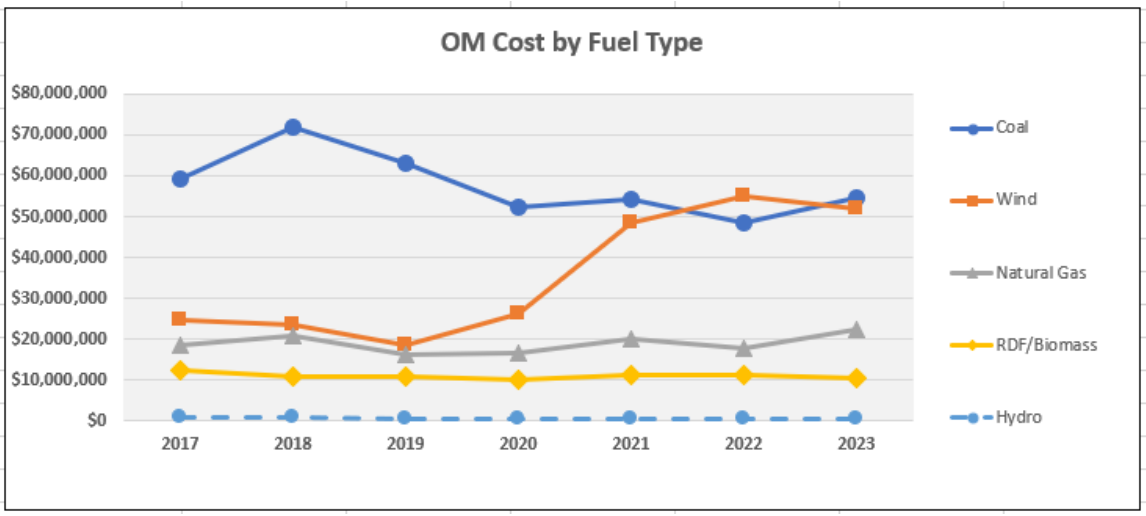
Q. WHAT IS INCLUDED IN THE ENERGY SUPPLY O&M BUDGET?

A. The Energy Supply O&M budget is necessary for the operation and maintenance of our generation fleet. O&M costs are categorized as internal labor, contract labor, materials, chemicals, and other. For example, significant internal labor is required to operate and maintain our generating plants on a day-to-day basis, including operating power plant equipment from control rooms, performing checks on equipment operating parameters, cleaning and inspecting our equipment, and performing routine maintenance such as repairing pumps and valves. We also regularly use chemicals such as lime, activated carbon, and ammonia to reduce emissions at the plants. In addition to existing assets, O&M costs have been included in the budget for new assets that are being added to the generation portfolio.

Q. HOW ARE THE COMPANY'S LONG-TERM O&M COSTS TRENDING AS THE GENERATION FLEET TRANSITIONS TO RENEWABLES?

A. Our baseline historical O&M spending from 2017 to 2019 averages $144 million per year. As shown in Figure 5 below, as we transition our fleet towards a carbon-free future, our O&M costs are also changing accordingly. The annual costs associated with operating and maintaining our coal units have been decreasing due to reduced overhaul and project investments as several units approach retirement. Conversely, the annual costs associated with operating and maintaining our renewable fleet have been increasing, mostly from new wind generation being added to our portfolio. The impact of this shift to less carbon-intensive generation sources has shifted our overall O&M priorities so that our O&M spending on wind will eclipse our spending on coal-fired generation by the end of this MYRP. The costs associated with our Combined Cycle, Simple Cycle, RDF, and Hydro units have been relatively flat, with variation between years due mostly to unit overhaul schedules.

Figure 5



There is some variation in our O&M expenses between years due to the timing of new assets going into service and other units moving towards retirement, but overall our average O&M budget for years 2021–2023 is approximately 12.9 percent more than our average O&M spend for years 2017–2019. The new wind farm operations and maintenance contracts and land easement payments are the primary drivers of the future O&M increases.

I note that some of our O&M costs will be recovered through the RES Rider during the pendency of this case. I discuss these costs here, as they are integral to Energy Supply's O&M budget regardless of how they are recovered. Mr. Halama discusses the costs included in the Company's RES Rider and how it affects our O&M request for this rate case in further detail.

Q. WHAT IS THE COMPANY'S O&M BUDGET FOR 2021, 2022, AND 2023?

A. As shown in Table 5 below, we have budgeted $159.1 ($116.0) million for Energy Supply O&M in 2021, $162.5 ($118.5) million in 2022, and $167.7 ($122.3) million in 2023. Table 5 also provides our actual O&M costs for 2017 to 2019, the 2020 forecast for O&M spend (half year actuals and half year forecast), and our average O&M costs from 2017 to 2019.

Table 5

Historical and Current NSPM Energy Supply O&M Budget

By Category

	2017 Actual	2018 Actual	2019 Actual	2017-19 Act Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Internal Labor	68,411,304	74,479,153	67,915,487	70,268,648	68,815,934	64,150,927	62,418,028	62,366,974
Contract Labor	38,755,328	37,070,615	26,413,033	34,079,659	31,230,098	51,820,955	54,721,015	58,121,959
Materials	17,759,626	18,215,699	19,431,453	18,468,926	15,242,824	18,001,200	17,866,225	19,817,260
Chemicals	8,564,834	6,865,136	5,689,360	7,039,777	4,327,345	4,910,427	5,158,867	5,554,460
Other	10,870,374	19,042,625	13,928,105	14,613,701	10,730,523	20,166,716	22,336,679	21,807,400
Total	$ 144,361,466	$ 155,673,228	$ 133,377,438	$ 144,470,711	$ 130,346,724	$ 159,050,224	$ 162,500,814	$ 167,668,053

A detailed overview of our O&M budget by plant and year, including the impact of the RES Rider on the new wind generation going into service, can be found in Schedule 2.

Q. HOW DOES THE COMPANY'S CHANGING FLEET AFFECT THE O&M BUDGET OVER THE TERM OF THE MYRP?

A. Asset additions and managing toward asset retirements materially impact our budgeting. As we install or purchase new assets, we need to budget O&M costs to effectively operate, maintain, and manage these resources. The addition of new assets into our portfolio also affects the operating profiles of our existing assets. Many of our existing assets have O&M costs that are variable based on their operating profiles, such as chemical costs, so any significant change to their operating profiles has a direct impact on their costs and thus needs to be accounted for in our O&M budget.

In addition to new assets affecting our O&M budget, assets that are scheduled for retirement are also impacting our O&M budgets. As a particular unit approaches retirement, typically less overhaul and project maintenance work is performed due to diminishing returns on investment, which decreases the O&M budget for that unit. The retirement of existing assets also affects the operating profiles of our other dispatchable assets. For example, when Black Dog 3 and 4 retired in 2015, Black Dog 5/2 had a marked increase in capacity factor partly due to the loss of generating capacity from Black Dog 3 and 4, which increased the variable O&M costs for that unit.

Q. WHAT IS THE IMPACT OF NEW GENERATION ASSETS ON THE 2021, 2022, AND 2023 O&M BUDGETS?

A. In 2019, we added two new wind farms to our generation portfolio – Lake Benton II and Foxtail. For 2021, we are forecasting approximately $2.1 million in O&M costs for the Lake Benton II wind farm and approximately $3.5 million for the Foxtail wind farm. By the end of 2020, the Company will have completed Blazing Star I, Blazing Star II, Crowned Ridge, Community Wind North, Jeffers, and Mower County Wind projects and will begin incurring O&M expenses from those assets in 2021. Collectively, these new wind farms total approximately $48.3 million in 2021 O&M costs.

In addition to the O&M costs in 2021 shown above, these new assets will continue to have an impact on our O&M budgets going forward as they become part of our base O&M budget and as we shift priorities to accommodate these units by reducing costs at other facilities. We are also budgeting approximately $12.2 million in 2022 for the Freeborn and Dakota Range wind farms scheduled

to go into service in 2021. Collectively, these new wind farms total approximately $55.0 million in 2022 O&M costs. Similarly, in 2023, we are budgeting O&M costs for all of the new wind assets at approximately $51.8 million. The decrease from 2022 to 2023 is due to negotiated contract changes for operations support at the wind farms.

Q. WHAT IS THE IMPACT OF GENERATION FLEET RETIREMENTS ON THE 2021, 2022, AND 2023 O&M BUDGETS?

A. The base O&M costs at Black Dog have been decreasing steadily since the coal units were retired in 2015 due to employee attrition and decreased equipment maintenance. The 2021 O&M budget at Black Dog is $6.7 million (includes BDSU6 O&M costs), which is approximately 33.0 percent less than 2015 actuals.

The closure of the Fibrominn plant in 2018, as approved by the Commission in Docket No. E002/M-17-530, removes that plant from the O&M budget starting in 2020, saving approximately $2.9 million in O&M costs per year. Further, the scheduled retirement of Sherco 2 in 2023 has a significant impact to the O&M budget, particularly in 2022, as the Company is not planning to perform a major unit overhaul as would normally be scheduled. Compared to the 2017–2019 historical O&M average of $43.6 million, the O&M budget at Sherco in 2022 is $35.0 million, which is a decrease of $8.9 million or 19.7 percent. In addition to the decreased costs from avoiding the major unit overhaul, there are reductions in base labor and base maintenance costs as the unit approaches retirement and less maintenance is performed.

Q. HOW WILL THE SEASONAL DISPATCH OF ALLEN S. KING UNIT 1 AND SHERCO UNIT 2 IMPACT O&M EXPENSES OVER THE TERM OF THE MYRP?

A. All major overhauls for the Allen S. King plant have been removed from the O&M budget, including the $5.7 turbine overhaul and boiler maintenance outage scheduled for 2021. Only small routine outages are scheduled at Allen S. King primarily to conduct regulatory-driven work. The 2022 Sherco Unit 2 outage for $4.5 million has also been reduced to $0.95 million. These are the primary cost savings drivers in addition to the chemical improvement discussed in Section IV(C)(4).

Q. HOW DOES THE 2020 O&M FORECAST COMPARE WITH 2019 ACTUAL O&M COSTS?

A. As shown in Table 5 above, we are forecasting $130.3 million in O&M costs for 2020, which is approximately $3.0 million or 2.3 percent lower than our 2019 actual costs. The 2020 forecast is less than our 2019 actuals for several reasons, which I discuss below.

In addition to these changes with our fossil plants, we are also forecasting cost savings for our existing wind fleet due to negotiated pricing from extending their service agreements to 10-year terms. In this 2020 forecast to 2019 actual budget comparison, Borders Wind, Courtenay Wind, and Pleasant Valley experienced long-term contract decreases of $0.5 million, $1.1 million, and $1.4 million respectively. While these changes account for most of the reduction in 2020, there are also other smaller reductions at most of our other generating facilities. These reductions help with our transition to renewable energy as the

Foxtail and Lake Benton wind farms were in-serviced in 2019, and we have started incurring O&M costs for these assets.

In addition, our operations in 2020 were impacted by the COVID-19 public health emergency. In response to the impact that COVID-19 had on our communities, customers, and operations in 2020, Energy Supply adjusted our operations to keep employees and communities safe as well as to maintain financial flexibility as the Company faced uncertainties about the depth and duration of the impacts of COVID-19. Specifically, Energy Supply temporarily modified our operations by reducing overtime and training, holding open positions, and shifting select projects and inspections to 2021. This resulted in a $6.7 million one-time decrease in Energy Supply's 2020 O&M budget.

Q. HOW DOES THE 2021 BUDGET COMPARE WITH 2019 ACTUAL COSTS?

A. The 2021 O&M budget is $159.1 million, which is an increase of 19.2 percent when compared to 2019 actuals of $133.4 million. The new wind farms that will join the fleet in 2020 and early 2021 increased the 2021 O&M budget by 28.5 percent as compared to 2019 actuals. Specifically, Blazing Star I Wind, Blazing Star II Wind, Community Wind North, Crowned Ridge II Wind, Jeffers Wind, and Mower County joined the fleet in 2020 and will have a full year of O&M costs in 2021. Freeborn Wind will join the fleet in early 2021 with a prorated annual O&M cost of $4.9 million in 2021. The Allen S. King plant and Sherco Plant O&M budgets decreased by 13.9 percent due to no planned major overhauls or turbine or boiler overhauls scheduled at the Allen S. King plant. There is also a reduction of approximately $5.0 million in O&M costs at Sherco due to removal of projects and reduced overhaul and chemical costs.

Q. HOW DOES THE 2021 BUDGET COMPARE WITH THE 2020 FORECAST?

A. Our 2021 Energy Supply O&M budget is approximately $28.7 million or 22.0 percent higher than our 2020 forecasted expenses. As discussed above, our 2020 forecast is significantly lower than our 2017–2019 historical spend in anticipation of our new renewable generation going into service in 2020. Since these units are going into service in late 2020, only part of the O&M costs for these units are being realized in the fiscal year 2020 due to timing. For example, the O&M forecast for Blazing Star II Wind in 2020 is only $0.2 million due to a December 2020 in-service date, whereas the 2021 O&M budget for the full year is $5.0 million. This trend is typical for the other new units going into service in 2020, which explains why the 2020 forecast is lower than both the 2017–2019 historical spend and 2021–2023 budget.

Q. HOW DOES THE 2022 BUDGET COMPARE WITH THE 2021 BUDGET?

A. We have budgeted $162.5 million in O&M costs for 2022, which is an increase of approximately 2.2 percent compared to 2021. The increase in 2022 is mostly due to the O&M costs for Dakota Range ($5.8 million) and Freeborn, which will have incurred only partial O&M costs in 2021 and a full year of O&M costs in 2022 and is budgeted at $6.3 million.

Q. HOW DOES THE 2023 BUDGET COMPARE WITH THE 2022 BUDGET?

A. We have budgeted $167.7 million in O&M costs for 2023, which is an increase of 3.2 percent or $5.2 million as compared to 2022. The increase in 2023 is due to a full year of operation for Dakota Range, which represents an O&M increase of $5.4 million. There are also slight decreases in O&M costs at our other plants that reduce the overall increase in O&M to $5.2 million over the 2022 budget.

Q. HOW HAS THE COVID-19 PANDEMIC AFFECTED ENERGY SUPPLY'S O&M FORECASTS FOR 2021 AND BEYOND?

A. The COVID-19 pandemic has not materially changed Energy Supply's O&M forecasted costs for 2021 through 2023. Our 2020 O&M budget reflects one-time reductions discussed above but these reductions are not sustainable, as the core work of Energy Supply–operating and maintaining our fleet–must continue in spite of the pandemic.

B. O&M Budgeting Process

Q. HOW DOES ENERGY SUPPLY SET THE O&M BUDGET FOR THE ENERGY SUPPLY BUSINESS UNIT?

A. Our O&M budget process is similar to our capital budget process in that both are based on a partnership between corporate management of overall finances and the business needs Energy Supply identifies. Ms. Ostrom explains how the Company establishes business area O&M spending guidelines and budgets based on financing availability, specific needs of business areas, and overall needs of the Company.

Q. CAN YOU GENERALLY DESCRIBE ENERGY SUPPLY'S O&M BUDGET PROCESS?

A. Yes. Each year, Energy Supply's generation facilities and Energy Supply's service organizations set a budget for the five-year budgeting period. The budget covers several cost categories including headcount, overtime, chemicals, materials, outside services, rents, land easements, and employee expenses. Costs in these categories are aggregated at the plant level and then compared to recent historical actuals for reasonableness and adjusted if necessary. If non-recurring overhauls and projects are budgeted at the plant level, they typically

impact the overtime, materials and outside services cost categories. The budget for each plant is reviewed by regional and executive leadership, and when finalized is presented at the Financial Leadership Summit.

Q. DOES ENERGY SUPPLY EVER NEED TO CHANGE ITS O&M BUDGETS DURING THE YEAR?

A. Many things can arise during the year that require an adjustment of the O&M budget, including emergent work, cancelled projects, an increase/decrease to budgeted headcount, forced outages, and scope changes to projects. When these budget change needs arise, the potential changes are discussed with Energy Supply leadership and Finance leadership to understand the impact these changes will have on operations and the overall financial picture of the company. Any changes to the O&M budget must be approved.

Q. HOW DOES ENERGY SUPPLY MONITOR ITS O&M EXPENDITURES THROUGHOUT THE YEAR?

A. Every month, actual O&M expenditures are compared both to the original budget and to the updated forecast of O&M costs. Variances are researched with plant and finance personnel and presented to Energy Supply leadership and Finance leadership every month.

C. O&M Budget Detail

Q. WHAT IS INCLUDED IN THIS SECTION OF TESTIMONY?

A. In this section, I will describe the variances in budgeted costs by each category of the Energy Supply O&M budget. Similar to past practice, I will use a three-year historical average of actuals (2017-2019) to make these comparisons.

Q. WHAT ARE THE BASIC CATEGORIES OF THE ENERGY SUPPLY O&M BUDGET?

A. We prepare our budgets in accordance with the overall competencies that the Energy Supply function must implement. Our O&M budget can be analyzed by the following categories: 1) Internal Labor, 2) Contract Labor, 3) Materials, 4) Commodities, and 5) Other.

Q. WHAT ARE THE MAIN DRIVERS OF THESE CATEGORIES?

A. There are several factors which influence the O&M budget categories shown in Table 5 above, the most significant being overhauls and projects, which vary between years depending on the condition of our equipment.

Q. WHAT IS AN OVERHAUL?

A. The process of generating electricity involves a complex series of consecutive steps, each step carried out in a different part of the station. In order to ensure that this process runs smoothly, efficiently, and safely, regular maintenance of a generating station is necessary.

Each of our coal units requires regular overhauls every one to three years, depending on the design of each. Our natural gas unit overhauls are dependent upon the number of hours they have operated and the number of times they have been started. During an overhaul, we perform detailed equipment inspections and perform preventive and corrective maintenance work activities to prepare the unit to meet our reliability goals. We also perform similar work that we classify as "projects" if it does not require the unit to be offline.

Q. HOW DO OVERHAULS AFFECT THE O&M BUDGET CATEGORIES?

A. Our planned overhauls influence our O&M costs in two ways. First, our planned Overhauls increase our Internal Labor, Contract Labor, and Material costs. Internal Labor costs increase due to overtime and additional labor costs associated with extended working hours to return the unit to service in a timely manner. Contract Labor costs increase due to additional contractors and vendors providing equipment inspections, repairs, and testing during the overhaul. Material costs also increase due to additional materials used during the overhaul for equipment repairs. Conversely, our Chemical costs decrease during overhauls since our operating equipment is out of service and no chemicals are required.

Q. HOW DOES THE COMPANY PLAN AND SCHEDULE OVERHAULS?

A. In general, overhauls are planned and budgeted based on forecasted operating profiles and equipment condition to ensure long-term reliability and prevent operational issues and forced outages. Planned overhauls are managed so that costs are relatively constant each year. This overhaul management strategy minimizes variation in annual overhaul costs. For example, in 2021, Sherco 1 is scheduled for a major overhaul while the Allen S. King plant does not have a scheduled overhaul. As a result of our overhaul and project planning and prioritization process, we manage annual O&M spending on these items while also maintaining safe and reliable operations.

Q. WHAT ARE THE OVERHAUL SCHEDULES FOR THE COMPANY'S COAL AND GAS GENERATION FACILITIES?

A. The Sherco units are on a three-year major overhaul schedule, with the

exception of Sherco 2, which was overhauled in 2019 and is not scheduled for a major overhaul in 2022 due to its retirement in 2023. The overhaul schedule for Allen S. King Unit 1 has changed to routine cleanings throughout the budget period, in part due to the seasonal operation strategy for this unit.

The gas turbine overhauls at Black Dog, High Bridge, and Riverside are scheduled based on either equivalent starts or equivalent fired hours, depending on how they are dispatched. The combined cycle plants are currently scheduled for overhauls based on an equivalent fired-hours basis due to their recent operating profiles. These plants also perform steam turbine overhauls approximately every eight to 10 years depending on operation and equipment conditions. Steam turbine and gas turbine overhaul schedules are aligned when possible to minimize total overhaul durations. Our gas turbine overhauls at Angus Anson, Blue Lake, and Inver Hills are scheduled on an equivalent-starts basis since they are typically used for peak demand and therefore have lower hours per start.

Red Wing and Wilmarth perform boiler overhaul work each year to ensure reliability over a 12-month cycle, and schedule turbine overhaul work every six to eight years depending on equipment condition.

Q. HOW ARE OVERHAULS SCHEDULED WITHIN A GIVEN BUDGET YEAR?

A. Our overhauls are scheduled in a collaborative effort with Commercial Operations to be least impactful to overall operations when a plant is in planned outage while ensuring Company and contractor resources are available to perform the work. Typically, our major overhauls are performed in the spring

season when demand is lower to ensure reliable generation in the summer peak demand period. To a lesser extent, some minor overhauls are performed in the fall season to prepare for the winter demand.

Q. IN ADDITION TO THE O&M CATEGORIES ABOVE, ARE THERE OTHER WAYS TO ANALYZE ENERGY SUPPLY'S O&M COSTS?

A. Yes. Our budgeting process begins at the plant level. Therefore, another way to analyze our O&M costs is by plant. Schedule 2 presents O&M costs by plant and by category from 2017 through 2023.

1. Internal Labor

Q. WHAT DOES THE INTERNAL LABOR COMPONENT OF THE ENERGY SUPPLY BUDGET CAPTURE?

A. Our Internal Labor budget component captures the costs of our Xcel Energy labor force that runs our plants and supports Energy Supply activities. Our Internal Labor budget also includes planned overtime and special time to ensure we have personnel available to operate our plants at all hours of the day. Our Internal Labor has historically been the largest component of our O&M budget, and this remains true as we transition to a carbon-free future.

Q. HOW DOES XCEL ENERGY DETERMINE WHICH OPERATIONS OF THE ENERGY SUPPLY FUNCTION WILL BE UNDERTAKEN BY INTERNAL LABOR?

A. We believe it best to maintain internal resources for the day-in, day-out work and support functions at our plants. Operating and maintaining our fleet is a core competency of the Company. Using internal labor to do so allows us to build up an internal knowledge base and expertise to meet these core needs.

Key roles that we believe should be filled with internal labor resources include plant operators, maintenance personnel, electricians, environmental service workers, engineers, instrument and control technicians, and chemists familiar with our fleet.

Further, we utilize a Special Construction workforce composed of members of the Minnesota Building and Construction Trades who are dispatched to different plants to address projects throughout our fleet. This ensures we have personnel at the ready to meet immediate needs. They essentially account for our "bench strength" to mitigate costs and maintain access to critical resources, such as boilermakers. Our collective bargaining agreement with the Minnesota State Building and Construction Trades Council and Affiliates has governed this relationship for over 25 years.

Q. HOW HAVE YOUR INTERNAL LABOR COSTS BEEN TRENDING?

A. As shown in Table 5 above, our historical three-year Internal Labor costs have averaged approximately $70.3 million annually with some variance between years due to overhauls and projects. We are forecasting a small but steady decrease in Internal Labor costs as several units approach retirement.

Q. WHAT IS THE COMPANY DOING TO CONTROL INTERNAL LABOR COSTS?

A. Our most significant means of controlling our Internal Labor costs is ensuring that we have the appropriate number of properly trained and qualified internal resources to perform the routine operation and maintenance of our operating units. As mentioned previously, we utilize our Special Construction workforce

and Contractors to perform irregular or specialty work during projects and overhauls which helps us control our Internal Labor costs.

Q. WHAT IS THE IMPACT OF THE COMPANY'S CHANGING GENERATION PORTFOLIO ON YOUR INTERNAL LABOR?

A. Generally, as our fossil units are retired, there is a corresponding reduction in our number of full-time employees, as no labor is required to operate or maintain a retired asset. The Company typically manages these transitions through attrition from employee retirements or transfers leading up to unit retirement. To help with these transitions, we have also utilized employees from other plants, our Special Construction workforce, and contractors to help maintain operation and maintenance as the unit nears retirement and we have reduced part of our regular workforce.

Q. WHAT IS THE IMPACT TO YOUR TOTAL NUMBER OF FULL-TIME EMPLOYEES DUE TO UNIT RETIREMENTS?

A. In preparation for Sherco 2 retirement in 2023, we are forecasting a regional reduction of approximately 6 percent through attrition from 2021–2023.

Q. WHAT IS THE IMPACT TO YOUR NUMBER OF FULL-TIME EMPLOYEES DUE TO UNIT ADDITIONS?

A. We are forecasting an additional seven full-time employees to support Lake Benton, Blazing Star I and II, Community Wind North, Crowned Ridge II, Dakota Range, Freeborn, Jeffers, Mower County, and Foxtail wind farms between 2020 and 2023.

Q. HOW DOES YOUR 2021 INTERNAL LABOR BUDGET COMPARE TO YOUR 2017-2019 ACTUALS?

A. Our 2021 Internal Labor budget is $64.2 million, which is approximately 8.7 percent lower than our 2017-2019 average costs. This decrease is mostly due to employee attrition at our fossil fuel generating stations offset some by annual wage increases and additional headcount to support our new renewable units.

Q. HOW DOES YOUR 2021 INTERNAL LABOR BUDGET COMPARE TO YOUR 2020 FORECAST?

A. Our 2021 Internal Labor budget is approximately 6.8 percent lower than our 2020 forecast. This decrease is mostly due to employee attrition at our fossil generating stations offset some by annual wage increases and additional headcount to support our new renewable units.

Q. HOW DOES YOUR 2022 INTERNAL LABOR BUDGET COMPARE TO YOUR 2021 BUDGET?

A. Our 2022 Internal Labor budget is approximately $ 62.4 million, which is 2.7 percent less than our 2021 budget. This, again, is due to employee attrition at our fossil generating stations offset some by annual wage increases and additional headcount to support our new renewable units.

Q. HOW DOES YOUR 2023 INTERNAL LABOR BUDGET COMPARE TO YOUR 2022 BUDGET?

A. Our 2023 Internal Labor budget is approximately $62.4 million, which is 0.08 percent less than our 2022 budget. This, again, is due to employee attrition at

our fossil generating stations offset some by annual wage increases and additional headcount to support our new renewable units.

2. Contract Labor

Q. WHAT DOES THE CONTRACT LABOR COMPONENT OF THE ENERGY SUPPLY BUDGET CAPTURE?

A. The Contract Labor component of our budget captures the costs of outside contractors, experts, and other third-party assistance that augment our core operations and maintenance competencies. Examples include crews hired to help with overhaul work, as well as experts from our equipment manufacturers to provide expertise on plant engineering and construction.

Q. HOW DOES THE COMPANY DETERMINE WHICH OPERATIONS OF THE ENERGY SUPPLY FUNCTION WILL BE UNDERTAKEN BY CONTRACT LABOR?

A. We look to outside vendors to provide specialized expertise that is not cost-effective for us to maintain for our core operations. Such expertise may be necessary for specialized and non-regularly occurring work such as repairs and overhauls. Examples of such functions include specialty engineers, turbine services, construction contractors, and specialty trades. Further, we use contract labor to supplement our workforce as needed to accommodate major projects such as overhauls and O&M projects.

Q. HOW HAVE THE CONTRACT LABOR COSTS BEEN TRENDING?

A. As shown in Table 5 above, our historical Contract Labor costs have been fairly consistent at approximately $34.1 million annually. As we transition to more renewable generation, we are initially forecasting a decrease in Contract Labor

costs in 2020 due to reduced overhaul and project spending at our fossil plants. However, this is followed by a significant increase in Contract Labor costs associated with our new wind resources coming online and the associated maintenance service agreements required to operate and maintain these generators. I explain these trends in more detail below.

Q. WHAT IS THE COMPANY DOING TO CONTROL CONTRACT LABOR COSTS?

A. We use the Master Service Agreement program, which I describe below, to help ensure we obtain qualified and cost-effective contract labor. We also carry out significant contract oversight protocols, which include validating hours charged to a project and compliance to contract terms and conditions.

Q. HOW DOES YOUR 2021 CONTRACT LABOR BUDGET COMPARE TO YOUR 2017-2019 ACTUALS?

A. Our 2021 Contract Labor budget is $51.8 million, which is an increase of approximately $17.8 million or 52 percent compared to our 2017-2019 average costs. This increase is attributed to the increase in contract labor required for our new wind farm facilities.

Q. HOW DOES YOUR 2021 CONTRACT LABOR BUDGET COMPARE TO YOUR 2020 FORECAST?

A. Our 2021 Contract Labor budget represents an increase of approximately $20.6 million or 66 percent compared to our 2020 forecast. Again, this is mostly due to additional Contract Labor costs in 2021 under the service agreements for our new wind farms that are being placed into service in 2020. The increase in Contract Labor costs are as follows: Blazing Star I is $3.2 million, Blazing Star

II is $3.2 million, Community Wind North is $0.52 million, Crowned Ridge is $1.3 million, Jeffers is $0.86 million, and Mower County $0.065 million.

Q. HOW DOES YOUR 2022 CONTRACT LABOR BUDGET COMPARE TO YOUR 2021 BUDGET?

A. Our 2022 Contract Labor budget is $54.7 million, which is an increase of $2.9 million or 5.6 percent compared to our 2021 budget. The increase is due to Contract Labor costs associated with Dakota Range ($3.4 million) and Freeborn ($3.1 million) wind farms that will be in service in 2022. This increase is offset by decreases in Contract Labor costs for our fossil generators due to the elimination of certain scheduled overhauls.

Q. HOW DOES YOUR 2023 CONTRACT LABOR BUDGET COMPARE TO YOUR 2022 BUDGET?

A. Our 2023 Contract Labor budget is approximately $58.1 million, which is an increase of $3.4 million or 6.2 percent compared to our 2022 budget. The majority of this increase is due to increased Contract Labor costs associated with the wind facilities discussed above. There is also an increase in Contract Labor costs of $3.4 million due in part to the Sherco Unit 3 boiler overhaul and chemical cleaning. These increases are offset by a decrease in Contract Labor for our fossil generators due to the elimination of certain scheduled overhauls.

3. Materials

Q. WHAT DOES THE MATERIALS COMPONENT OF THE ENERGY SUPPLY BUDGET CAPTURE?

A. The Materials budget component captures all non-chemical material costs we

incur to operate and maintain our plants. This includes items such as piping, pumps, valves, filters, building materials, and other miscellaneous materials used to operate and maintain our units.

Q. HOW HAVE MATERIAL COSTS BEEN TRENDING?

A. Our material costs have averaged approximately $18.5 million annually with some variance between years due to overhauls and projects. Our material costs tend to fluctuate within a confined band depending on the scope of overhauls and projects. Certain projects and overhauls may include replacement of equipment components, which requires significant materials, whereas others may be focused on equipment cleaning or inspections and not require materials. Our material costs also tend to increase when major equipment comes out of warranty and any replacement parts need to be purchased by the Company instead of being provided by the manufacturer.

Q. WHAT HAS THE COMPANY BEEN DOING TO CONTROL MATERIAL COSTS?

A. As part of the MSA program, we have implemented supply agreements with several preferred vendors to obtain bulk discounts and better service. Significant measures to leverage our purchasing volumes have also been implemented to reduce spend in the MRO (maintenance, repair, and operations) supplies category. The MRO supplies category includes general industrial supplies; fasteners; hand and power tools; pipe, valves and fittings; power transmission (clutch and gearbox); and safety materials. While these are generally less expensive items, we utilize a high volume of these materials.

Our basic sourcing strategy in this category is to lower the costs by leveraging volume purchasing at negotiated prices. Combining all of our sourcing with a few national suppliers has resulted in a cost reduction while also driving down operational costs. These savings are due to a combination of both negotiated pricing discounts and yearly cash rebate checks we receive from these suppliers.

The Company is also able to reduce costs with two measures: 1) by implementing consolidated statement billing to reduce administrative overhead, and 2) using consignment and dedicated inventory materials that allow the Company to reduce inventory and inventory holding costs. For example, during facility outages the Company uses consignment trailers from our suppliers to reduce lead-time, for returns of unused materials, and for overstock materials, resulting in more efficient outage material control.

Another example of an MRO supplies category cost-saving strategy includes using a vending machine program to monitor and limit the consumption of supplies at plants. We use vending machines to provide consumables to our plant workers as a way to make these items available but also to track them. For example, if an employee requires rubber gloves to perform some operation, they can retrieve them from a vending machine and appropriately allocate the costs of those gloves to an appropriate work order. By doing this, we can disperse the availability of these items in many different locations while being able to track their use without additional personnel. Some plant supplies can be accessed via a standard-size vending machine and locker device. Currently, the vending machines and locker units are being used for safety items (personal

protective equipment) and general industrial items (lubricants, batteries, and tools).

Q. HOW DOES YOUR 2021 MATERIALS BUDGET COMPARE TO YOUR 2017-2019 ACTUALS?

A. Our 2021 Materials budget is $18.0 million, which is a decrease of approximately 0.5 million or 2.5 percent compared to our 2017-2019 average costs. This is due mostly to variation in material costs for our new wind resources as well as variances in project and overhaul spending.

Q. HOW DOES YOUR 2021 MATERIALS BUDGET COMPARE TO YOUR 2020 FORECAST?

A. Our 2021 Materials budget is $18.0 million, which is an increase of approximately $2.5 million or 18 percent compared to our 2020 forecast. This is due mostly to additional Material costs for our new wind resources and variances within project and overhaul spending.

Q. HOW DOES YOUR 2022 MATERIALS BUDGET COMPARE TO YOUR 2021 BUDGET?

A. Our 2022 Materials budget is $17.9 million, which is stable with a small fluctuating decrease of $.13 million or 0.75 percent compared to our 2021 budget.

Q. HOW DOES YOUR 2023 MATERIALS BUDGET COMPARE TO YOUR 2022 BUDGET?

A. Our 2023 Materials budget is approximately $ 19.8 million, which is an increase of $2.0 million or 11 percent compared to our 2022 budget. This can be attributed to the 2023 Unit 3 overhaul at Sherco.

4. Chemicals

Q. WHAT IS INCLUDED IN YOUR CHEMICALS BUDGET?

A. This cost category consists primarily of chemicals used in the generation process and for the control of emissions. Chemicals for which we incur the most costs include sulfuric acid, lime, ammonia, and mercury sorbent. Exhibit___(KAR-1), Schedule 5 provides our 2017–2019 actuals, 2020 forecast, and 2021–2023 budgets for our main chemicals. Exhibit___(KAR-1), Schedule 6 provide the quantity and prices for our main chemicals by plant (actual percentage owned by the Company) for 2017–2019 (actuals), 2020 (forecast), and 2021–2023 (budgets).

Q. CAN YOU PROVIDE ADDITIONAL INFORMATION REGARDING THE MAIN CHEMICALS THE COMPANY USES?

A. Yes. The main chemicals we utilize at our plants are discussed below.

Sulfuric Acid. The vast majority of the sulfuric acid is used for water treatment to control scale formation in cooling waters. The material is received and handled in liquid form. It is then metered into the cooling tower waters where it controls scale by maintaining the pH within certain limits. Minor amounts are also used in demineralizers and process water for pH control.

Mercury Absorbents. Activated carbon is the industry standard for mercury removal from flue gases, and is used at Sherco and Allen S. King to remove mercury from the flue gas. Activated carbon is received in semi-tanker trucks, where it is loaded into large silos in a powder form. From these storage silos, it is metered into the boiler flue gas where mercury is absorbed into the active

carbon. This activated carbon now containing mercury is ultimately caught in the Air Quality Control System and then conveyed to a secure landfill for safe storage.

Lime. Lime is used at the Allen S. King, Sherco Unit 3, Red Wing, and Wilmarth plants to remove sulfur dioxide from the flue gas. The use of lime at these plants is governed by the design of the flue gas desulfurization system and regulatory removal limits. The material is received and stored in a solid pebble form. In order to use in an air quality control system, lime is usually slaked with water and stored a short time before being used as lime slurry. This lime slurry is then metered into the Air Quality Control System, where it reacts with sulfur dioxide to produce calcium sulfate. This calcium sulfate is then collected by this same Air Quality Control System and conveyed to a secure landfill for safe storage.

Ammonia. The vast majority of ammonia used is at the Allen S. King plant for use in a SCR system. In addition to the Allen S. King plant, the Riverside, High Bridge, and Black Dog plants also use ammonia in SCR systems but to a lesser degree. An SCR system reduces the nitrogen oxides in boiler flue gas. The ammonia is received and handled in a liquid form, then vaporized and applied just ahead of a large catalyst inside the boiler flue gas ductwork. Here nitrogen oxides react with the ammonia to form nitrogen and water. Allen S. King, Riverside, and High Bridge use 19 percent aqueous ammonia, whereas Black Dog uses 29 percent aqueous ammonia.

Significantly smaller amounts of ammonia are also used at these and other plants for boiler water treatments. In this application, it is used directly to raise the pH of the boiler water to specific limits to reduce corrosion of the boiler steel.

Other. "Other" chemicals include chemicals with lower usage rates that may be specific to a generating site or are used in ancillary systems. Examples of these chemicals include: bromine, polisher resin, corrosion inhibitors, scale inhibitors, ethylene, hydrogen, CO2, nitrogen, phosphate, sodium chloride, and urea.

a. Base Chemical Trends

Q. HOW DO YOUR HISTORICAL ACTUAL CHEMICAL COSTS COMPARE TO THEIR BUDGETED AMOUNTS?

A. Our chemical costs have historically been under budget. This is due to a variety of reasons. The most significant impact on our historical costs has been operational improvements made at our coal plants over the past few years, which have considerably reduced our chemical consumption rates (*i.e.*, the amount of chemicals consumed per MWh generated) compared to their original budgets. For example, at our Allen S. King plant, our ammonia consumption rate has decreased by approximately 33 percent since 2016 with the installation of triasing (three sections) secondary air dampers. Similarly, at our Sherco plant, we have decreased our forecasted mercury sorbent consumption rate by approximately 40 percent as we have gained more experience in using mercury sorbent and installed additional equipment to monitor and optimize its use. Our lime consumption rates have also decreased at most of our coal and RDF plants from operational improvements.

In addition to our improved chemical consumption rates, our chemical cost control measures have been more effective than originally anticipated, which has also accounted for some of the lower costs. While our generating capacity factors also affect our chemical consumption, and the capacity factors for our coal plants have generally been decreasing, we have been reasonably accurately forecasting capacity factors into our chemical budgets.

Q. HAS ENERGY SUPPLY ADJUSTED ITS CHEMICAL BUDGETING PROCESS IN LIGHT OF ITS OPERATIONAL EXPERIENCES?

A. Yes. As we have improved the efficiency of our chemical consumption, we have adjusted the 2021 test year budget and 2022 and 2023 plan year budgets to recognize more optimized chemical consumption rates going forward.

Q. DOES THE COMPANY EXPECT CHEMICAL CONSUMPTION RATES TO CONTINUE DECREASING SIGNIFICANTLY?

A. While we have made significant improvements over the past few years to optimize our chemical consumption, and we continue to analyze our consumption rates and ways to improve, we believe that we are approaching the limits of our current technology, and we are forecasting the consumption rates to stabilize accordingly.

Q. WHAT ARE THE SHORT-TERM TRENDS FOR BASE CHEMICALS?

A. Our chemical costs have generally been declining since 2017 due to the operational efficiency improvements I mentioned earlier, most notably improvements at Allen S. King 1, which have reduced ammonia consumption, and improvements at Sherco 1 and 2, which have reduced mercury sorbent

consumption. There are some fluctuations between years due to overhaul schedules and the impact of market cost changes on our supply contracts. While our chemical contracts protect us from short-term commodity pricing volatility, they are tied to a market index. The indices tend to increase steadily over the life of the contract, but we have negotiated a cap limit to price, as an additional protection measure. Our 2017-2019 actuals, 2020 forecast, and 2021-2023 budgets for Chemical for each type of chemical are provided in Table 6 below.

Table 6

Historical and Current NSPM Energy Supply O&M Costs

By Chemical

NSPM Total Company								
	2017 Actual	2018 Actual	2019 Actual	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Lime	$ 2,814,819	$ 2,855,981	$ 2,077,916	$ 2,582,905	$ 1,771,114	$ 1,996,188	$ 2,122,753	$ 2,117,985
Mercury Sorbent	$ 2,244,636	$ 1,023,096	$ 1,015,989	$ 1,427,907	$ 704,268	$ 449,681	$ 512,672	760,224
Ammonia	$ 2,185,677	$ 1,860,611	$ 1,339,781	$ 1,795,356	$ 855,135	$ 751,392	$ 746,954	710,954
Sulfuric Acid	$ 647,093	$ 763,803	$ 831,254	$ 747,383	$ 449,245	$ 477,580	$ 474,380	654,175
Other	$ 672,609	$ 361,645	$ 424,421	$ 486,225	$ 547,585	$ 1,235,586	$ 1,302,108	1,311,122
Total:	**$ 8,564,834**	**$ 6,865,136**	**$ 5,689,360**	**$ 7,039,777**	**$ 4,327,346**	**$ 4,910,427**	**$ 5,158,867**	**$ 5,554,460**

Q. HOW DO THE 2021-2023 CHEMICAL BUDGETS COMPARE TO THE 2017-2019 THREE-YEAR AVERAGE?

A. We have budgeted $4.9 million in 2021 for Chemicals, which is approximately 2.1 million less than our 2017–2019 average costs. This difference between the three-year historical average and 2021 budget is due mostly to a $0.9 million reduction in the mercury sorbent budget at Sherco and a $1.2 million reduction in the ammonia budget at the Allen S. King plant. These reductions recognize

the forecasted capacity factors at the plants as well as our recognition of the decreased consumption rates we have historically been experiencing.

Our 2022 and 2023 Chemicals budget are also lower than our 2017–2019 average costs but slightly higher than our 2021 costs. This is due to increases in mercury sorbent and sulfuric acid costs.

Q. CAN YOU ALSO DESCRIBE THE SHORT-TERM TRENDS FOR BASE CHEMICALS BY CHEMICAL TYPE?

A. Yes. I will describe the short-term trends for each chemical in turn.

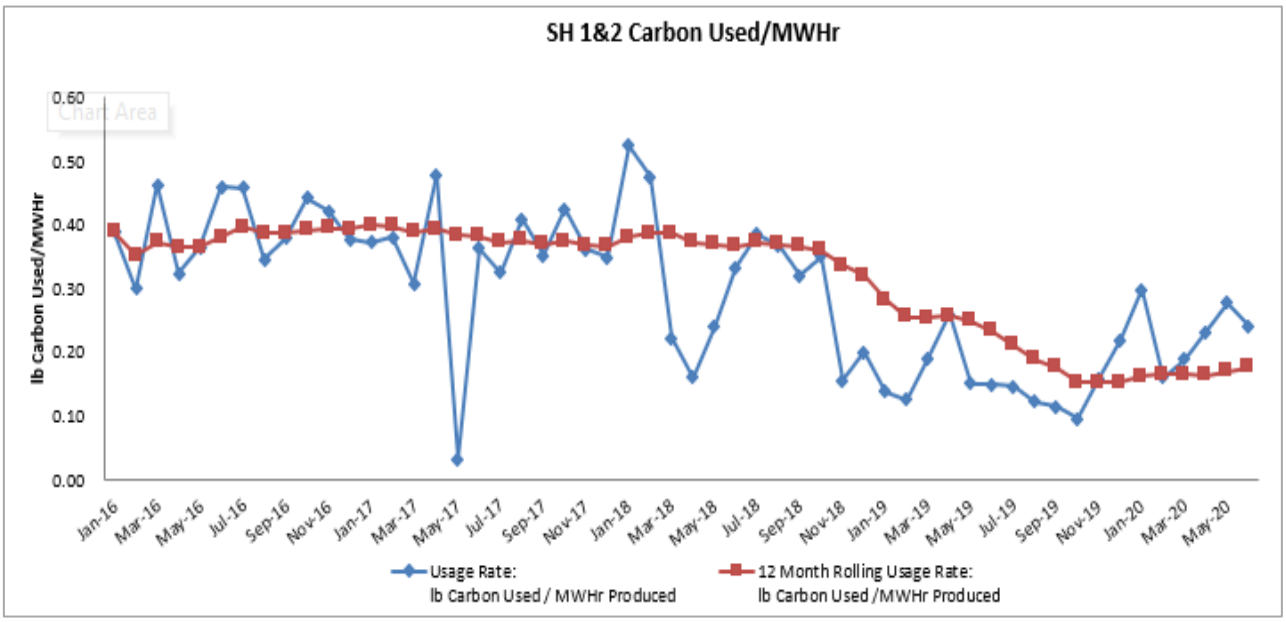
Lime. The majority of our lime consumption is due to Sherco 3 sulfur dioxide emissions control equipment. In June 2017, the Sherco EPA Reasonably Attributable Visibility Impairment (RAVI) settlement went into effect, which resulted in more stringent sulfur dioxide emissions limits and therefore increased lime consumption. The Company then transitioned to a different blend of coal in 2019, which allowed for lime consumption rates to return back to their historical average. In addition to these changes, lime consumption also varies with unit capacity. For this reason, Sherco 3 lime consumption actually decreased in 2017 and in 2020 due to the Sherco 3 major overhaul cycle. The 2020 forecasted lime consumption for Allen S. King is forecasted to be 48 percent less than the 2017-2019 average due primarily to the seasonal generating profile. The Red Wing and Wilmarth lime consumption have been relatively stable.

Mercury Sorbent. The mercury sorbent costs increased in 2015 after the new Sherco Units 1 and 2 activated carbon injection system went into service. The mercury sorbent costs were higher in 2017 since Units 1 and 2 did not have a planned overhaul that year, which resulted in increased capacity factor and therefore increased chemical use. This was offset somewhat by renegotiated pricing for mercury sorbent effective July 2017 which reduced unit costs.

In early 2018, the Company made significant improvements to the Continuous Emissions Monitoring System (CEMS), which allowed for real-time monitoring of mercury emissions compared to the previous methods that required sample analysis and only provided delayed results. The new CEMS equipment allowed for tuning adjustments and operational changes in real time, which significantly reduced carbon injection rates and improved efficiency **while** maintaining emissions compliance. This improvement can be seen in both the overall carbon usage and costs beginning with 2018 and 2019 actuals, and going forward in the 2020 forecast and 2021–2023 budget. A trend of the mercury sorbent consumption rate for Sherco 1 and 2 can be seen in Figure 6 below.

Figure 6

Mercury Sorbent Consumption Rate Sherco 1 and 2



Ammonia. Ammonia usage has been decreasing over the past few years for several reasons. The most significant improvement was installation of new triasing secondary air dampers placed into service at the Allen S. King plant in spring 2016. A new SCR catalyst was also installed at Black Dog in fall 2016, which reduced the ammonia usage rate for Black Dog 5. Other tuning adjustments and operational improvements have been performed over the years that have also reduced ammonia usage. A trend of the ammonia usage for Allen S. King Unit 1 and Black Dog 5 can be seen in Figure 7 and Figure 8 below.

Figure 7

Ammonia Consumption Rate Allen S. King

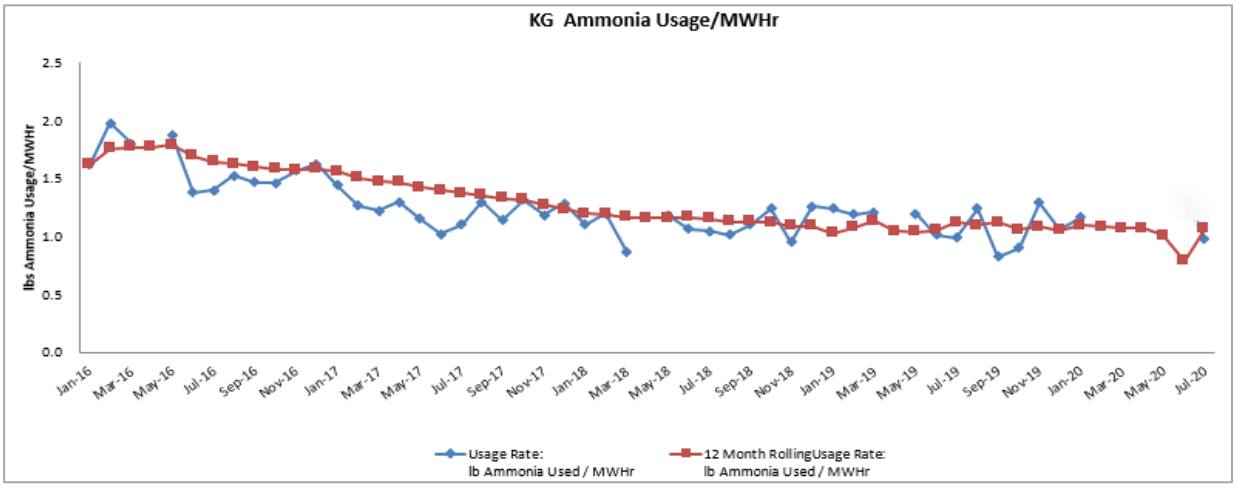
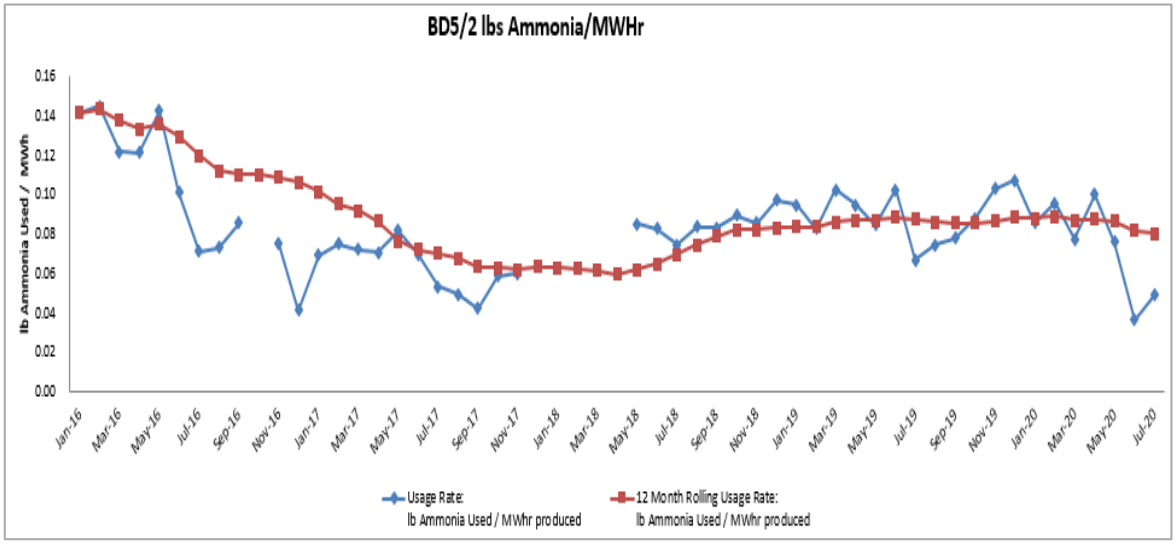


Figure 8

Ammonia Consumption Rate Black Dog 5



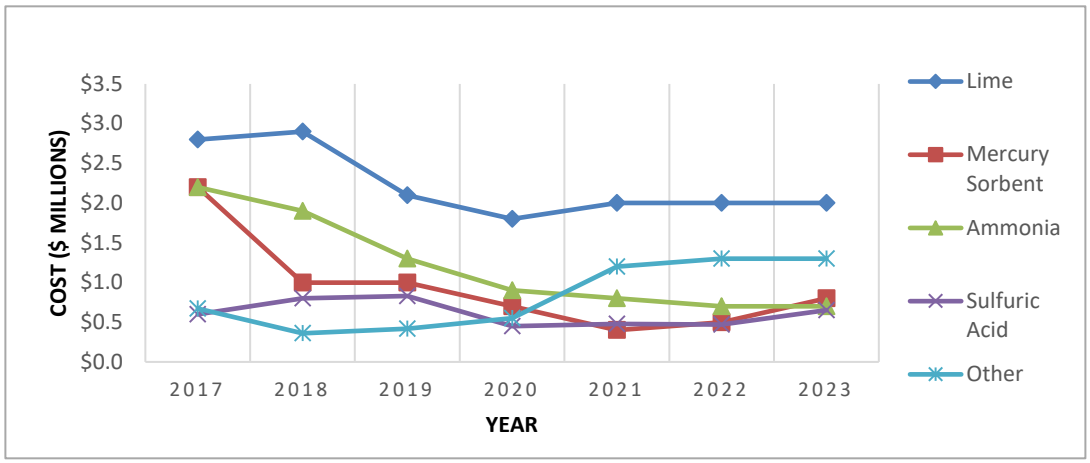
Q. WHAT ARE THE LONG-TERM TRENDS FOR BASE CHEMICALS?

A. The long-term costs of our major chemicals can be seen in Figure 9 below. Overall, most of our chemical costs have been flat or decreasing. Through a

combination of new emissions monitoring technology, improved operating efficiencies and negotiated pricing, we have been able to significantly reduce the costs of mercury sorbent beginning in 2018. As noted earlier, there is a slight increases in Other chemical costs starting in 2020 due to adding scale inhibitors at the Sherco plant. We are forecasting chemical costs to stabilize going forward between $5 and $6 million annually with continued improvements and efficiencies with our emissions control equipment.

Figure 9

Historical and Current NSPM Energy Supply O&M Chemical Costs



Q. CAN YOU PROVIDE MORE DETAIL REGARDING THE TRENDS DEPICTED IN FIGURE 9?

A. Yes. Historical data contains unique events that can make year-to-year trend analyses misleading. As described, chemical usage levels and costs are greatly affected by equipment planned overhauls, unplanned outages, and capacity factors. For example, during the Sherco Unit 3 overhauls years, the lime usage

will be less than non-outage years. Exhibit___(KAR-1), Schedule 7 shows the 2020-2023 overhaul schedules.

To a greater extent, Figure 9 above identifies material usage and cost reductions we have been able to achieve after gaining experience with newer emissions control chemicals at our plants. With greater experience, we are able to fine-tune the usage of these chemicals and optimize combustion equipment that effects emissions generation. As an example, our experience with SCR technology and the new triasing secondary air dampers at our Allen S. King plant have enabled us to fine-tune reductions in ammonia usage, which is evident in the trends.

b. Base Chemical Budgeting

Q. GIVEN THESE TRENDS AND CONSIDERATIONS, HOW DOES THE COMPANY BUDGET FOR BASE CHEMICALS?

A. Our budgeting methodology considers the historical unit average chemical consumption (*i.e.,* the amount of chemicals used at a given plant in a given year) while taking into consideration future capacity factors of the units and the current and forecasted chemical pricing. We then estimate forward pricing by factoring this data into our long-term chemical contract pricing formulas with adjustments for significant planned outages and improvements to chemical usage rates.

There are exceptions to this approach. In particular, because we are continually optimizing our usage rate of mercury sorbent as we gain more experience with mercury removal technologies, we use the previous year's data instead of a

three-year historical average for mercury sorbent. I discuss this chemical in more detail below.

We believe our methodologies are consistent with feedback we have received from our regulators and should result in more accurate budgeting. However, because our actual consumption of chemicals is based on the variables I described and is directly correlated to plant run times, unforeseen events can impact our actual costs when compared to our budgeted costs.

Q. WHAT ARE THE KEY VARIABLES THAT CAN AFFECT THE COMPANY'S BUDGETING PROCESS FOR CHEMICALS?

A. Our actual chemical costs are mainly affected by three variables: (1) plant dispatch; (2) operating efficiencies; and (3) commodity costs including the cost of transportation. While it is difficult to precisely predict these three variables, we have continued to refine our budgeting processes to reasonably predict chemical usage and costs.

Q. PLEASE DESCRIBE HOW PLANT OPERATING PROFILES AFFECT CHEMICAL CONSUMPTION AND WHAT THE COMPANY HAS DONE TO ACCOUNT FOR THIS FACTOR.

A. Our actual consumption of chemicals at a particular plant is directly correlated to the amount the plant is running. If a particular plant is run more than we predict during any particular period of time, we will consume more chemicals. And if it runs less than we predict, it will consume less chemicals. Therefore, plant dispatch is a main driver of our chemical costs. However, our budgeting methodology for chemicals captures past actual usage to inform our budgeting,

rather than relying on predictions of future changes in plant operating profiles. Further, improvements in reliability lead to greater accuracy in predicting usage.

Q. PLEASE DESCRIBE HOW OPERATING EFFICIENCIES AFFECT CHEMICAL CONSUMPTION AND WHAT THE COMPANY HAS DONE TO ACCOUNT FOR THIS FACTOR.

A. As we obtain more experience using chemicals for environmental remediation, we are able to fine-tune our chemical operations to best suit the operating needs of the plant. This means that, although we expected to use a certain amount of chemicals at a particular plant, through operating efficiencies we were able to utilize a lesser amount of chemicals. These operating efficiencies inform subsequent years' budgeting. It is for this reason we have modified our straight consumption average budgeting methodology to account for increased experience with certain emissions chemicals.

As an example, in 2016 we budgeted Sherco 1 and 2 mercury sorbent at a consumption rate of 206 lb./hour consistent with the manufacturer's guidelines. Through operating experience and equipment improvements, we have been able to reduce our consumption rates over time, and we are now budgeting Sherco 1 and 2 mercury sorbent at a consumption rate of 125 lb./hour, which represents a 40 percent reduction. Similarly, at Allen S. King, we have been able to reduce our budgeted ammonia consumption rate from 2.3 tons/hour in 2016 down to 1.55 tons/hour in 2020, which represents a 33 percent reduction. There have been similar improvements at these and other sites for our other major chemicals.

Q. THERE WAS SIGNIFICANT INTEREST IN MERCURY SORBENT BUDGETING IN THE COMPANY'S 2015 RATE CASE. PLEASE DESCRIBE HOW THE COMPANY'S MERCURY SORBENT PLANNING HAS EVOLVED AND IMPROVED SINCE THAT TIME.

A. We based our original absorbent budgets on OEM absorbent usage rate guidelines from ADA Carbon Solutions based on the system installed on Sherco Unit 3. After reviewing material supply proposal bids, Alstom was chosen as the equipment supplier, in part because of its decreased annual sorbent usage. We decreased absorbent usage rates in the budget based on OEM guidelines. After system installation and commissioning was complete, we analyzed our mercury removal rates and realized Alstom's guidelines were too conservative. We again decreased sorbent usage rates for budgeting purposes to match a level that allows us to conservatively meet our mercury emissions requirements. To be more accurate in our forecasting of sorbent consumption going forward, we use the previous year's data instead of a three-year historical average. As described earlier, the downward mercury consumption trend can be attributed to the CEMS monitoring of mercury emissions. We continue to optimize the mercury reduction system and the systems that contribute to removal efficiency by testing how each system affects the other throughout the load range of plant operations. This iterative budgeting approach has allowed us to significantly reduce the impact of mercury sorbent in our O&M budget.

Q. PLEASE DESCRIBE HOW COMMODITY COSTS AFFECT YOUR CHEMICAL COSTS AND WHAT THE COMPANY HAS DONE TO ACCOUNT FOR THIS FACTOR.

A. The base ingredients for the chemicals we use are commodities traded on world markets and subject to market volatility similar to metals or petroleum. The base pricing for all consumers of chemicals includes the base commodity costs

plus an adder from the provider for manufacturing costs and a profit margin. Consequently, we, like every other large consumer of chemicals, are subject to market fluctuations.

An example is the current indexed pricing model for ammonia, which is subject to market volatility and changes monthly. As the market for ammonia is driven by the world agriculture markets, any significant events affecting markets for fertilizer could have long-term impacts to our chemical pricing. As I explain below, however, we have negotiated long-term chemical contracts to help us ensure supply and achieve cost savings despite commodity cost fluctuations.

Q. HOW ACCURATE HAVE YOUR CHEMICAL PRICE FORECASTS BEEN?

A. Generally, our pricing forecasts have been reliable due to our negotiated rates in our chemical Master Service Agreements.

c. Base Chemical Cost Controls

Q. WHAT IS THE COMPANY DOING TO CONTAIN ITS CHEMICAL COSTS?

A. We are controlling our chemical costs by continuing to optimize our usage of chemicals at our plants; however, this fine-tuning can only provide limited cost reduction in any given year. Consequently, our efforts to mitigate our chemical costs are also focused on obtaining favorable pricing from our suppliers.

As part of overall fleet-wide cost mitigation measures, which I discuss further below, we have undertaken extensive chemical cost mitigation steps. By competitively bidding and negotiating long-term agreements with negotiated mark-ups above base commodity index pricing, we can leverage our volume

purchases to ensure supply and remove pricing-risk premiums that are inherent in long-term fixed contracts. These contracts allow us to mitigate the impact of supply constraints pricing when markets tighten. However, due to the inherent nature of index pricing, volatility remains a risk.

Q. CAN YOU PROVIDE A MORE DETAILED DISCUSSION OF THE SPECIFIC EFFORTS THE COMPANY IS UNDERTAKING TO PROCURE CHEMICALS AT REASONABLE PRICES?

A. Yes. I will discuss our effort with respect to each major chemical:

Mercury Sorbent. Our contract for activated carbon was competitively bid in 2020 and awarded to ADA Carbon Solutions. Our strategy for activated carbon in the near future is to build a strong relationship with our supplier to ensure sufficient supply and reasonable pricing. Pricing is based on the producers' price index for industrial chemicals less fuel, but also has capped yearly increases. Additional savings discounts and escalation caps were also negotiated for this contract. Our contract should allow for more consistent budget forecasts as well as anticipated below market, but indexed to market, pricing.

Lime. We underwent another competitive bidding process for lime in 2017, and as a result entered into an agreement that offered anticipated price protections through December 2021 based on available market intelligence. This contract has been renegotiated, and updated pricing forecasts can be found in Schedule 6.

Anhydrous and Aqueous Ammonia. We accepted bids for ammonia in 2019 and Airgas Specialty Products (Airgas) was once again the successful bidder. Airgas offered competitive prices, and importantly, Airgas is just a few miles away from our Allen S. King plant—the largest ammonia consumer in the NSP fleet—which minimizes shipping costs.

As I mentioned, ammonia prices are now subject to a volatile market. The Company's ammonia supplier agreement with Airgas is now based on the Tampa Ammonia Index. The agreement utilizes a new formula based on this index and negotiated pricing to procure ammonia at significantly lower costs than the spot market.

Sulfuric Acid. The Company's current sulfuric acid supply agreement with Brenntag was extended to 2024, through a negotiation conducted in 2020. In an effort to apply downward cost pressure for this commodity, we are looking for other supply opportunities to leverage the Brenntag relationship.

Q. IN ADDITION TO COSTS, ARE THERE OTHER CONSIDERATIONS WHICH ARE EVALUATED WHEN SELECTING A CHEMICAL SUPPLIER?

A. Yes. In addition to cost control, it is also important to ensure that the supplier can meet the demands of each plant to ensure continuity of supply. This is important, since the demand varies throughout the year and most of our major chemicals are required to operate our units; therefore, a shortage of chemicals due to supplier issues would result in unit derates or outages. When selecting a supplier, they are evaluated on their capability to ensure continuity of supply,

including infrastructure of chemical production and storage, quantity of supply trucks available for dispatching, and other factors.

Q. IN ADDITION TO COST CONTROL, DOES THE COMPANY ENSURE THAT EMISSIONS CONTROL EQUIPMENT IS OPTIMIZED AND OPERATING EFFICIENTLY?

A. Yes. The Company has considerable control measures and checks in place to ensure our emissions control equipment is operating effectively. Plant operations and instrument technicians monitor performance and operating parameters in real time from the control room and CEMS equipment. There are alarms built into our control systems to alert operations to critical equipment issues to take timely action to resolve. Our emissions control equipment is also inspected routinely during operation and also during outages when the equipment is available for internal inspection. Our CEMS equipment is also calibrated and checked regularly to ensure it is operating correctly, and third-party testing contractors are utilized to verify accuracy of the CEMS equipment as required. Furthermore, the Operations staff at our coal plants, combined cycle plants, and RDF plants work together with our Environmental Services and Performance Optimization departments to review short-term and long-term emissions and chemical usage trends to identify issues, perform system adjustments and tuning, and share best practices and improvement ideas. The lessons learned from these meetings are shared across our fleet.

Q. HOW DOES YOUR 2021 CHEMICALS BUDGET COMPARE TO YOUR 2017-2019 ACTUALS?

A. Our 2021 Chemicals budget is $4.9 million, which is a decrease of approximately $2.1 million or 30.2 percent compared to our 2017-2019 average costs. This is

mostly due to a decrease in mercury sorbent costs of approximately $0.98 million and a decrease in ammonia costs of approximately $1.0 million, offset by an increase in Other chemical costs of approximately $0.47 million. Consistent with the discussion above, the decrease in mercury sorbent costs was due to improved performance of the Sherco 1 and 2 carbon injection system. The decrease in ammonia costs was due mostly to improvements at the Allen S. King plant related to the installation of secondary air dampers, the new SCR catalyst at Black Dog 5, and other small improvements. The increase in Other chemical costs is due to the addition of scale inhibitor for Sherco 1 and 2 scrubber modules.

Q. HOW DOES YOUR 2022 CHEMICALS BUDGET COMPARE TO YOUR 2021 BUDGET?

A. Our 2022 Chemicals budget is $5.2 million, which is an increase of approximately $0.25 million or 5.1 percent compared to our 2021 budget. This slight variance is due to the additional cost of the scale inhibitor for Sherco 1 and 2 scrubber modules.

Q. HOW DOES YOUR 2023 CHEMICALS BUDGET COMPARE TO YOUR 2022 BUDGET?

A. Our 2023 Chemicals budget is $5.6 million, which is an increase of approximately $0.40 million or 7.7 percent compared to our 2022 budget. The increase is due to the addition of scale inhibitor for Sherco 1 and 2 scrubber modules.

5. Other

Q. WHAT DOES THE "OTHER" COMPONENT OF THE ENERGY SUPPLY O&M BUDGET CAPTURE?

A. The "Other" budget component (approximately 13 percent of the 2021 test year budget) captures all other costs we incur to operate and maintain our plants. This includes wind farmland easements, transportation fleet costs, utility costs for the plants such as gas, electric and sewer bills, fees including environmental fees, and other miscellaneous costs.

Q. HOW HAVE THE COSTS OF THE "OTHER" CATEGORY BEEN TRENDING?

A. Our costs in this category tend to fluctuate between years and have averaged around $ 14.6 million. We are expecting our "Other" category costs to increase as we add new wind farms into our portfolio and take on land easements and other costs associated with these assets.

Q. HOW DOES YOUR 2021 "OTHER" BUDGET COMPARE TO YOUR 2017-2019 ACTUALS?

A. Our 2021 "Other" budget is $20.2 million, which is an increase of approximately $5.5 million or 38.0 percent compared to our 2017-2019 average costs. This increase is primarily attributable to the increase in land easement payments at the newly-serviced wind farms. The new 2020 wind farms with a full year of land easement payments in 2021 include: Blazing Star I ($1.4 million), Blazing Star 2 ($1.4 million), Community Wind North ($0.1 million), Crowned Ridge II ($0.9 million), Jeffers Wind ($0.1 million), and Mower Wind ($0.6 million).

Q. HOW DOES YOUR 2021 "OTHER" BUDGET COMPARE TO YOUR 2020 FORECAST?

A. Our 2021 "Other" budget is $20.2 million, which is an increase of approximately $9.4 million or 8.8 percent compared to our 2020 forecast. The main driver of this change is land easement costs at the newly in-serviced wind farms as described in the 2017-2019 comparison to 2021 budget.

Q. HOW DOES YOUR 2022 "OTHER" BUDGET COMPARE TO YOUR 2021 BUDGET?

A. Our 2022 "Other" budget is $22.3 million, which is an increase of approximately $2.2 million or 10.8 percent compared to our 2021 budget. The main driver of this change is an increase in land easement costs at the newly in-serviced wind farms. The new 2021 wind farms with a land easement payments in 2022 are Dakota Range ($1.9 million) and Freeborn ($2.2 million).

Q. HOW DOES YOUR 2023 "OTHER" BUDGET COMPARE TO YOUR 2022 BUDGET?

A. Our 2023 "Other" budget is $21.8 million, which is a decrease of approximately 0.53 million or 23.7percent compared to our 2022 budget. The main driver of this change is that we have no new in-serviced wind farms nor the resulting land easement payments.

V. OPERATING PERFORMANCE

Q. PLEASE DISCUSS THE PURPOSE OF THIS SECTION OF YOUR TESTIMONY.

A. This section provides information related to our fleet performance. While we believe that our fleet generally performs well, there is always room for improvement, and we continue to seek ways to do so. Our focus is on

operational excellence and providing our customers with reliable and safe energy at a reasonable cost.

Q. WHY DO POWER PLANT OUTAGES OCCUR AT ALL?

A. Power plants consist of multiple complex chemical, thermal, mechanical and electrical systems working together to convert the energy content of fuel to thermal energy, to mechanical energy, and ultimately to electricity. These complex systems are under significant chemical, thermal and mechanical stresses. This causes the equipment to occasionally succumb to these stresses and fail, which can result in an unplanned outage.

Planned outages are necessary to maintain and replace equipment to mitigate failures, which result in unplanned outages. An appropriate analogy is with an automobile, which if driven new off the dealership lot and operated in a continuous 24-hour, seven-day manner without stopping for periodic planned maintenance (*i.e.* lube oil changes, belt replacement, etc.) will ultimately succumb to mechanical failure resulting in costly repairs, and the car will be unavailable for an extended period.

Q. HAVE YOU QUANTIFIED THE RELATIONSHIP BETWEEN PLANNED OVERHAULS AND RELIABILITY?

A. Yes. The reliability of a particular unit typically follows what is referred to as a bathtub curve. Immediately following an outage, reliability is not at its maximum but begins to bend down (to the bottom of the bathtub) as new equipment installed in the outage is broken in and contaminants introduced into plant systems during the outage are removed. The second region at the bottom

of the bathtub is the long period of highly reliable performance following the initial break in period. The third region presents the deterioration of reliability performance as equipment failures begin to occur over time prior to the next planned outage.

Q. HAS THE COMPANY IMPLEMENTED ANY STRATEGIES TO INCREASE PLANT PERFORMANCE?

A. Yes. Since 2011, we have implemented our Operating Model to develop and execute on strategies to improve plant performance. As I discuss further below, our success with the Operating Model has prompted us to implement Version 2.0 of the Operating Model beginning in 2019.

A. Past Performance and Outages

Q. HOW HAVE YOUR GENERATION UNITS PERFORMED FROM 2017 THROUGH 2020?

A. We are performing well compared to our industry peers. Benchmarking indicates that overhaul performance at our major plants is generally on par with industry norms. Of course, we consistently strive to improve performance.

For supplemental information related to plant performance, please refer to: Exhibit___(KAR-1), Schedule 8, which provides the following data by plant: 1) generation capacity (MWs); 2) type of fuel; 3) kWh produced by month for 2017, 2018, 2019, and 2020 through July; and 4) rate base amount for each plant. Exhibit___(KAR-1), Schedule 9, provides: 1) the number and duration of plant outages for 2017, 2018, 2019, and 2020 through July; 2) the reason the plant was in an outage; and 3) the plan to alleviate the reoccurrence of similar outages.

Q. DOES THE COMPANY UTILIZE ANY METRICS TO MEASURE PLANT PERFORMANCE?

A. Yes. The Company has standardized our performance metrics, utilizing Equivalent Availability Factor (EAF) as the main metric beginning in 2016, to develop consistency between units and provide an overall summary of unit performance considering both planned and unplanned events.

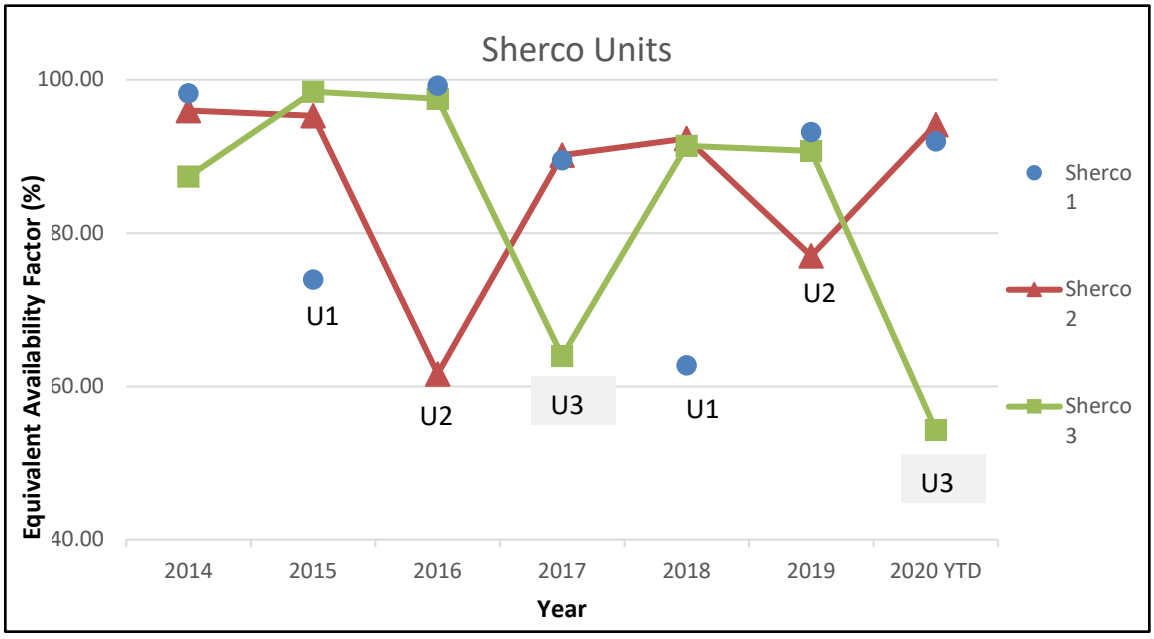
EAF measures a plant's availability at its maximum rating expressed as a percentage of all the available hours in a year. EAF is comprised of three sub-metrics to give the entire availability profile of the unit. The Equivalent Unplanned Outage Factor (EUOF) is used to calculate the availability impact of forced outages and derates, the Equivalent Planned Outage Factor (EPOF) is used to calculate the availability impact of planned outages, and Equivalent Seasonal Derate Hours (ESEDH) are used to calculate the availability impact of ambient temperature for our gas units. In other words, if a plant is unavailable for any reason, a planned outage for an overhaul or other work or an unplanned outage, this planned outage affects its EAF performance. Therefore, by utilizing the EAF metric for all our generating units, the Company emphasizes the importance of both preventing forced outages and also optimizing planned outage schedules.

These metrics are tracked across the industry by the North American Electric Reliability Corporation (NERC), which allows us to benchmark our performance against our industry peers.

Q. HOW HAS THE SHERCO PLANT PERFORMED BASED ON THE EAF METRIC?

A. Our Sherco plant is comprised of three coal-fired generating units. The historical EAF for each unit can be seen in Figure 10 below. In general, the trend shows how significantly planned overhauls influence the EAF calculation. For example, Sherco 1 EAF averages 68 percent during planned overhaul years (2015 and 2018), whereas Sherco 1 EAF is approximately 95 percent for non-overhaul years. This relationship can also be seen with Sherco 2 and Sherco 3 as well, which had planned overhauls in 2016 and 2019 (Sherco 2) and 2017 and 2020 (Sherco 3).

Figure 10
Historical and Current Equivalent Availability Factor (EAF)
Sherco Plant



For 2018, Sherco 1 EAF was 62.8 percent due mostly to an extended planned overhaul that was fourth quartile when compared to industry peers. Sherco 2

did not have any planned overhauls and finished with an EAF of 92.3 percent, which was first quartile. Sherco 3 also did not have any planned overhauls in 2018 and finished with an EAF of 91.4 percent, which was also first quartile.

Similarly, in 2019, Sherco 2 EAF is at 77.0 percent due to an extended spring overhaul, which is fourth quartile, whereas Sherco 1 and Sherco 3 EAF is at 93.15 percent and 90.71 percent, respectively, both of which are first quartile.

Q. WHAT DO YOU CONCLUDE BASED ON THESE METRICS?

A. I conclude that the Sherco Station has been operating well, being available consistent with top performance in the industry, while recognizing the need for overhauls and the impact those overhauls have on the EAF metric.

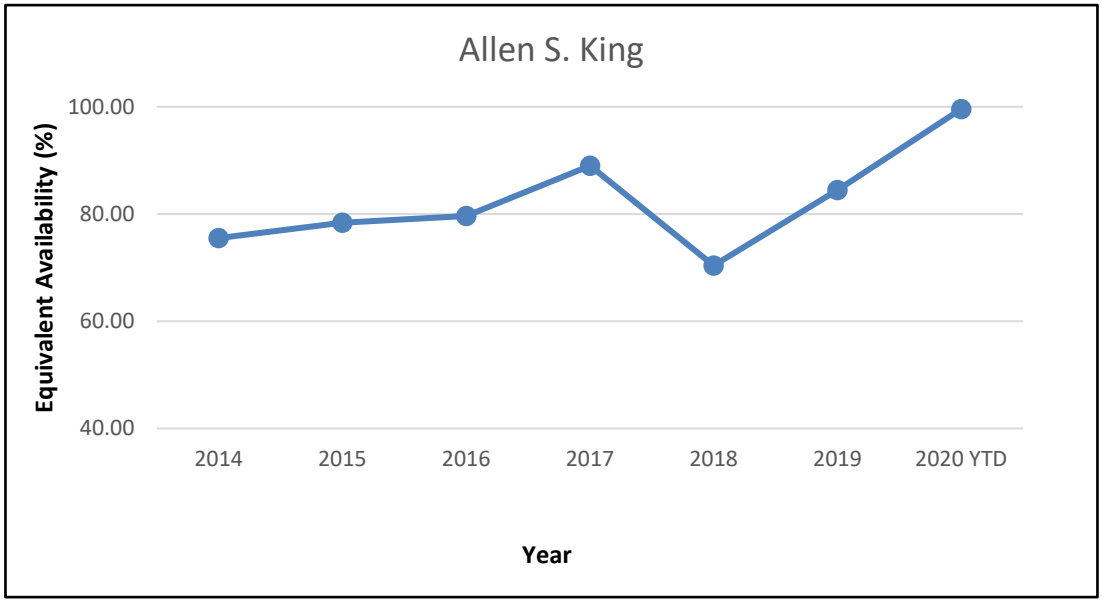
Q. HOW HAS THE ALLEN S. KING PLANT PERFORMED BASED ON THE EAF METRIC?

A. Our Allen S. King plant has a single coal-fired generating unit. The historical EAF can be seen in Figure 11 below. For 2018, Allen S. King Unit 1 EAF was 70.4 percent, which was fourth quartile when compared to industry peers. Similarly for 2019, Allen S. King Unit 1 EAF is at 84.5 percent due to a forced outage in the spring due to steam turbine generator vibrations, which is the upper end of second quartile. Overall, the plant is forecasting EAF to be at 93.98 percent at year end which places the plant in first quartile performance.

Figure 11

Historical and Current Equivalent Availability Factor (EAF)

Allen S. King Plant



Q. WHAT DO YOU CONCLUDE WITH RESPECT TO THESE METRICS?

A. I conclude that the Allen S. King plant is generally performing well and has been performing above second quartile except for 2018.

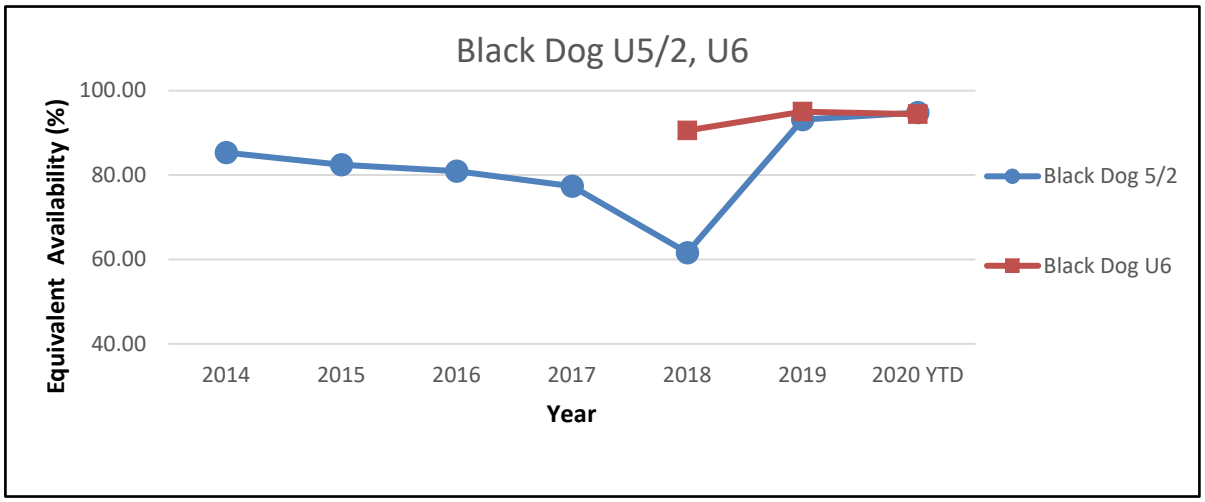
Q. HOW HAS THE BLACK DOG PLANT PERFORMED BASED ON THE EAF METRIC?

A. Black Dog is comprised of a repowered Unit 2 steam turbine in combined cycle with Unit 5 gas turbine, and a simple cycle gas turbine Unit 6 which went commercial in spring 2018. The historical EAF for these units can be seen in Figure 12 below.

Figure 12

Historical and Current Equivalent Availability Factor (EAF)

Black Dog Plant



For 2018, Black Dog 5/2 EAF was 61.6 percent due to an outage extension resulting from gas turbine damage identified during an inspection, which was fourth quartile. Black Dog 6 EAF was 90.6 percent following unit commissioning, which was second quartile.

In 2019, Black Dog 5/2 EAF was 93.12 percent and Black Dog 6 EAF was 95.02 percent, both of which are first quartile. Both units are forecasted to be in first quartile in 2020 at 94.8 percent for Unit 5/2 and 94.4 percent for Unit 6, both of which are in first quartile.

Q. WHAT DO YOU CONCLUDE BASED ON THESE METRICS?

A. I conclude that the Black Dog plant is operating well since the overhaul of Unit 5 combustion turbine in 2018, and Unit 6 has operated well since its commercial in-service date in April 2018.

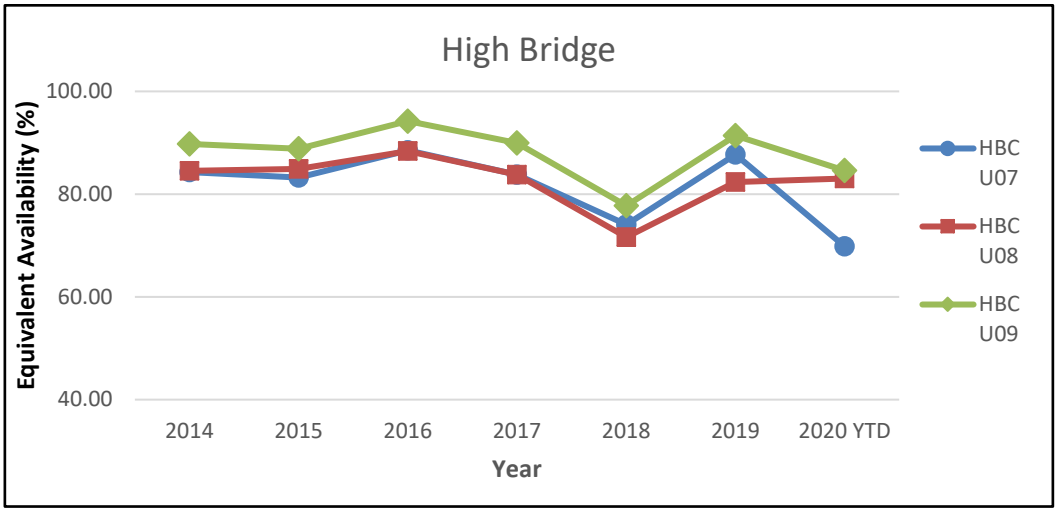
Q. HOW HAS THE HIGH BRIDGE PLANT PERFORMED BASED ON THE EAF METRIC?

A. The High Bridge plant is comprised of Unit 7 and Unit 8 gas turbines and Unit 9 steam turbine in combined cycle. The historical EAF for these units can be seen in Figure 13 below.

Figure 13

Historical and Current Equivalent Availability Factor (EAF)

High Bridge Plant



For 2018, High Bridge 7 EAF was 74.0 percent, High Bridge 8 EAF was 71.6 percent, and High Bridge 9 EAF was 77.7 percent due to a planned steam turbine overhaul, which was fourth quartile. For our combined cycle plants, any steam turbine overhaul work also requires the gas turbines to be out of service, since the units are not designed to be operated in simple cycle, which has a corresponding effect on the EAF for each units.

For 2019, High Bridge 7 EAF was 87.7 percent and High Bridge 8 EAF was 82.5 percent, both of which are second quartile. High Bridge Unit 8 was third

quartile due to a Hot Gas Inspection overhaul. High Bridge 9 EAF was 91.4, which is first quartile reliability performance.

Q. WHAT DO YOU CONCLUDE FROM THESE METRICS?

A. I conclude that the High Bridge plant is operating well.

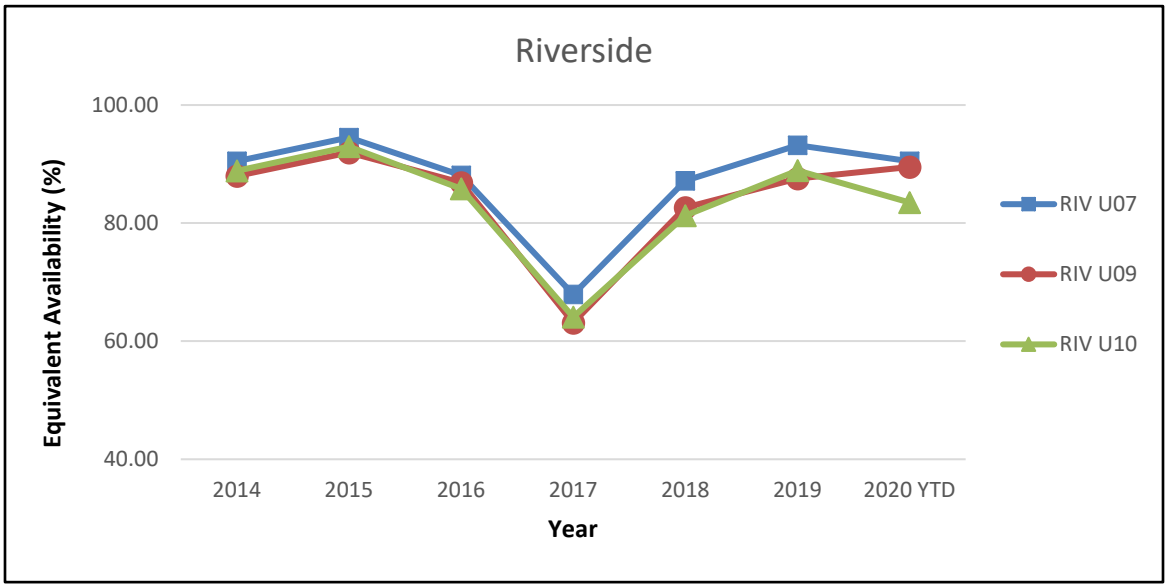
Q. HOW HAS THE RIVERSIDE PLANT PERFORMED BASED ON THE EAF METRIC?

A. The Riverside plant is comprised of a repowered Unit 7 steam turbine in combined cycle with Unit 9 and Unit 10 gas turbines. The historical EAF for these units can be seen in Figure 14 below.

Figure 14

Historical and Current Equivalent Availability Factor (EAF)

Riverside Plant



In 2017, Riverside steam turbine U7 incurred a planned major overhaul to replace the low-pressure section of turbine blading. The outage for the steam turbine, U7, also requires that the two combustion turbines, U9 and U10 be offline. This resulted in an average EAF of 65.0, fourth quartile performance.

For 2018, Riverside 7 EAF was 87.2 percent, which was second quartile, whereas Riverside 9 EAF was 82.6 percent and Riverside 10 EAF was 81.3 percent, both of which were fourth quartile.

For 2019, Riverside 7 EAF was 93.2 percent (first quartile). Riverside 9 EAF was at 87.58 and Riverside 10 EAF was 88.9 percent, both of which are second quartile.

Q. WHAT DO YOU CONCLUDE FROM THESE METRICS?

A. I conclude that the Riverside plant has been operating well.

Q. WHAT IS THE IMPACT OF SEASONAL DERATES ON THE COMPANY'S INTERMEDIATE PLANTS?

A. The intermediate combined cycle plants see a negative effect from seasonal derating during the summer months. The seasonal rating of a unit can impact its stated availability without truly affecting its performance. In this situation, a unit will see a calculated performance drop in its Net Dependable Capacity (NDC) due to warmer ambient conditions. When air is warmer, its density decreases. This affects the ability of the compressor section of the combustion turbine to supply adequate air for full load combustion. Performance on a given unit is not being impacted by any events, but rather its capacity changes due to

ambient temperature conditions. This affects combined cycle units in the NSPM region to a greater extent than units in other regions because of the wide range of ambient weather conditions we experience.

Xcel Energy uses a two-season capacity rating (summer/winter) for the NDC of all generating units. This methodology has a seasonal impact on our combined cycle units during the summer months. For the NSPM region, summer is defined as May through October. This is consistent with industry practice. Other major utilities against which Xcel Energy performs benchmarking also reduce their Net Maximum Capacity (NMC) during the summer months to eliminate the effect of seasonal derating and create a higher EAF performance.

Q. HOW DO YOU EVALUATE FORCED OUTAGES?

A. Any unplanned loss of generating capacity (e.g., through a forced outage or derate) is systematically evaluated through the work management process, the event assessment process, or both. These processes determine the cause of the event and identify corrective actions that are undertaken as governed by Company policy. We take every plant outage very seriously and have a comprehensive corporate policy and procedure for assessing and analyzing the causes of an outage. Exhibit___(KAR-1), Schedule 10 provides this policy. All events impacting the generating capacity of a unit (e.g., unplanned outages or unit derates) require completion of an Event Assessment Report. This report documents all pertinent information associated with the event and includes interviews with personnel involved.

In the event of an outage, we:

- Conduct a root-cause analysis to determine what caused the unplanned loss of capacity and document the incident in writing;
- Document all corrective actions taken to bring the plant back online;
- Meet regularly as plants to discuss corrective actions and repair progress, tracking the issue until it is resolved; and
- Share significant events monthly with all power plants to prevent recurrence at other sites.

By collecting this information, we hope to improve our internal processes and prevent similar occurrences in the future. Schedule 9 generally identifies the cause of the unplanned outages from 2017 through July 2020.

B. Best Practices and Productivity Improvements

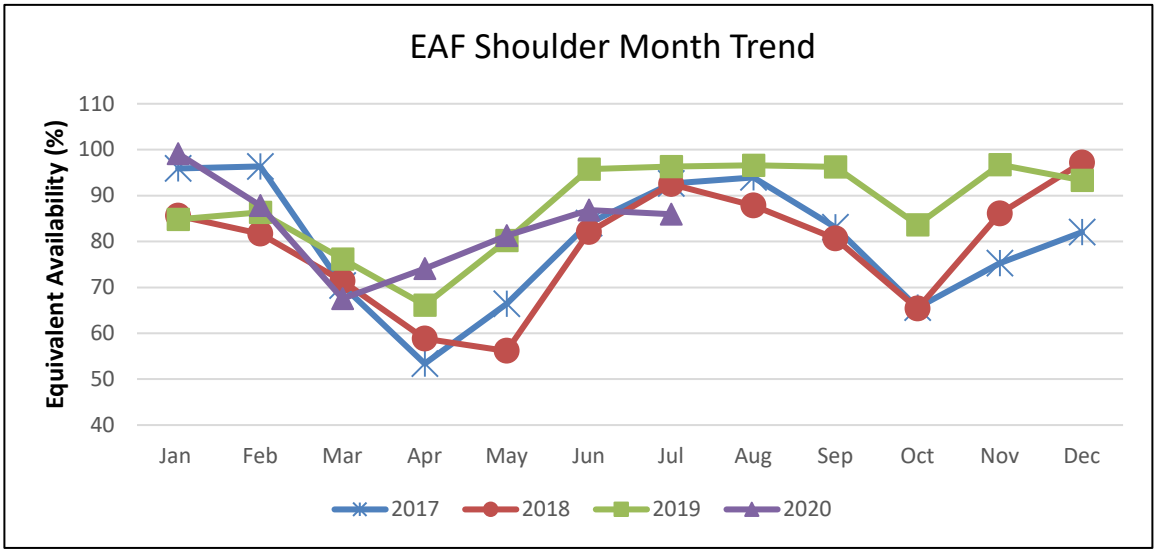
Q. HOW WOULD YOU SUMMARIZE THE PERFORMANCE OF THE NSPM GENERATING FLEET?

A. Our units have generally been operating well and meeting our goals for reliable generation. The most significant impact to our plant EAF performance has been due to planned overhauls in the spring and fall, which are necessary to prevent more costly forced outages during the summer peak demand. Figure 15 below shows this relationship and demonstrates how we have balanced the overhauls and EAF performance in the shoulder months to ensure our units are available and reliable during the summer.

Figure 15

Historical and Current Equivalent Availability Factor (EAF)

NSP-MN



As shown in Figure 15 above, our units have typically performed within or near the first quartile for EAF during the summer months when they are needed the most. This is particularly significant considering that our combined cycle plants are somewhat arbitrarily impacted by seasonal derates in the summer.

Q. DURING THE 2015 RATE CASE YOU DISCUSSED THE COMPANY'S NEW OPERATING MODEL. HOW HAS THE OPERATING MODEL BEEN PERFORMING?

A. We believe that the Generation Operating Model launched in late 2011 has been successful in its purpose of standardizing processes, creating efficiencies, and identifying and sharing best practices across the fleet to ultimately improve plant performance and reduce costs. Due to this success, the Company is utilizing these lessons learned and transitioned to the next phase of the Operating Model in 2019. The most significant component of this transition is the development

of the Performance Optimization department which further centralizes our technical support services and develops new departments to transition our organizational structure to match our evolving generation portfolio.

Q. WHAT ARE THE KEY COMPONENTS OF THE PERFORMANCE OPTIMIZATION DEPARTMENT WITHIN THE NEW 2019 OPERATING MODEL?

A. The Performance Optimization department was designed to provide a broad fleet focus with centralized functions and common processes to implement a fleet-wide asset management strategy and effectively drive systematic improvement in fleet asset and equipment health. Performance Optimization will increase the use of data, advanced analytics, and financial analysis to improve business decision making. The Performance Optimization department can be broken down into Reliability Engineering, Fleet Engineering, and Analytics and Practices.

Q. WHICH FUNCTIONS ARE INCLUDED IN THE RELIABILITY ENGINEERING DEPARTMENT?

A. The Reliability Engineering department is responsible for the daily engineering activities at our plants. This department is organized by plant technologies to optimize the sharing of best practices for each technology. Our coal and RDF units have similar technologies in regard to design, system, and operating characteristics. The Reliability Engineers provide onsite support for our operations and maintenance departments, ensure our plant design basis is maintained, and ensure we implement a consistent asset strategy across the fleet. We have similar engineering support and strategies for our combined cycle and

simple cycle units and our renewable generation to account for our increasing renewable portfolio.

Q. WHAT ARE THE FUNCTIONS OF THE FLEET ENGINEERING DEPARTMENT?

A. The Fleet Engineering department is responsible for developing and implementing asset and equipment strategies consistently across the fleet. This department is broken into fleet engineering teams for common systems and components including Electrical and Controls, Boilers and Balance of Plant, Steam Turbines and Gas Turbines, Materials Engineering, and Non-Destructive Examination and Testing. The department is organized by common systems and components to more efficiently and effectively share and implement system best practices and lessons learned. This department also includes an Asset Strategy and Budget Integration team to ensure that fleet asset strategies are effectively integrated and prioritized within our budgets.

Q. WHICH FUNCTIONS ARE INCLUDED IN THE ANALYTICS AND PRACTICES DEPARTMENT?

A. The Analytics and Practices department includes both a Monitoring and Diagnostics team and a System and Equipment Analytics team. The Monitoring and Diagnostics team utilizes the Company's remote monitoring capability and predictive analytics to identify abnormal operational issues and alert plant personnel for corrective actions prior to failure to minimize costs. The System and Equipment Analytics team integrates equipment monitoring, asset performance management analytical tools, and financial analysis to improve existing equipment maintenance practices and transition equipment

maintenance towards performance-based and condition-based maintenance practices.

Q. HOW IS THE NEW OPERATING MODEL IMPACTING PLANT RELIABILITY?

A. While each of our generating units is different, there are sufficient commonalities where we can further implement best practices and consistent program initiatives throughout our fleet. Additionally, by centralizing the management of our fleet, we can capture economies of scale to more efficiently procure service and materials.

Q. PLEASE PROVIDE EXAMPLES OF APPLICATION OF BEST PRACTICES AND EFFICIENCY OR PRODUCTIVITY INITIATIVES.

A. The key focus of the Operations Model II (2019) is Continuous Improvement. Continuous Improvement will be accomplished by utilizing Lean Management, Operating Model Governance, and Event Assessment (EA) and Root Cause Analysis (RCA). A short description of each is below.

- Lean Management – Provides a set of tools to eliminate waste and inefficiency. The people-based system produces improved processes, inventory management, teamwork, and customer relationships.
- Operating Model Governance – Monitoring, documenting, and resolving issues that arise while continuously improving performance is Operating Model Governance. Core functional leadership is committed to ensuring all aspects of the continuous improvement are successful
- Event Assessment and RCA – The objective of performing EAs and RCAs is to identify the causes of events, not only to correct, but to prevent recurrence in the fleet. EAs and RCAs are performed for forced

outages, major process breakdowns, equipment failures, and environmental permit exceedances.

Lastly, as we transition to the Operating Model II, we have also developed a Continuous Improvement Team that is responsible for identifying and implementing best practices across the fleet.

Q. ARE THERE OTHER ASPECTS OF THE COMPANY'S WORK YOU WISH TO NOTE?

A. Yes. The Company has been constantly improving its work management process. A significant improvement was the transition to System Analysis Program (SAP) software in 2016. This transition is still improving the Company's Work and Asset Management capabilities and process efficiencies, and standardized practices within Energy Supply. Along with SAP, mobility solutions, including wireless tablets, were also instituted to field workers. This allowed for field employees to access, transfer, complete and manage their assigned work orders and service requests generated remotely from SAP. This solution is part of our journey as we strive to improve productivity of the mobile field worker.

The Company has also been transitioning from Preventive Maintenance to more Predictive Maintenance (PdM) to extend maintenance intervals and reduce costs. As we integrate more of our equipment into our control systems, we have been able to improve upon our equipment diagnostics modeling and predictive analytics. This trend will continue with the expansion of the Monitoring and Diagnostic center and implementation of the new System and Equipment Analytics team.

In addition to expanding our remote monitoring capability, we also continue to expand our on-site predictive monitoring programs. Examples of these PdM activities include: 1) Thermography, 2) Vibration Analysis, 3) Acoustic Monitoring, 4) Lubrication Sampling and Analysis, and 5) Miscellaneous Non-Destructive Evaluation (NDE) (*e.g.,* Eddy current testing to determine condenser tube wall thickness). PdM activities are also being used to diagnose equipment problems when unusual conditions are detected.

Q. WHAT ARE YOUR CONCLUSIONS WITH RESPECT TO THE GENERATION OPERATING MODEL?

A. I believe that moving Energy Supply to a fleet-based model has improved performance. Operational improvements could be lost without a centralized governance model. Moving to a fleet-based approach allows the individual plants to leverage the power of the lessons learned. Our model facilitates knowledge transfer of leading practices through formalized, structured interactions and by centralizing critical functions, such as engineering and overhaul management. Expanding these core concepts into the next phase of the Operating Model will continue to improve our plant performance.

Q. IN ADDITION TO THE IMPROVEMENTS YOU JUST DESCRIBED, IS THE COMPANY DOING ANYTHING TO MITIGATE PROCUREMENT COSTS?

A. Yes. The Company utilizes MMAs and MSAs to mitigate procurement costs. The Company strategically identifies which materials and services are required for our business needs and enters into agreements to obtain these at favorable pricing. Our most significant agreements include the following:

- Wind Turbine Maintenance OEM and MSA contracts;
  - We have extended the Service, Maintenance, and Warranty agreements for existing wind farms with the OEMs and established new agreements for our expanding wind fleet. These agreements include scheduled maintenance, inspections, repairs, and routine operations support of our wind turbines, balance of plant equipment, and site grounds.
- Combustion Turbine Parts Exchange Program MSA;
  - This agreement was established in 2013 and allows the Company to purchase major gas turbine components which then immediately go into service. Instead of investing in complete sets of emergency spare parts for each plant, we utilize long-term contracts with a qualified parts supplier to provide the parts on a just-in-time basis. This has resulted in better pricing, reduced ownership costs, and fewer overhauls of our gas turbines.
- Combustion Turbine Overhaul MSA;
  - This agreement was established in 2015 and provides combustion turbine overhaul and maintenance services, including Combustion Inspections, Hot Gas Path Inspections, and Major Overhauls.
- Steam Turbine Overhaul MSA;
  - This agreement was established in 2016 and provides steam turbine and generator maintenance services including equipment disassembly, cleaning, inspections, and reassembly. There are also negotiated time and material rates for additional repair work scope if requested by the Company. This MSA leveraged a long-term agreement with a single contractor to establish competitive

pricing, transparent work scope and clear pricing structures, and improved predictability of steam turbine maintenance costs and schedules.

- Chemicals Supply MSAs;
  - Our chemical supply MSAs are competitively bid for each major chemical and have resulted in favorable pricing from our suppliers. This includes agreements for activated carbon, aqueous ammonia, lime, sulfuric acid, and other miscellaneous chemicals. By competitively bidding and negotiating long-term agreements with negotiated markups above base commodity index pricing, we leverage our volume purchases to ensure supply and remove pricing risk premiums that are inherent in long-term fixed contracts.

Q. PLEASE DESCRIBE THE MASTER SERVICES AGREEMENT INITIATIVE.

A. Keeping Xcel Energy's generation facilities running smoothly and efficiently requires the careful coordination of a wide range of maintenance processes and activities, including specialized efforts during outages. Much of this maintenance work is completed by contractors, including contractors with specific skills that are not cultivated in-house, such as work on railroad lines and cooling tower inspections.

The contracts required for each subcontractor are often complex and time-consuming to prepare and execute. We therefore launched the MSA with three main objectives:

- Reduction of costs due to "volume purchasing" at competitively-bid rates and the reduction of the associated transactional inefficiencies of negotiating services agreements on an individual or plant-by-plant basis;
- Consistent contract terms and conditions across business units and projects, which reduces the time spent in negotiation and allows the Company greater control of contractual risk; and
- QA and QC control, through standard contractual terms, allowing stricter adherence to the Company's operating and safety standards.

Q. WHAT BENEFITS HAVE RESULTED FROM THE MSA INITIATIVE?

A. The MSA initiative has reduced the number of service agreements for plant maintenance that we were executing with the same companies on a plant-by-plant basis. This allows our staff to focus on higher-value requests-for-proposals and negotiations, as opposed to one-time purchase orders. It has also resulted in a list of key providers for each work category, which allows plant employees to issue maintenance orders more quickly by having competitively-bid pricing, safety appendices, and terms and conditions already in place.

By aggregating the work performed by contractors across Xcel Energy and using longer-term contracts, we can negotiate better terms and pricing.

Q. CAN YOU QUANTIFY THESE BENEFITS?

A. Yes. We continuously monitor our Master Service Agreements to ensure they are being utilized by the Company, and we are seeing value in continuing their terms. The Company is forecasting a 2020 year-end O&M and capital savings total for Energy Supply of $187.8 million for the Energy Supply MSAs, all

regions. Table 7 below summarizes the benefits of these Master Services Agreements.

Table 7

MSA Year End Savings Forecast ($ millions)

(Energy Supply, all Regions)

Category Allocation	2019 Actual Savings	2020 YE Forecast
Boiler Systems	$4.91	$1.60
Chemicals Gases and Lubes	$4.89	$2.91
Construction	$0.86	$85.90
Environmental	$0.82	$0.87
Maintenance Services	$3.47	$3.68
MRO Materials	$0.53	$0.47
Other Plant Systems	$0.00	$0.24
Turbine and Generator System	$7.50	$6.65
Wind	$82.48	$85.45
Total	**$105.46**	**$187.77**

VI. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Energy Supply's primary responsibility is to operate and maintain the Company's non-nuclear generation portfolio in a safe, reliable, cost-effective, and environmentally-sound manner. I recommend that the Commission approve the Energy Supply capital investments and O&M budget presented in this rate case. Our 2021 through 2023 capital additions align with the Company's and State's policy goals and are part of a sound plan to address aging infrastructure and ensure system reliability as we transition to a carbon-free

future. We plan to in-service $847.9 ($614.8) million of capital additions in 2021, $69.6 (50.4) million in 2022, and $59.9 ($43.4) million in 2023 in furtherance of these goals. To support these capital investments and our existing assets, we have budgeted $159.1 ($116.0) million for Energy Supply O&M in 2021, $162.5 ($118.5) million in 2022, and $167.7 ($122.3) million in 2023. We manage our O&M activities to keep costs low and operate as efficiently as possible.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

Kimberly Randolph P.E, PMP
Vice President, Energy Supply Projects
414 Nicollet Mall, Minneapolis MN 55401

SUMMARY

Accomplished EPC executive with 25 years of combined experience in the power, renewable, petrochemical and natural gas industries. Practiced qualifications in the acquisition, development, engineering and construction of megaprojects in energy.

HISTORY

Xcel Energy, Vice President – Energy Supply, Projects **2017 - present**
Establishes strategic direction and holds accountability for all capital and overhaul engineering and construction projects in Energy Supply for the diverse portfolio of new and existing generation plants (coal, gas, oil, hydro, solar, and wind). Accountable for managing the strategic 5-year capital investment plan for Energy Supply and executing that plan across all operating jurisdictions.

IHI E&C International, Projects Director **2014 - 2017**
Client liaison and project team director responsible for the development and execution of engineering projects, including the leadership of multi-discipline teams and management of execution risk. Projects include the PreFEED, FEED, Detailed Engineering and/or EPC phases of a diverse portfolio, including: LNG Tanks, Natural Gas to Gasoline, Methanol, Steam Methane Reforming and Biomass Gasification.

BP plc, Vice President – Projects & Engineering **2006 - 2014**
Established strategic direction and held accountability for the engineering and construction of capital renewable projects, including $2 billion in new renewable power projects across North America. Notable accomplishments include

- $900 million Flat Ridge II Wind Farm in Kansas (470 MW, 296 GE turbines).
- $800 million, Fowler Ridge I/III Wind Farm in Indiana comprised (300MW, 40 Clipper & 122 Vestas turbines). Project was voted "Top Plant 2009" by Power Magazine.
- $280 million Mehoopany Wind Farm in Pennsylvania (140 MW, 88 GE turbines)
- $200 million Fowler Ridge II Wind Farm (100 MW, 133 GE & 60 Vestas turbines)
- $300 million Cedar Creek II Wind Farm (200MW, 60 Nordex turbines)

Williams Gas Pipelines, Project Manager **2001 – 2006**

Oxy Vinyls LP, Maintenance Mechanical Engineer **2000 – 2001**

Albemarle Corporation, Maintenance Technician **1993 – 2000**

Houston, Lighting and Power, Engineering Technician **1991 – 1993**

EDUCATION

MBA, University of Texas — Austin, TX
BS, Mechanical Engineering, University of Houston — Houston, TX

CERTIFICATIONS AND PROFESSIONAL DEVELOPMENT

BS, Mechanical Engineering Licensed Professional Engineer (P.E.)
Project Management Professional (PMP)
Executive Program, BP's Projects & Engineering Academy, Massachusetts Institute of Technology

PROFESSIONAL ASSOCIATIONS

2019 to Present	Board Member, Ordway Center for the Performing Arts
2018 to Present	Generation Council Member, Electric Power Research Institute (EPRI)
2017 to Present	Board Trustee & Academic Affairs Committee Chair, Dunwoody College
2017 to Present	National Advisory Council, Women's Energy Network
2009	Board President, Women's Energy Network

O&M Costs by Plant and Category: 2017-2023
($s)

NSPM Total Company

	2017 Actual	2018 Actual	2019 Actual	2017-19 Act Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Angus Plant	2,042,408	2,198,997	2,105,759	2,115,721	1,807,311	1,925,264	2,113,745	2,281,376
AS King Plant	21,297,022	25,355,172	16,937,421	21,196,538	12,721,499	13,657,146	13,654,976	13,653,026
Black Dog Station	7,427,549	5,452,103	7,016,036	6,631,896	6,038,278	6,658,229	10,286,023	7,934,652
Blazing Star I	-	-	857	286	3,708,424	5,257,894	4,112,218	4,166,565
Blazing Star II	-	-	-	-	189,331	4,970,863	5,210,762	4,173,438
Blue Lake Plant	1,183,990	1,113,645	1,174,350	1,157,328	1,329,654	1,212,004	1,696,148	1,399,798
Borders Wind	4,879,690	3,390,421	3,095,763	3,788,625	2,621,214	2,653,089	2,731,106	2,752,669
Community Wind North	-	-	-	-	143,387	815,377	1,089,485	843,599
Courtenay Wind	5,724,832	4,980,270	4,037,675	4,914,259	2,907,632	4,035,825	4,089,524	4,144,034
Crowned Ridge Wind	-	-	-	-	652,110	4,053,749	4,258,852	4,443,068
Dakota Range Wind	-	-	-	-	-	511,516	5,887,180	6,240,866
Fibrominn	-	2,875,783	(329,458)	848,775	5,115			
Foxtail Wind	-	-	50,070	16,690	3,225,767	3,505,091	3,357,579	2,637,976
Freeborn Wind	-	-	-	-	-	4,953,741	6,275,361	5,217,472
Grand Meadows Wind	2,785,828	3,205,058	2,405,127	2,798,671	2,306,310	2,643,411	2,691,176	2,673,061
Granite City Plant	63,327	-	115,974	59,767	52,374	5,000	5,000	5,000
High Bridge Plant	4,705,248	10,173,696	5,654,485	6,844,476	6,108,346	6,814,941	6,506,750	9,600,521
Inver Hills Plant	1,112,070	1,309,782	1,253,149	1,225,000	1,150,519	1,166,624	1,184,587	1,245,195
Jeffers Wind	-	-	-	-	398,274	1,193,507	1,476,869	1,240,449
Lake Benton Wind	-	-	163,574	54,525	1,595,194	2,064,870	1,993,175	2,025,772
Minnesota Valley Plant	6,782	-	24,532	10,438	21,319	21,320	21,320	21,320
Mower Wind	-	-		-	202,872	3,105,780	3,152,437	2,454,102
Nobles Wind	4,112,184	4,114,841	3,685,197	3,970,741	4,139,592	4,312,478	4,391,106	4,471,410
Pleasant Valley Wind	7,372,656	4,934,055	5,512,626	5,939,779	4,155,851	4,267,517	4,297,839	4,326,474
Red Wing Plant	5,471,224	5,046,205	5,201,022	5,239,484	4,979,597	5,585,348	5,682,720	4,924,485
Riverside Plant	9,490,481	5,917,660	6,022,861	7,143,667	6,041,117	8,948,183	6,280,492	7,860,856
Sherco Plant	38,019,495	46,716,244	45,917,728	43,551,156	39,657,221	40,476,295	34,966,331	40,773,395
St. Anthony Falls	861,332	740,693	646,316	749,447	661,371	607,299	533,266	505,918
Wilmarth Plant	7,055,002	5,928,121	5,758,135	6,247,086	5,257,979	5,577,116	5,404,279	5,489,345
Other Energy Supply O&M[1]	20,750,346	22,220,482	16,928,240	19,966,356	18,269,069	18,050,745	19,150,509	20,162,210
Total	$ 144,361,466	$ 155,673,228	$ 133,377,438	$ 144,470,711	$ 130,346,724	$ 159,050,224	$ 162,500,814	$ 167,668,053

Minnesota Jurisdiction
Net of Interchange Allocation

	2017 Actual	2018 Actual	2019 Actual	2017-19 Act Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Angus Plant	1,502,927	1,624,778	1,537,926	1,555,210	1,320,998	1,403,940	1,541,383	1,663,624
AS King Plant	15,671,633	18,734,233	12,370,121	15,591,996	9,298,383	9,959,054	9,957,471	9,956,049
Black Dog Station	5,465,638	4,028,408	5,124,110	4,872,719	4,413,491	4,855,309	7,500,766	5,786,101
Blazing Star I	-	-	626	209	2,710,557	3,834,157	2,998,708	3,038,339
Blazing Star II	-	-	-	-	138,386	3,624,849	3,799,788	3,043,351
Blue Lake Plant	871,251	822,841	857,678	850,590	971,869	883,817	1,236,864	1,020,759
Borders Wind	3,590,770	2,505,088	2,260,968	2,785,609	1,915,895	1,934,684	1,991,575	2,007,299
Community Wind North	-	-	-	-	104,804	594,589	794,473	615,169
Courtenay Wind	4,212,677	3,679,783	2,948,886	3,613,782	2,125,243	2,943,001	2,982,160	3,021,909
Crowned Ridge Wind	-	-	-	-	476,639	2,956,072	3,105,637	3,239,971
Dakota Range Wind	-	-	-	-	-	373,007	4,293,045	4,550,959
Fibrominn	-	2,124,836	(240,618)	628,073	3,739	-	-	-
Foxtail Wind	-	-	36,568	12,189	2,357,774	2,555,980	2,448,411	1,923,663
Freeborn Wind	-	-	-	-	-	3,612,363	4,576,114	3,804,681
Grand Meadows Wind	2,049,980	2,368,128	1,756,567	2,058,225	1,685,725	1,927,626	1,962,457	1,949,248
Granite City Plant	46,600	-	84,701	43,767	38,281	3,646	3,646	3,646
High Bridge Plant	3,462,405	7,517,062	4,129,712	5,036,393	4,464,705	4,969,586	4,744,847	7,000,885
Inver Hills Plant	818,328	967,762	915,228	900,439	840,936	850,725	863,824	908,020
Jeffers Wind	-	-	-	-	291,106	870,328	1,076,961	904,559
Lake Benton Wind	-	-	119,465	39,822	1,165,957	1,505,743	1,453,462	1,477,232
Minnesota Valley Plant	4,991	-	17,917	7,636	15,582	15,547	15,547	15,547
Mower Wind	-	-	-	-	148,283	2,264,795	2,298,818	1,789,578
Nobles Wind	3,025,993	3,040,342	2,691,457	2,919,264	3,025,706	3,144,742	3,202,079	3,260,638
Pleasant Valley Wind	5,425,245	3,645,636	4,026,106	4,365,662	3,037,590	3,111,955	3,134,067	3,154,948
Red Wing Plant	4,026,056	3,728,501	3,798,528	3,851,028	3,639,681	4,072,943	4,143,949	3,591,029
Riverside Plant	6,983,668	4,372,395	4,398,752	5,251,605	4,415,566	6,525,187	4,579,856	5,732,288
Sherco Plant	27,977,037	34,517,336	33,535,676	32,010,016	28,986,210	29,516,093	25,498,121	29,732,744
St. Anthony Falls	633,820	547,277	472,032	551,043	483,409	442,854	388,868	368,925
Wilmarth Plant	5,191,496	4,380,124	4,205,412	4,592,344	3,843,156	4,066,941	3,940,904	4,002,936
Other Energy Supply O&M[1]	15,269,356	16,418,097	12,363,417	14,683,623	13,353,206	13,162,951	13,964,919	14,702,671
Total	$ 106,229,870	$ 115,022,627	$ 97,411,236	$ 106,221,244	$ 95,272,876	$ 115,982,482	$ 118,498,718	$ 122,266,768

[1] "Other ES OM" includes the GM Bucket and the ES Service Orgs

O&M Costs by Plant and Category: 2017-2023
($s)

NSPM Total Company

	2017 Actual	2018 Actual	2019 Actual	2017-19 Act Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Internal Labor	68,411,304	74,479,153	67,915,487	70,268,648	68,815,934	64,150,927	62,418,028	62,366,974
Contract Labor	38,755,328	37,070,615	26,413,033	34,079,659	31,230,098	51,820,955	54,721,015	58,121,959
Materials	17,759,626	18,215,699	19,431,453	18,468,926	15,242,824	18,001,200	17,866,225	19,817,260
Chemicals	8,564,834	6,865,136	5,689,360	7,039,777	4,327,345	4,910,427	5,158,867	5,554,460
Other	10,870,374	19,042,625	13,928,105	14,613,701	10,730,523	20,166,716	22,336,679	21,807,400
Total	$ 144,361,466	$ 155,673,228	$ 133,377,438	$ 144,470,711	$ 130,346,724	$ 159,050,224	$ 162,500,814	$ 167,668,053

Minnesota Jurisdiction Net of Interchange Allocation

	2017 Actual	2018 Actual	2019 Actual	2017-19 Act Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Internal Labor	50,341,162	55,030,579	49,601,579	51,657,773	50,298,863	46,780,090	45,516,426	45,479,197
Contract Labor	28,518,507	27,390,448	19,290,565	25,066,507	22,826,667	37,788,837	39,903,617	42,383,650
Materials	13,068,604	13,459,074	14,191,620	13,573,099	11,141,267	13,126,821	13,028,395	14,451,127
Chemicals	6,302,521	5,072,458	4,155,182	5,176,721	3,162,938	3,580,778	3,761,945	4,050,419
Other	7,999,077	14,070,067	10,172,289	10,747,144	7,843,141	14,705,957	16,288,336	15,902,376
Total	$ 106,229,870	$ 115,022,627	$ 97,411,235	$ 106,221,244	$ 95,272,876	$ 115,982,482	$ 118,498,718	$ 122,266,768

Capital Additions for 2021-2023
($s)

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001707.001	Renewable and New Generation	DKR0 Dakota Range Wind Turbines	368,524,686.34	2021
NSP-Minnesota	A.0001704.001	Renewable and New Generation	FBW G100-Freeborn Wind Farm	327,934,287.32	2021
NSP-Minnesota	A.0001702.001	Renewable and New Generation	BS2-G100-Blazing Star II Wind Farm	16,169,131.00	2021
NSP-Minnesota	A.0001707.004	Renewable and New Generation	DKR0 Dakota Range Wind TSG Sub	13,410,674.85	2021
NSP-Minnesota	A.0001574.286	Reliability/Performance Enhancement	SHCJC Replace Auxiliary Boilers	9,928,956.54	2021
NSP-Minnesota	A.0001704.004	Renewable and New Generation	FBW G100-Freeborn Wind Farm TSG Sub	7,276,484.73	2021
NSP-Minnesota	A.0001579.137	Reliability/Performance Enhancement	RIV10C U10 Major Inspection No. 1	6,721,346.01	2021
NSP-Minnesota	A.0001579.101	Reliability/Performance Enhancement	RIV7 - Rplc L-1 LP Rotor Blading	4,390,513.67	2021
NSP-Minnesota	A.0001579.080	Reliability/Performance Enhancement	RIV0C --U10 CT Compressor Upgr	4,380,118.03	2021
NSP-Minnesota	A.0001574.087	Environmental Enhancement	SHC3C U3 Landfill Cell 4	3,598,892.81	2021
NSP-Minnesota	A.0001574.808	Environmental Enhancement	SHC99 Stormwater Management	3,010,064.40	2021
NSP-Minnesota	A.0001704.003	Renewable and New Generation	FBW G100-Freeborn Wind Farm TSG	2,939,291.22	2021
NSP-Minnesota	A.0001580.013	Renewable and New Generation	CWF0 Install Capacitor Bank	2,490,680.82	2021
NSP-Minnesota	A.0001572.122	Environmental Enhancement	ASK1C- Replace SCR Catalyst 20	2,440,825.57	2021
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	2,222,679.72	2021
NSP-Minnesota	A.0001574.288	Reliability/Performance Enhancement	SHC1 - Rplc Hot & Int. AH Basket	2,100,705.51	2021
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	2,016,304.87	2021
NSP-Minnesota	A.0001562.086	Reliability/Performance Enhancement	REW1C U1 GENERATOR REWIND	1,889,393.50	2021
NSP-Minnesota	A.0001704.013	Renewable and New Generation	FBW Freeborn Wind Farm Tline GIA NE	1,858,873.20	2021
NSP-Minnesota	A.0001572.048	Reliability/Performance Enhancement	ASK1C-Inst Emerson DCS Evergreen	1,842,730.98	2021
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,772,407.87	2021
NSP-Minnesota	A.0001559.014	Reliability/Performance Enhancement	BLL8-U8 CT Control System Repl	1,630,248.80	2021
NSP-Minnesota	A.0001559.015	Reliability/Performance Enhancement	BLL7-U7 CT Control System Repl	1,629,537.45	2021
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	1,572,761.37	2021
NSP-Minnesota	A.0001565.118	Environmental Enhancement	WLM1C Replace U1 Baghouse Bags	1,563,684.78	2021
NSP-Minnesota	A.0001559.005	Reliability/Performance Enhancement	BLLC8 U8 Exhaust Silencer Repl	1,537,956.79	2021
NSP-Minnesota	A.0001579.063	Reliability/Performance Enhancement	RIV0C Emerson DCS Evergreen	1,493,312.32	2021
NSP-Minnesota	A.0001579.079	Reliability/Performance Enhancement	RIV0C --U10 CT Cntrl Sys Upg	1,334,288.17	2021
NSP-Minnesota	A.0001579.084	Reliability/Performance Enhancement	RIV0C --U9 CT Control System	1,330,195.68	2021
NSP-Minnesota	A.0001562.038	Environmental Enhancement	REW0 - EPA 316b-Traveling Screens	1,283,668.07	2021
NSP-Minnesota	A.0001705.001	Renewable and New Generation	CRW G100-Crowned Ridge BOT Wind Far	1,250,000.00	2021
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	1,081,670.29	2021
NSP-Minnesota	A.0001571.079	Reliability/Performance Enhancement	ANS3C Rpl U3 Generator Breaker	970,547.43	2021
NSP-Minnesota	A.0001580.006	Environmental Enhancement	CWFC0 229005 Courtenay PCMM	968,444.19	2021
NSP-Minnesota	A.0001610.010	Renewable and New Generation	BWF0-Border WD Tower Climb System	915,966.74	2021
NSP-Minnesota	A.0001574.115	Environmental Enhancement	SHC3C U3 Repl fabric filter bags	850,677.77	2021
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	838,769.70	2021
NSP-Minnesota	A.0001559.120	Reliability/Performance Enhancement	BLL0 OTS-Security Monitor and Log	809,583.85	2021
NSP-Minnesota	A.0001574.471	Reliability/Performance Enhancement	SHC99-SHC99-Rpl SR Slew Drives	808,982.11	2021
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	793,752.97	2021
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	777,718.95	2021
NSP-Minnesota	A.0001580.010	Renewable and New Generation	CWF FAA Radar Lighting System	766,074.33	2021
NSP-Minnesota	A.0001610.009	Renewable and New Generation	BWF FAA Radar Lighting System	766,074.33	2021
NSP-Minnesota	A.0001574.817	Reliability/Performance Enhancement	SHC1-U1 DCS HW & Security Server	737,722.92	2021
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	723,078.21	2021
NSP-Minnesota	A.0001579.093	Reliability/Performance Enhancement	RIV9C-Install Preheater Harps Unit	669,936.96	2021
NSP-Minnesota	A.0001579.097	Reliability/Performance Enhancement	RIV10C-Install Preheater Harps Unit	668,862.89	2021
NSP-Minnesota	A.0001576.019	Renewable and New Generation	GDM0-SCADA Replacement	656,222.17	2021
NSP-Minnesota	A.0001566.170	Renewable and New Generation	NBL0-SCADA Replacement	634,725.63	2021
NSP-Minnesota	A.0001574.764	Reliability/Performance Enhancement	SHC1C Bus 13 14 Prot Relays Rplc	597,312.54	2021
NSP-Minnesota	A.0001611.004	Renewable and New Generation	PLV0C Eagle Take Permit	592,982.28	2021
NSP-Minnesota	A.0001574.795	Reliability/Performance Enhancement	SHC1-Upgrade U1 BMS HMI	570,696.97	2021
NSP-Minnesota	A.0001579.127	Reliability/Performance Enhancement	RIV7C-Install Circ Water Pumps CESP	560,906.96	2021
NSP-Minnesota	A.0001579.143	Reliability/Performance Enhancement	RIV0C-LCI Hardware and Ctrls Replac	548,388.95	2021
NSP-Minnesota	A.0001572.161	Reliability/Performance Enhancement	ASK1-Nuva Feeder PLC Replacement	534,785.30	2021
NSP-Minnesota	A.0001559.114	Reliability/Performance Enhancement	BLL8C U8 Excitation System Replacement	510,206.25	2021
NSP-Minnesota	A.0001559.112	Reliability/Performance Enhancement	BLL7C U7-Excitation System Replacement	510,197.51	2021
NSP-Minnesota	A.0001574.845	Environmental Enhancement	SHC0-Pond 3S Ring Dike Phase I	504,795.12	2021
NSP-Minnesota	A.0001559.104	Reliability/Performance Enhancement	BLL0C LCI Controls Replacement	495,612.20	2021
NSP-Minnesota	A.0001573.210	Reliability/Performance Enhancement	BDS0C-Replace Obsolete EDG Controls	465,444.25	2021
NSP-Minnesota	A.0001572.177	Reliability/Performance Enhancement	ASK1C Repl ID Fan Suction Exp	461,355.92	2021

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001574.298	Reliability/Performance Enhancement	SHC99 - Barn #51 Discharge Chute	455,172.39	2021
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	438,827.84	2021
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2017 Emergent Work	411,062.80	2021
NSP-Minnesota	A.0001591.004	Reliability/Performance Enhancement	ANS0C BOP Evrgren Ctrl	405,664.11	2021
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2021 Small Project Routine	398,890.09	2021
NSP-Minnesota	A.0001579.085	Reliability/Performance Enhancement	RIV0C -- Inst U9 Auto Tuning Package	382,003.69	2021
NSP-Minnesota	A.0001579.086	Reliability/Performance Enhancement	RIV0C -- Inst U10 Auto Tuning	381,998.78	2021
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2021 Small Project Routine	373,225.45	2021
NSP-Minnesota	A.0001561.014	Reliability/Performance Enhancement	IVH3C U3-4 UG Cable Replace	370,976.67	2021
NSP-Minnesota	A.0001562.030	Reliability/Performance Enhancement	REW0C RDF WALKING FLOOR REPLAC	356,639.59	2021
NSP-Minnesota	A.0001574.482	Reliability/Performance Enhancement	SHC1-U1 Mill 2021 Fall	356,527.63	2021
NSP-Minnesota	A.0001574.524	Reliability/Performance Enhancement	SHC3C Mill OH 2021 Spring	354,871.36	2021
NSP-Minnesota	A.0001562.031	Reliability/Performance Enhancement	REW1C U1 TURBINE BLADE REPLACE	351,271.26	2021
NSP-Minnesota	A.0001574.523	Reliability/Performance Enhancement	SHC3C Mill OH 2021 Fall	347,632.56	2021
NSP-Minnesota	A.0001572.152	Reliability/Performance Enhancement	ASK1-480V Plant Swgr Bus 3-4 R	334,148.31	2021
NSP-Minnesota	A.0001574.195	Reliability/Performance Enhancement	SHC2C 2021 Small Project Routine	330,891.77	2021
NSP-Minnesota	A.0001574.818	Reliability/Performance Enhancement	SHC1-Turb Ctrl Vlv Internals	319,683.57	2021
NSP-Minnesota	A.0001701.020	Renewable and New Generation	BS1-Blazing Star 1 PCMM	318,762.00	2021
NSP-Minnesota	A.0003000.680	Reliability/Performance Enhancement	REW0C Tool Blanket	315,000.00	2021
NSP-Minnesota	A.0001574.798	Reliability/Performance Enhancement	SHC1-Level 2 Mill OH 2021 Spring	308,672.64	2021
NSP-Minnesota	A.0001574.799	Reliability/Performance Enhancement	SHC2-Level 2 Mill OH 2021 Spring	308,672.64	2021
NSP-Minnesota	A.0001574.533	Reliability/Performance Enhancement	SHC0C Seal Wtr Pump Strainer	307,333.95	2021
NSP-Minnesota	A.0001574.504	Reliability/Performance Enhancement	SHC2-U2 Mill OH 2021 Fall	302,239.47	2021
NSP-Minnesota	A.0001572.246	Reliability/Performance Enhancement	ASK1-Protective Relay Upgrades	299,205.74	2021
NSP-Minnesota	A.0001574.850	Reliability/Performance Enhancement	SHC3-Foxboro Cyber Security Suite	298,588.10	2021
NSP-Minnesota	A.0001573.215	Reliability/Performance Enhancement	BDS6-Install 62 Air Compressor	294,389.87	2021
NSP-Minnesota	A.0001572.222	Reliability/Performance Enhancement	ASK99C 480V Coal Yrd Swgr Bus3-4 Rp	289,585.83	2021
NSP-Minnesota	A.0001579.078	Reliability/Performance Enhancement	RIV0C -- Inst Water Panel Auto	288,481.90	2021
NSP-Minnesota	A.0001575.164	Reliability/Performance Enhancement	HBC9C-Replace Seal Steam Superheate	288,156.48	2021
NSP-Minnesota	A.0001572.176	Reliability/Performance Enhancement	ASK1C Repl Hydrojet PC HF Sens	284,004.21	2021
NSP-Minnesota	A.0001574.673	Reliability/Performance Enhancement	SHC3C 1st Floor HVAC PLC Replace	283,094.88	2021
NSP-Minnesota	A.0001574.734	Reliability/Performance Enhancement	SHC0C Fire Prot Admin_Mapper Bldg	274,642.62	2021
NSP-Minnesota	A.0001574.741	Reliability/Performance Enhancement	SHC0C Service H2O Pipe Rplc	272,919.05	2021
NSP-Minnesota	A.0001574.731	Reliability/Performance Enhancement	SHC0C Fuel Oil Pump F.P.	255,591.60	2021
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	245,000.00	2021
NSP-Minnesota	A.0001706.008	Environmental Enhancement	LBW - Lake Benton PCMM	243,396.70	2021
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	239,598.44	2021
NSP-Minnesota	A.0001572.027	Reliability/Performance Enhancement	ASK1C-Admin Bldg HVAC Replace	239,378.97	2021
NSP-Minnesota	A.0001573.112	Reliability/Performance Enhancement	BDS2 - Ovhl 22 Circ Water Pump	238,899.28	2021
NSP-Minnesota	A.0001574.738	Reliability/Performance Enhancement	SHC0 2RSA H_Bushng Rplcmnt	235,199.61	2021
NSP-Minnesota	A.0001576.500	Renewable and New Generation	GDM Emergent Fund -Wind prod	228,025.31	2021
NSP-Minnesota	A.0001579.138	Reliability/Performance Enhancement	RIV10C U10 Comb Dynamics Replace	225,574.52	2021
NSP-Minnesota	A.0001579.139	Reliability/Performance Enhancement	RIV9C U9 Comb Dynamics Replace	225,472.85	2021
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	224,964.08	2021
NSP-Minnesota	A.0001579.157	Reliability/Performance Enhancement	RIV9-Replace U 9 HRSG Exp joints	214,424.23	2021
NSP-Minnesota	A.0001579.149	Reliability/Performance Enhancement	RIV10-Repl ExpJoints 10 CT Outlet	213,914.11	2021
NSP-Minnesota	A.0001703.013	Renewable and New Generation	FXW Foxtail PCMM New	212,508.00	2021
NSP-Minnesota	A.0001705.013	Renewable and New Generation	CRW Crowned Ridge PCMM	212,508.00	2021
NSP-Minnesota	A.0001706.013	Renewable and New Generation	LBW Lake Benton PCMM	212,508.00	2021
NSP-Minnesota	A.0001574.846	Reliability/Performance Enhancement	SHC3-SDA MTR purchase	212,393.97	2021
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	200,381.13	2021
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	200,000.00	2021
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2021 Small Project Routine	199,034.56	2021
NSP-Minnesota	A.0001565.085	Reliability/Performance Enhancement	WLM1 -Replace U1 CEMS Analyzers	198,806.65	2021
NSP-Minnesota	A.0001565.086	Reliability/Performance Enhancement	WLM2 -Replace U2 CEMS Analyzers	198,806.65	2021
NSP-Minnesota	A.0001573.230	Reliability/Performance Enhancement	BDS0 -Install High Water Road Gate	193,826.35	2021
NSP-Minnesota	A.0001571.094	Reliability/Performance Enhancement	ANS0C TBS Odorizer Rplc	180,508.28	2021
NSP-Minnesota	A.0001574.762	Reliability/Performance Enhancement	SHC1C Rewind BCP Motor 2021	180,503.25	2021
NSP-Minnesota	A.0001574.173	Reliability/Performance Enhancement	SHC3C Emergent work	175,083.59	2021
NSP-Minnesota	A.0001575.042	Reliability/Performance Enhancement	HBC8C U8Exh Exp Joint	174,739.03	2021
NSP-Minnesota	A.0001579.150	Reliability/Performance Enhancement	RIV10-Repl Unit 10 FW Reg Valve	173,172.65	2021

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001562.166	Reliability/Performance Enhancement	REW1-Electronic Overspeed	171,456.81	2021
NSP-Minnesota	A.0001574.800	Reliability/Performance Enhancement	SHC3-SHC3-Haul Road 2021	171,384.97	2021
NSP-Minnesota	A.0001574.419	Reliability/Performance Enhancement	SHC3C Control Room Roof Repl	169,659.70	2021
NSP-Minnesota	A.0001579.148	Reliability/Performance Enhancement	RIV9-Repl Combustion Air Purifiers-	167,385.81	2021
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2021 Small Project Routine	166,226.58	2021
NSP-Minnesota	A.0001575.041	Reliability/Performance Enhancement	HBC7C U7 Exh Exp Joint	165,881.62	2021
NSP-Minnesota	A.0001579.077	Reliability/Performance Enhancement	RIV0C -- DP Mon & Gen Gas Drye	165,774.33	2021
NSP-Minnesota	A.0001575.180	Reliability/Performance Enhancement	HBC9-HRH CRH Blk Vlv Vent Automate	162,786.71	2021
NSP-Minnesota	A.0001611.013	Renewable and New Generation	PVW0-PVW Eagle Take Permit	160,000.00	2021
NSP-Minnesota	A.0001571.091	Reliability/Performance Enhancement	ANS4-CT4 Turning Gear Reduction	159,271.07	2021
NSP-Minnesota	A.0001579.153	Reliability/Performance Enhancement	RIV9-Replace HP FW valve Unit 9	152,795.80	2021
NSP-Minnesota	A.0001561.500	Reliability/Performance Enhancement	IVH Emergent Fund -Other prod	152,313.81	2021
NSP-Minnesota	A.0001565.115	Reliability/Performance Enhancement	WLM0C DCS Software Hardware Upgrade	151,601.64	2021
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2021
NSP-Minnesota	A.0001574.268	Reliability/Performance Enhancement	SHC1C Emergent Projects	149,760.14	2021
NSP-Minnesota	A.0001574.303	Reliability/Performance Enhancement	SHC99 -CESP-2021 #4 CC Rotor Asmbl	147,480.45	2021
NSP-Minnesota	A.0001574.841	Reliability/Performance Enhancement	SHC3-Computer Room Fire Protect	145,437.15	2021
NSP-Minnesota	A.0001579.155	Reliability/Performance Enhancement	RIV10-All New Lowr Pen Seals HRSG	142,613.49	2021
NSP-Minnesota	A.0001565.120	Reliability/Performance Enhancement	WLM1C Replace U1 B11 Screw Auger 21	140,542.08	2021
NSP-Minnesota	A.0001703.009	Renewable and New Generation	FXW - Foxtail PCMM	136,227.58	2021
NSP-Minnesota	A.0001574.790	Reliability/Performance Enhancement	SHC0-CS1 Gas Bottle Storage	135,705.33	2021
NSP-Minnesota	A.0001564.027	Renewable and New Generation	HNI4C Replace Unit 4 Shaft Seals	135,214.08	2021
NSP-Minnesota	A.0001579.158	Reliability/Performance Enhancement	RIV9-Repl HRSG penetration seals	132,418.96	2021
NSP-Minnesota	A.0001574.819	Reliability/Performance Enhancement	SHC1-U1 TCS HMI Repl	131,771.99	2021
NSP-Minnesota	A.0001572.107	Reliability/Performance Enhancement	ASK1C Inst GRF Damper Drives	129,237.03	2021
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	125,000.00	2021
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	124,977.38	2021
NSP-Minnesota	A.0001559.500	Reliability/Performance Enhancement	BLL Emergent Fund -Other prod	120,013.31	2021
NSP-Minnesota	A.0001579.154	Reliability/Performance Enhancement	RIV10-Fuel Gas Valve Exchange	117,139.36	2021
NSP-Minnesota	A.0003000.697	Reliability/Performance Enhancement	SER-MMR- Misc Tools & Equip	117,000.00	2021
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	115,694.17	2021
NSP-Minnesota	A.0001574.842	Reliability/Performance Enhancement	SHC3-U3 Control Room Fire Protect	112,384.36	2021
NSP-Minnesota	A.0001579.142	Reliability/Performance Enhancement	RIV10 - Rplc Compressor Bleed Vlv	111,067.32	2021
NSP-Minnesota	A.0001573.010	Reliability/Performance Enhancement	BDS5C Cooling Water Strainer R	109,409.59	2021
NSP-Minnesota	A.0001573.088	Reliability/Performance Enhancement	BDS0 -Rplc Statn#9 Air Compressor	103,754.47	2021
NSP-Minnesota	A.0001574.302	Reliability/Performance Enhancement	SHC99-CESP-2021 #2 CC Rotor Asmbl	103,700.61	2021
NSP-Minnesota	A.0003000.491	Reliability/Performance Enhancement	SER-CHM-Evolution Test Set	102,000.00	2021
NSP-Minnesota	A.0001576.013	Renewable and New Generation	GDM Eagle Take Permit	97,641.62	2021
NSP-Minnesota	A.0001575.168	Reliability/Performance Enhancement	HBC0 -New Instmnt Air Compressor	96,640.94	2021
NSP-Minnesota	A.0001574.347	Reliability/Performance Enhancement	SHC1C Boiler Ignitor Replacement	95,993.01	2021
NSP-Minnesota	A.0001562.134	Reliability/Performance Enhancement	REW1C Repl Chutes U1 and Refract	95,550.12	2021
NSP-Minnesota	A.0001579.144	Reliability/Performance Enhancement	RIV10 -Rplc Lube Oil Pump	95,264.57	2021
NSP-Minnesota	A.0001579.152	Reliability/Performance Enhancement	RIV10-New FW isolation valves U10-2	94,733.39	2021
NSP-Minnesota	A.0001579.151	Reliability/Performance Enhancement	RIV9-Boiler FW isolation valves	93,205.44	2021
NSP-Minnesota	A.0001574.468	Reliability/Performance Enhancement	SHC3C Secoal Detector repl	86,031.23	2021
NSP-Minnesota	A.0005014.143	Renewable and New Generation	FBW0-Freeborn Building Furn & Equip	84,996.00	2021
NSP-Minnesota	A.0001575.182	Reliability/Performance Enhancement	HBC0-Install Aux Circ Strainer Bypass	82,838.99	2021
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	81,805.14	2021
NSP-Minnesota	A.0001576.021	Renewable and New Generation	GDM Eagle Take New	80,000.00	2021
NSP-Minnesota	A.0001574.732	Reliability/Performance Enhancement	SHC0C U1_2 Computer Room F.P.	70,815.04	2021
NSP-Minnesota	A.0001571.085	Reliability/Performance Enhancement	ANS4C Replace Unit 4 Battery	70,393.09	2021
NSP-Minnesota	A.0001573.227	Reliability/Performance Enhancement	BDS0 -Process Net Virtualization	69,107.90	2021
NSP-Minnesota	A.0001574.300	Reliability/Performance Enhancement	SHC99 - Rplc RCD DS Pipe	66,274.27	2021
NSP-Minnesota	A.0001573.118	Reliability/Performance Enhancement	BDS0 -#52 Cooling Wtr Instrument	65,188.80	2021
NSP-Minnesota	A.0001701.013	Renewable and New Generation	BS1 - Blazing Star1 PCMM	64,846.42	2021
NSP-Minnesota	A.0001559.115	Reliability/Performance Enhancement	BLL8-Replace u8 battery	60,683.34	2021
NSP-Minnesota	A.0003000.679	Reliability/Performance Enhancement	RIV0C-Tool Blanket	60,000.00	2021
NSP-Minnesota	A.0001574.297	Reliability/Performance Enhancement	SHC99-CESP-2020 #3 CC Rotor Asmbl	55,482.16	2021
NSP-Minnesota	A.0003000.748	Renewable and New Generation	BS10-Blazing Star 1 Tools and Equip	55,168.00	2021
NSP-Minnesota	A.0003000.750	Renewable and New Generation	FTW0-Foxtail Tools and Equipment	55,168.00	2021
NSP-Minnesota	A.0003000.577	Reliability/Performance Enhancement	SER0C MMR Video Probe 2021	55,002.00	2021

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001575.046	Reliability/Performance Enhancement	HBC8C U8 CT Servo Replace 2	54,502.64	2021
NSP-Minnesota	A.0003000.583	Reliability/Performance Enhancement	SER0C PMO DAS Upgrade 2021	51,000.00	2021
NSP-Minnesota	A.0001573.270	Reliability/Performance Enhancement	BDS2-21 CWP Motor Rewind	50,936.01	2021
NSP-Minnesota	A.0001574.666	Reliability/Performance Enhancement	SHC3C CT Vibration System	50,269.76	2021
NSP-Minnesota	A.0003000.669	Reliability/Performance Enhancement	HBC0C HB CC Tool Blanket	50,000.00	2021
NSP-Minnesota	A.0001707.003	Renewable and New Generation	DKR0 Dakota Range Wind TSG 345Kv Line	48,824.89	2021
NSP-Minnesota	A.0001561.115	Reliability/Performance Enhancement	IVH0 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001566.171	Renewable and New Generation	NBL OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001574.855	Reliability/Performance Enhancement	SHC99 BUD OTS-Security Monitor and	47,661.54	2021
NSP-Minnesota	A.0001576.020	Renewable and New Generation	GDM OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001580.014	Renewable and New Generation	CWF0 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001610.012	Renewable and New Generation	BWF0 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001611.012	Renewable and New Generation	PVW OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001701.019	Renewable and New Generation	BS1 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001703.012	Renewable and New Generation	FXW OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001706.012	Renewable and New Generation	LBW0 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0001721.003	Renewable and New Generation	JWF0 OTS Security Monitor and Log	47,661.54	2021
NSP-Minnesota	A.0003000.214	Reliability/Performance Enhancement	C100C PMO Tool Blanket-New	45,000.00	2021
NSP-Minnesota	A.0003000.661	Reliability/Performance Enhancement	BDS0C Tool Blanket	40,315.00	2021
NSP-Minnesota	A.0001571.073	Reliability/Performance Enhancement	ANS0C Replace Admin Battery	40,285.95	2021
NSP-Minnesota	A.0001574.856	Reliability/Performance Enhancement	SHC1 BUD OTS-Security Monitor and L	38,193.13	2021
NSP-Minnesota	A.0001574.857	Reliability/Performance Enhancement	SHC2 BUD OTS-Security Monitor and L	38,193.13	2021
NSP-Minnesota	A.0003000.708	Reliability/Performance Enhancement	C100C MTR-Replaced Failed Equip	36,000.00	2021
NSP-Minnesota	A.0003000.749	Renewable and New Generation	CRW0-Crowned Ridge Tools-Equip	35,000.00	2021
NSP-Minnesota	A.0003000.751	Renewable and New Generation	LBW0-Lake Benton Tools-Equip	35,000.00	2021
NSP-Minnesota	A.0001562.167	Reliability/Performance Enhancement	REW1-SKF Monitoring System	33,753.18	2021
NSP-Minnesota	A.0003000.662	Renewable and New Generation	BRDR Small Tools Equip	29,997.00	2021
NSP-Minnesota	A.0003000.685	Reliability/Performance Enhancement	WLM0C Tools & Equipment B	29,997.00	2021
NSP-Minnesota	A.0003000.752	Renewable and New Generation	FBWO Freeborn Tools and Equipment	25,000.00	2021
NSP-Minnesota	A.0001575.186	Reliability/Performance Enhancement	HBC8 Condensate Iso Vlv Install	24,013.51	2021
NSP-Minnesota	A.0001574.269	Reliability/Performance Enhancement	SHC2C Emergent Projects	20,502.20	2021
NSP-Minnesota	A.0001574.838	Reliability/Performance Enhancement	SHC99-Replace #6 well	20,000.00	2021
NSP-Minnesota	A.0003000.657	Reliability/Performance Enhancement	ANS0C Tools and Equip Ca	20,000.00	2021
NSP-Minnesota	A.0003000.659	Reliability/Performance Enhancement	BLL0C Tools Blanket	20,000.00	2021
NSP-Minnesota	A.0003000.672	Reliability/Performance Enhancement	IVH0C Misc tools and Equip	20,000.00	2021
NSP-Minnesota	A.0003000.676	Renewable and New Generation	NBLCo Misc Tools and Equip	20,000.00	2021
NSP-Minnesota	A.0003000.703	Reliability/Performance Enhancement	C100C CSC Tank Ladder and Platform	20,000.00	2021
NSP-Minnesota	A.0003000.678	Renewable and New Generation	PLV Tools Equip	19,998.00	2021
NSP-Minnesota	A.0003000.671	Renewable and New Generation	HNIC0 Misc Tools and Equ	15,000.00	2021
NSP-Minnesota	A.0005014.142	Renewable and New Generation	BS10-Blazing Star 1 Build Furn & Equip.	10,056.00	2021
NSP-Minnesota	A.0005014.144	Renewable and New Generation	FTW0-Foxtail Building Furn & Equip	10,056.00	2021
NSP-Minnesota	A.0003000.667	Renewable and New Generation	GDM0C Grand Mead Cap Tool	10,000.00	2021
NSP-Minnesota	A.0003000.128	Renewable and New Generation	CWF Tools & Misc Equipment	9,999.00	2021
NSP-Minnesota	A.0001574.733	Reliability/Performance Enhancement	SHC0C Electric & Electronic Room FP	8,516.31	2021
NSP-Minnesota	A.0003000.492	Reliability/Performance Enhancement	SER-CSC-Floor Scale Replace	4,000.00	2021
NSP-Minnesota	A.0001574.209	Reliability/Performance Enhancement	SHC3C 2021 Small Project Routine	3,591.51	2021
NSP-Minnesota	A.0001564.500	Renewable and New Generation	St Anthony Falls Emergent -Other Prod	91.91	2021
NSP-Minnesota	A.0001572.204	Reliability/Performance Enhancement	ASK1C Secondary Superheater Replace	(0.03)	2021
NSP-Minnesota	A.0001573.224	Reliability/Performance Enhancement	BDS5 - Ovhl U5 Hot Gas Path	8,810,293.83	2022
NSP-Minnesota	A.0001571.090	Reliability/Performance Enhancement	ANS4 - U4 Hot Gas Path	4,801,331.44	2022
NSP-Minnesota	A.0001573.226	Environmental Enhancement	BDS0 -BlackDog Rd Erosion Wall	2,717,095.85	2022
NSP-Minnesota	A.0001561.030	Reliability/Performance Enhancement	IVH3C Turbine Controls	2,431,758.42	2022
NSP-Minnesota	A.0001573.212	Reliability/Performance Enhancement	BDS2C-Replace U2 Turbine L-0 Blades	2,423,661.33	2022
NSP-Minnesota	A.0001579.072	Reliability/Performance Enhancement	RIV0C -- Replace Water Treatment	2,400,229.07	2022
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	1,991,981.61	2022
NSP-Minnesota	A.0001559.048	Reliability/Performance Enhancement	BLL8C-CESP GSU 171-227 MVA 18-115kV	1,877,641.70	2022
NSP-Minnesota	A.0001565.124	Environmental Enhancement	WLM2C Replace U2 Baghouse Bag	1,560,257.61	2022
NSP-Minnesota	A.0001559.006	Reliability/Performance Enhancement	BLLC7 U7 Exhaust Silencer Repl	1,526,643.60	2022
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	1,506,262.93	2022
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	1,433,650.63	2022
NSP-Minnesota	A.0001591.007	Reliability/Performance Enhancement	ANS4C U4 Repl Mark V Cn	1,402,194.55	2022

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,260,521.36	2022
NSP-Minnesota	A.0001573.070	Reliability/Performance Enhancement	BDS5C U5 Ovation System Evergreen	1,207,422.41	2022
NSP-Minnesota	A.0001573.281	Reliability/Performance Enhancement	BDS0-480V Load Centers Repl	1,145,942.16	2022
NSP-Minnesota	A.0001573.184	Reliability/Performance Enhancement	BDS2C Automated Trap Bypass Valve	1,115,158.61	2022
NSP-Minnesota	A.0001574.848	Reliability/Performance Enhancement	SHC99-New Rotary Plow Feeder on 53 conveyor	1,109,415.89	2022
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	996,994.87	2022
NSP-Minnesota	A.0001591.003	Reliability/Performance Enhancement	ANS2C Repl U2 gen break	975,842.94	2022
NSP-Minnesota	A.0001573.205	Reliability/Performance Enhancement	BDS0C-Replace Fire Protection Panel	968,356.07	2022
NSP-Minnesota	A.0001573.056	Reliability/Performance Enhancement	BDS2C U2 LP Steam to Crossover	960,646.51	2022
NSP-Minnesota	A.0001571.011	Reliability/Performance Enhancement	ANSC0 Replace U4 Silencer	925,358.89	2022
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	764,484.53	2022
NSP-Minnesota	A.0001575.037	Reliability/Performance Enhancement	HBC0C Warming Line to Intake	739,572.90	2022
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	700,027.30	2022
NSP-Minnesota	A.0001565.111	Reliability/Performance Enhancement	WLM0C Replace U0 Scalping Conveyor	694,866.18	2022
NSP-Minnesota	A.0001579.083	Reliability/Performance Enhancement	RIV0C --Aux boiler Controls Up	645,591.29	2022
NSP-Minnesota	A.0001579.069	Reliability/Performance Enhancement	RIV0C -- Instrument Air Sys Rep	631,747.68	2022
NSP-Minnesota	A.0001566.169	Renewable and New Generation	NBL0 - Replace Generators	553,836.09	2022
NSP-Minnesota	A.0001571.082	Reliability/Performance Enhancement	ANS4C U4-Ex 2100 E -Excitation Sys	537,769.49	2022
NSP-Minnesota	A.0001575.169	Reliability/Performance Enhancement	HBC0 - Boiler Feed Pump CESP	511,134.92	2022
NSP-Minnesota	A.0001565.132	Reliability/Performance Enhancement	WLM0-Replace Overhead Bridge Crane	506,303.66	2022
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	494,712.29	2022
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2022 Emergent Work	493,489.86	2022
NSP-Minnesota	A.0001565.077	Reliability/Performance Enhancement	WLM0C Slaker PLC Replacement	492,763.18	2022
NSP-Minnesota	A.0001572.214	Reliability/Performance Enhancement	ASK1C AQCS Battery Replacement	481,258.89	2022
NSP-Minnesota	A.0001591.004	Reliability/Performance Enhancement	ANS0C BOP Evrgren Ctrl	479,509.00	2022
NSP-Minnesota	A.0001572.232	Reliability/Performance Enhancement	ASK1C-TurboToc PLC Upgrade	474,696.73	2022
NSP-Minnesota	A.0001571.081	Reliability/Performance Enhancement	ANS4C U4-LCI Controls Replacement	459,574.99	2022
NSP-Minnesota	A.0001565.114	Reliability/Performance Enhancement	WLM0C Landfill Cell 7 and 6	458,819.84	2022
NSP-Minnesota	A.0001562.155	Reliability/Performance Enhancement	REW2-Replace Bus 21 Switchgear	455,518.41	2022
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2022 Small Project Routine	455,113.57	2022
NSP-Minnesota	A.0001562.156	Reliability/Performance Enhancement	REW1-Replace Bus 11 Switchgear	454,776.93	2022
NSP-Minnesota	A.0001572.233	Reliability/Performance Enhancement	ASK99C-Transfer House 1 Control Sys	450,529.16	2022
NSP-Minnesota	A.0001572.234	Reliability/Performance Enhancement	ASK99C-Transfer House 2 Control Sys	450,529.16	2022
NSP-Minnesota	A.0001574.195	Reliability/Performance Enhancement	SHC2C 2022 Small Project Routine	440,432.58	2022
NSP-Minnesota	A.0001574.304	Reliability/Performance Enhancement	SHC2 -Turb Ctrl Vlv Internals	435,553.91	2022
NSP-Minnesota	A.0001565.117	Reliability/Performance Enhancement	WLM1C Replace U1 Gratebed	431,901.75	2022
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	427,500.12	2022
NSP-Minnesota	A.0001565.125	Reliability/Performance Enhancement	WLM2-Replace U2 Boiler Grates	427,211.39	2022
NSP-Minnesota	A.0001702.018	Renewable and New Generation	BS2 Blazing Star 2 PCMM-New	425,016.00	2022
NSP-Minnesota	A.0001704.014	Renewable and New Generation	FBW Freeborn PCMM	425,016.00	2022
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2022 Small Project Routine	408,793.83	2022
NSP-Minnesota	A.0001573.182	Reliability/Performance Enhancement	BDS2C U2 Turning Gear Replace	407,595.67	2022
NSP-Minnesota	A.0001562.138	Reliability/Performance Enhancement	REW0C Replace Scalping Conveyor	404,189.82	2022
NSP-Minnesota	A.0001562.154	Reliability/Performance Enhancement	REW0-Replace Duct Scrubber Controls	403,513.99	2022
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	392,969.36	2022
NSP-Minnesota	A.0001573.223	Reliability/Performance Enhancement	BDS2 -Rplc Turbine Valve Internal	387,023.54	2022
NSP-Minnesota	A.0001561.015	Reliability/Performance Enhancement	IVH5C U5-6 UG Cable Replacement	381,375.53	2022
NSP-Minnesota	A.0001561.029	Reliability/Performance Enhancement	IVH3C Gas Valve Ctrl Repl	373,548.22	2022
NSP-Minnesota	A.0001573.171	Reliability/Performance Enhancement	BDS0C Admin Bldg Fire Protection	362,867.89	2022
NSP-Minnesota	A.0001574.493	Reliability/Performance Enhancement	SHC1C Mill OH 2022 Fall	356,469.33	2022
NSP-Minnesota	A.0001574.526	Reliability/Performance Enhancement	SHC3C Mill OH 2022 Spring	354,784.54	2022
NSP-Minnesota	A.0001574.525	Reliability/Performance Enhancement	SHC3C Mill OH 2022 Fall	347,610.53	2022
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	344,526.61	2022
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	326,297.99	2022
NSP-Minnesota	A.0001573.123	Reliability/Performance Enhancement	BDS0 - Install U3 Turbine Floor	316,761.09	2022
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	314,416.79	2022
NSP-Minnesota	A.0001574.491	Reliability/Performance Enhancement	SHC1C Mill 2022 Spring	308,595.14	2022
NSP-Minnesota	A.0001574.802	Reliability/Performance Enhancement	SHC2-Level 2 Mill OH 2022 Spring	308,595.14	2022
NSP-Minnesota	A.0001610.011	Renewable and New Generation	BWF0 - Oil Particle Count System	306,180.95	2022
NSP-Minnesota	A.0001562.149	Reliability/Performance Enhancement	REW1C-REW1 - Replace U1 Superheater	303,030.04	2022
NSP-Minnesota	A.0001562.135	Reliability/Performance Enhancement	REW0C Repl Baghouse Controls	302,612.83	2022

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001562.007	Reliability/Performance Enhancement	REW0613-Condenser Retube	301,861.47	2022
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	296,000.00	2022
NSP-Minnesota	A.0001572.251	Reliability/Performance Enhancement	ASK1-11&12 Travel Water Screen	276,001.89	2022
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	274,960.00	2022
NSP-Minnesota	A.0001562.039	Environmental Enhancement	REW0 - EPA 316b-Svc Water Pumps	249,774.64	2022
NSP-Minnesota	A.0001572.236	Reliability/Performance Enhancement	ASK1C-Econ Outlet Exp Joint	247,032.15	2022
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2022 Small Project Routine	227,512.48	2022
NSP-Minnesota	A.0001573.117	Reliability/Performance Enhancement	BDS2C Water Induction Monitor	218,460.21	2022
NSP-Minnesota	A.0001579.016	Reliability/Performance Enhancement	RIV7C-U7 Turbine Roof Replace	215,542.71	2022
NSP-Minnesota	A.0001573.186	Reliability/Performance Enhancement	BDS2C Redundant LO Vapor Extractor	211,937.14	2022
NSP-Minnesota	A.0001574.682	Reliability/Performance Enhancement	SHCJC 3, 4 Xshr Fdr Floor Resto	198,754.19	2022
NSP-Minnesota	A.0001573.271	Reliability/Performance Enhancement	BDS5-Replace CT Inlet Filters	195,580.74	2022
NSP-Minnesota	A.0001574.801	Reliability/Performance Enhancement	SHC3-Landfl Mtnc Grg Lim Rcv HVAC P	183,494.30	2022
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2022 Small Project Routine	182,766.61	2022
NSP-Minnesota	A.0001562.139	Reliability/Performance Enhancement	REW2C Repl U2 Trvlg Gate Bed	176,193.77	2022
NSP-Minnesota	A.0001562.051	Reliability/Performance Enhancement	REW1C REPLACE U1 TRAVELING GRA	175,819.85	2022
NSP-Minnesota	A.0001562.169	Reliability/Performance Enhancement	REW2-Electronic Overspeed	172,720.35	2022
NSP-Minnesota	A.0001574.803	Reliability/Performance Enhancement	SHC3-Haul Road	171,382.46	2022
NSP-Minnesota	A.0001562.136	Reliability/Performance Enhancement	REW0C C9 Internal Repl	168,864.85	2022
NSP-Minnesota	A.0001573.225	Reliability/Performance Enhancement	BDS5 - Rplc U5 Duct Burner PLC	164,992.49	2022
NSP-Minnesota	A.0001573.128	Reliability/Performance Enhancement	BDS5C CT Expansion Joint	161,688.77	2022
NSP-Minnesota	A.0001574.200	Reliability/Performance Enhancement	SHC1C #13 Boiler FeedPump Over	159,096.33	2022
NSP-Minnesota	A.0001574.687	Reliability/Performance Enhancement	SHCJC 3A Gate to 4A-B Upgrade	157,046.10	2022
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2022
NSP-Minnesota	A.0001565.052	Reliability/Performance Enhancement	WLM0-Replace Lime Mixer Grit S	136,376.20	2022
NSP-Minnesota	A.0001565.128	Reliability/Performance Enhancement	WLM1-Replace U1 B12 Screw Augers	130,568.58	2022
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	122,317.86	2022
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	118,653.83	2022
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	114,170.54	2022
NSP-Minnesota	A.0001574.306	Reliability/Performance Enhancement	SHC99-CESP 2022 #1 CC Rotor Asmbl	105,661.51	2022
NSP-Minnesota	A.0001574.463	Reliability/Performance Enhancement	SHC3-U3 Stock Fdr Speed repl	103,308.07	2022
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	100,000.00	2022
NSP-Minnesota	A.0001572.227	Environmental Enhancement	ASK1C-316b Permit	99,822.87	2022
NSP-Minnesota	A.0001574.840	Reliability/Performance Enhancement	SHC99-Chemistry Lab Fire Protection	96,954.47	2022
NSP-Minnesota	A.0001573.120	Reliability/Performance Enhancement	BDS2 -Rplc Circ Pump Disch Valves	96,527.11	2022
NSP-Minnesota	A.0001573.207	Reliability/Performance Enhancement	BDS2C-Install Lube Oil Trip Manifol	89,561.67	2022
NSP-Minnesota	A.0003000.697	Reliability/Performance Enhancement	SER-MMR- Misc Tools & Equip	86,630.00	2022
NSP-Minnesota	A.0001573.274	Reliability/Performance Enhancement	BDS5-Repl 5 CT Compartment Dampers	85,551.66	2022
NSP-Minnesota	A.0001579.115	Reliability/Performance Enhancement	RIV0-U0 Install CEMS power red	79,272.87	2022
NSP-Minnesota	A.0001579.135	Reliability/Performance Enhancement	RIV0C 62 Battery Replace	77,508.95	2022
NSP-Minnesota	A.0001574.358	Reliability/Performance Enhancement	SHC1C North Blr Bldg Roof Repl	75,456.05	2022
NSP-Minnesota	A.0001573.269	Reliability/Performance Enhancement	BD5 Modified HGP w_Flex Ops	74,305.36	2022
NSP-Minnesota	A.0001579.073	Reliability/Performance Enhancement	RIV0C -- Replace 61 Battery	73,787.05	2022
NSP-Minnesota	A.0001574.769	Reliability/Performance Enhancement	SHC3C CR HVAC PLC 2nd Flr Replace	69,923.12	2022
NSP-Minnesota	A.0001573.221	Reliability/Performance Enhancement	BDS2 -Ovhl #21 Cndnsr Vcm Pump	69,211.31	2022
NSP-Minnesota	A.0001573.222	Reliability/Performance Enhancement	BDS2 - Ovhl #22 Cndnsr Vcm Pump	69,211.31	2022
NSP-Minnesota	A.0001565.065	Reliability/Performance Enhancement	WLM1C C7 & C8 VFD	65,318.17	2022
NSP-Minnesota	A.0001574.805	Reliability/Performance Enhancement	SHC0-Coal conveyor F.P.	63,885.42	2022
NSP-Minnesota	A.0003000.679	Reliability/Performance Enhancement	RIV0C-Tool Blanket	60,000.00	2022
NSP-Minnesota	A.0001572.246	Reliability/Performance Enhancement	ASK1-Protective Relay Upgrades	58,532.00	2022
NSP-Minnesota	A.0001573.203	Reliability/Performance Enhancement	BDS5C-Repl U5 Fuel Gas Heater CV	58,052.91	2022
NSP-Minnesota	A.0001576.500	Renewable and New Generation	GDM Emergent Fund -Wind prod	56,403.27	2022
NSP-Minnesota	A.0001573.272	Reliability/Performance Enhancement	BDS5-Repl U5 LP Drum Feedwater CV-2	56,011.90	2022
NSP-Minnesota	A.0001561.500	Reliability/Performance Enhancement	IVH Emergent Fund -Other prod	55,963.22	2022
NSP-Minnesota	A.0003000.578	Reliability/Performance Enhancement	SER0C MMR Video Probe	55,000.00	2022
NSP-Minnesota	A.0001574.731	Reliability/Performance Enhancement	SHC0C Fuel Oil Pump F.P.	50,000.00	2022
NSP-Minnesota	A.0003000.669	Reliability/Performance Enhancement	HBC0C HB CC Tool Blanket	50,000.00	2022
NSP-Minnesota	A.0001559.500	Reliability/Performance Enhancement	BLL Emergent Fund -Other prod	49,685.92	2022
NSP-Minnesota	A.0003000.661	Reliability/Performance Enhancement	BDS0C Tool Blanket	42,852.00	2022
NSP-Minnesota	A.0001573.102	Reliability/Performance Enhancement	BDS0C Office Area Heaters	41,960.45	2022
NSP-Minnesota	A.0001575.171	Reliability/Performance Enhancement	HBC0 - Rmv & Rplc BFP Spare YR1	40,893.70	2022

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0003000.567	Reliability/Performance Enhancement	SER0C MMR Alloy Analyzer	38,000.00	2022
NSP-Minnesota	A.0001573.273	Reliability/Performance Enhancement	BDS5-U5 Overspeed Probe	35,650.60	2022
NSP-Minnesota	A.0003000.707	Reliability/Performance Enhancement	C100C CSC Aerosol Can Crusher	32,180.00	2022
NSP-Minnesota	A.0003000.748	Renewable and New Generation	BS10-Blazing Star 1 Tools and Equip	30,168.00	2022
NSP-Minnesota	A.0003000.750	Renewable and New Generation	FTW0-Foxtail Tools and Equipment	30,168.00	2022
NSP-Minnesota	A.0003000.662	Renewable and New Generation	BRDR Small Tools Equip	29,997.00	2022
NSP-Minnesota	A.0003000.678	Renewable and New Generation	PLV Tools Equip	29,997.00	2022
NSP-Minnesota	A.0003000.667	Renewable and New Generation	GDM0C Grand Mead Cap Tool	29,997.00	2022
NSP-Minnesota	A.0003000.128	Renewable and New Generation	CWF Tools & Misc Equipment	29,997.00	2022
NSP-Minnesota	A.0003000.563	Reliability/Performance Enhancement	SER0C CSC Drum Packer Crusher	21,000.00	2022
NSP-Minnesota	A.0003000.659	Reliability/Performance Enhancement	BLL0C Tools Blanket	20,000.00	2022
NSP-Minnesota	A.0003000.657	Reliability/Performance Enhancement	ANS0C Tools and Equip Ca	20,000.00	2022
NSP-Minnesota	A.0003000.672	Reliability/Performance Enhancement	IVH0C Misc tools and Equip	20,000.00	2022
NSP-Minnesota	A.0003000.676	Renewable and New Generation	NBLCo Misc Tools and Equi	20,000.00	2022
NSP-Minnesota	A.0001574.173	Reliability/Performance Enhancement	SHC3C Emergent work	18,928.09	2022
NSP-Minnesota	A.0001574.268	Reliability/Performance Enhancement	SHC1C Emergent Projects	16,191.11	2022
NSP-Minnesota	A.0001574.673	Reliability/Performance Enhancement	SHC3C 1st Floor HVAC PLC Replace	15,635.00	2022
NSP-Minnesota	A.0003000.680	Reliability/Performance Enhancement	REW0C Tool Blanket	15,000.00	2022
NSP-Minnesota	A.0003000.671	Renewable and New Generation	HNIC0 Misc Tools and Equ	15,000.00	2022
NSP-Minnesota	A.0001562.168	Reliability/Performance Enhancement	REW2-SKF Monitoring System	13,582.43	2022
NSP-Minnesota	A.0005014.142	Renewable and New Generation	BS10-Blazing Star 1 Build Furn & Equip.	10,056.00	2022
NSP-Minnesota	A.0005014.144	Renewable and New Generation	FTW0-Foxtail Building Furn & Equip	10,056.00	2022
NSP-Minnesota	A.0001574.666	Reliability/Performance Enhancement	SHC3C CT Vibration System	9,834.00	2022
NSP-Minnesota	A.0003000.564	Reliability/Performance Enhancement	SER0C CSC Rolloff Container 1	8,000.00	2022
NSP-Minnesota	A.0003000.565	Reliability/Performance Enhancement	SER0C CSC Rolloff Container 2	8,000.00	2022
NSP-Minnesota	A.0001574.738	Reliability/Performance Enhancement	SHC0 2RSA H_Bushng Rplcmnt	6,128.00	2022
NSP-Minnesota	A.0001574.269	Reliability/Performance Enhancement	SHC2C Emergent Projects	2,216.61	2022
NSP-Minnesota	A.0001574.733	Reliability/Performance Enhancement	SHC0C Electric & Electronic Room FP	1,666.00	2022
NSP-Minnesota	A.0001565.118	Environmental Enhancement	WLM1C Replace U1 Baghouse Bags	1,000.00	2022
NSP-Minnesota	A.0001565.115	Reliability/Performance Enhancement	WLM0C DCS Software Hardware Upgrade	500.00	2022
NSP-Minnesota	A.0001574.209	Reliability/Performance Enhancement	SHC3C 2022 Small Project Routine	388.26	2022
NSP-Minnesota	A.0001564.500	Renewable and New Generation	St Anthony Falls Emergent -Other Pr	9.95	2022
NSP-Minnesota	A.0001707.001	Renewable and New Generation	DKR0 Dakota Range Wind Turbines	(7,156,446.00)	2022
NSP-Minnesota	A.0001575.170	Reliability/Performance Enhancement	HBC8 - U8 CT Ovhl Major Outage	11,057,186.55	2023
NSP-Minnesota	A.0001571.023	Reliability/Performance Enhancement	ANS2-C-U2 replace vanes and bl	10,626,069.83	2023
NSP-Minnesota	A.0001561.032	Reliability/Performance Enhancement	IVH5C Turbine Controls	2,538,542.31	2023
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	2,370,770.15	2023
NSP-Minnesota	A.0001573.169	Reliability/Performance Enhancement	BDS0C Reverse Osmosis 2nd Pass	2,143,771.93	2023
NSP-Minnesota	A.0001574.672	Reliability/Performance Enhancement	SHC3C 36_1 & 36_2 FWHs Replace	2,101,699.60	2023
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,924,347.88	2023
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	1,509,246.54	2023
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	1,243,834.70	2023
NSP-Minnesota	A.0001574.804	Reliability/Performance Enhancement	SHC3-U3 DCS Workstation Upgrade	1,054,653.15	2023
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	1,051,022.52	2023
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	975,123.65	2023
NSP-Minnesota	A.0001575.167	Reliability/Performance Enhancement	HBC0-Evergreen Upgrade #2	961,937.16	2023
NSP-Minnesota	A.0001565.083	Reliability/Performance Enhancement	WLM0- Landfill Cells 8, 9, 10	881,381.33	2023
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	880,088.02	2023
NSP-Minnesota	A.0001574.307	Reliability/Performance Enhancement	SHC3 - Replace U3 Inverter	819,054.20	2023
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2023 Small Project Routine	742,231.87	2023
NSP-Minnesota	A.0001571.088	Reliability/Performance Enhancement	ANS2-ANS U2 Generator Inspection	683,061.86	2023
NSP-Minnesota	A.0001575.174	Reliability/Performance Enhancement	HBC8- Rplc LP Lower Prehtr Header	614,274.03	2023
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	546,205.99	2023
NSP-Minnesota	A.0001574.671	Reliability/Performance Enhancement	SHC3C CW Valve & EXJ Rplcmnt	540,091.56	2023
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2017 Emergent Work	506,831.99	2023
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2023 Small Project Routine	461,312.02	2023
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	460,394.65	2023
NSP-Minnesota	A.0001707.012	Renewable and New Generation	DKR Dakota Range PCMM New	425,016.00	2023
NSP-Minnesota	A.0001579.156	Reliability/Performance Enhancement	RIV0-Replace Obsolete EDG Controls	408,609.02	2023
NSP-Minnesota	A.0001561.039	Reliability/Performance Enhancement	IVHC Gas Vlv Ctrl Rplc	407,478.14	2023
NSP-Minnesota	A.0001562.153	Reliability/Performance Enhancement	REW2C-REW2 - Replace U2 Superheater	403,990.86	2023

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year
NSP-Minnesota	A.0001562.060	Environmental Enhancement	REW0 - 316b - Fish Return Line	402,234.50	2023
NSP-Minnesota	A.0001566.169	Renewable and New Generation	NBL0 - Replace Generators	398,300.75	2023
NSP-Minnesota	A.0001565.037	Reliability/Performance Enhancement	WLM1C Replace U1 Rear Wall	378,885.54	2023
NSP-Minnesota	A.0001574.816	Reliability/Performance Enhancement	SHC3-U3 Level 2 Mill OH 2023 Sprg	354,909.73	2023
NSP-Minnesota	A.0001562.043	Environmental Enhancement	REW0 - 316b-Control System	352,101.46	2023
NSP-Minnesota	A.0001574.815	Reliability/Performance Enhancement	SHC3-U3 Level 2 Mill OH 2023 Fall	347,642.25	2023
NSP-Minnesota	A.0001562.162	Environmental Enhancement	REW1-Replace U1 Baghouse Bags	346,457.38	2023
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	337,340.14	2023
NSP-Minnesota	A.0001573.217	Reliability/Performance Enhancement	BDS0-Repl Discharge Gate Comm Ctrl	318,967.94	2023
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	311,416.25	2023
NSP-Minnesota	A.0001574.820	Reliability/Performance Enhancement	SHC1-U1 Level 2 Mill OH 2023 Sprg	308,706.92	2023
NSP-Minnesota	A.0001574.821	Reliability/Performance Enhancement	SHC1-U1 Level 2 Mill OH 2023 Fall	302,248.27	2023
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	293,805.04	2023
NSP-Minnesota	A.0001574.025	Reliability/Performance Enhancement	SHC3C U3 Rpl Aux Cool HX Ball	290,673.14	2023
NSP-Minnesota	A.0001574.814	Reliability/Performance Enhancement	SHC3-U3 landfill	287,645.96	2023
NSP-Minnesota	A.0001572.252	Reliability/Performance Enhancement	ASK1-13&14 Travel Water Screen	281,622.29	2023
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	266,624.00	2023
NSP-Minnesota	A.0001565.134	Reliability/Performance Enhancement	WLM2 Turbine Electronic Overspeed	251,932.53	2023
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	243,990.17	2023
NSP-Minnesota	A.0001573.206	Reliability/Performance Enhancement	BDS0C-Replace CV Positioners	234,825.54	2023
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2023 Small Project Routine	230,651.22	2023
NSP-Minnesota	A.0001574.309	Reliability/Performance Enhancement	SHC3 - Turb Cntrl Vlv Intnl	229,958.70	2023
NSP-Minnesota	A.0001573.283	Reliability/Performance Enhancement	BDS0-Install Security Badge Readers	225,412.86	2023
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	200,004.00	2023
NSP-Minnesota	A.0001565.116	Reliability/Performance Enhancement	WLM1C U1 Static Exciter	191,044.75	2023
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2023 Small Project Routine	184,602.80	2023
NSP-Minnesota	A.0001565.122	Reliability/Performance Enhancement	WLM2C U2 Static Exciter	180,933.96	2023
NSP-Minnesota	A.0001573.179	Reliability/Performance Enhancement	BDS0C GSU Containment Const Spare	177,180.99	2023
NSP-Minnesota	A.0001574.791	Reliability/Performance Enhancement	SHC3-SHC3-Haul Road	171,386.07	2023
NSP-Minnesota	A.0001573.107	Reliability/Performance Enhancement	BDS0C Vehicle Fueling Station	154,791.49	2023
NSP-Minnesota	A.0001573.059	Reliability/Performance Enhancement	BDS5C CT Remote Monitoring	150,546.93	2023
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2023
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	123,065.44	2023
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	122,669.14	2023
NSP-Minnesota	A.0001575.162	Reliability/Performance Enhancement	HBC8C Exh Exp Joint (EE00) Rplc	122,242.58	2023
NSP-Minnesota	A.0001562.165	Reliability/Performance Enhancement	REW1-Repl U1 CEMS Analyzers	120,822.56	2023
NSP-Minnesota	A.0001562.170	Reliability/Performance Enhancement	REW2-Replace U2 CEMS Analyzers	120,822.56	2023
NSP-Minnesota	A.0001574.737	Reliability/Performance Enhancement	SHC0 Air Comp Controls U0	118,559.95	2023
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	113,031.20	2023
NSP-Minnesota	A.0001574.311	Reliability/Performance Enhancement	SHC99 -CESP 2023 #3 CC Rotor Asmbl	105,693.39	2023
NSP-Minnesota	A.0001574.572	Reliability/Performance Enhancement	SHC99 -CESP-2024 #4 CC Rotor Asmbl	104,453.93	2023
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	100,000.00	2023
NSP-Minnesota	A.0001573.178	Reliability/Performance Enhancement	BDS0C Heating System Sample Panel	96,706.17	2023
NSP-Minnesota	A.0001574.677	Reliability/Performance Enhancement	SHC3C Air Comp Controls Replace	96,575.98	2023
NSP-Minnesota	A.0001574.535	Reliability/Performance Enhancement	SHC3C BFP Overhaul 33	95,304.02	2023

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001707.001	Renewable and New Generation	DKR0 Dakota Range Wind Turbines	368,524,686.34	2021	Construct a 300 MW New Wind Farm in Grant and Codington Counties, South Dakota. The wind farm includes 72- V136 Vestas Turbines rated at 4.2 MWs each, a collector system, O&M building, access roads, and collector substation.	This project qualifies for the Federal Production Tax Credit (PTC) at an 80% level.
NSP-Minnesota	A.0001704.001	Renewable and New Generation	FBW G100-Freeborn Wind Farm	327,934,287.32	2021	Construct a 150- 200 MW New Wind Farm in Freeborn County, MN. The wind farm includes 75-100 V110 and V116 Vestas Turbines at 2.0 MWs each, a collector system, O&M building, access roads, collector substation, and transmission line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001702.001	Renewable and New Generation	BS2-G100-Blazing Star II Wind Farm	16,169,131.00	2021	Construct a 200 MW New Wind Farm in Lincoln County, MN. The wind farm includes 100 V110 and V116 Vestas Turbines at 2.0 MWs each, a collector system, O&M building, access roads, collector substation, and approximately 10 miles of transmission line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001707.004	Renewable and New Generation	DKR0 Dakota Range Wind TSG Sub	13,410,674.85	2021	Construct a 300 MW New Wind Farm in Grant and Codington Counties, South Dakota. The wind farm includes 72- V136 Vestas Turbines rated at 4.2 MWs each, a collector system, O&M building, access roads, and collector substation.	This project qualifies for the Federal Production Tax Credit (PTC) at an 80% level.
NSP-Minnesota	A.0001574.286	Reliability/Performance Enhancement	SHCJC Replace Auxiliary Boilers	9,928,956.54	2021	Install new Auxiliary Boilers (ABs) to provide a reliable source of steam supply for unit cold start-up for the existing power plant and building heating. These ABs would also be used to supply start-up steam for the new combined cycle that is planned for the Sherco site. The new ABs would be designed to supply steam to the following (not necessarily concurrently): Existing SHERCO Coal Fired Units 1 and 2 for building heating Existing SHERCO Coal Fired Unit 3 for building heating and startup steam Future SHERCO Combined cycle for process heating in the combined cycle to enable fast start ups, but not for building heating.	The existing ABs are in poor condition. The #1 AB was removed from service and permanently decommissioned a number of years ago due to problems with the controls and numerous tube leaks. The #2 AB is serviceable and runs for a few hours each year to ensure it will operate if needed; however, it has been unreliable and requires extensive efforts each time to get it started. The #2 AB is over 40 years old and parts are not readily available to fix the unit. Steam from the Auxiliary boilers could also be sold to LPI as a back-up steam supply if the existing generation assets were not operating or if it was more economical to use that steam for electricity generation. A reliable source of steam for startup and building heating becomes increasingly important in the future, since there will be times where no coal unit will be operating to supply heat or start up steam to any other unit. Therefore a reliable source of startup steam and building heating will be needed. Steam supply from the new AB's will decrease our dependence on U1&2 for cold start requirements. This provides more flexibility related to any economic outages/seasonal operation and potential earlier retirement of U1&2.
NSP-Minnesota	A.0001704.004	Renewable and New Generation	FBW G100-Freeborn Wind Farm TSG Sub	7,276,484.73	2021	Construct a 150- 200 MW New Wind Farm in Freeborn County, MN. The wind farm includes 75-100 V110 and V116 Vestas Turbines at 2.0 MWs each, a collector system, O&M building, access roads, collector substation, and transmission line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001579.137	Reliability/Performance Enhancement	RIV10C U10 Major Inspection No. 1	6,721,346.01	2021	Major Inspection outage No. 1 for Riverside's Combined Cycle Unit 10. Included in this capital project is the labor and rental equipment needed to replace Hot Gas Path parts. Parts include: Stage 1, 2, and 3 turbine nozzles, buckets, shrouds, and diaphragms as well as a full inspection of the units compressor section.	The combustion turbine OEM, GE recommends that at 24,000 EOH or 900 factored starts (whichever comes first) after the Hot Gas Path Inspection a Major Inspection be performed. For Unit 10, the first Major is projected to be performed in 2021. During a Major, the existing parts will be removed from the turbine and the refurbished parts will be installed. As these components age, they may undergo thermal mechanical fatigue, cracking, abnormal wear, foreign object damage, cooling hole damage or plugging, TBC coating damage, oxidation, corrosion, erosion, hot spots / burning, clearance issues, etc. The probability of seeing these problems increases above the OEM recommended maintenance interval. Any combination of these issues could result in unit trips, extended forced outages, and possibly major equipment damage.
NSP-Minnesota	A.0001579.101	Reliability/Performance Enhancement	RIV7 - Rplc L-1 LP Rotor Blading	4,390,513.67	2021	Replace the L-1 blading on both ends of the Unit 7 Turbine LP rotor.	The L-1 blading is original to the unit and reached the end of its design life of 30 years in 2017. There is also a service bulletin from the OEM, Siemens, related to a known defect with the existing blading design that has caused failures on other units during operation. The service bulletin recommends replacing the existing blading with redesigned blading to reduce operational risk and improve reliability. In addition to the erosion damage that occurs on the leading edge of the blading, the blading material has a finite life and normal operating conditions slowly degrade the material over time. This degradation makes the blading more susceptible to cracking, which has the potential to lead to a catastrophic turbine failure. The blading should be replaced to minimize operational risk to the unit and plant personnel.
NSP-Minnesota	A.0001579.080	Reliability/Performance Enhancement	RIV0C --U10 CT Compressor Upgr	4,380,118.03	2021	Replace S-0 thru S-4 and S-17 compressor vanes and exit guide vanes (EGV) with PSM parts. The work will be completed at the same time as the U10 major overhaul to minimize costs.	Some compressor damage was found during the last 2013 Combustor Inspection. Review by TechnicalResources and Loss Control led to a recommendation to address known GE compressor issues.
NSP-Minnesota	A.0001574.087	Environmental Enhancement	SHC3C U3 Landfill Cell 4	3,598,892.81	2021	Construct 24 acre, GCL/HDPE composite lined, cell located West of Cell 3. Project includes an additional sump pump station, extension of fence and permitting (renewal for cell 4 and inclusion of cell 5). Fill rates have been evaluated and assuming the rates continue without changes.	The new cell is necessary for the continued disposal of AQCS ash from Sherco U3 and as backup disposal for King Fly Ash. Cell 4 design was approved my MPCA in current permit. Ash generation and utilization is assumed to continue at present rates.
NSP-Minnesota	A.0001574.808	Environmental Enhancement	SHC99 Stormwater Management	3,010,064.40	2021	Install systems to collect and divert storm water away from the Recycle Basin and Scrubber Pond.	Reducing water flow into the Recycle Basin will reduce the volume of water transferred to the Scrubber Solids Pond. Which will reduce the amount and cost of water treatment that will be needed at end of life of Sherco 1-3.
NSP-Minnesota	A.0001704.003	Renewable and New Generation	FBW G100-Freeborn Wind Farm TSG	2,939,291.22	2021	Construct a 150- 200 MW New Wind Farm in Freeborn County, MN. The wind farm includes 75-100 V110 and V116 Vestas Turbines at 2.0 MWs each, a collector system, O&M building, access roads, collector substation, and transmission line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001580.013	Renewable and New Generation	CWF0 Install Capacitor Bank	2,490,680.82	2021	Install additional capacitor banks to increase the capability of the wind farm to respond to voltage requirements on the transmission system. The scope of the project will include the capacitors, racks, installation, reconfiguration of some substation elements, and control system modifications.	The Plant must meet the requirements of the Voltage Letter Agreement with the transmission owner (Ottertail). The current arrangement cannot hold the voltage within the required range.
NSP-Minnesota	A.0001572.122	Environmental Enhancement	ASK1C- Replace SCR Catalyst 20	2,440,825.57	2021	Install new catalyst, removal and proper disposal of the existing catalyst, and ammonia injection tuning after installation. Replace the middle layer (143 modules) of the SCR with new catalyst during the 2021 outage. Each catalyst module has rough dimensions of 64" x 75" x 38" and weighs 2,900 lbs each. The lead times for new catalyst require that the purchase order be placed with catalyst supplier in the year prior to installation.	Environmental. Compliance of NOx emissions.
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	2,222,679.72	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.288	Reliability/Performance Enhancement	SHC1 - Rplc Hot & Int. AH Basket	2,100,705.51	2021	Unit 1 has two tri-sector ljungstrom air heaters. Each air heater has three layers of baskets; hot, intermediate, and cold. The hot and intermediate end get replaced together during the 2021 overhaul.	An inspection in 2018 identified downward element migration of the hot baskets into the intermediate layer. As the elements loosen and move down, they break up which causes an increase in differential pressure and a loss in heat transfer. Prolonged operation of deteriorating baskets will lead to excessive differential pressure which will then limit the capability of the primary air and secondary air fans causing derates and eventually forcing the unit offline for basket cleaning. Replacing the baskets before critical DP increases and heat transfer losses will ensure continued reliable and efficient operation.
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	2,016,304.87	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001562.086	Reliability/Performance Enhancement	REW1C U1 GENERATOR REWIND	1,889,393.50	2021	This project will replace the original 1948 General Electric generator stator windings. Activities associated with this project will include winding removal; stator frame and core cleaning and inspection; inspect, clean, and tighten associated clamping hardware; new winding installation; and applicable testing per IEEE and ANSI standards.	The 2007 Turbine Generator Major Overhaul Inspection and 2010 Life Extension Study both recommend a generator rewind based on age and condition of the generator. The current stator winding is 65 years old from original installation in 1948 while median life expectancy is 40 yrs. Cycling duty on RDF plants is higher than normal which has caused problems with French Island units and although they are not the same machines, the designs are similar with a large number of fairly thin turns. Other concerns in the condition assessments identify girth cracks, slot wedge tightness, and endturn mechanical integrity as potential issues. The reports indicate a generator rewind is required for operation through 2027.
NSP-Minnesota	A.0001704.013	Renewable and New Generation	FBW Freeborn Wind Farm Tline GIA NE	1,858,873.20	2021	Construct a 150- 200 MW New Wind Farm in Freeborn County, MN. The wind farm includes 75-100 V110 and V116 Vestas Turbines at 2.0 MWs each, a collector system, O&M building, access roads, collector substation, and transmission line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001572.048	Reliability/Performance Enhancement	ASK1C-Inst Emerson DCS Evergreen	1,842,730.98	2021	Emerson to provide new hardware and software to support plant digital control system.	To keep pace with advancements is the goal of the Ovation Evergreen program. This SureService customer support module provides a way to keep your Ovation system continuously up-to-date. The Evergreen program allows you to avoid a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new I/O and security features.
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,772,407.87	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001559.014	Reliability/Performance Enhancement	BLL8-U8 CT Control System Repl	1,630,248.80	2021	Replacement of the Combustion Turbine Control System Hardware and Software.	The Combustion Turbine Control System hardware/Software needs to be refreshed periodically in order to ensure the system does not fall behind the obsolescence curve. There is difficulty with older systems in procuring replacement parts, finding good field service support, and meeting up to date cyber asset security requirements. The current system has been operating since 2005.
NSP-Minnesota	A.0001559.015	Reliability/Performance Enhancement	BLL7-U7 CT Control System Repl	1,629,537.45	2021	Replace the Combustion Turbine Control System (AKA Speedtronic Mark V Turbine Controls) Hardware and Software on Blue Lake Unit 7	The Combustion Turbine Control System Hardware/Software needs to be refreshed periodically in order to ensure the system does not fall behind the obsolescence curve. There is difficulty with older systems in procuring replacement parts, finding good field service technicians, and meeting up to date cyber asset security requirements. The current system has been operating since 2005. GE drives and controls, Inc. will cease normal production of the SpeedTronic Mark V turbine Control system on March 31, 2004. As with many products, and particularly with electronics, the Mark V will eventually exceed its supportable life as parts and components become unavailable and technology resources become scarce. This makes it increasingly difficult to guarantee timely availability/ reparability of parts for an extended period of time. Support Option 2014->2019 -Repair Only -Referral -Obsolete/ No Longer Offered -Documentation
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	1,572,761.37	2021	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001565.118	Environmental Enhancement	WLM1C Replace U1 Baghouse Bags	1,563,684.78	2021	Replace six modules (1260 total) of baghouse bags and cages. This project would also include a series of repairs to the baghouse modules including replacement of the bottom hoppers, repairs at the tops of the modules above and below the tubesheet, sand-blasting the inside of the module and coating it with an anti-corrosive coating, re-tinning and re-insulating the modules, etc.	Permit required to meet capacity standards. Bags are on a four year frequency to be changed out. The bags were on a six plus year changeout in the past but it was determined that changing out the bags more frequently saves on material loss on boiler tubes. It has been determined that after four years the bags begin to blind/plug and no longer allow enough air flow to operate the units at their full potential. Because of the plugged bags the air flow through the unit is decreased causing a high differential pressure reducing load capability and allowing the flue gas to consume more of the tube material throughout the boiler.
NSP-Minnesota	A.0001559.005	Reliability/Performance Enhancement	BLLC8 U8 Exhaust Silencer Repl	1,537,956.79	2021	Replace silencer on unit 8 CT exhaust stack.	The panels are used to reduce the decibels coming out the stack of the CT. The panels are melting and breaking up. They are made with a stainless steal the can not standup to the higher temperature of a GE 7FA Ct. They where designed for a GE 7FE class CT that runs cooler exhaust temperatures.
NSP-Minnesota	A.0001579.063	Reliability/Performance Enhancement	RIV0C Emerson DCS Evergreen	1,493,312.32	2021	This project will cover the cost of Emerson Process Management's 'Ovation Evergreen Program'. This program will provide full replacement of all workstation hardware, replacement of network equipment, and upgrade of the Ovation DCS software to the latest revision.	To keep pace with advancements is the goal of the Ovation Evergreen program. This SureService customer support module provides a way to keep your Ovation system continuously up-to-date. The Evergreen program allows you to avoid a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new I/O and security features.
NSP-Minnesota	A.0001579.079	Reliability/Performance Enhancement	RIV0C --U10 CT Cntrl Sys Upg	1,334,288.17	2021	Replace the Combustion Turbine Control System hardware.	The Combustion Turbine Control System Hardware needs to be refreshed periodically in order to ensure the system does not fall behind the obsolescence curve. There is difficulty with older systems in procuring replacement parts, finding good field service technicians, and meeting current cyber asset security requirements. The existing system was installed in 2009.The current version of the Mark VI is operating on the Windows XP operating system. Microsoft is no longer issuing licenses for the XP operating system. Continued operation with the present hardware increases the risk of failure and potential long term outage. This includes servers, HMI's, switches, historian and obsolete control cards.
NSP-Minnesota	A.0001579.084	Reliability/Performance Enhancement	RIV0C --U9 CT Control System	1,330,195.68	2021	Replace the Combustion Turbine Control System Hardware.	The Combustion Turbine Control System Hardware needs to be refreshed periodically in order to ensure the system does not fall behind the obsolescence curve. There is difficulty with older systems in procuring replacement parts, finding good field service technicians, and meeting current cyber asset security requirements. The existing system was installed in 2009.The current version of the Mark VI is operating on the Windows XP operating system. Microsoft is no longer issuing licenses for the XP operating system. Continued operation with the present hardware increases the risk of failure and potential long term outage. This includes servers, HMI's, switches, historian and obsolete control cards.
NSP-Minnesota	A.0001562.038	Environmental Enhancement	REW0 - EPA 316b-Traveling Screens	1,283,668.07	2021	Screen house intake traveling screen modification. The new screens will include a fish handling and return system with sufficient water flow to avoid harming the fish flowing back into the source water. The design may include dual flow screens with smooth mesh to continuously protect fish from descaling or rotary screens with a low pressure vacuum return to remove fish prior to any high pressure sprays that may otherwise harm the creatures.	This is a mandated environmental project by the MPCA to ensure we are compliant with EPA regulation 316(b) of the Clean Water Act. Section 316(b) requires that National Pollutant Discharge Elimination System permits be obtained by any facility that contains a cooling water intake structure to ensure that the engineering design of the structure minimizes harmful impacts on the environment.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001705.001	Renewable and New Generation	CRW G100-Crowned Ridge BOT Wind Far	1,250,000.00	2021	Purchase a 200MW Wind Farm from NextEra near Watertown, SD. The wind farm will consist of 73 GE 2.3-116 90HH and 15 GE 2.1 -116 80HH wind turbine generators, a collection system, Operations and Maintenance building, access roads, collector substation, and a transmission interconnection line.	Qualifies for a Federal Production Tax Credit (PTC).
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	1,081,670.29	2021	Replace failed gearboxes in GE 1.5 SLE wind turbines. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001571.079	Reliability/Performance Enhancement	ANS3C Rpl U3 Generator Breaker	970,547.43	2021	Replacement of unit 3 generator breaker and MOD.	Fugi has not provided parts or service since 2015.
NSP-Minnesota	A.0001580.006	Environmental Enhancement	CWFC0 229005 Courtenay PCMM	968,444.19	2021	Standardized post-construction monitoring program which incorporates commitments and methodologies presented in the Courtenay project Bird and Bat Conservation Strategy(BBCS).	Standardized post-construction monitoring program which incorporates commitments and methodologies presented in the Courtenay project Bird and Bat Conservation Strategy(BBCS) as required by permit.
NSP-Minnesota	A.0001610.010	Renewable and New Generation	BWF0-Border WD Tower Climb System	915,966.74	2021	Installation of a new climbing system that will replace the existing climb assist system. The new system will be a Climb Auto or equivalent system that can support the full weight of a technician and lift them from the bottom of the turbine tower to the nacelle without the need to climb the ladder.	The system will provide long term reliability and safety benefits for the farm. It is estimated that each of the 75 turbines will be off line 2 fewer hours for each of the 2 planned maintenance events per year. The additional benefits include reduced risk of climbing related injuries and fatigue related issues. Retention of qualified technicians will increase which results in lower training costs and reduced risk of errors. The towers on this site are 15 meters taller than several of our sites and will be a proving ground to determine if this system should be installed across the fleet.
NSP-Minnesota	A.0001574.115	Environmental Enhancement	SHC3C U3 Repl fabric filter bags	850,677.77	2021	Current set of bags were installed starting in 2009. Typical life is 7 to 9 years. Replace approx. 33% of the bags each year. For each compartment, 378 bags will be replaced, thimbles as required, and the walls will be blasted and coated wit h an anti-corrosion coating.	Compliance with Plant Air Quality Permit.
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	838,769.70	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001559.120	Reliability/Performance Enhancement	BLL0 OTS-Security Monitor and Log	809,583.85	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites and a fire wall is needed.
NSP-Minnesota	A.0001574.471	Reliability/Performance Enhancement	SHC99-SHC99-Rpl SR Slew Drives	808,982.11	2021	Replace Coal Stacker/Reclaimer Slew Drive Gearboxes to a Hydraulic unit. Removal of two old gearboxes and motors. Install new hydraulic power unit and 2 hydraulic motors and hydraulic brake. Cost includes new bull gear around the gantry. Update controls and electrical feeds for HPU system. Some structural modifications will be needed to mount the new equipment.	Current gearboxes are undersized. We change them twice a year just for repair and parts. And we spend for extra coal handling cost with the Stacker down. This replacement will also enhance safety by reducing repair time.
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	793,752.97	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	777,718.95	2021	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001580.010	Renewable and New Generation	CWF FAA Radar Lighting System	766,074.33	2021	Install ground based radar system and wind turbine FAA lights activated by that system.	The state of North Dakota requires that all wind farms have a radar activated FAA lighting system in service prior to December 31, 2021.
NSP-Minnesota	A.0001610.009	Renewable and New Generation	BWF FAA Radar Lighting System	766,074.33	2021	Install ground based radar system and wind turbine FAA lights activated by that system.	The state of North Dakota requires that all wind farms have a radar activated FAA lighting system in service prior to December 31, 2021.
NSP-Minnesota	A.0001574.817	Reliability/Performance Enhancement	SHC1-U1 DCS HW & Security Server	737,722.92	2021	Upgrade U1 DCS workstation hardware and add a security server (WSUS) to the controls network.	Updating the hardware will provide workstations for the IO and Wet Scrubber FATs and will also provide spares for the obsolete computers on U2 that are running outdated Windows XP software. This also eliminates the need for performing manual Windows Patches updates to 24 workstations (could take 80 man-hours/month).
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	723,078.21	2021	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001579.093	Reliability/Performance Enhancement	RIV9C-Install Preheater Harps Unit	669,936.96	2021	Replace the first two preheater harps in #9 preheater. Replace the four lower 4" headers with new 6" headers. The tubes are left in place, but header replacement with redesign eliminates the stress at the tube to header attachment. This design reduces estimated project cost considerably.	This will replace the preheater harps which were poorly designed to handle thermal stresses caused by startup and shutdown of the unit resulting in numerous tube leaks and unit forced outages. The new harps will have thicker tubes and stronger welded joints at the header connection to avoid thermal stress related crack propagation resulting in leaks.
NSP-Minnesota	A.0001579.097	Reliability/Performance Enhancement	RIV10C-Install Preheater Harps Unit	668,862.89	2021	Replace the first two preheater harps in #9 preheater. Each harp to be complete with an upper and lower header and two full rows of finned tubes.	This will replace the preheater harps which were poorly designed to handle thermal stresses caused by startup and shutdown of the unit resulting in numerous tube leaks and unit forced outages. The new harps will have thicker tubes and stronger welded joints at the header connection to avoid thermal stress related crack propagation resulting in leaks.
NSP-Minnesota	A.0001576.019	Renewable and New Generation	GDM0-SCADA Replacement	656,222.17	2021	Replacement of the control system for the entire wind farm. The system is original to the Plant and will be obsolete in 2020.	An up to date control system will add stability and control functions not available in the current SCADA system. In addition, the new controls will allow for future enhancements such as bird/bat mitigation control schemes.
NSP-Minnesota	A.0001566.170	Renewable and New Generation	NBL0-SCADA Replacement	634,725.63	2021	Replacement of the control system for the entire wind farm. The system is original to the Plant and will be obsolete in 2020.	An up to date control system will add stability and control functions not available in the current SCADA system. In addition, the new controls will allow for future enhancements such as bird/bat mitigation control schemes.
NSP-Minnesota	A.0001574.764	Reliability/Performance Enhancement	SHC1C Bus 13 14 Prot Relays Rplc	597,312.54	2021	Replace Bus 13 and Bus 14 Protective Relaying, including replacing approximately 225 electromechanical relays with approximately 45 microprocessor based relays for the following functions: Motor protection (ID/FD/PA Fans, Coal Mills, Pumps, Conveyors, etc) Feeder protection (SUS Feeds) Transformer Protection (MSA and RSA transformers) Bus Protection (Bus 13 and 14 protective relaying)	The replacement microprocessor based relays cost approximately half of a single electromechanical relay and a single relay can replace up to a dozen electromechanical relays. During the 2015 Unit 1 overhaul, Bus 11 and 12 relay maintenance required approximately 300 man-hours by relay technicians to clean, calibrate, test and reseal relaying with a bus outage typically lasting 5-6 days. The new microprocessor based relaying is expected to take 50 man-hours with a typical bus outage lasting 2-3 days. This will significantly reduce O&M costs and interruptions to critical plant and coal yard equipment. The replacement relays also have an oscillography function which captures significant events (trips, faults, etc) in its memory that significantly reduce the amount of time required to troubleshoot the cause. This can be very valuable in shortening a forced outage duration in the future.
NSP-Minnesota	A.0001611.004	Renewable and New Generation	PLV0C Eagle Take Permit	592,982.28	2021	This project supports the activities required to coordinate and manage an Eagle Take Permit at Pleasant Valley Wind Farm. The tasks associated with this include: Point Count Surveys, Aerial Nest Survey, Weekly Nest Monitoring, Application Fee, and Consulting Services.	Nesting eagles were observed in March 2016 on the Pleasant Valley Wind Farm. Xcel Energy notified State and Federal agencies and an Eagle Take Permit is required. The agencies involved are MDNR (Minnesota Department of Natural Resources), USFWS (US Fish and Wildlife Services), and the Minnesota Department of Commerce, Energy Environmental Review and Analysis.
NSP-Minnesota	A.0001574.795	Reliability/Performance Enhancement	SHC1-Upgrade U1 BMS HMI	570,696.97	2021	Upgrade U1 BMS HMI: During the U1 major overhaul in 2021, replace the Unit 1 Burner Management Emerson Ovation DCS Equipment with security hardened workstations, servers, network switches and Domain Server. This includes all software updates/bug fixes, hardened software security, and complete configuration translation to the new Ovation VersionX.	This is a periodic update required for reliability. Increased controller fail rate is expected as controllers are nearing their normal life expectancy. A controller is a required interface between the field instrumentation into Ovation. The controllers will be six years old. Network switches typically last 4-5 years.
NSP-Minnesota	A.0001579.127	Reliability/Performance Enhancement	RIV7C-Install Circ Water Pumps CESP	560,906.96	2021	Provide one spare circulating water pump and motor for Riverside. The spare pump and motor will be identical to the existing installed pumps.	Minimize plant downtime in the event of another circulating water pump failure. The plant is de-rated if one circulating water pump is out of service. A spare circulating water pump and motor will allow the failed pump to be replaced in a few days.
NSP-Minnesota	A.0001579.143	Reliability/Performance Enhancement	RIV0C-LCI Hardware and Ctrls Replac	548,388.95	2021	Replace RIV LCI hardware/controls with new supported equipment	The LCI controls and portions of the LCI hardware will be nearing the end of their useful life. It will be necessary to upgrade in order to ensure reliable operation and parts availability.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001572.161	Reliability/Performance Enhancement	ASK1-Nuva Feeder PLC Replacement	534,785.30	2021	This project will bring the Nuva Feeder controls into the existing plant DCS control system. The construction work for this project can be done non-outage. Engineering and procurement of equipment will begin at the beginning of the year.	Parts are getting scarce on PLC's; there is inventory and risk reduction by moving this PLC into Ovation. Internal and External knowledge of PLC's is limited. Existing PLC systems have no redundancy and risk unavailability. Ovation is King's control system standard with trained personnel.
NSP-Minnesota	A.0001559.114	Reliability/Performance Enhancement	BLL8C U8 Excitation System Replacement	510,206.25	2021	Replace U8 Excitation System with reliable, non-obsolete equipment.	The BLL U8 Excitation System Controls are nearing end of useful life. It is necessary to upgrade in order to ensure reliable operation and parts availability.
NSP-Minnesota	A.0001559.112	Reliability/Performance Enhancement	BLL7C U7-Excitation System Replacement	510,197.51	2021	Replace U7 Excitation System Controls with reliable, non-obsolete equipment.	The BLL U7 Excitation Systems Controls are nearing end of useful life. It is necessary to upgrade in order to ensure reliable operation and parts availability. GE Drives and Controls Inc. will cease normal production of the EX2000 Excitation control system effective March 30, 2004. As with many products, and particularly with electronics, the EX2000 will eventually exceed its supportable life as components become unavailable and technology resources become scarce. This makes it increasingly difficult to guarantee timely reparability of parts for an extended period of time.
NSP-Minnesota	A.0001574.845	Environmental Enhancement	SHC0-Pond 3S Ring Dike Phase I	504,795.12	2021	Use excavated Bottom Ash from BA Pond 1, to construct the First Phase Ring Dike within Pond 3S.	The ring dike will allow the disposal of wet scrubber solids at a higher elevation within the existing Pond 3. This avoids the construction of a new Scrubber Pond and is the lowest cost method of gaining additional disposal capacity.
NSP-Minnesota	A.0001559.104	Reliability/Performance Enhancement	BLL0C LCI Controls Replacement	495,612.20	2021	Replace the U7/U8 Shared LCI controls with non-obsolete equipment. Upgrade the existing EX2000 J-Frame HBU exciters (qty2) to an EX2100 e Redundant digital front end (DFE) excitation system	The LCI controls are nearing the end of their useful life. There have been several failures and parts availability is becoming an increasing problem It will be necessary to upgrade in order to ensure reliable operation and spare parts are available. GE drives and controls, Inc will cease normal production of the EX2000 Excitation Control system effective March 30, 2004. As with many products, and particularly with electronics, the EX2000 will eventually exceed its supportable life as components become unavailable and technology resources become scarce. This makes it increasingly difficult to guarantee timely reparability of parts for an extended period of time. 2014->2019 Support Options -Repair Only -Referral -Obsolete/ No Longer offered -Documentation
NSP-Minnesota	A.0001573.210	Reliability/Performance Enhancement	BDS0C-Replace Obsolete EDG Controls	465,444.25	2021	Replace the obsolete controls on the Black Dog Emergency Diesel Generators.	The Black Dog Diesel Generators are required by the plant to recover from a loss of offsite power event. The Diesel Generators provide power to critical plant equipment to support a safe shutdown and provide protection to plant equipment to ensure that full plant capacity would be available in short order once offsite power is re-established (provides power to maintain boiler feed to prevent steam drum dry-out). The existing controls are original from initial Diesel Generator installation (1990s). We have had several controls component failures in the recent past, and we have been notified by our Diesel Generator Service Provider that the equipment we have is no longer available and they will have difficultly supporting it going foreword.
NSP-Minnesota	A.0001572.177	Reliability/Performance Enhancement	ASK1C Repl ID Fan Suction Exp	461,355.92	2021	Replacement of four ID fan suction expansion joints.	Expansion joints are interior to the ID fan building and are over 40 years old. They are brittle and cannot be repaired.
NSP-Minnesota	A.0001574.298	Reliability/Performance Enhancement	SHC99 - Barn #51 Discharge Chute	455,172.39	2021	Replace chute work coming from 51 conv, going to 52 conv, and Scraper Loading Hopper. This is to include the receiving dust box on 52 conv tail end, and a new splitter gate. Chute work is to be of new technology 'controlled flow' chute work to greatly reduce fugitive dust in the area. Cost estimates are as follows: 51 to 52 and Hopper section $475,000 52 load zone section $41,000	This is a safety measure to reduce fugitive dust inside the enclosed coal barn.
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	438,827.84	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2017 Emergent Work	411,062.80	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001591.004	Reliability/Performance Enhancement	ANS0C BOP Evrgren Ctrl	405,664.11	2021	This project is to upgrade Units 2, 3, and Balance of Plant for Unit 4 Evergreen System Upgrade.	Existing controls will become obsolete during this current budget cycle
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2021 Small Project Routine	398,890.09	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001579.085	Reliability/Performance Enhancement	RIV0C -- Inst U9 Auto Tuning Package	382,003.69	2021	Installation of an Automatic Tuning Package to improve Combustion Turbine operational performance and prevent unit tuning related trips.	This package has been installed on other fleet units (Ft. St. Vrain) with positive results (emissions improvements, unit efficiency improvements, and reduced need for seasonal tuning). Installation on all fleet GE 7FA Units is recommended by the fleet Combustion Turbine experts.
NSP-Minnesota	A.0001579.086	Reliability/Performance Enhancement	RIV0C -- Inst U10 Auto Tuning	381,998.78	2021	Installation of an Automatic Tuning Package to improve Combustion Turbine operational performance and prevent unit tuning related trips.	This package has been installed on other fleet units (Ft. St. Vrain) with positive results (emissions improvements, unit efficiency improvements, and reduced need for seasonal tuning). Installation on all fleet GE 7FA units is recommended by the fleet Combustion Turbine experts.
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2021 Small Project Routine	373,225.45	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc that have failed during plant operation.
NSP-Minnesota	A.0001561.014	Reliability/Performance Enhancement	IVH3C U3-4 UG Cable Replace	370,976.67	2021	Replace wiring for Units 3 & 4 to include underground wiring for aux power from transformers and control wiring.	There have been previous failures of underground wiring/cable at Wheaton in the past, which is an identical site. Once in 2001, cable failure between units 1 and 2. A second time in 2006 when the aux power cable feeding units 3 and 4 failed sending 4160 volts into the control system for unit 3 (unit 3 control cables were co-located with the 4160 cable). The direct buried cable and wiring is at end of life. Also requiring replacement are various connections in the GE units. These connections were made with "plugs" to allow for the various segments of the combustion turbine unit to be brought in on trucks and then placed/connected together. These plugs are beginning to fail. In addition, a contributing cause to the unit 3 PLC cabinet fire was the fact that the high side protection for the aux power to the units did not isolate when the undergound fault occurred.
NSP-Minnesota	A.0001562.030	Reliability/Performance Enhancement	REW0C RDF WALKING FLOOR REPLAC	356,639.59	2021	This project will replace the existing walking floor assembly. The replacement will include a whole new super structure utilizing 1/2" thick aluminum floor slats.	The walking floor was replaced in 2011 and has a 5 year life expectancy. At this time the floor is expected to be worn to the point of having holes. Worn slats will curl and buckle due to their reduced thickness. The floor is required to operate or both units will be offline
NSP-Minnesota	A.0001574.482	Reliability/Performance Enhancement	SHC1-U1 Mill 2021 Fall	356,527.63	2021	Project consists of replacing capital components as needed including but not limited to new journal assemblies, floor segments, classifier blades, and vane wheel.	Unit 1 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5 million tons of throughput, or every 3-7 years depending upon usage. Maintaining pulverizer performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.524	Reliability/Performance Enhancement	SHC3C Mill OH 2021 Spring	354,871.36	2021	Project consists of replacing capital components as needed including but not limited to new roll-wheel assemblies, floor segments, classifier blades, rotating throat assembly, and the inverted cone.	Unit 3 has 10 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5-2 million tons of throughput, or every 5 years depending upon usage. Maintaining mill performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.
NSP-Minnesota	A.0001562.031	Reliability/Performance Enhancement	REW1C U1 TURBINE BLADE REPLACE	351,271.26	2021	This project would replace any rows of blades in the U1 turbine identified during the major overhaul.	Any blades that are identified as being too worn by the turbine contractor, will need to be replaced to ensure mechanically safe operation of the rotating assembly.
NSP-Minnesota	A.0001574.523	Reliability/Performance Enhancement	SHC3C Mill OH 2021 Fall	347,632.56	2021	Project consists of replacing capital components as needed including but not limited to new roll-wheel assemblies, floor segments, classifier blades, rotating throat assembly, and the inverted cone.	Unit 3 has 10 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5-2 million tons of throughput, or every 5 years depending upon usage. Maintaining mill performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.
NSP-Minnesota	A.0001572.152	Reliability/Performance Enhancement	ASK1-480V Plant Swgr Bus 3-4 R	334,148.31	2021	Replace 480V main plant switchgear bus 3/4 lineup. These switchgears are 1968 vintage. There are eight busses total in the plant and four in the coal yard. The replacement would include the disconnects, dry transformers (not oil filled), main breakers, tie breaker and feeder breakers, along with protective relaying. This continues a series of switchgear bus replacement projects, with the first one during the 2015 outage.	Due to projects installed over the last decade or so, the MCCs in the plant (boiler/turbine rooms) have been filling up to capacity, which leads to relay coordination issues and circuit coordination issues. The electrical system in the AQCS and cooling tower areas have good capacity, but the systems in the plant (boiler/turbine rooms) are nearing their designed capacity. This project will increase that capacity. Due to the age of the switchgear and lack of replacement and spare parts, there are challenges to keep the switchgear operational.
NSP-Minnesota	A.0001574.195	Reliability/Performance Enhancement	SHC2C 2021 Small Project Routine	330,891.77	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001574.818	Reliability/Performance Enhancement	SHC1-Turb Ctrl Vlv Internals	319,683.57	2021	Replace main turbine control valve internals including but not limited to stems, balance chambers, plugs, and seats.	The valve internals have been subject to damage due to excessive wear and tear due to frequent unit cycling and more frequent economic outages. There are four control valves, all four of which experience significant degradation. The control valves are critical safety devices used to prevent turbine overspeed after a unit trip and are also responsible for regulating steam admission to the turbine. Their mechanical integrity is essential to safe and reliable operation of the turbine.
NSP-Minnesota	A.0001701.020	Renewable and New Generation	BS1-Blazing Star 1 PCMM	318,762.00	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0003000.680	Reliability/Performance Enhancement	REW0C Tool Blanket	315,000.00	2021	This project will be used to purchase capital maintenance tools for the 2021 calendar year. Such equipment may include scaffolding, specialized electrical instruments, machining equipment, welding machines, etc.	This project will allow for the site to have on-hand the appropriate tools required for plant personnel to perform their work tasks efficiently and safely. Having the appropriate tools and equipment makes for a safer work environment and reduces the risk of potential industrial safety incidents. Staying current with electrical diagnostic equipment enables personnel to troubleshoot plant equipment more quickly and easily.
NSP-Minnesota	A.0001574.798	Reliability/Performance Enhancement	SHC1-Level 2 Mill OH 2021 Spring	308,672.64	2021	Project consists of replacing capital components as needed including but not limited to new journal assemblies, floor segments, classifier blades, and vane wheel.	Sherco Units 1 & 2 each have 7 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5 million tons of throughput, or every 3-7 years depending upon usage. Maintaining pulverizer performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.
NSP-Minnesota	A.0001574.799	Reliability/Performance Enhancement	SHC2-Level 2 Mill OH 2021 Spring	308,672.64	2021	Project consists of replacing capital components as needed including but not limited to new journal assemblies, floor segments, classifier blades, and vane wheel.	Sherco Units 1 & 2 each have 7 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5 million tons of throughput, or every 3-7 years depending upon usage. Maintaining pulverizer performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.
NSP-Minnesota	A.0001574.533	Reliability/Performance Enhancement	SHC0C Seal Wtr Pump Strainer	307,333.95	2021	Installing a second (redundant) Seal Water Booster Pump (~500-700 GPM) and Strainer.	The seals that use this water are highly dependent on the strainer being in service. With changing pond chemistries, the seal water strainer is taken out of service for cleaning, which requires fire water to be supplied to the seals. Fire water can cause damage to the seals on the pumps, and during times of high water use, wells are drawn above max capacity.
NSP-Minnesota	A.0001574.504	Reliability/Performance Enhancement	SHC2-U2 Mill OH 2021 Fall	302,239.47	2021	Project consists of replacing capital components as needed including but not limited to new journal assemblies, floor segments, classifier blades, and vane wheel.	Sherco Units 1 & 2 each have 7 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of overhauls. The major grinding components tend to wear out after about 1.5 million tons of throughput, or every 3-7 years depending upon usage. Maintaining pulverizer performance is essential to maintain boiler reliability, performance, and to stay within emission regulations.
NSP-Minnesota	A.0001572.246	Reliability/Performance Enhancement	ASK1-Protective Relay Upgrades	299,205.74	2021	The protective relaying on each of the Main Plant's 6.9KV and 4.16KV Cubicles has reached an age in which replacement is needed. The existing mechanical relays are original 1969 vintage and are starting to fail. In addition, preventative maintenance of these relays is time consuming. Newer digital style would provide better reliability and ease of maintenance. There are 8 - 6.9KV and 22 - 4.16KV cubicles; cost per ~$5,000	This project would improve reliability for our Medium Voltage source cubicles for various motors and MCC feeds in the plant. It also simplifies maintenance work and would lengthen out the periods in which PM's would be required.
NSP-Minnesota	A.0001574.850	Reliability/Performance Enhancement	SHC3-Foxboro Cyber Security Suite	298,588.10	2021	Purchase and install Foxboro Cyber Security Suite	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites. These products are currently the standard Foxboro control systems cyber security protections in place throughout NSP and SPS.
NSP-Minnesota	A.0001573.215	Reliability/Performance Enhancement	BDS6-Install 62 Air Compressor	294,389.87	2021	Installation of a second air compressor and dryer to supply a redundant source of instrument air for Unit 6. Project includes new equipment, electrical, controls, and labor to perform the work. Equipment will be similar to currently existing 61 Air Compressor for maintenance and operational purposes.	This project will install a new air compressor to establish a 2x100% instrument air configuration for Unit 6. This will allow for scheduled maintenance and provide a backup supply to safeguard against any operational issues with the existing air compressor. The new compressor will also be arranged to provide backup instrument air to Unit 5/2 to improve reliability of the instrument air system. The plant changed to 100% instrument air configuration in 2017 after reliability issues associated with wet house air infiltrating the instrument air supply, since the systems are interconnected throughout the building, which increased instrument air demand.
NSP-Minnesota	A.0001572.222	Reliability/Performance Enhancement	ASK99C 480V Coal Yrd Swgr Bus3-4 Rp	289,585.83	2021	Replace the 480V coal yard switchgear bus 3/4 lineup during the spring outage. These switchgears are 1968 vintage. There are eight busses total in the plant and three in the coal yard. The replacement would include the disconnects, dry transformers (not oil filled), main breakers, tie breaker and feeder breakers, along with protective relaying.	This will increase capacity. Due to projects installed over the last decade or so, the MCCs in the plant (boiler/turbine rooms) have been filling up to capacity, which leads to relay coordination issues and circuit coordination issues. The electrical system in the AQCS and cooling tower areas have good capacity, but the systems in the plant (boiler/turbine rooms) are nearing their designed capacity. Due to the age of the switchgear and lack of replacement and spare parts, there are challenges to keep the switchgear operational.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.078	Reliability/Performance Enhancement	RIV0C -- Inst Water Panel Auto	288,481.90	2021	Replace the existing manual water chemistry panel with an automated panel.	The existing plant water chemistry panel requires a large number of manual operations to ensure correct chemistry every time any of the units is started-up or if the plant transitions from 2x1 operation to 1x1. In addition, the existing design makes the system difficult to maintain. The existing panel design results in a high possibility of operator error and/or system operations concerns (small manual valve failures, plugged lines, etc.) that could result in damage to the plant equipment (notably the HRSGs).
NSP-Minnesota	A.0001575.164	Reliability/Performance Enhancement	HBC9C-Replace Seal Steam Superheate	288,156.48	2021	Several heating elements in existing electric seal steam superheater 9STS-HTR-0001 have failed. The project includes the purchase of a new superheater, demolition of the existing superheater and installation of the new superheater.	The existing seal steam superheater was purchased and installed in 2010, after Mitsubishi Power Systems Americas (now Mitsubishi Hitachi Power Systems Americas, the manufacturer of the High Bridge steam turbine) specified that, in order to avoid steam turbine rotor fatigue (cracking) damage, seal steam temperature should be higher than rotor temperature and contain not less than 25F of superheat. In the absence of the seal steam superheater, seal steam was up to 65F cooler than rotor temperature during 2-on-1 operation and up to 124F cooler than rotor temperature during 1-on-1 operation.
NSP-Minnesota	A.0001572.176	Reliability/Performance Enhancement	ASK1C Repl Hydrojet PC HF Sens	284,004.21	2021	This project's scope includes the replacement of the existing hydrojet PC and software.	King's hydrojet software and PC are outdated and require replacement. PC issues have caused chronic hydrojet downtime, elevating furnace exit gas temperatures which threatens unit performance and possible derates. Also, upgraded software has the capability to integrate with King's intelligent sootblowing software Powerclean. Additional heat flux sensors will increase the number of cleaning zones, and provide more accurate cleanliness readings. With the recent past and current replacement of major waterwall panel's it is prudent to protect the waterwalls from excessive thermal shock. The upgraded software is designed to adjust spraying speeds and flows to limit the impact of thermal transients.
NSP-Minnesota	A.0001574.673	Reliability/Performance Enhancement	SHC3C 1st Floor HVAC PLC Replace	283,094.88	2021	Replace the PLC, remote panels, damper actuators and other instruments as needed. This HVAC system supplies all of the transition building from the 1st floor maintenance offices all the way up to the I&C shop. A significant portion of the cost is associated with upgrading ancillary equipment such as damper drives and duct heater controllers which are obsolete and need upgrades or repairs to work with the new PLC. Temporary heating and or cooling may be required depending on when the major work is performed.	The existing equipment is obsolete and repairs are becoming difficult or not possible. This equipment controls the HVAC in the Unit 3 office areas. Should a larger failure occur this project will have to be performed as an emergent project at a greater cost.
NSP-Minnesota	A.0001574.734	Reliability/Performance Enhancement	SHC0C Fire Prot Admin_Mapper Bldg	274,642.62	2021	Install fire/smoke detection and alarm in the Sherco Administration and Mapper buildings. Alarm system will connect to the control room to notify them of a fire in the area.	These areas consist of mostly offices and training rooms. They are, however, both attached to the main building and present an exposure to the main building. The cost of a sprinkler system is much higher than anticipated. A smoke/fire detection and alarm system will provide the majority of the benefit that a sprinkler system would but at a cost more in line with the initial estimate.
NSP-Minnesota	A.0001574.741	Reliability/Performance Enhancement	SHC0C Service H2O Pipe Rplc	272,919.05	2021	Replace heavily corroded service water piping on U1 between floors 4-6.	This will improve reliability. Service water is used for Demin, Fire Protection, and many other unit functions. This pipe is heavily corroded per previous inspections.
NSP-Minnesota	A.0001574.731	Reliability/Performance Enhancement	SHC0C Fuel Oil Pump F.P.	255,591.60	2021	Install automatic sprinkler protection over the fuel oil pumps in the Auxiliary Boiler Building designed for 0.25 GPM/square feet over a design area of 3,000 square feet with a 250 GPM hose stream allowance.	There are four fuel oil pumps in this room, which present a fire risk. Since there is no sprinkler protection in this area, such a fire could spread throughout the Administration areas in the Main Building and to the turbine under deck mezzanine area and lower boiler areas, doing damage to the Unit 1 turbine generator and boiler. There is sprinkler protection in the turbine under deck area and a fire could burn out or be manually controlled at this point. However, there could still be enough damage done to affect Unit 1. Therefore, sprinkler protection is recommended.
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	245,000.00	2021	Purchase of Miscellaneous Tools/Laboratory Instrumentation. These tools are used for analysis of water to monitor and control corrosion and scaling in power plants and to comply with monitoring requirements for NPDES and Solid Waste Permits.	Chemistry Resources functions as a non-profit in-house general laboratory for Xcel Energy. It provides analyses for mandatory regulatory monitoring programs and for operational and maintenance activities in the plants. All of its tools are used throughout Energy Supply's Minnesota fleet as well as backup support for Denver and Amarillo labs.
NSP-Minnesota	A.0001706.008	Environmental Enhancement	LBW - Lake Benton PCMM	243,396.70	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	239,598.44	2021	Replace failed generators in GE 1.5 SLE wind turbines.	High operating temperatures in the compact design have caused a small amount of failures in the industry after 5 years of operation.
NSP-Minnesota	A.0001572.027	Reliability/Performance Enhancement	ASK1C-Admin Bldg HVAC Replace	239,378.97	2021	Replace the HVAC air handling unit (including cooling coils and heating coils) on 5th Floor with that feeds the 3rd/4th floors (offices, restrooms, break areas, conference rooms).This project also includes the replacement of complete sections of corroded ducting on the 3rd/4th floors.	Mold has been found on walls and ceiling tiles in the 3rd floor restroom. The existing system is original installation (1960s) and has shown signs of corrosion and some leakage, and is believed to be contributing to the mold.
NSP-Minnesota	A.0001573.112	Reliability/Performance Enhancement	BDS2 - Ovhl 22 Circ Water Pump	238,899.28	2021	Overhaul of No. 22 Condenser Circulating Water Pump. Assumes replacement of complete rotating assembly or replacement of complete stationary assembly, or both. This project will also include improvements to pump outer column structure to reduce pump vibration signature, as was successfully done for the most recent overhaul of the No. 21 condenser circulating water pump. Improving pump vibration results in longer time between pump overhauls.	Condenser circulating water pumps require periodic overhaul, in order to maintain performance. During the warmer half of the year, both 21 and 22 circulating water pumps must be in service, or a unit derate will result.
NSP-Minnesota	A.0001574.738	Reliability/Performance Enhancement	SHC0 2RSA H_Bushng Rplcmnt	235,199.61	2021	Replaced 2 RSA H0, H1, H2 and H3 bushings and oil pumps. Scope of work includes draining, processing and refilling oil in transformer.	Some bushings showed signs of degradation in recent testing.
NSP-Minnesota	A.0001576.500	Renewable and New Generation	GDM Emergent Fund -Wind prod	228,025.31	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001579.138	Reliability/Performance Enhancement	RIV10C U10 Comb Dynamics Replace	225,574.52	2021	Install a replacement combustion dynamics system on Unit 10.	The existing combustion dynamics system has been operating since 2009. It will need to be replaced in order to stay ahead of the obsolescence curve. This project would be completed in conjunction with installation of the auto tune system. A new combustion dynamics system tailored to auto tune is required to optimize the auto tune system and insure the reliability of the auto tune system. The Combustion Dynamics Monitoring System provides input to the Operator regarding stability of the CT combustion. If the indication is not available, then it is more likely the Operator would not pick up on combustion abnormalities until it is too late. If the combustion dynamics get out of control resulting in too high of Low, Medium or High Tones or if the Lean Blow Out conditions are not detected via the combustion dynamics system, and the unit operation is continued, then complete destruction of the turbine is possible, depending upon the condition and what is causing it.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.139	Reliability/Performance Enhancement	RIV9C U9 Comb Dynamics Replace	225,472.85	2021	Install a replacement combustion dynamics system on Unit 9.	The existing combustion dynamics system has been operating since 2009. It will need to be replaced in order to stay ahead of the obsolescence curve. This project would be completed in conjunction with installation of the auto tune system. A new combustion dynamics system tailored to auto tune is required to optimize the auto tune system and insure the reliability of the auto tune system. The Combustion Dynamics Monitoring System provides input to the Operator regarding stability of the CT combustion. If the indication is not available, then it is more likely the Operator would not pick up on combustion abnormalities until it is too late. If the combustion dynamics get out of control resulting in too high of Low, Medium or High Tones or if the Lean Blow Out conditions are not detected via the combustion dynamics system, and the unit operation is continued, then complete destruction of the turbine is possible, depending upon the condition and what is causing it.
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	224,964.08	2021	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001579.157	Reliability/Performance Enhancement	RIV9-Replace U 9 HRSG Exp joints	214,424.23	2021	Capital replacement of the 9 Unit CT exhaust transition duct expansion joints. Riverside has several hot spots that could fail soon, and will fail in the near future. It is best to replace the entire joint about every 10 years instead of waiting for them to fail. Failure could cause a significant forced outage of days or weeks, and cost tens of thousands of dollars for emergency repairs that would only be temporary at best.	Reliability of the unit. Avoidance of forced outage and maintenance costs for emergency repairs.
NSP-Minnesota	A.0001579.149	Reliability/Performance Enhancement	RIV10-Repl ExpJoints 10 CT Outlet	213,914.11	2021	Replace the Unit 10 combustion turbine exhaust transition duct expansion joints. Both inlet and outlet joint are included.	There are hot spots that will burn through and cause a forced shutdown. Replacement will assure long-term reliability of the exhaust enclosure leading into the boiler.
NSP-Minnesota	A.0001703.013	Renewable and New Generation	FXW Foxtail PCMM New	212,508.00	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001705.013	Renewable and New Generation	CRW Crowned Ridge PCMM	212,508.00	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001706.013	Renewable and New Generation	LBW Lake Benton PCMM	212,508.00	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001574.846	Reliability/Performance Enhancement	SHC3-SDA MTR purchase	212,393.97	2021	Sherco plant to purchase a Capital Emergency Spare Part (CESP) atomizer motor to allow for refurbishment of existing atomizer motors one-by-one on-line without de-rating the plant. Original install year for the existing motors is 1987.	The existing atomizer motors are in very bad shape and required frequent PMs. We have had one motor failed and many have been reconditioned. We need seven (7) out of nine (9) atomizers to operate at full load. Currently the plant is operating with eight (8) atomizers due to failure of one SDA motor.
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	200,381.13	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	200,000.00	2021	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction. All tools under $1000 each.	Improve capability and efficiency of daily operations maintenance tasks.
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2021 Small Project Routine	199,034.56	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001565.085	Reliability/Performance Enhancement	WLM1 -Replace U1 CEMS Analyzers	198,806.65	2021	Procure and install new CEMs analyzers. On the inlet side, replace O2 and SO2 analyzers. On the outlet side, replace CO, NOx and SO2 analyzers. Additionally, this project will procure a new standing rack in CEMs shack for the analyzers and upgrade the HVAC system which has not been replaced in over 10 years.	The CEMs analyzers were all last replaced in 2010. Parts are becoming more difficult to procure to maintain the current analyzers. The current HVAC system in the CEMs shack has not been replaced in over 10 years.
NSP-Minnesota	A.0001565.086	Reliability/Performance Enhancement	WLM2 -Replace U2 CEMS Analyzers	198,806.65	2021	Procure and install new CEMs analyzers. On the inlet side, replace O2 and SO2 analyzers. On the outlet side, replace CO, NOx and SO2 analyzers. Additionally, this project will procure a new standing rack in CEMs shack for the analyzers and upgrade the HVAC system which has not been replaced in over 10 years.	The CEMs analyzers were all last replaced in 2010. Parts are becoming more difficult to procure to maintain the current analyzers. The current HVAC system in the CEMs shack has not been replaced in over 10 years.
NSP-Minnesota	A.0001573.230	Reliability/Performance Enhancement	BDS0 -Install High Water Road Gate	193,826.35	2021	Install fencing, a gate, gate controls, camera, badge reader, and security call box at the end of the vehicle bridge on the Black Dog High Water Road.	Part of the long term Black Dog Security Plan is to install a barrier (fence/gate) to restrict and control access across the vehicle bridge portion of the Black Dog High Water Road. The High Water Road is a much more controllable access point than the site border with the Black Dog Park area. Site access controls are mandated by corporate policy. Project also includes fencing along new stormwater pond.
NSP-Minnesota	A.0001571.094	Reliability/Performance Enhancement	ANS0C TBS Odorizer Rplc	180,508.28	2021	Replacement of the odorizer feeding the 13-mile natural gas pipe line that supplies natural gas to Angus Anson.	The YZ Odorizer supplying odorant to the natural gas line feeding Angus Anson is under sized and nearing end of life. The current odorizer is experiencing high pump, low verometer, expansion tank pressure, and vapor lock alarms. This is due to pump injection rate being so fast that the verometer and expansion tank don't have time to fill back up before next injection. In the event of an Odorizer failure or alarm the Angus Anson Units must be taken off line and put in outage until the alarm is responded to.
NSP-Minnesota	A.0001574.762	Reliability/Performance Enhancement	SHC1C Rewind BCP Motor 2021	180,503.25	2021	Rewind each boiler-circ-pump one at a time. The need for this project is based on the as-found condition of the 12 BCP after removal in 2015.	Loss of a BCP results in a derate to 90% power. Repairs/replacement typically result in a minimum 5-day outage.
NSP-Minnesota	A.0001574.173	Reliability/Performance Enhancement	SHC3C Emergent work	175,083.59	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001575.042	Reliability/Performance Enhancement	HBC8C U8Exh Exp Joint	174,739.03	2021	Replace the CT exhaust expansion joint and the insulation material. The expansion joint will be replaced when it begins to show signs of degradation such as brittleness and discoloration. At this time the insulation material will also be replaced.	The expansion joint has been in service for 5 years. These expansion joints have an expected life of 5 to 8 years. Additionally, the insulating material, Fiberfrax, used in conjunction with the expansion joint is listed as a possible cancer hazard by inhalation on the MSDS. Failure of the expansion joint could release the insulation material and hot exhaust gases into plant.
NSP-Minnesota	A.0001579.150	Reliability/Performance Enhancement	RIV10-Repl Unit 10 FW Reg Valve	173,172.65	2021	Replace Unit 10 Feed Water Regulating Valve. The original valve has performed poorly. Plugs frequently with magnetite which can cause a forced outage to address issues. The valves require a minimum of annual repair with replacement of parts and exchange of the cage to keep the valve functional.	The new valves will be a more robust design for severe duty and designed not to plug with magnetite (rust.) They will be designed to perform in service for 3 - 4 years between maintenance cycles.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001562.166	Reliability/Performance Enhancement	REW1-Electronic Overspeed	171,456.81	2021	This project will replace the current mechanical overspeed with an electronic overspeed system. The current overspeed system involves a mechanical trip mechanism and a single channel electronic system.	The lack of redundancy with the electronic overspeed means that the mechanical system must be the primary trip method, and since it's the primary method it must be tested annually. There is a large risk involved with over speeding a turbine to test the mechanical overspeed trip, the installation of an electronic overspeed will negate the need to do many of these tests.
NSP-Minnesota	A.0001574.800	Reliability/Performance Enhancement	SHC3-SHC3-Haul Road 2021	171,384.97	2021	SHC3P Haul Road; Overlay 25% of Landfill Haul Road.	Haul road in poor repair causes considerable damage to heavy equipment and repairing it will improve safety.
NSP-Minnesota	A.0001574.419	Reliability/Performance Enhancement	SHC3C Control Room Roof Repl	169,659.70	2021	Remove the existing roofing materials and install a new roofing system of like kind. The substructure will also be assessed at the time of the tear off . The project would include the roof replacement over the U3 Control room (15,000 SF) and the U3 Transition Room (7100 SF).	The existing roofing system has exceeded its life cycle and is need of replacement. Continual patching and repairing due to the weather and wear over the years is becoming costly to maintain. A new roof will enhance the life of the asset and will bring a 20 year warranty to mitigate the costly repairs. Presently the leakage is a common occurrence when it rains or during springtime snowmelts.
NSP-Minnesota	A.0001579.148	Reliability/Performance Enhancement	RIV9-Repl Combustion Air Purifiers-	167,385.81	2021	Full replacement of the Unit 9 High Efficiency Combustion Air Inlet Purifiers. This includes the entire assembly of 528 sets of cylindrical and conical elements.	Replacement of the Combustion Turbine Inlet Air Filters is necessary as the elements become aged and dirty. These elements have been in-service since early 2015 and will be due for replacement near 2021. Riverside utilizes a pulse cleaning system which helps, but the differential pressure is 0.6" water as of February 2020. As the elements become plugged, the higher differential pressure across the inlet section will reduce the output of the Combustion Turbine and increase the unit's heat rate. Eventually, the differential will cause a forced outage to replace the elements. In addition to high differential, another concern with dated elements is that if they begin to breakdown or become damaged, they could allow large airbourne particles to enter the combustion airflow and damage the Combustion Turbine. So far, the filter "structure" is still in reasonable condition.
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2021 Small Project Routine	166,226.58	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001575.041	Reliability/Performance Enhancement	HBC7C U7 Exh Exp Joint	165,881.62	2021	Replace the CT exhaust expansion joint and the insulation material. The expansion joint must replaced when it begins to show signs of degradation such as brittleness and discoloration, and the insulation material will also be replaced at the same time.	The expansion joint has been in service for 5 years and have an expected life of 5 to 8 years. The insulating material used in conjunction with the expansion joint, Fiberfrax, is a potential inhalation hazard. Failure of the expansion joint could release the insulation material and hot exhaust gases into plant.
NSP-Minnesota	A.0001579.077	Reliability/Performance Enhancement	RIV0C -- DP Mon & Gen Gas Drye	165,774.33	2021	Add a hydrogen dew point temperature monitoring instrument to unit 7 generator. This can be accomplished by replacing existing Gas Dryer with a new gas dryer that has the capability to measure inlet and outlet hydrogen dew point temperature. The replacement gas dryer should have the capability to operate when the unit is on turning gear. Also, the hydrogen dew point temperature monitor will have the capability to send an alarm to the control room.	The Unit 7 generator does not currently have any dew point monitor instrument with alarm indication in the control room. Hydrogen dew point temperature is an indicator of the moisture content in the generator casing hydrogen gas. Moisture is un-desirable for the stator and rotor insulation systems, since it can initiate insulation failure by electrical tracking, and for various steel components in the generator due to corrosion. Hydrogen dew point should be monitored on a continuous basis by a dew point instrument, with an alarm if the dew point rises above this set point.
NSP-Minnesota	A.0001575.180	Reliability/Performance Enhancement	HBC9-HRH CRH Blk Vlv Vent Automate	162,786.71	2021	Install new metal seated ball valves with pneumatic actuators on the bonnet equalizing vent valves on the U9 HRH and CRH header block valves. Install new controls wiring and build new controls logic to automatically position the valves based on whether Unit 7 or 8 is in the lead.	The bonnet vent valves need to be in the proper configuration based on plant operation(ie upstream vent closed/downstream open or vice versa). If the valves are not in the proper configuration, chattering and damage can occur to the large CRH and HRH parallel disc valves. One of the MS valves has already failed due to this chattering. The existing valves are in hard to reach locations and must be manually operated by Operations if a unit trips or if the lead/lag units are swapped. Automating these valves will reduce the chance that an Operator is injured as these valves will no longer need to be manipulated in non-ergonomic locations. This also supports the initiative that was implemented to go down to 2 operators per shift, as it reduces Operator workload by installing automated valves.
NSP-Minnesota	A.0001611.013	Renewable and New Generation	PVW0-PVW Eagle Take Permit	160,000.00	2021	This project supports the activities required to coordinate and manage an Eagle Take Permit at Pleasant Valley Wind Farm. The tasks associated with this include: Point Count Surveys, Aerial Nest Survey, Weekly Nest Monitoring, Application Fee, and Consulting Services.	Nesting eagles were observed in March 2016 on the Pleasant Valley Wind Farm. Xcel notified State and Federal agencies and an Eagle Take Permit is required. The agencies involved are MDNR (Minnesota Department of Natural Resources), USFWS (US Fish and Wildlife Services), and the Minnesota Department of Commerce, Energy Environmental Review and Analysis.
NSP-Minnesota	A.0001571.091	Reliability/Performance Enhancement	ANS4-CT4 Turning Gear Reduction	159,271.07	2021	Replace existing turning gear package with a variable speed drive and Motor to allow for reduced turning gear speeds.	The combustion turbine spends a substantial amount of time on turning gear. Reducing the turning gear speed would substantially reduce wear on the machine while on gear. GE Gas Turbines of this vintage, experience 1st stage bucket rock while on turning gear. This rocking over time will result in the need to replace the rotor disks. Rotor disc replacement is very expensive and should be avoided
NSP-Minnesota	A.0001579.153	Reliability/Performance Enhancement	RIV9-Replace HP FW valve Unit 9	152,795.80	2021	Replace the existing HP Feed Water Regulating Valve on Unit 9. The current valve has trim that plugs with magnetite on a regular basis. The new FW valve will be designed not to plug up and to only need maintenance every 3 - 4 years.	The current FW valve plugs up every 12 months and forces repair and internal component change out. The existing valves have been high maintenance and have performed poorly. They have caused generating unit down time to address problems. The new valve will be a more robust and severe service valve good for 3 - 4 year maintenance cycle.
NSP-Minnesota	A.0001561.500	Reliability/Performance Enhancement	IVH Emergent Fund -Other prod	152,313.81	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001565.115	Reliability/Performance Enhancement	WLM0C DCS Software Hardware Upgrade	151,601.64	2021	DCS Software update (latest revision) and hardware replacement of 10 work stations.	Updating to the latest software revision keeps the DCS up to date for servicing and trouble shooting. After time the older revisions are essentially unsupported by the vendor. Hardware replacements every five years will help to ensure limited failures.
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2021	2021 blanket for miscellaneous tools needed to support plant core operations.	Ensure necessary tools continue to be available to support plant core operations.
NSP-Minnesota	A.0001574.268	Reliability/Performance Enhancement	SHC1C Emergent Projects	149,760.14	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.303	Reliability/Performance Enhancement	SHC99 -CESP-2021 #4 CC Rotor Asmbl	147,480.45	2021	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #4 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency of the plant.
NSP-Minnesota	A.0001574.841	Reliability/Performance Enhancement	SHC3-Computer Room Fire Protect	145,437.15	2021	Replace the existing Halon Fire Protection system in the Unit 3 computer room. Recommendation from 2019 Sherco All Risk Loss Prevention Report.	The system was removed from service some time ago but Fire Protection is still required for this area. Halon is an old system and is very difficult to procure parts and materials for. Restoring the existing system is not feasible when there are modern gaseous systems that can replace it.
NSP-Minnesota	A.0001579.155	Reliability/Performance Enhancement	RIV10-All New Lowr Pen Seals HRSG	142,613.49	2021	Replace all 18 lower Penetration seals on Unit 10 HRSG with new fabric seals.	The existing seals have reached end of life and are near failure. Failure will result in forced outages of the unit to address one at a time. This could be very expensive in lost generation and O & M costs for emergency repairs. Blown seals could also be a safety concern depending on severity of the blowout. If all the failing seals are replaced at one time, the cost will be capital and the work can be better planned to limit total cost.
NSP-Minnesota	A.0001565.120	Reliability/Performance Enhancement	WLM1C Replace U1 B11 Screw Auger 21	140,542.08	2021	Replace six augers in U2 Bin 11.	The augers are failing and need to be replace so that both fuel metering bins will be operable.
NSP-Minnesota	A.0001703.009	Renewable and New Generation	FXW - Foxtail PCMM	136,227.58	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.790	Reliability/Performance Enhancement	SHC0-CS1 Gas Bottle Storage	135,705.33	2021	Setup old elevator room to be Calibration Gas Storage for the CEMS equipment. This will include running a heated umbilical from the ground floor up to the 440' CEMS level. Ventilation and gas detection equipment will be required as well for the room.	Lack of room for Calibration gas up in CEMS room, transporting issues of calibration gas up stairs to elevator and moving calibration gas in the elevator.
NSP-Minnesota	A.0001564.027	Renewable and New Generation	HNI4C Replace Unit 4 Shaft Seals	135,214.08	2021	Replace the turbine shaft seals on both the upstream and downstream end. The seals will be either mechanical or packing modified with a plastic backer that helps absorb shaft movement. A clean water package may also be needed. The existing 304 SS shaft sleeves will be removed and new hardened sleeves will be installed that match well with the shaft seal material.	The existing packing cannot handle the added shaft movement while running. The center bearing was removed to make maintaining the unit safer. The current 304 SS sleeves are grooved from debris in the seal water. The packing is being used at a much higher rate. Annually we are spending about $6,000 per year on packing. The extra leakage causes slipping hazards in the plant. The shaft sleeves will continue to wear and likely within 5 years cause shaft damage that would require extensive disassembly and repairs.
NSP-Minnesota	A.0001579.158	Reliability/Performance Enhancement	RIV9-Repl HRSG penetration seals	132,418.96	2021	Replace a full set of lower HRSG penetration seals. The seals are at or beyond end of life, and if failure occurs could cause a forced shutdown and require emergency temporary repairs on O & M costs.	Repairs require the unit to be offline, so failures will raise down time, lower availability, and cost O & M for repairs which then need to be redone at the next opportunity. It is better to be proactive.
NSP-Minnesota	A.0001574.819	Reliability/Performance Enhancement	SHC1-U1 TCS HMI Repl	131,771.99	2021	Replace the Unit 1 Turbine Controls System (TCS) Human-Machine Interfaces (HMIs) or computers.	HMIs at this time have reached the end of their useful lifecycle. Critical Computer errors are more likely to occur as the computers age, and replacement components will be difficult to find at this time. Spare parts created can also be used for Unit 2 Turbine Controls.
NSP-Minnesota	A.0001572.107	Reliability/Performance Enhancement	ASK1C Inst GRF Damper Drives	129,237.03	2021	Replace the excising inlet damper drives with new damper drives.	The existing Beck-brand drives do not control well. There are startup issues with control of the existing dampers at low percentage damper flows.
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	125,000.00	2021	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction. Included, but not all inclusive: Safety equipment, small tools, shop equipment and specialized tools.	Tool replacements are needed as tools come to end of life and are no longer cost effective to repair. The plants and facilities utilize Special Construction to supplement outages, projects and routine maintenance work at their sites. The sites typically do not have the tools and equipment necessary to complete the work that is performed by Special Construction. The expectation is that our department will bring the necessary resources to complete the work. The tools and equipment will be housed in a central location and rotated from site to site.
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	124,977.38	2021	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001559.500	Reliability/Performance Enhancement	BLL Emergent Fund -Other prod	120,013.31	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001579.154	Reliability/Performance Enhancement	RIV10-Fuel Gas Valve Exchange	117,139.36	2021	Exchange Riverside U10 fuel control valves PM-1, PM-2, PM-3, PM-4, and Stop Ratio Valve (SRV) for refurbished fuel control valves. Refurbished valves would be shipped to site prior to the outage. During the outage the currently installed valves would be removed, and the refurbished valves would be installed. The valves that come out of the unit will then be shipped to supplier. Exchanging existing valves for refurbished valves.	The Riverside U10 fuel control valves have been in operation since the unit was commissioned. No maintenance work has been performed on the valves during that time. The Major overhaul scope includes refurbishment/replacement of the turbine auxiliaries including the fuel control valves. The valves are leaking oil/hydraulic fluid. The supplier offers an exchange program in lieu of rebuilding the valves. $97,000 for supplier, $23,000 labor.
NSP-Minnesota	A.0003000.697	Reliability/Performance Enhancement	SER-MMR- Misc Tools & Equip	117,000.00	2021	Miscellaneous tools for plant overhauls	These tools are used for plant overhauls and troubleshooting equipment problems.
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	115,694.17	2021	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	Need to replace failed transformers because the wind turbine cannot be run without these transformers.
NSP-Minnesota	A.0001574.842	Reliability/Performance Enhancement	SHC3-U3 Control Room Fire Protect	112,384.36	2021	Replace the existing Halon Fire Protection system in the Unit 3 control room. From 2019 Sherco All Risk Loss Prevention Report	The system was removed from service some time ago but Fire Protection is still required for this area. Halon is an old system and is very difficult to procure parts and materials for. Restoring the existing system is not feasible when there are modern gaseous systems that can replace it.
NSP-Minnesota	A.0001579.142	Reliability/Performance Enhancement	RIV10 - Rplc Compressor Bleed Vlv	111,067.32	2021	Replace the #1, #2, #3, and #4 compressor bleed valve and actuator assemblies during the Unit 10 Major Outage. The new air operated valve assemblies that will be installed are an upgraded design and fully compliant with the GE TIL 1416-R1 Compressor Bleed Valve Reliability Upgrades. The new valves are a bolt in replacement, with the only system modification being the installation of inline coalescing air filters on the instrument air supply manifold.	GE recommends replacement/overhaul of the compressor bleed valves and actuators on the Hot Gas Path based interval of 24,000 hrs. The existing valves are original, and by the time the unit reaches its Major Outage the existing valves will have been in-service for 48,000 hrs, double the OEM recommendation. The existing valves have experienced operational issues periodically, resulting in failed unit start-ups. In addition, periodic issues have been experienced with valves failing to open during shut down, which could lead to a compressor stall/surge condition. A compressor stall/surge is a very serious event that has the potential to cause significant compressor damage and lead to a costly and lengthy forced outage.
NSP-Minnesota	A.0001573.010	Reliability/Performance Enhancement	BDS5C Cooling Water Strainer R	109,409.59	2021	Replace the existing auxiliary cooling water self-cleaning strainer with an improved strainer.	The existing Hayward self-cleaning strainer frequently plugs with debris and must be disassembled and manually cleaned approximately twice per year. Additionally, the wedgewire design is not effective at straining fine debris, causing the heat exchangers to frequently plug. The ALF strainer is specifically designed by Alfa Laval to protect heat exchangers in low quality water installations. It would cost about $24,000 per year (about 2 cleanings) to hire a contractor to clean the heat exchanger and $9,000 per year (2 cleanings) to clean and maintain the strainer. Installation of the new strainer is expected to decrease this to 1 cleaning per year. In summer conditions, the constant plugging of the heat exchangers allows the closed cooling temperature to rise above the design temperatures. This has potential for long term damage to equipment.
NSP-Minnesota	A.0001573.088	Reliability/Performance Enhancement	BDS0 -Rplc Statn#9 Air Compressor	103,754.47	2021	Replace the No. 9 Station Air Compressor with a new air compressor of a similar capacity.	Both the Nos. 8 and 9 station air compressor were new in the Black Dog Units 5&2 Repowering Project of 2002. No. 8 station air compressor failed in early 2018, and was replaced that year under an emergent capital project. At the time of the No. 8 station air compressor failure, Black Dog's air compressor service contractor stated that the no. 9 station air compressor was in the same condition as the No. 8 station air compressor. No. 9 is currently available as a backup.
NSP-Minnesota	A.0001574.302	Reliability/Performance Enhancement	SHC99-CESP-2021 #2 CC Rotor Asmbl	103,700.61	2021	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #1 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency of the plant.
NSP-Minnesota	A.0003000.491	Reliability/Performance Enhancement	SER-CHM-Evolution Test Set	102,000.00	2021	This instrument is necessary to maintain operation excellence in support of fleet wide lubricating oil and insulating oil systems. It is also used in support of the plants in identifying unknown materials and verifying the composition of purchased materials. It is also necessary to maintain environmental excellence in assisting the plants by identifying wastes for proper disposal methods. This instrument is used to measure the inhibitor content of oils which is vital to proper maintenance of oil-filled equipment.	If we are unable to purchase this equipment, we will be required to send this work to an outside contract lab. For some uses, there is no known contract lab available.
NSP-Minnesota	A.0001576.013	Renewable and New Generation	GDM Eagle Take Permit	97,641.62	2021	This project supports the activities required to coordinate and manage an Eagle Take Permit at the Grand Meadow Wind Farm. The tasks associated with this include: Point Count Surveys, Aerial Nest Survey, Weekly Nest Monitoring, Application Fee, and Consulting Services.	Nesting Eagles were observed in March 2016 on the adjacent Pleasant Valley Wind Farm. Xcel notified State and Federal agencies and an Eagle Take Permit is required. The agencies involved are MDNR (Minnesota Department of Natural Resources), USFWS (US Fish and Wildlife Service), and the Minnesota Department of Commerce, Energy Environmental Review and Analysis.
NSP-Minnesota	A.0001575.168	Reliability/Performance Enhancement	HBC0 -New Instmnt Air Compressor	96,640.94	2021	Installation of a new (smaller) air compressor and dryer skid on the south side of the main plant building. This compressor would be tailored to precisely match the continuous air needs of the plant, with the (2) existing main compressors transitioning to standby/backup functionality.	The service contract for the existing compressor has expired and was not generally felt to be effective for ensuring reliability. The two existing compressors are also oversized for the continuous air demand at High Bridge and as such they cycle frequently, diminishing the expected usable life of the compressors. An additional, appropriately sized compressor, air receiver, and dryer skid on the south end of the plant would provide more constant air pressure, cycle much less frequently (fewer thermal/pressure cycles) and add storage volume to the system which is also lacking.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.347	Reliability/Performance Enhancement	SHC1C Boiler Ignitor Replacement	95,993.01	2021	The replacement of 56 ignitor internal components consisting of an air and oil atomization assembly with flexible hoses to be used to connect to the oil and air supply lines, a High Energy Ignition (HEI) solid spark rod with tip, a solidflame rod. This includes the replacement of 56 motor operated valves and flow switches; Eddy Plate oil side ignitors, including ignitor internal components; and 56 ignitor horns.	The current ignitor system has reached the end of life due to material failures and unsupported individual components by the OEM. The motor operated air/oil valve is not supported anymore. The igniter horns are badly warped. Supporting infrastructure such as the air and oil lines are failing due to age. The high energy spark plugs and wire have been damage from excessive heat, and the D/P switches are getting difficult to maintain. The replacement system will be the latest ignitor technology from the OEM. Failure of the ignitors to function properly can increase boiler start-up/overhaul durations. Replacement of the boiler ignitors will 1) reduce future O&M costs for ignitor repair and 2) avoid a minimum of two 10 hour outage extensions per year due to ignitor failures.
NSP-Minnesota	A.0001562.134	Reliability/Performance Enhancement	REW1C Repl Chutes U1 and Refract	95,550.12	2021	Replace all 4X wind swept spouts and front wall refractory for the Unit 1 Boiler.	After approximately 5 years of service life the structural integrity of the spouts compromise tramp air is pulled into the boiler resulting in increased CO levels. In addition, holes in the spouts allow fire to exit the boiler when furnace draft goes positive creating a safety and fire hazard for the plant.
NSP-Minnesota	A.0001579.144	Reliability/Performance Enhancement	RIV10 -Rplc Lube Oil Pump	95,264.57	2021	Replace the existing #1 and #2 AC lube oil pumps and motors during the Unit 10 Major. The existing grease lubricated pumps require frequent maintenance and an overhaul every 16k hrs. Pump overhauls do not fit within Hot Gas Path outage windows so they have historically not been completed. An upgraded, forced oil lubricated 30k hr interval pump is available that offers increased reliability and longevity. It is expected that this upgraded pump design will operate reliably between Major Outage intervals, at which time pump overhauls would be completed.	The existing pumps are of the design that has been known within the industry to cause issues. One of the pumps is original and overdue for an overhaul. 7FA gas turbines do not have shaft driven oil pumps, so lubricating oil for the turbine and generator bearings is supplied from either of the two 100% capacity AC lube oil pumps. One pump is always running unless the unit is in a maintenance outage, so the pumps accumulate operating hours even while the unit is offline in reserve shut down. In November 2016, the #1 AC lube oil pump on Unit 10 failed during operation. The damage to the pump was extensive and a forced outage was required to make repairs.
NSP-Minnesota	A.0001579.152	Reliability/Performance Enhancement	RIV10-New FW isolation valves U10-2	94,733.39	2021	Install new high pressure boiler feed water isolation valves. These valves will isolate a boiler FW pump as needed so that repairs can be made to the pump while the unit is on line.	The current valves don't hold. Repairing the valves installed is only a short term solution because the valves need to be throttled on unit startup, and this causes the valves to leak. New isolation valves dedicated only for isolation will fix this issue and allow repairs to the boiler feed water pumps while the other pump and the unit is in operation.
NSP-Minnesota	A.0001579.151	Reliability/Performance Enhancement	RIV9-Boiler FW isolation valves	93,205.44	2021	Add two new boiler feed pump discharge valves on the boiler feed pump discharge line for redundant isolation. This will allow the pumps to be isolated and worked on while the unit is in service.	Currently the isolation valves do not hold. The current isolation valves are also needed to throttle flow during startup, which causes valve wear and causes valve leakage. Therefore, manually isolated normally open valves dedicated to isolation service only will assure isolation for safely working on a boiler feed pump with the generating unit in service.
NSP-Minnesota	A.0001574.468	Reliability/Performance Enhancement	SHC3C Secoal Detector repl	86,031.23	2021	Replacement of the legacy Secoal coal seal detectors on the 10 coal feeders supplying coal to the Unit 3 boiler. Part of this project includes the removal and disposal of 10 Nuclear Sources.	This is legacy equipment for which we can not obtain OEM support or parts. These electronic coal detectors with nuclear sources have been in service for over 28 years, well beyond their design life. These detectors ensure that we maintain the coal seal between the coal mills and the coal silos to prevent any hot gasses and ignition sources from getting into the bunker and causing a fire or explosion. This is critical to prevent a bunker explosion.
NSP-Minnesota	A.0005014.143	Renewable and New Generation	FBW0-Freeborn Building Furn & Equip	84,996.00	2021	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0001575.182	Reliability/Performance Enhancement	HBC0-Install Aux Circ Strainer Bypass	82,838.99	2021	Install new 24" Schedule 10 stainless steel bypass piping and a new 24" 150 lb butterfly valve around the aux circ water strainer. There are existing tees with blind flanges installed to connect the new bypass piping	The aux circ strainer is a single point of failure. If it plugs up or has a failure of the backwash mechanism the plant will not be able to supply aux circ water to the closed cooling system heat exchangers, which will cause plant equipment to overheat and result in a forced outage. The new bypass will allow the plant to operate in the event of an aux circ strainer failure. Other plants with similar strainers have bypass piping installed.
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	81,805.14	2021	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the transformer and then reinstall it.	Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001576.021	Renewable and New Generation	GDM Eagle Take New	80,000.00	2021	This project supports the activities required to coordinate and manage an Eagle Take Permit at the Grand Meadow Wind Farm. The tasks associated with this include: Point Count Surveys, Aerial Nest Survey, Weekly Nest Monitoring, Application Fee, and Consulting Services.	Nesting Eagles were observed in March 2016 on the adjacent Pleasant Valley Wind Farm. Xcel notified State and Federal agencies and an Eagle Take Permit is required. The agencies involved are MDNR (Minnesota Department of Natural Resources), USFWS (US Fish and Wildlife Services), and the Minnesota Department of Commerce, Energy Environmental Review and Analysis.
NSP-Minnesota	A.0001574.732	Reliability/Performance Enhancement	SHC0C U1_2 Computer Room F.P.	70,815.04	2021	Provide an automatic suppression system in each of these computer rooms.	These computer rooms are critical to the operation of the units, and the unit in question would be shut down if the units computer room were lost. These rooms currently have no suppression systems, and they are separated from adjacent operating center and relay rooms by non-fire rated construction. This total area covers about 10,000 square feet. Automatic sprinklers or a clean agent gaseous suppression system could be installed.
NSP-Minnesota	A.0001571.085	Reliability/Performance Enhancement	ANS4C Replace Unit 4 Battery	70,393.09	2021	Replace all UPS batteries in Unit 4.	Battery testing shows that these batteries are nearing their end of life.
NSP-Minnesota	A.0001573.227	Reliability/Performance Enhancement	BDS0 -Process Net Virtualization	69,107.90	2021	Purchase and install hardware/software for a virtualized server environment that can be used to host the Black Dog Process Network services once the existing hardware/software reaches end of useful life.	The One Metro Plant upgrade plan for the various process network systems at the plant (System One, Annunciator System, SKF, etc.) consists in large part of a move to a virtualized server environment. Moving to a virtualized environment provides benefits in the areas of hardware independence/flexibility, lower costs (lower number of server class machines needed), ease of maintenance/management, fully functional backup capabilities, and disaster recovery.
NSP-Minnesota	A.0001574.300	Reliability/Performance Enhancement	SHC99 - Rplc RCD DS Pipe	66,274.27	2021	Replace sections of the Dust Suppression water line in the RCD building. This is a 6" pipe. Replace 20' feet or more.	This is an environmental compliance matter; we are permitted to run dust suppression when we are dumping trains. This run of piping has MIC corrosion and there are a lot of patches on this pipe.
NSP-Minnesota	A.0001573.118	Reliability/Performance Enhancement	BDS0 -#52 Cooling Wtr Instrument	65,188.80	2021	Installation of additional instrumentation on the Unit 5/2 Cooling Water system (river water side) to monitor operating parameters and facilitate condition based maintenance. Instruments to include bearing seal water flow and pressure transmitters, pump vibration monitoring, pump motor amps and speed, pump discharge pressure transmitters, strainer d/p transmitter, and heat exchanger d/p transmitters.	The Unit 5/2 Cooling Water system has limited feedback into the plant DCS control system so it is difficult to monitor operating performance and identify issues or maintenance needs. There have been several events throughout the equipment life which have resulted in outages, equipment damage, and increased maintenance costs. Both pumps failed in the summer of 2004 causing an extended outage, and there have been more recent issues with pumps failing (broken shaft) with no indication of issues, pumps rotating backwards from leaking check valves, pump wear from inadequate bearing supply flow, strainer and heat exchangers plugging up with no indication, etc. Improving the instrumentation will improve the reliability of this equipment and prevent future issues.
NSP-Minnesota	A.0001701.013	Renewable and New Generation	BS1 - Blazing Star1 PCMM	64,846.42	2021	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001559.115	Reliability/Performance Enhancement	BLL8-Replace u8 battery	60,683.34	2021	Replace batteries TAB 58-8 OPzS 800 - 58 cells	The battery string is approaching its end of design life and testing indicates that it is approaching the end of its life. Battery installed 2004 with a design life of 15-years
NSP-Minnesota	A.0003000.679	Reliability/Performance Enhancement	RIV0C-Tool Blanket	60,000.00	2021	Miscellaneous tools and equipment. All individual tools to be >$1000 and meet definitions for general plant equipment.	Improve capability and efficiency of daily operations and maintenance tasks.
NSP-Minnesota	A.0001574.297	Reliability/Performance Enhancement	SHC99-CESP-2020 #3 CC Rotor Asmbl	55,482.16	2021	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #3 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency of the plant.
NSP-Minnesota	A.0003000.748	Renewable and New Generation	BS10-Blazing Star 1 Tools and Equip	55,168.00	2021	Tool and equipment blanket for initial O&M setup and sustainment	New site in remote location for plant support
NSP-Minnesota	A.0003000.750	Renewable and New Generation	FTW0-Foxtail Tools and Equipment	55,168.00	2021	Tool and equipment blanket for initial O&M setup and sustainment of Foxtail Wind Farm	New site in remote location for plant support

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0003000.577	Reliability/Performance Enhancement	SER0C MMR Video Probe 2021	55,002.00	2021	Replace borescope video probe.	Replace non-destructive examination inspection equipment with up to date technology. Two video probes are replaced on an 8-year cycle, 1 every 4 years.
NSP-Minnesota	A.0001575.046	Reliability/Performance Enhancement	HBC8C U8 CT Servo Replace 2	54,502.64	2021	Replace/rebuild servo valves on 8 CT	The servos are necessary for controlling bypass valve, IGVs and fuel gas to the combustion turbine. It is essential the servos be maintained.
NSP-Minnesota	A.0003000.583	Reliability/Performance Enhancement	SER0C PMO DAS Upgrade 2021	51,000.00	2021	Upgrade existing hardware and software to more user friendly and current versions.	Existing hardware and software was purchased in the early 2000s and will be obsolete and possibly inoperable due to computer upgrades.
NSP-Minnesota	A.0001573.270	Reliability/Performance Enhancement	BDS2-21 CWP Motor Rewind	50,936.01	2021	Rewind failed Circulating Water pump motor.	21 CWP motor failed recently and one of the motors from U3 was modified and used as an emergency backup. This project will rewind the original 21 CWP motor to restore the unit back to original configuration and allow for the modified U3 motor to go back to an emergency status. Both U2 circulating water pumps are needed to keep the plant at full load during the warm spring, summer, and fall months.
NSP-Minnesota	A.0001574.666	Reliability/Performance Enhancement	SHC3C CT Vibration System	50,269.76	2021	Connect the two Bentley vibration systems to the plant computer to allow for trending and real time display of equipment condition.	The original project did not connect the equipment to the plant computer. Thus current readings and trending functions are not available.
NSP-Minnesota	A.0003000.669	Reliability/Performance Enhancement	HBC0C HB CC Tool Blanket	50,000.00	2021	Tool blanket to purchase tools more than $1000 each.	Tools needed to adequately perform jobs safely. Existing tools can break or a new tool can do a task better.
NSP-Minnesota	A.0001707.003	Renewable and New Generation	DKR0 Dakota Range Wind TSG 345Kv Line	48,824.89	2021	Construct a 300 MW New Wind Farm in Grant and Codington Counties, South Dakota. The wind farm includes 72- V136 Vestas Turbines rated at 4.2 MWs each, a collector system, O&M building, access roads, and collector substation.	This project qualifies for the Production Tax Credit (PTC) at an 80% level.
NSP-Minnesota	A.0001561.115	Reliability/Performance Enhancement	IVH0 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001566.171	Renewable and New Generation	NBL OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001574.855	Reliability/Performance Enhancement	SHC99 BUD OTS-Security Monitor and	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001576.020	Renewable and New Generation	GDM OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001580.014	Renewable and New Generation	CWF0 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001610.012	Renewable and New Generation	BWF0 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001611.012	Renewable and New Generation	PVW OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001701.019	Renewable and New Generation	BS1 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001703.012	Renewable and New Generation	FXW OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001706.012	Renewable and New Generation	LBW0 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001721.003	Renewable and New Generation	JWF0 OTS Security Monitor and Log	47,661.54	2021	Replace plant firewall to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0003000.214	Reliability/Performance Enhancement	C100C PMO Tool Blanket-New	45,000.00	2021	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Improve testing capabilities.
NSP-Minnesota	A.0003000.661	Reliability/Performance Enhancement	BDS0C Tool Blanket	40,315.00	2021	This funding provides for new or replacement tools and equipment for the plant.	The addition and replacement of tools and equipment is necessary to maintain the productivity of the operating and maintenance personnel.
NSP-Minnesota	A.0001571.073	Reliability/Performance Enhancement	ANS0C Replace Admin Battery	40,285.95	2021	Replace all UPS batteries in Admin Building.	Battery testing shows batteries are getting to the end of life.
NSP-Minnesota	A.0001574.856	Reliability/Performance Enhancement	SHC1 BUD OTS-Security Monitor and L	38,193.13	2021	Replace plant cyber security software to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0001574.857	Reliability/Performance Enhancement	SHC2 BUD OTS-Security Monitor and L	38,193.13	2021	Replace plant cyber security software to include increased protection measures	Enterprise Security Services (ESS) has identified a potential cyber vulnerability associated with these sites.
NSP-Minnesota	A.0003000.708	Reliability/Performance Enhancement	C100C MTR-Replaced Failed Equip	36,000.00	2021	Replace test equipment for motors, generators, and/or control systems to replace existing equipment that has failed or is no longer supported by the manufacturer.	The Technical Resources & Compliance group supports the plants by performing tests to determine the condition of equipment and to diagnose emergent equipment problems. Functioning test equipment is required to perform these tests expeditiously and effectively.
NSP-Minnesota	A.0003000.749	Renewable and New Generation	CRW0-Crowned Ridge Tools-Equip	35,000.00	2021	Tools and Equipment. Includes a drone for blade inspections	Tools and equipment needed to maintain the wind farm.
NSP-Minnesota	A.0003000.751	Renewable and New Generation	LBW0-Lake Benton Tools-Equip	35,000.00	2021	Tools and Equipment. Includes a drone for blade inspections.	Tools and equipment needed to maintain the wind farm.
NSP-Minnesota	A.0001562.167	Reliability/Performance Enhancement	REW1-SKF Monitoring System	33,753.18	2021	This project will replace the SKF monitoring system (monitors turbine vibration). It will also combine both Unit's systems into a single control rack to save space and cut costs. This project goes hand-in-hand with the U2 SKF Monitoring System project.	The current system is obsolete and it is becoming increasingly harder to find replacement parts.
NSP-Minnesota	A.0003000.662	Renewable and New Generation	BRDR Small Tools Equip	29,997.00	2021	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.685	Reliability/Performance Enhancement	WLM0C Tools & Equipment B	29,997.00	2021	Replace toolboxes, chain hoists, misc tools, and test equipment.	Improve work force efficiency and safety. Improve testing capabilities.
NSP-Minnesota	A.0003000.752	Renewable and New Generation	FBW0 Freeborn Tools and Equipment	25,000.00	2021	Tool and equipment blanket for initial O&M Building setup and sustainment.	New site in remote location for plant support
NSP-Minnesota	A.0001575.186	Reliability/Performance Enhancement	HBC8 Condensate Iso Vlv Install	24,013.51	2021	Add a new 10" manual isolation valve on the condensate supply line to U8.	There is currently only a single motor operated isolation valve on the condensate header to U8. The existing MOV has known leak-by issues. A secondary manual isolation valve will allow the plant to achieve double isolation, which is important for outages where one unit remains online and work needs to be completed on the preheater or low pressure section of HRSG. The additional isolation valve will increase the integrity of the isolation and result in increased worker safety.
NSP-Minnesota	A.0001574.269	Reliability/Performance Enhancement	SHC2C Emergent Projects	20,502.20	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.838	Reliability/Performance Enhancement	SHC99-Replace #6 well	20,000.00	2021	This project will replace the #6 well. It will involve drilling a new well and installing a new casing with new sand point and pump. Piping and building modifications will be required to connect the new well to the existing structure and piping. It is planned to drill the new well approximately 20 feet from the existing well. The existing well will be capped and closed as needed.	The existing well has holes in the casing. This is allowing sand and silt to bypass the sand point and pass through the pump and into the system. It is very likely causing pump damage at this time but is not clear how much longer the pump will run. Sand and silt is likely also entering the piping system and may eventually start restricting flow. This is one of two wells that provide the majority of the water for the Sherco site and are much deeper than the original wells on the east side of the Units. This well is critical to continued plant operations and will be a supply for the new combined cycle plant.
NSP-Minnesota	A.0003000.657	Reliability/Performance Enhancement	ANS0C Tools and Equip Ca	20,000.00	2021	Replace toolboxes, chain hoists, misc tools, and test equipment.	Improve work force efficiency and safety. Upgrade and replace old equipment.
NSP-Minnesota	A.0003000.659	Reliability/Performance Enhancement	BLL0C Tools Blanket	20,000.00	2021	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Improve testing capabilities.
NSP-Minnesota	A.0003000.672	Reliability/Performance Enhancement	IVH0C Misc tools and Equip	20,000.00	2021	Replace toolboxes, chain hoists, misc tools, and test equipment.	Improve work force efficiency and safety.
NSP-Minnesota	A.0003000.676	Renewable and New Generation	NBLCo Misc Tools and Equip	20,000.00	2021	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.703	Reliability/Performance Enhancement	C100C CSC Tank Ladder and Platform	20,000.00	2021	Adding a ladder and working platform on top of a 10,000 mineral oil storage tank.	From a safety standpoint, using an attached ladder and platform-railings provides a safer and easier option than a person tied-off using a JLG basket. Required maintenance and annual calibrations of level instrumentation on the 10,000 mineral oil storage tank are required on a periodic basis. Having the ladder and platform installed will make the tasks quicker and more efficient and safer.
NSP-Minnesota	A.0003000.678	Renewable and New Generation	PLV Tools Equip	19,998.00	2021	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.671	Renewable and New Generation	HNIC0 Misc Tools and Equ	15,000.00	2021	Blanket for miscellaneous tools. These tools will be used for day to day operation and in preparation for the turbine overhauls.	Necessary for continued upkeep of operating facilities.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0005014.142	Renewable and New Generation	BS10-Blazing Star 1 Build Furn & Equip.	10,056.00	2021	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0005014.144	Renewable and New Generation	FTW0-Foxtail Building Furn & Equip	10,056.00	2021	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0003000.667	Renewable and New Generation	GDM0C Grand Mead Cap Tool	10,000.00	2021	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.128	Renewable and New Generation	CWF Tools & Misc Equipment	9,999.00	2021	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0001574.733	Reliability/Performance Enhancement	SHC0C Electric & Electronic Room FP	8,516.31	2021	From Risk Loss Prevention Report for Sherco, Recommendation 06-23: Install smoke detection in the following areas (to be monitored by the Main Control Room or other 24/7 occupied area): * Main secondary unit substation room (ground floor) * Main 4,160 volt switchgear room (mezzanine level) for Unit 1 and 2 * Unit 1 and 2, 480-volt SUS room * Unit 1 and 2 Relay Rooms * All of the Inverter Rooms * Unit 1 and 2 Electrostatic Precipitator switchgear rooms * All of the battery rooms	The most likely problem in the listed areas is an electrical fault, which will often generate smoke. Smoke detection in these areas can provide an early warning of a problem and allow action to be taken prior to significant damage occurring. Reference NFPA 850, Section 7.8.4 and 7.8.5.
NSP-Minnesota	A.0003000.492	Reliability/Performance Enhancement	SER-CSC-Floor Scale Replace	4,000.00	2021	Replace existing floor scale	Floor scale - existing floor scale was purchased in 2001. This operational life may be extended by proper care and maintenance; however, the life span may be degraded by continued, sustained use with heavy loads and corrosive materials. The HWSF floor scale endures both conditions which may shorten the cost-effective operational lifespan and accelerated failure. Once the scale has become degraded, it may display an incorrect weight and require repair/calibration more frequently. Confidence in the floor scale is essential for the exact measuring of weights for both the VSQG and PCB program. Without accurate weighing abilities, customers will lose trust with our programs as they will not be able to have assurance that they are being billed an honest rate. The scale was inspected early in 2011.
NSP-Minnesota	A.0001574.209	Reliability/Performance Enhancement	SHC3C 2021 Small Project Routine	3,591.51	2021	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001564.500	Renewable and New Generation	St Anthony Falls Emergent -Other Prod	91.91	2021	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001572.204	Reliability/Performance Enhancement	ASK1C Secondary Superheater Replace	(0.03)	2021	Replace the secondary superheater section (SSH) of boiler per long-term recommendation of boiler reliability team. There are 35 inlet (front) platen sections, 35 intermediate (middle) platen sections, and 70 outlet (rear) pendant sections. This does include the replacement of the inlet and outlet headers.	Recent issues include one failure determined during a forced outage in 2016. an in-depth boiler inspection during the Spring 2013 annual outage indicated that 86 location in the front pendants require pad welding, as well as 184 locations in the middle pendants, and 6 locations in the rear pendants.
NSP-Minnesota	A.0001573.224	Reliability/Performance Enhancement	BDS5 - Ovhl U5 Hot Gas Path	8,810,293.83	2022	Parts and labor to perform a Hot Gas Path overhaul tentatively scheduled for the 2028 time frame. Parts purchased include one full set of CI parts (support housings, pilot nozzles, combustor baskets, transitions, and transition seals) and one full set of turbine parts (ring segments, vanes, and blades for turbine rows 1 - 3).	Per current parts agreement, scheduled outages must occur within 10% of 24k advertised parts life. Historical operating data shows that a HGP overhaul will be required every 5 - 6 years depending on how the unit is dispatched. This is the next HGP overhaul following the Major Inspection which is scheduled around 2023. Parts replacement is required to maintain unit reliability and avoid catastrophic equipment damage and extensive outage time and repair costs.
NSP-Minnesota	A.0001571.090	Reliability/Performance Enhancement	ANS4 - U4 Hot Gas Path	4,801,331.44	2022	Hot gas path inspection for U4 at Angus Anson. The project includes replacement of the following standard hot gas path parts per the PSM parts contract; transitions, liners, liner end caps, fuel nozzle assemblies, stage 1 buckets/nozzles/shroud blocks, stage 2 buckets/shroud blocks. The project also includes replacing the R0 (1st stage) compressor blades to mitigate a design issue with the OEM blades. The exhaust frame flex seals will be replaced with a set of Inconnel seals.	The HGP inspection is required at 24,000 operating hours or 900 starts per the OEM and the PSM parts contract.
NSP-Minnesota	A.0001573.226	Environmental Enhancement	BDS0 -BlackDog Rd Erosion Wall	2,717,095.85	2022	Installation of sheet pile wall or alternative means of correcting and preventing erosion between Black Dog Road and the Minnesota River between Lyndale Gates and the main plant entrance. It is estimated that approximately 600 linear feet of river wall will be required, subject to final engineering and design performed during the project.	There are several locations along Black Dog Road which have eroded significantly from the Minnesota River and requires permanent repair and corrections for ensuring safe travel into and out of the generating station. A temporary solution to mitigate the rate of erosion is being implemented in 2018 / 2019 but it is expected that a more permanent solution will be required.
NSP-Minnesota	A.0001561.030	Reliability/Performance Enhancement	IVH3C Turbine Controls	2,431,758.42	2022	Replace the existing obsolete GE Fanuc turbine controls and integrated balance of plant controls with a modern control system including new microprocessors, HMI's, monitors, historian, EMS-SCADA interface, network switches, dual redundant network, data links, etc. The new turbine control system is planned to be similar to sister Wheaton Units 1-4. The new controls will include overspeed integration including 4 active speed probes similar to Wheaton. The project also includes modifying the fuel oil controls with position feedback. This project includes upgrading the vibration monitoring with Bently Nevada equipment rather than the equipment provided by Emerson as was done for the Wheaton plant. For transmission system requirements, new controls will be installed 2 units at a time, thereby maintaining 4 units available for operation. This is a 3 year project starting in 2019 and ending in 2021.	The existing control system is obsolete and not supported by the manufacturer. Spare parts are difficult to find and costly to procure when located. The NSP fleet control systems are being standardized on Emerson Ovation to improve operations, maintainability, reliability, and availability.
NSP-Minnesota	A.0001573.212	Reliability/Performance Enhancement	BDS2C-Replace U2 Turbine L-0 Blades	2,423,661.33	2022	This project would entail the full replacement of the last row of LP turbine blading (L-0) in Unit 2. This activity should be performed during a major turbine overhaul when the unit is disassembled for inspection. This work will require rotor removal, and it should be sent to a qualified repair facility for machining and NDE, as well as high-speed balancing.	The current L-0 blades were installed in 1987 and will have 30+ years of operation during the next steam turbine major overhaul. These blades typically have a life expectancy of between 20-40 years, or 160,000 - 320,000 EOH, depending on operating conditions. This unit is more susceptible to water droplet erosion because of the lower main steam temperature than design, especially during winter months. Cycling duty will also decrease life expectancy by increasing fatigue and thermal stresses on the turbine, possibly necessitating replacement earlier in the life expectancy range. Recent inspections on these blades have shown evidence of more rapid moisture erosion than would be expected with this operating history, which may warrant replacement during the next major overhaul, but these blades should be re-inspected before the overhaul do determine if this project can be deferred to a future overhaul. Failure of these blades would result in a significant unplanned outage to repair or replace.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.072	Reliability/Performance Enhancement	RIV0C -- Replace Water Treatment	2,400,229.07	2022	Design, permit, fabricate, and install one new Reverse Osmosis (RO) Water Treatment System located In the approximate area of the existing equipment so that a new building and related infrastructure is not required. This is a scope reduction to the original project which included relocation of the new equipment to a new building which would require additional infrastructure such as electrical switchgear and additional piping, control wiring, HVAC fire protection, etc. That project was estimated at 3.7 million dollars, and would be too expensive to justify in Sharps. The revised scope it to replace the two existing RO's installed in 2000 and 2011 with two new RO's for a 2 pass system, or one two pass RO. The location of the new equipment is to be in the same or general area of the existing equipment to make use of the existing electrical and piping infrastructure - including location in an existing building. The new location can also utilize the Ovation system control cabinet - intertie that was originally installed to support the retired demineralizer system, but never used. The new system is sized for 1 x 90GPM nominal. 1st pass RO, 2nd pass RO, Electrodeionization (EDI) Skid, Clean-In-Place (CIP), Mixed Bed Polisher, and Chemical Feed systems. The new system will remove CO2 with either a membrane separator system, or a caustic feed system. The new system will be operated from a PLC to allow for future vendor interface. The only function from the maint. control room is start/stop capability. There is now removal activities associated with this project. The new install cost is estimated at 2.35 million and removal at $175,000 for a total new installation estimated cost of 2.55 million, or a reduction of approximately 1.2 million from the original scope and estimate.	The present plant water treatment systems are a significant Operations and Maintenance burden. As plant staff is adjusted (reduced) to planned permanent levels there will not be resources available to devote to high maintenance ancillary (non-core) plant equipment. By the year 2021, the existing 1st pass RO, controls, pressure vessels, ancillary equipment, etc. will be 20 years old, and the existing 2nd pass RO will be 10 years old. The membranes will be in need of replacing - and the system will be operating at a significantly higher cost than necessary due to the lack of a CDI - deionizer system for the necessary condensate polishing. It would not be advised to update the old and antiquated system with a new CDI system addition since the controls, valves, transmitters, and operator interface equipment the existing equipment relies on is all past end of life and likely of multiple failures each year that risk availability of the generating plant due to loss of water production capability. A new 90 gpm system is recommended to be installed prior to 2022. The new estimate of 2.525 million dollars is what should be used as an estimate based on the 2019 revised scope recommendation.
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	1,991,981.61	2022	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001559.048	Reliability/Performance Enhancement	BLL8C-CESP GSU 171-227 MVA 18-115kV	1,877,641.70	2022	Obtain a Capital Emergency Spare Generator Step Up (GSU) Transformer suitable for use at Angus Anson 4, Black Dog 5, Blue Lake 7 & 8, High Bridge 7 & 8, Riverside 9 & 10. Scope to include GSU, accessories, and preparation of layup location.	Lead time on these transformers can range from 12-18 months. We consumed our spare transformer from the retirement of Black Dog Unit 4 when a fault occurred in the Angus Anson 4 transformer. Having the transformer on hand greatly reduces the potential down time of a generating asset. The transformers for these units are equivalent to one another from an MVA, Voltage and Bushing arrangement to support this.
NSP-Minnesota	A.0001565.124	Environmental Enhancement	WLM2C Replace U2 Baghouse Bag	1,560,257.61	2022	Replace six modules (1260 total) of baghouse bags and cages. This project would also include a series of repairs to the baghouse modules including replacement of the bottom hoppers, repairs at the tops of the modules above and below the tubesheet, sand-blasting the inside of the module and coating it with an anti-corrosive coating, re-tinning and re-insulating the modules, etc.	Permit required to meet opacity standards. Bags are on a four year frequency to be changed out. The bags were on a six plus year changeout in the past but it was determined that changing out the bags more frequently saves on material loss on boiler tubes. It has been determined that after four years the bags begin to blind/plug and no longer allow enough air flow to operate the units at their full potential. Because of the plugged bags the air flow through the unit is decreased causing a high differential pressure reducing load capability and allowing the flue gas to consume more of the tube material throughout the boiler.
NSP-Minnesota	A.0001559.006	Reliability/Performance Enhancement	BLLC7 U7 Exhaust Silencer Repl	1,526,643.60	2022	Replace silencer on Unit 7 CT exhaust stack.	The panels are used to reduce the Db's coming out the stack of the CT. The panels are melting and breaking up. They are made with a stainless steal the can not standup to the higher temperature of a GE 7FA Ct. They where designed for a GE 7FE class CT that runs cooler exhaust temperatures.
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	1,506,262.93	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	1,433,650.63	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001591.007	Reliability/Performance Enhancement	ANS4C U4 Repl Mark V Cn	1,402,194.55	2022	Replace Mark V Control System. This includes microprocessors, HMI's, I/O Boards, and Power Supplies.	System is no longer supported by GE. Parts are obsolete. Running on Windows 2000. Installed at plant in 2004. (These were 2001 CT's.)
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,260,521.36	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001573.070	Reliability/Performance Enhancement	BDS5C U5 Ovation System Evergreen	1,207,422.41	2022	This project is to replace the Black Dog Unit 5/2 Ovation System Hardware and Software.	To keep pace with advancements is the goal of the Ovation Evergreen program. This SureService customer support module provides a way to keep your Ovation system continuously up-to-date. The Evergreen program allows you to avoid a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new I/O and security features.
NSP-Minnesota	A.0001573.281	Reliability/Performance Enhancement	BDS0-480V Load Centers Repl	1,145,942.16	2022	Low voltage load centers 101, 102 and 103 are in need of replacement due to age and parts availability. They are 1950s and 1960s vintage equipment and have energized bus exposed when racking equipment and from below. This project has four main goals. The primary goal is to disassemble and remove the existing SUS 101, 102 and the attached 11/12LT Load Center, then purchase and replace with a new 480VAC (101, 102) load center with a TIE breaker and a new 11/12 208V lighting load center. The second goal is to replace all incoming and if required any outgoing cables from the existing 101, 102, 11LTG, and 12LTG transformers. Install as required new cable trays, conduits and junction boxes for short out going load cables. Also install any new area lighting as required. The third goal is to purchase a new remote drop Emerson DCS equipment, including modules, and commissioning and programming services for communication and control of the load centers. And then install and commission the new load centers which will allow remote auto control from the main operators control room. The fourth goal is to purchase and install a high resistance ground system (HRG) for the new 480VAC load center gear. Alarm communication through the DCS.	Failure of load center 102 would result in loss of power to the screen house for an extended period, requiring shutdown of all units. It would also result in loss of power to battery charger #11. Loss of load center 101 would result in loss of power to battery charger #12 and air compressor #5. Loss of load center 103 would result in loss of power to auxiliary transformer 31 and 41 cooling fans and the alternate power supply to GSU 4 transformer cooling fans. There is also a safety concern related to the exposed bus on the switchgear.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001573.184	Reliability/Performance Enhancement	BDS2C Automated Trap Bypass Valve	1,115,158.61	2022	Installation of automated bypass valves of existing steam traps off the HP steam, LP steam, gland steam, extraction steam, and turbine drain systems to ensure condensate is removed from these systems during startup, operation, and shutdown. This includes new valves, piping, thermocouples, instrumentation, wiring, and controls to perform the project. Valves will be tied into Ovation BOP controls and function in automatic and manual per operator input. Valves will have position feedback to the DCS to ensure they are functional.	These bypass valves are currently manually operated globe valves which are in need of replacement due to age and recent failures. These valves currently require operations to manually open and close these valves during each startup and shutdown. Black Dog cycles 50 - 100 times per year and is forecasted to increase operation in the future. These bypasses are critical for ensuring that condensate is drained from steam lines to prevent turbine water induction and other operational issues which could cause significant equipment damage and extended forced outages. Frequent manual operation of these valves is prone to operator error which could have significant consequences. These drain lines have also had a history of pluggage due to iron oxide which would be identified by the instrumentation of this project so corrective actions could be performed, and will also indicate when steam trap maintenance is required.
NSP-Minnesota	A.0001574.848	Reliability/Performance Enhancement	SHC99-New Rotary Plow Feeder on 53 conveyor	1,109,415.89	2022	Install a new Drop In Rotary Plow Feeder (RPF) on 53 conv in the bottom of the coal barn. New unit to be complete with hydraulic power unit, electrical components with more operator feedback like feedrate, and position along the rails. New unit will have a remote PLC to allow much of the current festoon cable to be eliminated, allowing the re-use of the festoon cables.	We have feeders that are 35 years old, and have obsolescence problems. Due to the age of the equipment, it is not as reliable as it once used to be. In addition, there are potential fire issues that need to be mitigated.
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	996,994.87	2022	Replace failed generators in GE 1.5 SLE wind turbines.	High operating temperatures in the compact design have caused a small amount of failures in the industry after 5 years of operation.
NSP-Minnesota	A.0001591.003	Reliability/Performance Enhancement	ANS2C Repl U2 gen break	975,842.94	2022	Replacement of unit 2 generator breaker and MOD.	The vendor has not provided parts or service for these components since 2015.
NSP-Minnesota	A.0001573.205	Reliability/Performance Enhancement	BDS0C-Replace Fire Protection Panel	968,356.07	2022	Replace Fire Protection Panels and instruments in the Black Dog Power Plant.	Improves fire safety. Newer panels would have self-monitoring capabilities that the existing panels lack, resulting in a better protecting system.
NSP-Minnesota	A.0001573.056	Reliability/Performance Enhancement	BDS2C U2 LP Steam to Crossover	960,646.51	2022	Installation of new piping to route the existing LP Steam supply to the crossover pipe. This includes materials and labor for new 10" piping, insulation, valves, drip legs, instrumentation, electrical, and controls to complete the project.	The existing configuration of the LP Steam system supplies steam to Unit 2 DA for deaeration purposes and supplies steam to row 32 of the HP turbine for injection into the steam turbine for power generation. The row 32 admission line connects to a re-purposed extraction nozzle but there have been historical issues and concerns with admitting LP Steam to the HP turbine in that location. During the 2010 turbine overhaul, it was discovered that the row 32 blades had experienced plastic deformation and other damage which required the entire row of blades to be replaced at that time. At that time, Siemens performed an internal study and recommended that injection into the extraction line be discontinued. Since then, the plant has operated mostly with the LP Steam admission system out of service because it is believed that this system was the primary cause of the damage. This project would re-route the LP Steam supply to the LP Crossover pipe to restore approximately 3 - 4 MWs to the unit which are currently being lost because the admission system is out of service. This project would not increase the NDC capacity of the unit, rather the additional load could be achieved without requiring duct burner operation at a significant heat rate penalty.
NSP-Minnesota	A.0001571.011	Reliability/Performance Enhancement	ANSC0 Replace U4 Silencer	925,358.89	2022	Replace Unit 4 CT Silencer. The panels are used to reduce the Db's coming out the stack of the CT	The panels are melting and breaking up. The are made with a stainless steal the can not standup to the higher temperature of a GE 7FA Ct. They were designed for a GE 7FE class CT that runs at lower temps.
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	764,484.53	2022	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001575.037	Reliability/Performance Enhancement	HBC0C Warming Line to Intake	739,572.90	2022	Install warming line to take a portion of the condenser/CW discharge from the plant to combat frazil ice conditions at the circulating water intake structure.	When frazil ice conditions exist, the plant has no way to address them other than shutting the units down. We are investigating revisions to our T-screen air blast system, but do not have confidence that this system will be able to combat frazil ice. Frazil ice forms in water that is super cooled (i.e. is below 32F, e.g. 31.8F). The frazil ice is small shards of ice suspended in the water. The frazil ice attaches to anything solid that it touches. Frazil ice causes the inlet screens (a.k.a. T-screens) to become plugged with ice. The clogging starts out slow and as the opening begins to become blocked, the process speeds up very quickly to the point of pluggage. Once the screens are plugged, the suction to the circulating water pumps empties and the low water level causes the pumps to trip. Without the circulating water pumps, the plant cannot be started up and the plant cannot continue to operate, if already running. There is no real good way of preventing frazil ice from accumulating on stationary solid objects other than to either warm the object above 32F or warm the water to 32F, or above.
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	700,027.30	2022	Replace failed gearboxes in GE 1.5 SLE wind turbines. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001565.111	Reliability/Performance Enhancement	WLM0C Replace U0 Scalping Conveyor	694,866.18	2022	Replace Scalping Conveyor. This includes pans, chain, gears, etc.	Complete conveyor was last replaced in 2005 and the chain was last replaced in 2009. The conveyor use to be on a 5-year replacement schedule but has been lengthened due to the chain replacements happening between complete replacement. By 2012, the chain will be three-years old and links will be breaking due to the chain stretching out.
NSP-Minnesota	A.0001579.083	Reliability/Performance Enhancement	RIV0C --Aux boiler Controls Up	645,591.29	2022	Replace the Riverside Auxiliary Boiler Controls.	The Auxiliary Boiler Control System has configuration/programming issues with the original controls logic that makes the burner controls very unstable at low load operation. This instability results in excess CO emissions and is one of the reasons the boiler has to be operated at a higher load to maintain emissions compliance. Due to the nature of the controls logic configuration, only the OEM would be able to make the necessary changes to the software. Upgrading the controls would allow a VFD for the FD fan to be incorporated into the Aux Boiler Control System. This will result in heat rate improvements during the operation of the Aux Boiler, as it will improve emissions at lower loads, resulting in improved turndown capability. The current practice at Riverside is to run the Aux Boiler at a higher load than is necessary for the building heating system and frazil ice system to maintain emissions compliance. This is accomplished by venting steam out of the roof, which results in a waste of natural gas and water. Upgrading the controls will also ensure that the system does not fall behind the obsolescence curve. There is difficulty with older systems in procuring replacement parts, finding good field service technicians, and meeting up to date cyber asset security requirements.
NSP-Minnesota	A.0001579.069	Reliability/Performance Enhancement	RIV0C -- Instrument Air Sys Rep	631,747.68	2022	Replace the existing plant instrument air compressors	The present plant air compressors are aging and are an increasingly large Operations and Maintenance burden. The poor reliability of these units may result in simultaneous unavailability of multiple units, possibly resulting in failure of plant air system. As plant staffing is reduced to planned permanent levels there will not be in-house resources available to devote to high maintenance ancillary (non-core) plant equipment. The existing system capacity is also limited on the CT side of the plant.
NSP-Minnesota	A.0001566.169	Renewable and New Generation	NBL0 - Replace Generators	553,836.09	2022	Replace failed generator in GE 1.5 SLE wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures in the compact design have caused a small amount of failures in the industry after 5 years of operation.
NSP-Minnesota	A.0001571.082	Reliability/Performance Enhancement	ANS4C U4-Ex 2100 E -Excitation Sys	537,769.49	2022	Replace U4 Excitation System Controls with reliable, non-obsolete equipment.	The ANS U4 Excitation Systems Controls are nearing end of useful life. It is necessary to upgrade in order to ensure reliable operation and parts availability.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001575.169	Reliability/Performance Enhancement	HBC0 - Boiler Feed Pump CESP	511,134.92	2022	Purchase of a rotating spare boiler feed pump for use during the overhauls of in service pumps	Currently, one boiler feed pump is needed to operate the unit to 100% load. The second pump is on standby mode to protect the HRSG water components if the first pump would trip at any time. The OEM has indicated that an overhaul of one pump would take six to eight weeks. Our normal outage lengths are 10 days. To send out a pump during an outage, we would either have to risk the units operability in a trip event or to extend the outage to the six to eight weeks. This spare pump would allow one operating pump to be removed during the shorter time outage period and replaced with the new (or spare) pump.
NSP-Minnesota	A.0001565.132	Reliability/Performance Enhancement	WLM0-Replace Overhead Bridge Crane	506,303.66	2022	Project to replace and install new 65-ton rated overhead bridge crane. The supplier will reuse the existing remote-control system, replace the trolley frame and replace the hook block, refurbish the bridge crane motor for VFD duty, and perform a rated load test upon completion of installation.	The large overhead bridge crane hook at the Wilmarth plant has been out of commission since fall 2018 when it was damaged after the block became lodged in one of the main sheaves after a kill sensor failed. The overhead bridge is needed to safely lift the heavier pieces of equipment during major overhauls: examples include turbine casings, turbine rotors, generator rotors, etc. If the plant is ever going to a turbine overhaul or generator rewind again in its lifetime, it needs to have a way to lift these types of components safely with equipment that is properly rated for it.
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	494,712.29	2022	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2022 Emergent Work	493,489.86	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001565.077	Reliability/Performance Enhancement	WLM0C Slaker PLC Replacement	492,763.18	2022	Slaker PLC Replacement	Slaker is one of the last systems at Wilmarth using IFIX. Project is to replace early 1990's PLCs and move to Delta V for the DCS as most of the rest of the plant is. Slaker is used to produce slurry, the PLCs/controls are used to control SO2 emissions.
NSP-Minnesota	A.0001572.214	Reliability/Performance Enhancement	ASK1C AQCS Battery Replacement	481,258.89	2022	Replace 125V AQCS station batteries. There are 60 total cells in this array.	These batteries need to be replaced as they are showing signs of deterioration.
NSP-Minnesota	A.0001591.004	Reliability/Performance Enhancement	ANS0C BOP Evrgren Ctrl	479,509.00	2022	This project is to upgrade Units 2, 3, and Balance of Plant for Unit 4 Evergreen System Upgrade.	Existing controls will become obsolete during this current budget cycle
NSP-Minnesota	A.0001572.232	Reliability/Performance Enhancement	ASK1C-TurboToc PLC Upgrade	474,696.73	2022	Replace Allen Bradley Control System. Upgrade the following PLC hardware on both (two) panels: 1. MicroLogix compact PLC to ControLogix compact PLC 2. Implement the following PLC program changes: 3. Port PLC program to new platform Add/Renew the following hardware: 1. Add communication hardware and wiring for tie in to PLC controls network to allow unattended program backups.	Need to be replaced due to obsolescence.
NSP-Minnesota	A.0001571.081	Reliability/Performance Enhancement	ANS4C U4-LCI Controls Replacement	459,574.99	2022	Replace U4 LCI System Controls with reliable, non-obsolete equipment.	The ANS U4 LCI Systems Controls are nearing end of useful life. It is necessary to upgrade in order to ensure reliable operation and parts availability.
NSP-Minnesota	A.0001565.114	Reliability/Performance Enhancement	WLM0C Landfill Cell 7 and 6	458,819.84	2022	Project to cap three cells at the Wilmarth ADF (cells 7 and 6). The total acreage is approximately 2 acres.	We are required by permit (MPCA permit # SW-298-008) to cap landfill cells.
NSP-Minnesota	A.0001562.155	Reliability/Performance Enhancement	REW2-Replace Bus 21 Switchgear	455,518.41	2022	1949 vintage Bus 21 live-front style switchgear needs to be replaced. Also, because of the age and type of the equipment, all new breaker panels will need to be redesigned to fit the pre-existing space. In addition the 13.8 kV to 480 V transformer and bus 11 to bus 21 tiebreaker would be replaced to have a larger capacity to allow ID fan operation.	Bus 21 Switchgear is a live front design, where if the front door is open the electrician or operator is exposed to parts that are energized. When racking breakers the operator is not shielded from an arc flash if one occurs, this makes it an extremely hazardous process. Due to safety hazards involved with these, manufacturers no longer construct these types of switchgear. This was a recommendation from the life extension study conducted by E&C, TR&C, and Excel Engineering.
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2022 Small Project Routine	455,113.57	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001562.156	Reliability/Performance Enhancement	REW1-Replace Bus 11 Switchgear	454,776.93	2022	1949 vintage Bus 11 live-front style switchgear needs to be replaced. Also, because of the age and type of the equipment, all new breaker panels will need to be redesigned to fit the pre-existing space. In addition the 13.8 kV to 480 V transformer and bus 11 to bus 21 tiebreaker would be replaced to have a larger capacity to allow ID fan operation.	Bus 11 Switchgear is a live front design, where if the front door is open the electrician or operator is exposed to parts that are energized. When racking breakers the operator is not shielded from an arc flash if one occurs, this makes it an extremely hazardous process. Due to safety hazards involved with these, manufacturers no longer construct these types of switchgear. This was a recommendation from the life extension study conducted by E&C, TR&C, and Excel Engineering.
NSP-Minnesota	A.0001572.233	Reliability/Performance Enhancement	ASK99C-Transfer House 1 Control Sys	450,529.16	2022	Replace current Allen Bradley control system with Ovation DCS, and add the following hardware: 1. Ovation Controls to replace all Allen Bradley hardware currently in place Implement the following program changes: 1. Port PLC program to Ovation platform	Existing control system is problematic and a source of issues for yard operations. It is also expected that the existing control system would need to be replaced due to obsolescence.
NSP-Minnesota	A.0001572.234	Reliability/Performance Enhancement	ASK99C-Transfer House 2 Control Sys	450,529.16	2022	Replace current Allen Bradley control system with Ovation DCS, and add the following hardware: 1. Ovation Controls to replace all Allen Bradley hardware currently in place Implement the following program changes: 1. Port PLC program to Ovation platform	Existing control system is problematic and a source of issues for yard operations. It is also expected that by this year the existing control system would need to be replaced due to obsolescence.
NSP-Minnesota	A.0001574.195	Reliability/Performance Enhancement	SHC2C 2022 Small Project Routine	440,432.58	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001574.304	Reliability/Performance Enhancement	SHC2 -Turb Ctrl Vlv Internals	435,553.91	2022	Replace main turbine control valve internals including, but not limited to stems, balance chambers, plugs, and seats.	The valve internals have been subject to damage due to excessive wear and tear due to frequent unit cycling and more frequent economic outages. There are four control valves, all four of which experience significant degradation. The above work description is intended for all four control valves. The control valves are critical safety devices used to prevent turbine overspeed after a unit trip and are also responsible for regulating steam admission to the turbine. Their mechanical integrity is essential to safe and reliable operation of the turbine.
NSP-Minnesota	A.0001565.117	Reliability/Performance Enhancement	WLM1C Replace U1 Gratebed	431,901.75	2022	Replace all grates beds (called 11 grates and 12 grates) in Unit 1 boiler. This would include replacing all grate bars, chains, grate weights, sprockets, pins, seals, etc.	Bars and chain were replaced in 2008 to prolong life with having to replace entire conveyor. Previous frequency of complete change out was every 5 years. Since bars and chain were replaced in 2008 we were able to buy another 5 years until a complete replacement.
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	427,500.12	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001565.125	Reliability/Performance Enhancement	WLM2-Replace U2 Boiler Grates	427,211.39	2022	Replace all grates beds (called 21 grates and 22 grates) in Unit 2 boiler. This would include replacing all grate bars, chains, grate weights, sprockets, pins, seals, etc.	Bars and chain were replaced in 2008 to prolong life with having to replace entire conveyor. Previous frequency of complete change out was every 5 years. Since bars and chain were replaced in 2008 we were able to buy another 5 years until a complete replacement.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001702.018	Renewable and New Generation	BS2 Blazing Star 2 PCMM-New	425,016.00	2022	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001704.014	Renewable and New Generation	FBW Freeborn PCMM	425,016.00	2022	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2022 Small Project Routine	408,793.83	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc that have failed during plant operation.
NSP-Minnesota	A.0001573.182	Reliability/Performance Enhancement	BDS2C U2 Turning Gear Replace	407,595.67	2022	This project includes replacement of the 1950's vintage turning gear internals for Unit 2 Steam Turbine / Generator. This includes removal of the existing turning gear internal assembly and motor and replacement in kind. Project includes all necessary labor (company and contractor), materials, and additional costs to perform the work.	The turning gear for Unit 2 Steam Turbine is 60+ years old and is nearing end of life. The turning gear was not designed for cycling operation and excessive turning gear hours (4000 - 6000 hours per year) and has been increasingly difficult to maintain since the conversion to combined cycle operation in 2002. Turning gear is a critical component as it is required to operate continuously when the unit is offline to keep the unit available to commercial operations by preventing the rotor from bowing or sagging while idle. Furthermore, even a short duration off turning gear while the unit is hot could result in excessive bowing which would require several days forced outage to cool the unit down before it can be put back on gear. In December 2012, the turning gear failed to engage which attributed to a high vibration event during unit startup which resulted in a forced outage totaling 77 days, 500,000 lost MW-hrs, and approximately $2,000,000 repair costs. Since then, the turning gear assembly has had other significant issues including failures to disengage during startup, high amps causing turning gear motor trips, locked components preventing rotation, excessive noise and vibration, and oil leaks. The turning gear assembly has been overhauled on an accelerated frequency every 2 - 3 years to maintain equipment reliability at an estimated average cost of $85,000 with no significant improvement to unit operation. If the turning gear is not replaced, it is likely that additional forced outage events will continue to occur as the equipment condition continues to degrade, regardless of accelerated overhaul schedule.
NSP-Minnesota	A.0001562.138	Reliability/Performance Enhancement	REW0C Replace Scalping Conveyor	404,189.82	2022	This project will replace the scalping conveyor and all it's components (i.e. chain, flights, pans, etc.).	The scalper is an essential part of the fuel system that affects both units. If the scalper breaks down the plant will run for about 30 minutes before there isn't enough fuel left in the bins. After the 5 year mark, the scalper breaks down more and more causing more downtime for the plant.
NSP-Minnesota	A.0001562.154	Reliability/Performance Enhancement	REW0-Replace Duct Scrubber Controls	403,513.99	2022	Replace Duct Scrubber Allen Bradley Controls to combine the baghouse and scrubber controls to a single processor for each unit for simplification and improved physical layout. This project should be completed in conjunction with the REW0-Replace Baghouse Controls project as they go hand-in-hand.	These Allen Bradley controls are obsolete and parts availability is becoming more and more rare. It is unknown exactly when in the next several years these controls will fail beyond the point of repair, when that does occur it will require an immediate estimated 16 week replacement.
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	392,969.36	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001573.223	Reliability/Performance Enhancement	BDS2 -Rplc Turbine Valve Internal	387,023.54	2022	Replacement of the Unit 2 steam turbine valve internals (two stop valves, six control valves) during the Fall 2022 major steam turbine overhaul. This includes replacement of the stems, plugs, bushings, and other internal parts which are considered capital and other associated costs to perform the work. The valve actuators will be sent off-site for rebuild under O&M funds.	The unit 2 steam turbine valves are overhauled every 4 - 6 years per OEM, Company, and insurance requirements to maintain unit safety and reliability. These valves are critical for unit operation since they control the steam flow admitted to the turbine and perform unit overspeed protection. These valves were last overhauled in Fall 2016 and are scheduled for the Fall 2022 overhaul under contract with GE. It is recommended that the valve internals are replaced under a planned project due to past experience with repairs and extensive lead time for the parts if found to be damaged. Any parts which are inspected and found to be in reusable condition will be repaired under O&M funds and placed into inventory as spares.
NSP-Minnesota	A.0001561.015	Reliability/Performance Enhancement	IVH5C U5-6 UG Cable Replacement	381,375.53	2022	Replace dated direct buried cable on units 5-6. This will include control cables between the control room and the units, the cables from the aux transformers and support equipment, this includes both 480 and 4-kV. This project would install new cabling in conduits or raceways to segregate voltages and facilitate ease of future replacement. The insulation of the cables is failing due to age.	Due to the insulation type and advanced age of the original construction cables failures are likely. In fact, there have been events in the last 12-18 months that unit unavailability was incurred due to grounds on the 480-V systems. Additionally the sister units to Inver Hills at the Wheaton WI facility suffered a insulation failure on buried cable that resulted in a energizing low voltage control cables that initiated a fire in a control cabinet in the plant control room.
NSP-Minnesota	A.0001561.029	Reliability/Performance Enhancement	IVH3C Gas Valve Ctrl Repl	373,548.22	2022	Replace the existing obsolete gas control logic, gas control valves, wiring, and pressure switches on Units 3 & 4. This project is planned to be run in parallel with the turbine control replacement project because the software and microprocessor hardware for turbine control, gas valve control and fuel oil valve control is one integrated whole. Due to transmission system requirements the new gas control valves will be installed 2 units at a time; thereby maintaining 4 units available for concurrent operation. The new control valves are slightly narrower and a bit longer than the existing valve per initial vendor drawings. Per field measurements we expect that the new valves will fit in the same location with minor piping modifications. We do not expect to require gas valve cabinets and other major modifications. This is a 2 year project starting in 2019 and ending in 2020.	The servomotors that operate the gas control valves (GCV) are obsolete. They are controlled by obsolete Pacific-Scientific controllers. This control scheme has not proven to be very reliable over the years with numerous unit outages due to component failure and electrical/control/mechanical issues with gas operation. In addition these components are very difficult to troubleshoot and maintain in calibration. The existing control system is obsolete and not supported by the manufacturer. Spare parts are difficult to find and costly to procure when located. The NSP fleet control systems are being standardized on Emerson Ovation to improve operations, maintainability, reliability, and availability.
NSP-Minnesota	A.0001573.171	Reliability/Performance Enhancement	BDS0C Admin Bldg Fire Protection	362,867.89	2022	Install automatic sprinkler protection in the administrative and office areas connected to the main plant as follows: In the administrative areas, sprinkler protection designed for 0.15 gpm/sq. ft. over a design area of 2,000 sq. ft. using ordinary temperature quick response sprinklers with a 250 gpm hose stream allowance.	The areas described above are not sprinkler protected and are connected to the main plant. If a fire were to occur in these areas, there are sufficient combustibles present to result in a total loss of the area in question, and then to allow the fire to spread to the main plant creating an exposure to the electrical generating equipment, particularly the Unit 5 combustion turbine. Therefore, sprinkler protection should be installed in these areas.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.493	Reliability/Performance Enhancement	SHC1C Mill OH 2022 Fall	356,469.33	2022	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 1 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineess, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001574.526	Reliability/Performance Enhancement	SHC3C Mill OH 2022 Spring	354,784.54	2022	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on Floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 3 has 7 coal mills whose performance is tracked though operating data (mill motor amps, coal fineness, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001574.525	Reliability/Performance Enhancement	SHC3C Mill OH 2022 Fall	347,610.53	2022	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on Floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 3 has 7 coal mills whose performance is tracked though operating data (mill motor amps, coal fineness, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	344,526.61	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	326,297.99	2022	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001573.123	Reliability/Performance Enhancement	BDS0 - Install U3 Turbine Floor	316,761.09	2022	Construction of a load bearing concrete floor in the area left over from Unit 3 steam turbine / generator demolition scheduled for year 2021. Project includes materials, labor, engineering, and project management to perform the work. This project is scheduled to be performed before the Fall 2022 overhaul which currently includes U2 STG major overhaul and U5 HGP overhaul to have additional floor space for the outage.	Following the Unit 3 steam turbine / generator demolition in 2021 there will be a large opening in the turbine floor which either requires permanent handrail to be installed or a permanent floor to be installed. Installation of additional floor space is preferred to provide valuable equipment laydown areas during overhaul activities. During previous overhauls some equipment had to be stored outdoors which is not recommended due to corrosion and FME concerns with outdoor storage. Construction of additional floor space in this location is ideal since it is located between Unit 5/2 and newly constructed Unit 6 and will provide a good laydown space for all three units, reducing outage costs and duration, and preventing outdoor storage of exposed equipment and associated concerns.
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	314,416.79	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.491	Reliability/Performance Enhancement	SHC1C Mill 2022 Spring	308,595.14	2022	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 1 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineess, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001574.802	Reliability/Performance Enhancement	SHC2-Level 2 Mill OH 2022 Spring	308,595.14	2022	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 2 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineness, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001610.011	Renewable and New Generation	BWF0 - Oil Particle Count System	306,180.95	2022	Install oil particle count sensors on all 75 turbines. The sensors will report data continuously to the SCADA system	Long term detailed monitoring of the oil condition will allow early detection of unusual gearbox wear to allow potential to reduce repair costs or to allow for a planned shutdown and replacement.
NSP-Minnesota	A.0001562.149	Reliability/Performance Enhancement	REW1C-REW1 - Replace U1 Superheater	303,030.04	2022	This project would replace all 37 pendants (all 592 tubes) in Unit 1 superheater.	NDE inspections indicate extensive wall thinning in the area identified for replacement. Tube leaks occur frequently which increases lost burn revenue and increases safety risk. History shows a 5-year replacement cycle is ideal to minimize O&M expenditures and forced outages.
NSP-Minnesota	A.0001562.135	Reliability/Performance Enhancement	REW0C Repl Baghouse Controls	302,612.83	2022	Replace Baghouse Allen Bradley Controls to combine the baghouse and scrubber controls to a single processor for each unit for simplification and improved physical layout. This project should be completed in conjunction with the REW0-Replace Duct Scrubber Controls project as they go hand-in-hand.	These Allen Bradley controls are obsolete and parts availability is becoming more and more rare. It is unknown exactly when in the next several years these controls will fail beyond the point of repair, when that does occur it will require an immediate estimated 16-week replacement.
NSP-Minnesota	A.0001562.007	Reliability/Performance Enhancement	REW0613-Condenser Retube	301,861.47	2022	This project will return the condenser to original design by replacing the Unit 1 Condenser tubes with Cupro Nickel tubes.	Retubing U1 condenser to the original Cupro Nickel tubes will increase heat transfer rate and standardize the units. Stainless steel tubes are currently installed in Unit 1 Condenser. When stainless steel tubes were placed in the condenser the design heat transfer rate of the condenser was affected resulting in a 1.5 MW loss.
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	296,000.00	2022	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction. All tools under $1000 each.	Improve capability and efficiency of daily operations maintenance tasks.
NSP-Minnesota	A.0001572.251	Reliability/Performance Enhancement	ASK1-11&12 Travel Water Screen	276,001.89	2022	Rebuild Complete Rotating Assembly for King Plant #11 & #12 Traveling Water Screens. Complete Rotating Assembly rebuild includes: Head shaft Assembly (torque tube), Foot Shaft Assembly, Bearings, Chain, Chain Guides, Basket Plates, Hardware, etc.	Rebuild Complete Rotating Assembly for Traveling Water Screens required every 5 years to maintain reliability. Permit required for plant operation. #11 & #12 Traveling Water Screens last rebuilt in spring 2017.
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	274,960.00	2022	Purchase of Miscellaneous Tools/Laboratory Instrumentation. These tools are used for analysis of water to monitor and control corrosion and scaling in power plants and to comply with monitoring requirements for NPDES and Solid Waste Permits.	Chemistry Resources functions as a non-profit in-house general laboratory for Xcel Energy. It provides analyses for mandatory regulatory monitoring programs and for operational and maintenance activities in the plants.
NSP-Minnesota	A.0001562.039	Environmental Enhancement	REW0 - EPA 316b-Svc Water Pumps	249,774.64	2022	Two new redundant 75hp Screen House service water pumps will be installed to ensure an adequate flow of water through the screen house and to the plant. The main functionality of these pumps will be to aid in the correct flow of water through the traveling screens to maximize their effectiveness & ensure EPA 316b compliance.	This is a mandated environmental project by the MPCA to ensure we are compliant with EPA regulation 316(b) of the Clean Water Act. Section 316(b) requires that National Pollutant Discharge Elimination System permits be obtained by any facility that contains a cooling water intake structure to ensure that the engineering design of the structure minimizes harmful impacts on the environment.
NSP-Minnesota	A.0001572.236	Reliability/Performance Enhancement	ASK1C-Econ Outlet Exp Joint	247,032.15	2022	Replace economizer outlet flue gas expansion joint with fabric expansion joint on the north side. The existing joint is 27-1/2' x 21-1/2' in area. The joint was last replaced during the MERP project in 2007 and has torn during normal operation. The south expansion will be replaced during Spring 2014 outage.	Replace Economizer Outlet fabric expansion joint. There are holes starting to form in this existing joint. As the boiler fouls between spring overhaul cleanings, this joint temperature can be limiting on load. Leakage thru this expansion joint affects O2 sensors and emission controls (primarily the NOx analyzer).
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2022 Small Project Routine	227,512.48	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001573.117	Reliability/Performance Enhancement	BDS2C Water Induction Monitor	218,460.21	2022	Installation of a water induction monitoring system to alert operations if the Unit 2 steam turbine experiences water induction. This includes instrumentation, wiring, conduit, and associated controls work to implement the system for the affected HP, LP and Extraction drain lines.	The Unit 2 steam turbine does not currently have any water induction detection equipment. Improper operation of steam turbine drains and other issues can cause water induction which can lead to distortion and mis-alignment of the turbine casing, increasing the risk of rubs, damaged bearings or seals, water induced erosion, or similar issues. Water induction detection systems are standard with current steam turbine technology.
NSP-Minnesota	A.0001579.016	Reliability/Performance Enhancement	RIV7C-U7 Turbine Roof Replace	215,542.71	2022	Replace roof over Unit 7 Steam Turbine.	Roof is showing increasing signs of leakage as evident by accumulating puddles on the turbine floor. Puddles present tripping hazards, and leakage is getting bad.
NSP-Minnesota	A.0001573.186	Reliability/Performance Enhancement	BDS2C Redundant LO Vapor Extractor	211,937.14	2022	Replace the existing 60 year old U2 lube oil vapor extractor with a dual 100% redundant vapor extractor system. This will consist of dual motors and blowers with an in-tank separator and connections with isolation capabilities to existing oil tank, exhaust and water drain lines. The extractor system will be tied into the turbine controls and be controlled in automatic / standby operation in the event of failure of the other extractor.	The existing vapor extractor is 60 years old and wearing out, a single point of failure with the current lube oil configuration; if this extractor were to fail the unit would not be available until the repairs were performed. Failure of the vapor extractor could cause our lube oil to leak at the bearings which would saturate the insulation and could cause a fire and significant turbine damage and pose a personnel safety hazard. Replacement parts are no longer available, OEM & and outage contractors in 2010 and 2016 have suggested replacement.
NSP-Minnesota	A.0001574.682	Reliability/Performance Enhancement	SHCJC 3, 4 Xshr Fdr Floor Resto	198,754.19	2022	The floor is not designed for constant washdowns. The floor used to be grating that was open. Then the grating was capped with metal sheeting and the bottom was sprayed with particle insulation. The insulation, grating and sheeting has become packed with moisture and coal over the years, and is never completely cleaned or dried out. The floor needs to be redesigned for water washdown, and the structural members need to be repaired or replaced.	After 30 years of washing the floor has gone unchecked for corrosion. The structural integrity of this floor is weakened and this needs to be addressed.
NSP-Minnesota	A.0001573.271	Reliability/Performance Enhancement	BDS5-Replace CT Inlet Filters	195,580.74	2022	Full replacement of the combustion turbine inlet filters. This includes labor and materials to replace the pre-filters and pulse jet filters of the combustion inlet section with new HEPA style filters.	As the inlet filters age, they become plugged to the point that air pulsing is no longer effective and combustion turbine performance degrades. Aging filters can also become brittle and there is a risk of filter damage if not replaced which could have severe consequences. These filters were last replaced in Fall 2014, and past experience and testing has indicated that new filters will be required every 6 years. Before the Fall 2014 replacement, filter testing showed that the previous filters were too brittle to be air pulsed so that function was de-activated leading up to the replacement. This project aligns with the Unit 5 HGP overhaul scheduled in 2022 and the Evap Cooler Media replacement and coating project being performed under O&M during that same outage. Aligning the projects will minimize costs since the filters need to be removed to perform the coating project.
NSP-Minnesota	A.0001574.801	Reliability/Performance Enhancement	SHC3-Landfl Mtnc Grg Lim Rcv HVAC P	183,494.30	2022	Replace the Lime Receiving HVAC, and the Landfill Maintenance Garage HVAC PLC systems.	These PLC's are unsupported SquareD systems. Troubleshooting these devices are very difficult, and can take a lot of time due to cryptic, outdated error codes. The hardware is also unsupported, so buying new components is impossible. We are forced to keep used inventory on-site in case failures occur.
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2022 Small Project Routine	182,766.61	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001562.139	Reliability/Performance Enhancement	REW2C Repl U2 Trvlg Gate Bed	176,193.77	2022	Replace the complete grate bed (includes grate bars, rails, and sprockets) during the February major overhaul. This is on a 5 year replacement schedule.	Current grates have holes, and the rails and sprockets are showing severe wear. As the grates wear-out they jam more frequently. This immediately stops the throughput of RDF and 50% of the time causes a shut-down of the boiler to repair for 1-2 days. From and environmental standpoint, the excess holes in the grating effect the boiler airflow and combustion, which results in higher CO emissions.
NSP-Minnesota	A.0001562.051	Reliability/Performance Enhancement	REW1C REPLACE U1 TRAVELING GRA	175,819.85	2022	Replace the complete grate bed (includes grate bars, rails, and sprockets) during the February major overhaul. This is on a 5 year replacement schedule.	Current grates have holes, and the rails and sprockets are showing severe wear. As the grates wear-out they jam more frequently. This immediately stops the throughput of RDF and 50% of the time causes a shut-down of the boiler to repair for 1-2 days. From an environmental standpoint, the excess holes in the grating effect the boiler airflow and combustion, which results in higher CO emissions.
NSP-Minnesota	A.0001562.169	Reliability/Performance Enhancement	REW2-Electronic Overspeed	172,720.35	2022	This project will replace the current mechanical overspeed with an electronic overspeed system. The current overspeed system involves a mechanical trip mechanism and a single channel electronic system.	The lack of redundancy with the electronic overspeed means that the mechanical system must be the primary trip method, and since it's the primary method it must be tested annually. There is a large risk involved with over speeding a turbine to test the mechanical overspeed trip, the installation of an electronic overspeed will negate the need to do many of these tests.
NSP-Minnesota	A.0001574.803	Reliability/Performance Enhancement	SHC3-Haul Road	171,382.46	2022	Haul Road; Overlay 25% of Landfill Haul Road.	Haul road in poor repair is a major safety hazard and causes considerable damage to heavy equipment.
NSP-Minnesota	A.0001562.136	Reliability/Performance Enhancement	REW0C C9 Internal Repl	168,864.85	2022	C9 Conveyor Internals - Replace internals such as flights, chain, sprockets, idlers, and hardware.	Valves leak and need replacing of the internals.
NSP-Minnesota	A.0001573.225	Reliability/Performance Enhancement	BDS5 - Rplc U5 Duct Burner PLC	164,992.49	2022	Replacement of existing U5 duct burner PLC controls with new Emerson Ovation controls. Project includes necessary equipment, instrumentation, wiring, conduit, labor, and engineering to perform the work.	The existing U5 duct burner PLC controls are 2002 vintage and nearing end of life. There have been times where the duct burners have tripped and a fault code is not displayed on the PLC, indicating a PLC hardware issue was the cause. This most recently occurred in July 2018 and nearly caused Unit 5/2 to trip on high drum level from the load swing after the duct burners tripped. The existing duct burner PLC does not have a historian so troubleshooting efforts are limited. If not replaced, the duct burner PLC will become an increasing reliability risk. Replacing with Emerson Ovation DCS controls will result in more reliable operation with easier troubleshooting and maintenance, and the ability to more seamlessly integrate duct burner controls into AGC operation per marketing request.
NSP-Minnesota	A.0001573.128	Reliability/Performance Enhancement	BDS5C CT Expansion Joint	161,688.77	2022	Perform complete replacement of Unit 5 Combustion Turbine Exhaust Expansion Joint. This includes labor and materials to perform a full replacement of the expansion joint.	The combustion turbine exhaust expansion joint is a critical component subject to severe duty. If the joint should fail, 1100F exhaust gases would escape the combustion turbine exhaust into the plant. The original expansion joint furnished with the combustion turbine in 2002 required replacement in December 2003. The first replacement expansion joint was of better quality than the original, and was replaced in 2012 when the Siemens single piece exhaust was installed. This current expansion joint may need to be replaced during the Hot Gas Path Inspection, currently scheduled for 2018.
NSP-Minnesota	A.0001574.200	Reliability/Performance Enhancement	SHC1C #13 Boiler FeedPump Over	159,096.33	2022	Overhaul Boiler Feed Pump	Pump overhauls should be done on a 9 year interval.
NSP-Minnesota	A.0001574.687	Reliability/Performance Enhancement	SHCJC 3A Gate to 4A-B Upgrade	157,046.10	2022	Retrofit 3A to 4A/B diverter gate to a splitter gate. Design needs to eliminate coal build up around the gate inside the chute work. This will involve retrofitting the housing/chute work section, gate, and actuator.	This project will eliminate the need for employees to have to blow, pry, chip, and clean out the gate to get them unplugged with coal. This project will eliminate redundancy because with a splitter gate you will not need to run your redundant path to help with blending. This project will help with blending because with a splitter gate you will be able to run more coal to the 4 belts because you will have 2 paths to supply coal to.
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2022	Miscellaneous tools needed to support plant core operations.	Ensure necessary tools continue to be available to support plant core operations.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001565.052	Reliability/Performance Enhancement	WLM0-Replace Lime Mixer Grit S	136,376.20	2022	2500 lbs/hr CaO (Lime) slaker, 24 inch lime grit shaker, and floor replacement.	Current slaker and grit shaker were installed in 1992 along with most of the AQCS system. The machines have been very durable over the years but are now beginning to show there age. The agitator stub shaft on the slaker was found to be bent during our January 2009 outage which causes the seals to fail allowing slurry into the bearings if not closely watched. One of the liners was replaced in 2008 but the other liner will need to be replaced soon. The grit shaker has been repaired using O M dollars many times over the years; multiple motors, spring rebuild kits, screens, cords, seals and tubs. The slaker and grit shaker are vital to our burning RDF for without them we could not process the lime we use in the scrubbers for SO2 removal. The floor under the slaker and grit shaker developed holes years ago and has been repeatedly patched. We need to replace this floor because it is the ceiling to the slurry tank; crud and rust fall through the floor reaching the slurry tank plugging our system. The slaker and grit shaker need to be removed to replace the floor, now would be a good time to do all three.
NSP-Minnesota	A.0001565.128	Reliability/Performance Enhancement	WLM1-Replace U1 B12 Screw Augers	130,568.58	2022	Replace six fuel metering screw augers in Bin 12.	The augers are failing and need to be replace so that both fuel metering bins will be operable.
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	122,317.86	2022	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	These transformers need to be replaced because the are necessary to the operation of the wind turbine.
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	118,653.83	2022	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the transformer and then reinstall it.	These transformers need to be replaced because the are necessary to the operation of the wind turbine.
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	114,170.54	2022	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001574.306	Reliability/Performance Enhancement	SHC99-CESP 2022 #1 CC Rotor Asmbl	105,661.51	2022	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #1 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency , of the burning, of the coal in the plant.
NSP-Minnesota	A.0001574.463	Reliability/Performance Enhancement	SHC3-U3 Stock Fdr Speed repl	103,308.07	2022	Replace the original feeder speed controls for 9 of the 10 Stock coal feeders on Unit 3. One already had their speed controls replaced several years ago. They were our pilot tests for the Stock Feeder control conversion. The remaining 8 feeder controls have been in-service since 1987.	Legacy equipment that is not supported anymore by Stock Feeder Corp. We are currently using the parts from the Unit 1 feeders after they were upgraded in 2012.
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	100,000.00	2022	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction. Included, but not all inclusive: Safety equipment, small tools, shop equipment and specialized tools.	Tool replacements are needed as tools come to end of life and are no longer cost effective to repair. The plants and facilities utilize Special Construction to supplement outages, projects and routine maintenance work at their sites. The sites typically do not have the tools and equipment necessary to complete the work that is performed by Special Construction. The expectation is that our department will bring the necessary resources to complete the work. The tools and equipment will be housed in a central location and rotated from site to site.
NSP-Minnesota	A.0001572.227	Environmental Enhancement	ASK1C-316b Permit	99,822.87	2022	Project to acquire the NPDES permit that is needed to operate the plant. This would include the costs of the initial fish studies required by the EPA 316(b) regulation and the MPCA negotiations to acquire the permit.	Mandated by EPA 316b regulation and the plant NPDES permit.
NSP-Minnesota	A.0001574.840	Reliability/Performance Enhancement	SHC99-Chemistry Lab Fire Protection	96,954.47	2022	Replace the existing Halon Fire Protection system in the Chemistry Lab. From 2019 Sherco All Risk Loss Prevention Report	The system was removed from service some time ago but Fire Protection is still required for this area. Halon is an old system and is very difficult to procure parts and materials for. Restoring the existing system is not feasible when there are modern gaseous systems that can replace it.
NSP-Minnesota	A.0001573.120	Reliability/Performance Enhancement	BDS2 -Rplc Circ Pump Disch Valves	96,527.11	2022	Replace Unit 2 circulating water pump discharge valves (42") and actuators.	The existing valves were installed in 2002 and no longer seal effectively, which presents hazards to the pumps (could spin backwards and damage/disassemble pump) and personnel during maintenance. The valves have non-serviceable seals molded into the disc and seat that are worn out. The actuators were reused from the previous installation and require frequent adjustment and overhaul due to worn components.
NSP-Minnesota	A.0001573.207	Reliability/Performance Enhancement	BDS2C-Install Lube Oil Trip Manifol	89,561.67	2022	Install a Pressure Status Manifold and redundant pressure transmitters to implement the lube oil pressure Turbine trip at Black Dog Unit 2. This project includes all Emerson DCS hardware and software and logic and HMI screen updates for the new equipment, instruments, and any digital and analog Inputs and Outputs accordingly. And this project includes all wiring and power protection for the new equipment.	The lube oil pressure trip is a critical trip for plant equipment protection. The installation of a Pressure Status Manifold (PMS) including a three transmitter and 2/3 transmitter logic configuration would ensure this critical trip is implemented in a reliable and fault-tolerant manner. The current lube oil pressure trips are 1 of out 1 logic, meaning a single component failure could result in a spurious trip or the loss of the automatic trip function.
NSP-Minnesota	A.0003000.697	Reliability/Performance Enhancement	SER-MMR- Misc Tools & Equip	86,630.00	2022	Miscellaneous tools for plant overhauls	These tools are used for plant overhauls and troubleshooting equipment problems.
NSP-Minnesota	A.0001573.274	Reliability/Performance Enhancement	BDS5-Repl 5 CT Compartment Dampers	85,551.66	2022	Replace the Unit 5 combustion turbine enclosure ventilation dampers to make them more reliable, less prone to actuator failure. This project will replace the existing pneumatic-actuated dampers with gravity-actuated passive dampers. This project is intended to be completed during the Fall 2022 major overhaul as this ductwork will already be removed as part of that project.	The Unit 5 combustion turbine enclosure ventilation dampers are actuated by pneumatic actuators which are prone to failure. The failure of a damper actuator can only be visually observed, so may continue for longer periods of time before being discovered. When a ventilation damper fails closed, the enclosure is not properly ventilated, and higher enclosure temperatures result. Often, when the pneumatic actuators fail, they are accompanied by instrument air leakage, which can reduce the CT instrument air pressure to dangerously low levels. There have been unit trips and other reliability issues as a result of low instrument air pressure when these dampers have failed in the past.
NSP-Minnesota	A.0001579.115	Reliability/Performance Enhancement	RIV0-U0 Install CEMS power red	79,272.87	2022	This project will install a redundant power feed to the Continuous Emissions Monitoring System (CEMS) and install a local UPS source to the main computer.	The Continuous Emissions Monitoring System (CEMS) is required to operate reliably for environmental monitoring and reporting and to reduce unit emissions. It was discovered during an environmental vulnerability assessment that one major vulnerability is that the CEMS system has only one power source with very short and limited backup power.
NSP-Minnesota	A.0001579.135	Reliability/Performance Enhancement	RIV0C 62 Battery Replace	77,508.95	2022	Replace Riverside 62 Battery	Station batteries have a limited operational life, this battery is expected to reach it's end of life around 2023. The load test results have shown this battery has already degraded to 85% capacity meaning it is only capable of 6.8 hours vs. its designed 8 hours.
NSP-Minnesota	A.0001574.358	Reliability/Performance Enhancement	SHC1C North Blr Bldg Roof Repl	75,456.05	2022	Removal of the existing roofing system and install a new roofing system over the Level 10 North boiler building for unit 1 (6000 sq. ft.), the Level 10 North boiler building over unit 2, (5200 sq. ft.), the Conveyor bridge connecting unit 1 and 2 (2700 sq. ft.), and the scrubber building bridge connecting unit 1 and 2 (2700 sq. ft.). The infrastructure will be assessed at the time of the tear off and removal of the existing system.	The roofing systems are past their normal life cycle and are leaking as a result of rain and snow melting. The maintenance costs are building each year. A new roofing system will add value to the asset and will include a 20 yr warranty.
NSP-Minnesota	A.0001573.269	Reliability/Performance Enhancement	BD5 Modified HGP w_Flex Ops	74,305.36	2022	U5 combustion turbine modified hot gas path (HGP). Since the rotor was removed during the 2017 outage, it will not be removed for this outage which was originally planned to be a major inspection. Turbine rows 1-3 will be replaced and all major combustor parts will be replaced. The row 4 blades/vanes were replaced during the 2012 single piece exhaust (SPEX) outage. Due to the hours on the R4 parts vs. the next scheduled HGP/Major outage, the R4 parts will be replaced during this outage, as well. This modified HGP includes flex operations modifications to increase operating range, improve heat rate, reduce emissions, and provide an overall improved unit flexibility. The improved flexibility is required to accommodate the ongoing and future wind and solar installations on the grid.	Per current PSM parts agreement, scheduled outages must occur within 10% of 25,000 hour parts life.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.073	Reliability/Performance Enhancement	RIV0C -- Replace 61 Battery	73,787.05	2022	Replace Riverside 61 Battery	Station batteries have a limited operational life, this battery is expected to reach its end of life around 2016. This battery is a non-NERC PRC-004 battery but provides back-up power to emergency lighting on the Unit 7 side of the Riverside Power Plant.
NSP-Minnesota	A.0001574.769	Reliability/Performance Enhancement	SHC3C CR HVAC PLC 2nd Flr Replace	69,923.12	2022	Replace the PLC, remote panels, damper actuators and other instruments as needed. Work could be done during an outage or in spring or fall moderate temperatures.	The existing equipment is obsolete and repairs are becoming difficult or not possible. Higher temperatures could have an adverse effect on control room equipment.
NSP-Minnesota	A.0001573.221	Reliability/Performance Enhancement	BDS2 -Ovhl #21 Cndnsr Vcm Pump	69,211.31	2022	Overhaul the Unit 2 No. 21 Condenser Vacuum Pump. Disassemble the pump, inspect, replace components as necessary. Condenser vacuum pumps have been in service since 2015, and this overhaul will be the first done on the pump. This project assumes that the complete rotating assembly, or the complete stationary assembly, or both, will be replaced.	The Unit 2 condenser liquid ring vacuum pumps require periodic overhaul. The overhaul could be capital if either the complete rotating assembly, or the complete stationary assembly, or both, require replacement. Unit 2 has two 100% redundant condenser vacuum pumps, but both are used during startups, to remove larger volumes of air from the steam side of the condenser. Without both pumps in service, Unit 2 startups will take longer.
NSP-Minnesota	A.0001573.222	Reliability/Performance Enhancement	BDS2 - Ovhl #22 Cndnsr Vcm Pump	69,211.31	2022	Overhaul Unit 2 No. 22 Condensate Pump using stock spare bowl assembly and stock mechanical seal. The bowl assembly removed from this pump will be overhauled, and returned to stock for the next pump overhaul.	Pumps require periodic overhaul. Black Dog stocks a spare bowl assembly and a spare mechanical seal for the Unit 2 condensate pumps, both of which will be checked out of stock. The Unit 2 condensate pumps are each 75% capacity, so both must be operating for the 5&2 combined cycle to run. Following the overhaul, the removed bowl assembly will be overhauled.
NSP-Minnesota	A.0001565.065	Reliability/Performance Enhancement	WLM1C C7 & C8 VFD	65,318.17	2022	Install Variable Frequency Drive's on the new C7 & C8 conveyors. This project will also cover the installation of new VFD's on the plant C3 and C4 conveyors.	Install drives to slow the new conveyors down saving wear and future O&M costs
NSP-Minnesota	A.0001574.805	Reliability/Performance Enhancement	SHC0-Coal conveyor F.P.	63,885.42	2022	From 2014 All Risk Loss Prevention Report for Sherco, Recommendation SHC P 06-11. Extend the existing sprinkler protection for the following coal conveyors to include inside the metal enclosures over selected portions of the conveyors: -Conveyor 52 located on the upper level of the east side of the Coal Storage Barn -The head end of Conveyors 4A and 4B -The tail end of Conveyors 4A and 4B - The head end of the No. 1 Emergency Reclaim conveyor -The tail and head end of Conveyor 2A -The east end of Conveyor 1A -The east end of Conveyor 5S -The head end of Conveyor 51 -The Crusher end of Conveyor 6A and 6B	Currently, these conveyors are sprinkler protected except for the enclosed portions indicated above. If a fire occurs on these conveyors inside the enclosures, there would be no sprinkler protection to control it until the fire exited the enclosure, which would result in greater damage than would otherwise occur. Therefore, this protection should be installed.
NSP-Minnesota	A.0003000.679	Reliability/Performance Enhancement	RIV0C-Tool Blanket	60,000.00	2022	Miscellaneous tools and equipment.	Improve capability and efficiency of daily operations and maintenance tasks.
NSP-Minnesota	A.0001572.246	Reliability/Performance Enhancement	ASK1-Protective Relay Upgrades	58,532.00	2022	The protective relaying on each of the Main Plant's 6.9KV and 4.16KV Cubicles has reached an age in which replacement is needed. The existing mechanical relays are original 1969 vintage and are starting to fail. In addition, preventative maintenance of these relays is time consuming. Newer digital style would provide better reliability and ease of maintenance. There are 8 - 6.9KV and 22 - 4.16KV cubicles.	This project would improve reliability for our Medium Voltage source cubicles for various motors and MCC feeds in the plant. It also simplifies maintenance work and would lengthen out the periods in which PM's would be required.
NSP-Minnesota	A.0001573.203	Reliability/Performance Enhancement	BDS5C-Repl U5 Fuel Gas Heater CV	58,052.91	2022	Replace the Unit 5 Fuel Gas Heater Feedwater Control Valve (1", 1500#) and actuator with a severe duty control valve.	HP Feedwater pressure drop across this control valve reduces from approximately 2,000 psig boiler feed pump discharge pressure to approximately 100 psig. The existing control valve is not up to the duty. The existing control valve must be disassembled, inspected, and cleaned annually, to avoid control valve sticking and other problems experienced. The new control valve would be a true severe duty control valve and provide more reliable service without requiring ongoing maintenance and valve issues associated with the current design. This valve is critical for maintaining Unit 5 fuel gas temperature, which causes unit runbacks and trips if not within control.
NSP-Minnesota	A.0001576.500	Renewable and New Generation	GDM Emergent Fund -Wind prod	56,403.27	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001573.272	Reliability/Performance Enhancement	BDS5-Repl U5 LP Drum Feedwater CV-2	56,011.90	2022	Replace the Unit 5 LP Drum Feedwater Control Valve (1", 1500#) and actuator with a severe duty control valve. Project includes engineering, craft labor, materials, and other costs to support the project.	HP Feedwater pressure drop across this control valve reduces from approximately 2,000 psig boiler feed pump discharge pressure to approximately 100 psig. This is severe duty, and the existing control valve is not up to the duty. The existing control valve must be disassembled, inspected, and cleaned annually, to avoid control valve sticking and other problems experienced. The new control valve would be a true severe duty control valve and provide more reliable service without requiring ongoing maintenance and valve issues associated with the current design. This valve is critical for maintaining Unit 5 LP Drum Level, which will trip the unit on low and high levels if not within control. Proper drum level control is the most important boiler operating parameter from a safety perspective as well. There have been historical conditions where the leakage by this valve was so significant that drum level was being controlled with the valve at 0% (due to leakage through the plug / seat).
NSP-Minnesota	A.0001561.500	Reliability/Performance Enhancement	IVH Emergent Fund -Other prod	55,963.22	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0003000.578	Reliability/Performance Enhancement	SER0C MMR Video Probe	55,000.00	2022	Replace Video Probe iPLEX	MMR-Replace Video Probe iPLEX
NSP-Minnesota	A.0001574.731	Reliability/Performance Enhancement	SHC0C Fuel Oil Pump F.P.	50,000.00	2022	Install automatic sprinkler protection over the fuel oil pumps in the Auxiliary Boiler Building designed for 0.25 GPM/square feet over a design area of 3,000 square feet with a 250 GPM hose stream allowance.	There are four fuel oil pumps in this room, which present a fire risk. Since there is no sprinkler protection in this area, such a fire could spread throughout the Administration areas in the Main Building and to the turbine under deck mezzanine area and lower boiler areas, doing damage to the Unit 1 turbine generator and boiler. There is sprinkler protection in the turbine under deck area and a fire could burn out or be manually controlled at this point. However, there could still be enough damage done to affect Unit 1. Therefore, sprinkler protection is recommended.
NSP-Minnesota	A.0003000.669	Reliability/Performance Enhancement	HBC0C HB CC Tool Blanket	50,000.00	2022	Tool blanket to purchase tools more than $1000 each.	Tools needed to adequately perform jobs safely. Existing tools can break or a new tool can do a task better.
NSP-Minnesota	A.0001559.500	Reliability/Performance Enhancement	BLL Emergent Fund -Other prod	49,685.92	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0003000.661	Reliability/Performance Enhancement	BDS0C Tool Blanket	42,852.00	2022	This funding provides for new or replacement tools and equipment for the plant.	The addition and replacement of tools and equipment is necessary to maintain the productivity of the operating and maintenance personnel.
NSP-Minnesota	A.0001573.102	Reliability/Performance Enhancement	BDS0C Office Area Heaters	41,960.45	2022	Install (2) 360,000 BtuH electric boilers for heating hot water loops while plant steam is not in operation, there are (2) separate hot water loops for the area. One loop serves the baseboard radiation, the other serves the hot water coil in the air handler rooftop unit.	The current HVAC in the Engr/Supt office is dependent on the chiller system in the warmer months and depends on the Plant steam heat in the colder months. Due to Units 3&4 retiring, the heating units to be installed will be electric boilers that will operate when the plant steam is not operating during shoulder months of the year.
NSP-Minnesota	A.0001575.171	Reliability/Performance Enhancement	HBC0 - Rmv & Rplc BFP Spare YR1	40,893.70	2022	Remove boiler feed pump and install the rotating CESP pump in its place.	Boiler feed pumps are severe duty critical plant equipment. Periodical overhauls are required. Two pumps are currently showing indications of thrust bearing degradation.
NSP-Minnesota	A.0003000.567	Reliability/Performance Enhancement	SER0C MMR Alloy Analyzer	38,000.00	2022	MMR-Replace Alloy Analyzer 2022	Alloy Analyzer is failing and long longer providing accurate readings
NSP-Minnesota	A.0001573.273	Reliability/Performance Enhancement	BDS5-U5 Overspeed Probe	35,650.60	2022	Currently U5 overspeed protection is only equipped with two speed probes, and there is no redundancy available if either probe or associated wiring and controls are unavailable. This project would be to install a third speed probe that can be wired up to enable two out of three voting.	Overspeed protection needs to have a high level of redundancy and accuracy to prevent catastrophic damage to the unit. The additional probe will also allow for 2 out of 3 voting which will be more fault tolerant and allow for 2 out of 3 voting if there are any issues with a particular speed probe, card, wiring, etc.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0003000.707	Reliability/Performance Enhancement	C100C CSC Aerosol Can Crusher	32,180.00	2022	Replace existing aerosol can crusher.	Aerosol can crusher - our operating experience with three previous aerosol can crushers indicate that they last three years. The existing crusher was installed in 2003. The manufacture of the current crusher believes the service life under our operating conditions should be at least 5 years; that is two years longer than our experience with other designs. Crushers have complex linkages and controls and closed tolerances which become more problematic as the equipment ages, resulting in improper cycling of the equipment, jams, and miss cycles of the hydraulic ram causing equipment damage. Environmental conditions for this equipment are relatively harsh with paint spray, wedged can parts, and high hydraulic forces. Once the machine becomes excessively worn, repairs become frequent and out of service times longer. Because of the relatively high payback from operating the aerosol can crusher and the storage limits for flammable liquids at the HWSF when the equipment becomes inoperative it is very important to repair or replace quickly.
NSP-Minnesota	A.0003000.748	Renewable and New Generation	BS10-Blazing Star 1 Tools and Equip	30,168.00	2022	Tool and equipment blanket for initial O&M setup and sustainment	New site in remote location for plant support
NSP-Minnesota	A.0003000.750	Renewable and New Generation	FTW0-Foxtail Tools and Equipment	30,168.00	2022	Tool and equipment blanket for initial O&M setup and sustainment of Foxtail Wind Farm	New site in remote location for plant support
NSP-Minnesota	A.0003000.662	Renewable and New Generation	BRDR Small Tools Equip	29,997.00	2022	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.678	Renewable and New Generation	PLV Tools Equip	29,997.00	2022	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.667	Renewable and New Generation	GDM0C Grand Mead Cap Tool	29,997.00	2022	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.128	Renewable and New Generation	CWF Tools & Misc Equipment	29,997.00	2022	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.563	Reliability/Performance Enhancement	SER0C CSC Drum Packer Crusher	21,000.00	2022	Replace existing drum packer/crusher.	The existing drum packer/crusher was purchased in 1987 and has been in service since the inception of the Hazardous Waste Storage Facility. It is used primarily for crushing metal 55-gallon drums (and occasionally other sizes) and for compacting empty containers inside of 55-gallon drums, which significantly reduce (waste volume) (e.g., PCB contaminated drums can be crushed and palletized to reduce storage space & transport space, in return reducing transportation costs). Minor repairs have been made to the lever that controls the up and down motion. Eventually, it is anticipated that this unit will fail due to the longevity of the equipment. The exact service life of this piece of equipment is unknown, but has been estimated to be 15 years. The existing crusher does not have the ability to crush overpack drums. It also has removable plates to go from packing of materials to crushing of drums. The plates are held in place by 3 bolts. Handling and positioning of the plates presents both lifting and other ergonomic concerns. The existing model can also operate with the front door open, which presents additional safety concerns. New models have the capability of crushing overpacks (85-gal capacity drums). An emergency stop button shuts off all power at a touch. A safety interlock automatically shuts off the hydraulic power when the door is not completely closed. A universal head can be used for either compacting or crushing eliminating the removal of one of the plates. A piercer on this plate vents closed drums through the squeeze head.
NSP-Minnesota	A.0003000.659	Reliability/Performance Enhancement	BLL0C Tools Blanket	20,000.00	2022	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Improve testing capabilities.
NSP-Minnesota	A.0003000.657	Reliability/Performance Enhancement	ANS0C Tools and Equip Ca	20,000.00	2022	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Upgrade and replace old equipment.
NSP-Minnesota	A.0003000.672	Reliability/Performance Enhancement	IVH0C Misc tools and Equip	20,000.00	2022	Replace toolboxes, chain hoists, misc tools, and test equipment.	Improve work force efficiency and safety.
NSP-Minnesota	A.0003000.676	Renewable and New Generation	NBLCo Misc Tools and Equi	20,000.00	2022	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0001574.173	Reliability/Performance Enhancement	SHC3C Emergent work	18,928.09	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.268	Reliability/Performance Enhancement	SHC1C Emergent Projects	16,191.11	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.673	Reliability/Performance Enhancement	SHC3C 1st Floor HVAC PLC Replace	15,635.00	2022	Replace the PLC, remote panels, damper actuators and other instruments as needed. This HVAC system supplies all of the transition building from the 1st floor maintenance offices all the way up to the I&C shop. A significant portion of the cost is associated with upgrading ancillary equipment such as damper drives and duct heater controllers which are obsolete and need upgrades or repairs to work with the new PLC. Temporary heating and or cooling may be required depending on when the major work is performed.	The existing equipment is obsolete and repairs are becoming difficult or not possible. This equipment controls the HVAC in the Unit 3 office areas. Should a larger failure occur this project will have to be performed as an emergent project at a greater cost.
NSP-Minnesota	A.0003000.680	Reliability/Performance Enhancement	REW0C Tool Blanket	15,000.00	2022	This project will be used to purchase capital maintenance tools for the 2021 calendar year. Such equipment may include scaffolding, specialized electrical instruments, machining equipment, welding machines, etc.	This project will allow for the site to have on-hand the appropriate tools required for plant personnel to perform their work tasks efficiently and safely. Having the appropriate tools and equipment makes for a safer work environment and reduces the risk of potential industrial safety incidents. Staying current with electrical diagnostic equipment enables personnel to troubleshoot plant equipment more quickly and easily.
NSP-Minnesota	A.0003000.671	Renewable and New Generation	HNIC0 Misc Tools and Equ	15,000.00	2022	Blanket for miscellaneous tools. These tools will be used for day to day operation and in preparation for the turbine overhauls.	Necessary for continued upkeep of operating facilities.
NSP-Minnesota	A.0001562.168	Reliability/Performance Enhancement	REW2-SKF Monitoring System	13,582.43	2022	This project will replace the SKF monitoring system (monitors turbine vibration). It will also combine both Unit's systems into a single control rack to save space and cut costs. This project goes hand-in-hand with the U1 SKF Monitoring System project.	The current system is obsolete and it is becoming increasingly harder to find replacement parts.
NSP-Minnesota	A.0005014.142	Renewable and New Generation	BS10-Blazing Star 1 Build Furn & Equip.	10,056.00	2022	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0005014.144	Renewable and New Generation	FTW0-Foxtail Building Furn & Equip	10,056.00	2022	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0001574.666	Reliability/Performance Enhancement	SHC3C CT Vibration System	9,834.00	2022	Connect the two Bentley vibration systems to the plant computer to allow for trending and real time display of equipment condition.	The original project did not connect the equipment to the plant computer. Thus current readings and trending functions are not available.
NSP-Minnesota	A.0003000.564	Reliability/Performance Enhancement	SER0C CSC Rolloff Container 1	8,000.00	2022	Replace Rolloff Container 1-replace the first existing roll-off container.	CSC-Replace Rolloff Container 1 The Hazardous Waste Storage Facility (HWSF) has two roll-off containers. One container is always on site for loading of industrial wastes and the other is storage at the transportation company's location. When the on-site roll-off is full, the empty roll-off is delivered and the full one is picked up. This method allows for the continuous ability to dispose of industrial wastes. The new roll-off would be cable and hook hoist compatible (currently the roll-off is only cable hoist compatible). This would allow for greater flexibility in transporting the roll-off as Xcel Energy trucking or other vendors could also transport it. Without replacing the first roll-off container, we would be limited to cable hoist trucks to swap out the roll-off containers as one roll-off would be hook compatible and the second one would not.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0003000.565	Reliability/Performance Enhancement	SER0C CSC Rolloff Container 2	8,000.00	2022	Replace Rolloff Container 2-eplace the second existing roll-off container.	CSC-Replace Rolloff Container 2 The Hazardous Waste Storage Facility (HWSF) has two roll-off containers. One container is always on site for loading of industrial wastes and the other is storage at the transportation company's location. When the on-site roll-off is full, the empty roll-off is delivered and the full one is picked up. This method allows for the continuous ability to dispose of industrial wastes. The new roll-off would be cable and hook hoist compatible (currently the roll-off is only cable hoist compatible). This would allow for greater flexibility in transporting the roll-off as Xcel Energy trucking or other vendors could also transport it. Without replacing the second roll-off container, we would be limited to cable hoist trucks to swap out the roll-off containers as one roll-off would be hook compatible and the second one would not.
NSP-Minnesota	A.0001574.738	Reliability/Performance Enhancement	SHC0 2RSA H_Bushng Rplcmnt	6,128.00	2022	Replaced 2 RSA H0, H1, H2 and H3 bushings and oil pumps. Scope of work includes draining, processing and refilling oil in transformer.	Some bushings showed signs of degradation in recent testing. Replacement of all high-side bushings meets capitalization criteria. Oil pumps have never been replaced and also meet capitalization criteria.
NSP-Minnesota	A.0001574.269	Reliability/Performance Enhancement	SHC2C Emergent Projects	2,216.61	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.733	Reliability/Performance Enhancement	SHC0C Electric & Electronic Room FP	1,666.00	2022	Install smoke detection in the following areas (to be monitored by the Main Control Room or other 24/7 occupied area): * Main secondary unit substation room (ground floor) * Main 4,160 volt switchgear room (mezzanine level) for Unit 1 and 2 * Unit 1 and 2, 480-volt SUS room * Unit 1 and 2 Relay Rooms * All of the Inverter Rooms * Unit 1 and 2 Electrostatic Precipitator switchgear rooms * All of the battery rooms	The most likely problem in the listed areas is an electrical fault, which will often generate smoke. Smoke detection in these areas can provide an early warning of a problem and allow action to be taken prior to significant damage occurring.
NSP-Minnesota	A.0001565.118	Environmental Enhancement	WLM1C Replace U1 Baghouse Bags	1,000.00	2022	Replace six modules (1260 total) of baghouse bags and cages. This project would also include a series of repairs to the baghouse modules including replacement of the bottom hoppers, repairs at the tops of the modules above and below the tubesheet, sand-blasting the inside of the module and coating it with an anti-corrosive coating, re-tinning and re-insulating the modules, etc.	Permit required to meet opacity standards. Bags are on a four year frequency to be changed out. The bags were on a six plus year changeout in the past but it was determined that changing out the bags more frequently saves on material loss on boiler tubes. It has been determined that after four years the bags begin to blind/plug and no longer allow enough air flow to operate the units at their full potential. Because of the plugged bags the air flow through the unit is decreased causing a high differential pressure reducing load capability and allowing the flue gas to consume more of the tube material throughout the boiler.
NSP-Minnesota	A.0001565.115	Reliability/Performance Enhancement	WLM0C DCS Software Hardware Upgrade	500.00	2022	DCS Software update (latest revision) and hardware replacement of 10 work stations.	Updating to the latest software revision keeps the DCS up to date for servicing and trouble shooting. After time the older revisions are essentially unsupported by the vendor. Hardware replacements every five years will help to ensure limited failures.
NSP-Minnesota	A.0001574.209	Reliability/Performance Enhancement	SHC3C 2022 Small Project Routine	388.26	2022	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001564.500	Renewable and New Generation	St Anthony Falls Emergent -Other Pr	9.95	2022	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001707.001	Renewable and New Generation	DKR0 Dakota Range Wind Turbines	(7,156,446.00)	2022	Construct a 300 MW New Wind Farm in Grant and Codington counties in South Dakota. The wind farm includes 72- V136 Vestas Turbines rated at 4.2 MWs each, a collector system, O&M building, access roads, and collector substation.	This project qualifies for the Federal Production Tax Credit (PTC) at an 80% level.
NSP-Minnesota	A.0001575.170	Reliability/Performance Enhancement	HBC8 - U8 CT Ovhl Major Outage	11,057,186.55	2023	Labor cost to perform major overhaul on U8 CT. During a major overhaul, all combustion parts are replaced, all turbine blades and vanes are replaced. The rotor is pulled out of the CT disassembled and restacked.	Per OEM specification a major overhaul is required at 48,000 hours.
NSP-Minnesota	A.0001571.023	Reliability/Performance Enhancement	ANS2-C-U2 replace vanes and bl	10,626,069.83	2023	U2 major overhaul with rotor removal and Class 3 inspection. Replacement of row 4 turbine rotor disk, row 2, 3 and 4 blades, and . The refurbishment of combustion components is also included to extend the unit life.	U2 has been in operation since 1994. The OEM recommendation for a major overhaul is 3200 starts. U2 is expected to be at or above the recommended starts by 2022. In addition, the row 4 turbine rotor disk has significant wear due to the number of hours on turning gear. This causes high vibration during startup and has resulted in unit trips.
NSP-Minnesota	A.0001561.032	Reliability/Performance Enhancement	IVH5C Turbine Controls	2,538,542.31	2023	Replace the existing obsolete GE Fanuc turbine controls and integrated balance of plant controls with a modern control system including new microprocessors, HMI's, monitors, historian, EMS-SCADA interface, network switches, dual redundant network, data links, etc. The new turbine control system is planned to be similar to sister Wheaton Units 1-4. The new controls will include overspeed integration including 4 active speed probes similar to Wheaton. The project also includes modifying the fuel oil controls with position feedback. This project includes upgrading the vibration monitoring with Bently Nevada equipment rather than the equipment provided by Emerson as was done for the Wheaton plant. For transmission system requirements, new controls will be installed 2 units at a time, thereby maintaining 4 units available for operation. This is a 3-year project starting in 2020 and ending in 2022.	The existing control system is obsolete and not supported by the manufacturer. Spare parts are difficult to find and costly to procure when located. The NSP fleet control systems are being standardized on Emerson Ovation to improve operations, maintainability, reliability, and availability.
NSP-Minnesota	A.0001566.168	Renewable and New Generation	NBL0 - Gearbox Replacements	2,370,770.15	2023	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001573.169	Reliability/Performance Enhancement	BDS0C Reverse Osmosis 2nd Pass	2,143,771.93	2023	Installation of a new 100 GPM (outlet) water treatment system. This new system will be located in the basement of Unit 2 - located just north of the existing vacuum pumps. This project includes new equipment, piping, wiring, instrumentation, conduit, controls, and associated auxiliary equipment (softener, pre-filtration, chemical feed, EDI, CIP skid, etc). The new equipment will be operated by an Allen Bradley PLC (with HMI screen at the equipment skid). The system will have the ability to be remote controlled by the Ovation DCS in the control room. There is no DCS operator screen at the equipment skid. The existing demineralizer will be retired in-place and neutralized.	This project will provided needed redundancy for the boiler water makeup system at the Black Dog plant, after the recent retirement of the 1960's No. 1 ion exchange demineralizer. Under normal plant conditions, the No. 2 RO demineralizer, capacity 50 gpm, installed with the Repowering Project in 2002, meets the boiler water and evaporative cooler makeup demand of the Units 5&2 combined cycle unit. The installation of Black Dog Unit 6 in 2018 adds to the demand for demineralized water, for the Unit 6 evaporative cooler. Several operating scenarios could overtax the capability of the existing No. 2 RO demineralizer to provide demineralized water, such as more Unit 6 evaporative cooler operation, more Unit 5 HRSG boiler blowdowns due to water chemistry excursions, and more on and off line cycling duty of the Units 5&2 combined cycle unit, which uses demineralized water much more than continuous on-line operation. In addition, scheduled No. 2 RO demineralizer maintenance, such as RO membrane chemical cleaning or replacement, softener resin sampling and replacement, must be done during scheduled outages, in order to avoid the cost of trucking water to the plant. Installation of a second RO and retirement of the existing Demineralizer equipment is recommended by the Xcel Energy Chemistry Resources department.
NSP-Minnesota	A.0001574.672	Reliability/Performance Enhancement	SHC3C 36_1 & 36_2 FWHs Replace	2,101,699.60	2023	Replace the 36-1 and 36-2 Feedwater Heaters.	The heaters are original from 1987 and tube failures are projected to be significant enough to warrant replacement of these heaters.
NSP-Minnesota	A.0001573.500	Reliability/Performance Enhancement	BDS Emergent Fund -Other prod	1,924,347.88	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001576.005	Renewable and New Generation	GDM0 - Gearbox replacements	1,509,246.54	2023	Replace failed gearboxes in GE 1.5 SLE wind turbines. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001579.500	Reliability/Performance Enhancement	RIV Emergent Fund -Other prod	1,243,834.70	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.804	Reliability/Performance Enhancement	SHC3-U3 DCS Workstation Upgrade	1,054,653.15	2023	Unit 3 DCS Workstation Upgrade 2023: Replacement of the Engineering and Operator Workstations hardware and software. This would include the Historian and other misc PC computers. Installation would take place during the Spring 2023 Major Outage on Unit 3. In addition, the Unit 3 Simulator will be upgraded.	Estimated end of life for the Workstation hardware and unsupported software by Microsoft and Invensys (Foxboro). It improves the system health score to be less than 30 which is significantly less critical than it is now at 60. Energy Supply Policy dictates that we do this project, it states"4.2.6 Current Operating Systems, Applications and Hardware: Plant networks should have current operating, hardware and software systems that are supported by the involved manufacturers to provide current antivirus and malware signatures and operational patches. A plant improvement project request shall be submitted using the EPM system if any plant network equipment is no longer supported by the vendor and requires upgrade in order to maintain current cyber-security protections." By doing this project we are regaining support form Microsoft, and Foxboro by having supported computer hardware, and anti-virus definitions.
NSP-Minnesota	A.0001611.009	Renewable and New Generation	PVW0-Pleasant Valley Gearbox Replac	1,051,022.52	2023	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001575.500	Reliability/Performance Enhancement	HBR Emergent Fund -Other prod	975,123.65	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001575.167	Reliability/Performance Enhancement	HBC0-Evergreen Upgrade #2	961,937.16	2023	Upgrade Ovation control system through the Emerson Evergreen program. The Evergreen program allows all controllers to be upgraded once during the Sure Service contract period.	To keep pace with advancements is the goal of the Ovation Evergreen program. This SureService customer support module provides a way to keep the Ovation system continuously up-to-date. The Evergreen program will avoid a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new I/O and security features.
NSP-Minnesota	A.0001565.083	Reliability/Performance Enhancement	WLM0- Landfill Cells 8, 9, 10	881,381.33	2023	Project to cap three cells at the Wilmarth ADF (cells 8, 9 and 10). The total acreage is approximately 3 acres.	We are required by permit (MPCA permit # SW-298-008) to cap landfill cells.
NSP-Minnesota	A.0001580.007	Renewable and New Generation	CWF0-Courtenay Gearbox Replacement	880,088.02	2023	Replace failed gearboxes. Cost includes the crane and labor to remove the rotor, gearbox, and main shaft, and then reinstall the components.	Gearboxes fail with planetary section damage and need to be replaced.
NSP-Minnesota	A.0001574.307	Reliability/Performance Enhancement	SHC3 - Replace U3 Inverter	819,054.20	2023	This project encompasses replacement of the Unit 3 Essential Service Power System. The Unit 3 Essential Service Power Inverter Power Supply System provides an uninterruptible source of 120 volt, single-phase power to loads that cannot withstand power outages exceeding cycle, and that need to remain operational during loss of normal station AC power. The system consists of the Plant Inverter Power Supply System and the AQCS Inverter Power Supply System. Each inverter system includes, two inverter system cabinets, one 75 kVA voltage regulator, and four inverter panelboards. Each inverter system cabinet contains the uninterruptible power supply (UPS) equipment, which includes a 350-ampere battery charger (rectifier), a 75-kVA inverter, and a static switch with a manual bypass switch. The four inverter battery chargers each receive 480 VAC power from a respective MCC and supply 250 VDC power to the 32 Battery and to an associated inverter. Each of four inverters converts the 250 VDC to 120 VAC which feeds the respective essential loads such as the digital control system and other critical computers. Each inverter is capable of carrying 100% of all essential loads of the associated Plant Inverter Power Supply System or AQCS Inverter Power Supply System.	The existing U3 battery chargers, inverters, static switches and voltage regulators are original equipment installed in 1986. Current reliability is questionable, they are obsolete (replacement components are hard to find or non-existent), they continue to degrade, and are becoming more difficult to maintain. There are very few left that are trained to trouble shoot and repair these devices.
NSP-Minnesota	A.0001574.190	Reliability/Performance Enhancement	SHC3C 2023 Small Project Routine	742,231.87	2023	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc that have failed during plant operation.
NSP-Minnesota	A.0001571.088	Reliability/Performance Enhancement	ANS2-ANS U2 Generator Inspection	683,061.86	2023	Parts and labor for removal and inspection of the ANS U2 combustion turbine generator rotor/stator.	The inspection of the generator is scheduled during the ANS U2 major combustion turbine overhaul. This project is required to extend the life of the unit.
NSP-Minnesota	A.0001575.174	Reliability/Performance Enhancement	HBC8- Rplc LP Lower Prehtr Header	614,274.03	2023	Replace lower preheater header.	In 2014, 86% of header stubs were found cracked. Operational changes made which may resolve the issue of thermal shocking of the preheater. Cracked tube stubs were cut out and replaced during the Spring 2014 outage as well as the Fall 2014 outage.
NSP-Minnesota	A.0001576.006	Renewable and New Generation	GDM0C Generator Replacements	546,205.99	2023	Replace failed generators in GE 1.5 SLE wind turbines.	High operating temperatures in the compact design have caused a small amount of failures in the industry after 5 years of operation.
NSP-Minnesota	A.0001574.671	Reliability/Performance Enhancement	SHC3C CW Valve & EXJ Rplcmnt	540,091.56	2023	Replace the 84" Circulating Water inlet and outlet isolation valves to the U3 Condenser (TCW-3005,6,7,8) and the expansion joints.	A tight seal is not possible on these valves, therefore it is not possible to remove a single loop from service to repair a tube leak or other issues. A unit shutdown would be required instead of a reduction to 50% power to perform repairs.
NSP-Minnesota	A.0001574.198	Reliability/Performance Enhancement	SHCCC 2017 Emergent Work	506,831.99	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.180	Reliability/Performance Enhancement	SHC1C 2023 Small Project Routine	461,312.02	2023	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001572.500	Reliability/Performance Enhancement	ASK Emergent Fund -Steam prod	460,394.65	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001707.012	Renewable and New Generation	DKR Dakota Range PCMM New	425,016.00	2023	To better understand the potential impacts to birds and bats, Xcel Energy executes a post-construction mortality monitoring (PCMM) study using methods developed in conjunction with U.S. Fish and Wildlife Service and Minnesota Department of Natural Resources as part of a Bird and Bat Conservation Strategy (BBCS).	The BBCS called for conducting a post-construction mortality monitoring study with the primary objectives of providing a summary of documented fatalities, presenting estimates of searcher efficiency and carcass persistence, and calculating fatality rates adjusted for bias during the study. The secondary objective was to monitor all turbines specifically for eagle and other large bird fatalities.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.156	Reliability/Performance Enhancement	RIV0-Replace Obsolete EDG Controls	408,609.02	2023	Riverside diesel generator controls are obsolete and have a long history of failures. The Woodward load controllers, and synchronizers are obsolete and are no longer supported by the OEM. The plant is forced to purchase items on the second hand market if there is a failure. The Allen Bradley PLCs are also more than 20-years old. The frequency and load control are also problematic rheostat controlled which have contributed to failed starts and trips of the units. This project scope would include full controls replacement, generator protection, and excitation/AVR control. These diesels should be able to Island and utility parallel to support plant stabilization during black out conditions.	This obsolete equipment makes the diesel generator operation unreliable. These generators are needed during black out conditions to make sure the plant can be quickly available after a black out event. Reliability and simple/fast operation of these units is paramount to reduce equipment damage and lessen downtime during a loss of offsite power event.
NSP-Minnesota	A.0001561.039	Reliability/Performance Enhancement	IVHC Gas Vlv Ctrl Rplc	407,478.14	2023	Replace the existing obsolete gas control logic, gas control valves, wiring, and pressure switches on Units 5 & 6. This project is planned to be run in parallel with the turbine control replacement project because the software and microprocessor hardware for turbine control, gas valve control and fuel oil valve control is one integrated whole. Due to transmission system requirements the new gas control valves will be installed 2 units at a time; thereby maintaining 4 units available for concurrent operation. The new control valves are slightly narrower and a bit longer than the existing valve per initial vendor drawings. Per field measurements we expect that the new valves will fit in the same location with minor piping modifications. We do not expect to require gas valve cabinets and other major modifications. This is a 2 year project starting in 2020 and ending in 2021.	The servomotors that operate the gas control valves (GCV) are obsolete. They are controlled by obsolete Pacific-Scientific controllers. This control scheme has not proven to be very reliable over the years with numerous unit outages due to component failure and electrical/control/mechanical issues with gas operation. In addition these components are very difficult to troubleshoot and maintain in calibration. The existing control system is obsolete and not supported by the manufacturer. Spare parts are difficult to find and costly to procure when located. The NSP fleet control systems are being standardized on Emerson Ovation to improve operations, maintainability, reliability, and availability.
NSP-Minnesota	A.0001562.153	Reliability/Performance Enhancement	REW2C-REW2 - Replace U2 Superheater	403,990.86	2023	This project would replace all 37 pendants (all 592 tubes) in the U2 superheater.	NDE inspections indicate extensive wall thinning in the area identified for replacement. Tube leaks occur frequently which increases lost burn revenue and increases safety risk.
NSP-Minnesota	A.0001562.060	Environmental Enhancement	REW0 - 316b - Fish Return Line	402,234.50	2023	A new fish return line will be installed as a collection of pipes and troughs to aid the fish as they exit back into the source water. Also included with this return line will be a series of basins and washing stations to help with the gentle return of the fish. This project will optimize of the screening system to ensure compliance with EPA 316b regulations. Fish impingement & mortality rates with be studied at the completion of the project to ensure it's operating as designed.	This is a mandated environmental project by the MPCA to ensure we are compliant with EPA regulation 316(b) of the Clean Water Act. Section 316(b) requires that National Pollutant Discharge Elimination System permits be obtained by any facility that contains a cooling water intake structure to ensure that the engineering design of the structure minimizes harmful impacts on the environment.
NSP-Minnesota	A.0001566.169	Renewable and New Generation	NBL0 - Replace Generators	398,300.75	2023	Replace failed generator in GE 1.5 SLE wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures in the compact design have caused a small amount of failures in the industry after 5 years of operation.
NSP-Minnesota	A.0001565.037	Reliability/Performance Enhancement	WLM1C Replace U1 Rear Wall	378,885.54	2023	Replace quantity 39 rear wall tubes that will be rolled 0.5" into the Mud Drum and attached approximately 24" above the lower membrane waterwall header. The tubes will Inconel-cladded on all sides at 0.100" thick. This project will involve procuring and installing the new Rear Wall tubes as well as installation of new refractory, insulation and boiler skin to facilitate installation of new tubes.	Rear wall was last replaced in 1997 and rotated 180 degrees in 2007 to gain 10 more years. There have been wall failures at Wilmarth in the past, by replacing the wall we greatly reduce the chance of another failure.
NSP-Minnesota	A.0001574.816	Reliability/Performance Enhancement	SHC3-U3 Level 2 Mill OH 2023 Sprg	354,909.73	2023	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 3 has 7 coal mills whose performance is tracked though operating data (mill motor amps, coal fineness, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001562.043	Environmental Enhancement	REW0 - 316b-Control System	352,101.46	2023	There is currently a SLC 500 model PLC that monitors information from the Screen House. This is an old PLC that was installed in the early 2000's, and there is a limited market for replacement parts. This project will replace the PLC with an updated model and include a variety of control valves that will allow for more logic control from the PLC, not just information gathering. The new controls will allow optimal control/tuning of the screening components to ensure compliance with EPA 316b regulations.	This is a mandated environmental project by the MPCA to ensure we are compliant with EPA regulation 316(b) of the Clean Water Act. Section 316(b) requires that National Pollutant Discharge Elimination System permits be obtained by any facility that contains a cooling water intake structure to ensure that the engineering design of the structure minimizes harmful impacts on the environment. A new control system will allow for the maximum effectiveness in submitting to Section 316(b) requirements.
NSP-Minnesota	A.0001574.815	Reliability/Performance Enhancement	SHC3-U3 Level 2 Mill OH 2023 Fall	347,642.25	2023	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on Floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 3 has 7 coal mills whose performance is tracked though operating data (mill motor amps, coal fineness, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001562.162	Environmental Enhancement	REW1-Replace U1 Baghouse Bags	346,457.38	2023	Replace baghouse bags and cages. This project would also include a series of repairs to the baghouse modules including replacement of the bottom hoppers, repairs at the tops of the modules above and below the tubesheet, sand-blasting the inside of the module and coating it with an anti-corrosive coating, re-tinning and re-insulating the modules, etc.	Permit required to meet opacity standards. Bags are on a four year frequency to be changed out. The bags were on a six plus year changeout in the past but it was determined that changing out the bags more frequently saves on material loss on boiler tubes. It has been determined that after four years the bags begin to blind/plug and no longer allow enough air flow to operate the units at their full potential. Because of the plugged bags the air flow through the unit is decreased causing a high differential pressure reducing load capability and allowing the flue gas to consume more of the tube material throughout the boiler.
NSP-Minnesota	A.0001580.008	Renewable and New Generation	CWF1-Generator Replacements	337,340.14	2023	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001573.217	Reliability/Performance Enhancement	BDS0-Repl Discharge Gate Comm Ctrl	318,967.94	2023	Replace the discharge gate control PLCs and radio link between the gate equipment and the plant.	The communications and control equipment for the outplant discharge gates is aging. It will be obsolete in the near future and require replacement. The gate control equipment consists primarily of a PLC at each gate house, the radio link includes transmit/receive electronics and hardware at both gates and at the plant. This equipment is used to control the discharge gates and maintain our environmental thermal discharge permit limits and lake level limits. Also, failed communications requires frequent trips by plant operations to the gates which is a significant burden on plant operations, and is also a safety concern in the winter time as access to the gates is limited and walkways are slippery.
NSP-Minnesota	A.0001562.500	Reliability/Performance Enhancement	REW Emergent Fund -Steam prod	311,416.25	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.820	Reliability/Performance Enhancement	SHC1-U1 Level 2 Mill OH 2023 Sprg	308,706.92	2023	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 1 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineess, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001574.821	Reliability/Performance Enhancement	SHC1-U1 Level 2 Mill OH 2023 Fall	302,248.27	2023	Includes replacement of worn ceramic surfaces, wear liners, classifier vane blade replacements, air inlet vane replacement, RTV, roll to ring adjustment, hardwire weld overlay on floor, replace mill rolls, replace hardox wall liners, replace outlet valve discs, replace door springs, all external repairs, classifier replacement, inverted cone replacement, pyrite area and pyrite hopper repairs, and replacement of pyrite supply valve and jet pump/piping.	Unit 1 has 7 mills whose performance is tracked through operating data (mill motor amps, coal fineess, etc.) to determine the frequency of Level 1, Level 2, and Level 3 overhauls. Typically there are 2-3 Level 2 overhauls per year.
NSP-Minnesota	A.0001565.500	Reliability/Performance Enhancement	WLM Emergent Fund -Steam prod	293,805.04	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.025	Reliability/Performance Enhancement	SHC3C U3 Rpl Aux Cool HX Ball	290,673.14	2023	Replace U3 Aux Cooling HX cleaning system controls and screens. The systems controls replacement would be the Installation of a PLC based system with local operator interface and new software programming. Replace screens with new designs that effectively recycle the cleaning balls.	The Amertap [Taprogge] tube cleaning system is vital to the efficient operation of the unit steam cycle and to the auxiliary cooling water systems. The relay based controls have been in service since 1987. They are not reliable and are difficult to troubleshoot and repair. The system is operated only ~ 50% because of control problems and because balls need frequent replenishment. Aux Cooling capacity is "pushed" on hot summer days.
NSP-Minnesota	A.0001574.814	Reliability/Performance Enhancement	SHC3-U3 landfill	287,645.96	2023	project to cap the next approximately 3 acres of Cell 4 of the Unit 3 Landfill	Meet permit requirements by reducing water infiltration into the landfill, reducing the amount of leachate generated and providing protective cover. The solid waste permit requires capping within 180 days of reaching final elevation.
NSP-Minnesota	A.0001572.252	Reliability/Performance Enhancement	ASK1-13&14 Travel Water Screen	281,622.29	2023	Replace Complete Rotating Assembly for King Plant #13 & #14 Traveling Water Screens. Complete Rotating Assembly includes: Head Shaft Assembly (torque tube), Foot Shaft Assembly, Bearings, Chain, Chain Guides, Basket Plates, Hardware, etc.	Replace Complete Rotating Assembly for King Plant #13 & #14 Traveling Water Screens required every 5 years to maintain reliability. Permit required for plant operation. #13 & #14 Traveling Water Screens last rebuilt in spring 2018.
NSP-Minnesota	A.0003000.698	Reliability/Performance Enhancement	SER-CHM-Misc Tools-MN	266,624.00	2023	Purchase of Miscellaneous Tools/Laboratory Instrumentation. These tools are used for analysis of water to monitor and control corrosion and scaling in power plants and to comply with monitoring requirements for NPDES and Solid Waste Permits.	Chemistry Resources functions as a non-profit in-house general laboratory for Xcel Energy. It provides analyses for mandatory regulatory monitoring programs and for operational and maintenance activities in the plants.
NSP-Minnesota	A.0001565.134	Reliability/Performance Enhancement	WLM2 Turbine Electronic Overspeed	251,932.53	2023	The scope of this project is to install a true electronic overspeed trip system on our Unit 2 turbine to replace the existing primary mechanical overspeed trip mechanism. This project would also replace the existing SKF Turbine monitoring system that has become obsolete. Replacing the monitoring system comes at the recommendation from Fleet Engineering.	The unit currently utilizes a mechanical bolt system as its primary overspeed tripping mechanism. Based on input from multiple SMEs including Fleet Engineering, Hazard Insurance, and Operations it has been recommended to convert to an electronic overspeed protection system. They are much more reliable than a mechanical system. Additionally, moving to an electronic overspeed system allows for much less risk when testing the overspeed. It would be a much safer system overall and eliminate the need to perform an annual test on the mechanical overspeed which has a lot of safety concerns and risk for damaging the equipment.
NSP-Minnesota	A.0001571.500	Reliability/Performance Enhancement	ANS Emergent Fund -Other prod	243,990.17	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001573.206	Reliability/Performance Enhancement	BDS0C-Replace CV Positioners	234,825.54	2023	Replacement of existing positioners on 22 existing control valves at the Black Dog Power Plant with upgraded positioner design, which also include actual valve position feedback to the plant control system. Project includes engineering for project management, plant I&C labor to replace the positioners, and plant electrician labor to pull new wire for those which are needed. This project also includes any required new Emerson DCS modules, new logic, new HMI screen updates for all digital and analog inputs and outputs required for the new equipment.	A substantial number of control valves at the Black Dog power plant utilize positioners that do not include means to provide actual valve feedback to the plant control system. For the majority of control valves currently at the plant, the control system can only display the requested position only, meaning in the event the valve does not move to the requested position due to a component failure, Operations would not be immediately aware. A mis-positioned valve may not be evident until the operating system is already impacted, this could result in trips or equipment damage. Actual position feedback provides improved operator awareness and effectiveness which is critical as the operations staff has decreased in number, and supports the ongoing efforts to improve Ovation HMI. In addition there are several valve positioners that are obsolete/no longer supported by the manufacturer that need replacement. The newer positioners are more reliable, and this project would address multiple causes of historic trips and runbacks at Black Dog.
NSP-Minnesota	A.0001574.172	Reliability/Performance Enhancement	SHCCC 2023 Small Project Routine	230,651.22	2023	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001574.309	Reliability/Performance Enhancement	SHC3 - Turb Cntrl Vlv Intnl	229,958.70	2023	Replace main turbine control valve internals including, but not limited to stems, bushings, crosshead assemblies, balance chambers, plugs, and seats.	The valve internals have been subject to damage due to excessive wear and tear due to frequent unit cycling and more frequent economic outages. There are four control valves, all four of which experience significant degradation. The above work description is intended for all four control valves. The control valves are critical safety devices used to prevent turbine overspeed after a unit trip and are also responsible for regulating steam admission to the turbine. Their mechanical integrity is essential to safe and reliable operation of the turbine.
NSP-Minnesota	A.0001573.283	Reliability/Performance Enhancement	BDS0-Install Security Badge Readers	225,412.86	2023	Installation of new identification badge readers to screen access to sensitive areas of the plant. This project includes installation of the readers, wiring, conduit, and other hardware to connect the new readers to the security network. This includes new readers at each entrance to the control room, breaker rooms, DCS and network rooms, and general plant access doors which are currently not equipped with card readers.	Additional card readers at sensitive locations around the plant would promote higher levels of security and prevent the risk of unauthorized entrants purposely or mistakenly controlling, manipulating, tampering, or otherwise sabotaging plant equipment.
NSP-Minnesota	A.0003000.682	Reliability/Performance Enhancement	SHCJC Tools and Equip pur	200,004.00	2023	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction.	Improve capability and efficiency of daily operations maintenance tasks.
NSP-Minnesota	A.0001565.116	Reliability/Performance Enhancement	WLM1C U1 Static Exciter	191,044.75	2023	This project replaces the obsolete Basler 200 exciter with a DECS 400N, to bring the unit into compliance with the NSP fleet.	Current exciter OEM parts are obsolete, requiring work arounds to keep it running.
NSP-Minnesota	A.0001574.174	Reliability/Performance Enhancement	SHCJC 2023 Small Project Routine	184,602.80	2023	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001565.122	Reliability/Performance Enhancement	WLM2C U2 Static Exciter	180,933.96	2023	Replace obsolete Basler 200 Exciter - installed in 2002 - with the NSP fleet standard Basler DECS 400 series Static Exciter.	This exciter has a history of loss of field trips, and has had to have contactors and other parts replaced. The exciter is an obsolete model, and OEM parts are no longer available, leading to a work-around to keep the unit running.
NSP-Minnesota	A.0001573.179	Reliability/Performance Enhancement	BDS0C GSU Containment Const Spare	177,180.99	2023	Construction of a concrete containment pad in 2018 for the retired 3 GSU transformers which is being removed in spring of 2017 as part of the Black Dog site demolition project. This includes construction of a new concrete pad of approximately 30' x 40' with wall height of approximately 3', which will provide sufficient containment volume in the event of an oil leak from 3 GSU (8,635 gallons) and provide enough square footage to place the transformer. Electric power supply 240 VAC must be provided for control cabinet heating. Containment must be provided with a low-point sump and drainage provisions.	The transformer will be removed in the spring of 2017 and require a containment pad for long term storage as fleet spares. 3 GSU will serve as a spare transformer for Unit 2 at Black Dog. Utilizing the transformer as fleet spare is recommended due to significant costs and lead times associated with a new transformer to mitigate the risk of an extensive forced outage in the event of a GSU transformer failure.
NSP-Minnesota	A.0001574.791	Reliability/Performance Enhancement	SHC3-SHC3-Haul Road	171,386.07	2023	SHC3P Haul Road; Overlay 25% of Landfill Haul Road.	Haul road in poor repair is a major safety hazard and causes considerable damage to heavy equipment.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001573.107	Reliability/Performance Enhancement	BDS0C Vehicle Fueling Station	154,791.49	2023	Construction of a fill station for gasoline and diesel fuel to supply plant vehicles at Black Dog. This includes labor and materials to install the necessary tanks, piping, valves, containment, structures, and other equipment as necessary to perform this function.	As part of the plant decommissioning and remediation beginning in 2015, the large underground fuel tanks in the yard will be removed from service as part of the cleanup. This will leave Black Dog with no method of filing the on-site vehicles with gasoline or diesel fuel. These vehicles are not licensed for road traffic, so it is not legal (or practical) to drive to the gas station when they are low on fuel.
NSP-Minnesota	A.0001573.059	Reliability/Performance Enhancement	BDS5C CT Remote Monitoring	150,546.93	2023	Installation of remote monitoring and diagnostic hardware and software for Unit 5 combustion turbine. This includes one-way firewall to protect plant control network from outside access and meet NERC CIP requirements, PI interface node and PI on-site server with rack, all required software (PI server, interfaces, communication), and communication hardware for connection to the remote monitoring center.	Remote monitoring by PSM or other vendor to monitor real-time data from Unit 5 combustion turbine to track key performance indicators, provide early warnings of potential issues, analyze causes and recommend solutions for both immediate fixes and long-term improvement. Parameters being monitored include Combustor Dynamics, Blade Path Spread, Exhaust Gas Temperature Spreads, Fuel Gas/Oil Temperature, Bearing Temperature & Vibration, Compressor Discharge Temperature & Pressure, Inlet Guide Vane Position, Turbine Speed, Compressor Inlet Temperature, Alarm Displays in the DCS, and Generator Monitoring.
NSP-Minnesota	A.0003000.658	Reliability/Performance Enhancement	ASK0C- Tool Blanket	150,000.00	2023	2021 blanket for miscellaneous tools needed to support plant core operations.	Ensure necessary tools continue to be available to support plant core operations.
NSP-Minnesota	A.0001611.011	Renewable and New Generation	PVW1-Transformer Replacements	123,065.44	2023	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	Replacement of transformer is needed to operate the wind turbine.
NSP-Minnesota	A.0001580.009	Renewable and New Generation	CWF1-Transformer Replacements	122,669.14	2023	Replace failed transformer in Vestas V100 wind turbines. Cost includes the crane and labor to remove the transformer and then reinstall it.	Replacement of transformer is needed to operate the wind turbine.
NSP-Minnesota	A.0001575.162	Reliability/Performance Enhancement	HBC8C Exh Exp Joint (EE00) Rplc	122,242.58	2023	Replace the CT exhaust expansion joint and the insulation material. The expansion joint will be replaced when it begins to show signs of degradation such as brittleness and discoloration. At this time the insulation material will also be replaced.	A history of leakage at the expansion joint. Additionally, the insulating material, Fiberfrax, used in conjunction with the expansion joint is listed as a possible cancer hazard by inhalation on the MSDS. Failure of the expansion joint could release the insulation material into plant ambient and HRSG.
NSP-Minnesota	A.0001562.165	Reliability/Performance Enhancement	REW1-Repl U1 CEMS Analyzers	120,822.56	2023	This project would replace the CEMS flue gas analyzers on Unit 1.	The existing CEMS analyzers are outdated. The equipment being used is obsolete and replacement parts are becoming sparse. The existing equipment leads to unnecessary failures that have the potential to force the units offline.
NSP-Minnesota	A.0001562.170	Reliability/Performance Enhancement	REW2-Replace U2 CEMS Analyzers	120,822.56	2023	This project will replace the CEMS flue gas analyzers on Unit 2. These analyzers are for 2 inlet samples and 4 outlet samples and were originally installed in 2009.	The current analyzers are becoming old and outdated. Any unnecessary failures in the existing equipment have the potential to force the units offline.
NSP-Minnesota	A.0001574.737	Reliability/Performance Enhancement	SHC0 Air Comp Controls U0	118,559.95	2023	Replace the existing air compressor controls on #1 and #2 Air Compressors with Case controls which are based on an Allen Bradley PLC platform.	The controls for each compressor need to be replaced for two reasons: 1. The existing controls rely on a relay based control system making the microprocessor based control system reliant on aux contacts on mechanical relays. This has lead to numerous control failures attributed to malfunctioning relays and complicated troubleshooting. 2. It is anticipated the manufacturer of the existing control systems will be out of the market place in the near future. This leaves the house air and instrument air system vulnerable to an obsolete, proprietary microprocessor.
NSP-Minnesota	A.0001611.010	Renewable and New Generation	PVW1-Generator Replacements	113,031.20	2023	Replace failed generator in Vestas V100 wind turbines. Cost includes the crane and labor to remove the generator and then reinstall it.	High operating temperatures and a high vibration environment have lead to generator failures in the industry. Upon failure, the wind turbine can not be run.
NSP-Minnesota	A.0001574.311	Reliability/Performance Enhancement	SHC99 -CESP 2023 #3 CC Rotor Asmbl	105,693.39	2023	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #3 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency , of the burning, of the coal in the plant.
NSP-Minnesota	A.0001574.572	Reliability/Performance Enhancement	SHC99 -CESP-2024 #4 CC Rotor Asmbl	104,453.93	2023	Change out the rotating hammer assembly with CESP rotor Assembly on Sherco #4 Coal Crusher. Also change out worn / thin cage pieces, and wear plating inside the crusher.	Crusher is worn out and cannot provide a consistent coal fineness to the plant. This in turn effects the efficiency , of the burning, of the coal in the plant.
NSP-Minnesota	A.0003000.699	Reliability/Performance Enhancement	SER-SMC-Misc Tools & Equipment	100,000.00	2023	Purchase tools and equipment to support outages, projects and routine maintenance work performed by Special Construction. Included, but not all inclusive: Safety equipment, small tools, shop equipment and specialized tools.	Tool replacements are needed as tools come to end of life and are no longer cost effective to repair. The plants and facilities utilize Special Construction to supplement outages, projects and routine maintenance work at their sites. The sites typically do not have the tools and equipment necessary to complete the work that is performed by Special Construction. The tools and equipment will be housed in a central location and rotated from site to site.
NSP-Minnesota	A.0001573.178	Reliability/Performance Enhancement	BDS0C Heating System Sample Panel	96,706.17	2023	Installation of a sample panel for the heating system condensate return including sample coolers and analyzers, and integration into the Ovation DCS control system for monitoring and alarming functions. This includes the sample panel, cooling water connections, and electrical requirements to perform the project.	The heating system returns currently have a single conductivity analyzer without a sample cooler which subjects the instrument to excessive temperature and erroneous readings. This analyzer is local indication only as well, so it does not provide adequate monitoring and alarming capability into the control room. Over the history of the plant, the heating system condensate returns have become contaminated due to various causes. These events sometimes cause contamination of the boiler water systems, resulting in higher than normal blowdowns and wasting water, which could also lead to forced outages from water chemistry impacts which has happened in the past at Black Dog. This project would make it possible to detect contamination early, making it possible to plan better for remedial action, and prevent operational issues.
NSP-Minnesota	A.0001574.677	Reliability/Performance Enhancement	SHC3C Air Comp Controls Replace	96,575.98	2023	Replace the existing air compressor controls on 31, 32, and 33 Air Compressors with Case controls which are based on an Allen Bradley PLC platform.	The controls for each compressor need to be replaced for two reasons: 1. The existing controls were installed incorrectly by leaving a relay based control system in place and making the microprocessor based control system a slave of aux contacts on mechanical relays. This has lead to numerous control failures attributed to malfunctioning relays and immensely complicated troubleshooting. 2. It is anticipated the manufacturer of the existing control systems will be out of the market place in the near future. This leaves the house air and instrument air system vulnerable to an obsolete, proprietary microprocessor.
NSP-Minnesota	A.0001574.535	Reliability/Performance Enhancement	SHC3C BFP Overhaul 33	95,304.02	2023	Overhaul Boiler Feed Pump	Pump overhauls should be done on a 6 year interval to provide reliable operation.
NSP-Minnesota	A.0001573.229	Reliability/Performance Enhancement	BDS0 - Rplc #41 Screen Wash Pump	91,684.12	2023	Replace 41 Screen Wash Pump bowl and rotating assembly, including stainless steel impellers and abrasion resistant Greene Tweed bearings for the bowl assembly.	Based on historical performance, 41 Screen Wash Pump will be in need of an overhaul in 2022. Previous overhauls have shown extensive damage and wear to the impellers and bowl assemblies, requiring replacement of the existing damaged bowl assemblies with OEM recommended upgrades to SS impellers and abrasion resistant bearings. Historical overhaul results also indicate there will likely be flow path damage.
NSP-Minnesota	A.0001573.275	Reliability/Performance Enhancement	BDS0-Plant Admin Area Roof Repl	86,586.45	2023	Replace plant administrative building roof.	Roof leaks have been an issue for the past few years, especially from the area underneath the Unit 5 combustion turbine air inlet ducting. Temporary repairs have been made that have mitigated, but not eliminated the leaks. Roof leaks have been located in mailroom and library areas which have resulted in damage and slip hazards.
NSP-Minnesota	A.0001562.163	Reliability/Performance Enhancement	REW2-Rep 22 Screw Feeder Augers	80,718.32	2023	Replace the Screw Feeder Augers in Bin #22	The augers are failing and need to be replace so that both fuel metering bins will be operable.
NSP-Minnesota	A.0001562.164	Reliability/Performance Enhancement	REW2-Rep 21 Screw Feeder Augers	80,699.93	2023	Replace the Screw Feeder Augers in Bin #21	The augers are failing and need to be replace so that both fuel metering bins will be operable.
NSP-Minnesota	A.0001574.308	Reliability/Performance Enhancement	SHC3 - Replace U3 TCS HMI	78,819.93	2023	Replace the Unit 3 Turbine Controls System (TCS) Human-Machine Interfaces (HMIs), or computers.	HMI's at this time have reached the end of their useful lifecycle. Critical Computer errors are morel likely to occur as the computers age, and replacement components will be difficult to find at this time. Spare parts created can also be used for Unit 2 Turbine Controls. This project will make us less vulnerable to cyber attacks by strengthening our anti-virus systems on the DCS.
NSP-Minnesota	A.0001562.160	Reliability/Performance Enhancement	REW1-Replace Bin 12 Augers	75,903.45	2023	This project will replace all six (6) RDF screw feeder augers in #12 metering bin.	The augers are failing and need to be replace so that both fuel metering bins will be operable.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001574.847	Reliability/Performance Enhancement	SHC3-LFLeachate Truck FIll Station-	68,986.05	2023	Upgrade Landfill Water Truck Fill Tank to load trucks with Landfill Leachate Water for disposal at a Waste Water Treatment (WWTF). Costs include permitting efforts to receive approval for disposal at the WWTF.	Currently excess Landfill Leachate water is disposed in the Sherco Ash Ponds. Off-site disposal provides a backup disposal option, in-case the Ponds are unable to take the water during high level pond inventory emergencies.
NSP-Minnesota	A.0001579.017	Reliability/Performance Enhancement	RIV7C-71 UPS Battery Replaceme	68,644.08	2023	Replace 71 UPS back up batteries (incorrect title, should be 71 UPS not 61 UPS).	Batteries provide back-up power for generator and breaker DC controls and alarms.
NSP-Minnesota	A.0001574.310	Reliability/Performance Enhancement	SHC99 - Rplc RCD DS Pipe 2023	66,312.72	2023	Replace sections of the Dust Suppression water line in the RCD building. This is a 6" pipe. Replace 20' feet or more.	Environmental - We are permitted to run DS when we are dumping trains. This run of piping has MIC corrosion and there are a lot of patches all over this pipe.
NSP-Minnesota	A.0003000.273	Reliability/Performance Enhancement	SER-MMR-RSOM Repl Phased Array ET-1	64,002.00	2023	Replace CoreStar Phased Array Eddy Current test instrument, laptop, and software	Replace non-destructive examination inspection equipment with up to date technology.
NSP-Minnesota	A.0003000.679	Reliability/Performance Enhancement	RIV0C-Tool Blanket	60,000.00	2023	Miscellaneous tools and equipment. All individual tools to be >$1000 and meet definitions for general plant equipment.	Improve capability and efficiency of daily operations maintenance tasks.
NSP-Minnesota	A.0001574.421	Reliability/Performance Enhancement	SHC3C Fan Control Room Roof Re	54,911.30	2023	Remove the existing roofing system and install a new roofing system of similar type. The area over the fan control room is approximately 4000 sq. feet.	The life cycle of the usefulness of the roof warrants replacement. Due to weather and wear, maintenance costs have increase over time. The roof is over 30 yrs old. A new roof would include a 20 year warranty.
NSP-Minnesota	A.0001575.051	Reliability/Performance Enhancement	HBC7C U7 CT Servo Replace 2	54,708.49	2023	Purchase new set of Moog servo valves for CT.	The currently installed servos are obsolete. Moog will not rebuild them anymore. The servo's are necessary for controlling the combustor bypass, IGV's, and fuel gas to the combustion turbine. It is essential the servo's be maintained to ensure safe and reliable control of critical CT systems.
NSP-Minnesota	A.0001574.417	Reliability/Performance Enhancement	SHC3C Bearing Fire Protect Pip	54,136.58	2023	Replace fire protection piping for the Steam Turbine and Generator and BFP and BFPT bearing fire protection. The current piping configuration was found unable to carry sufficient flow to all heads. The main bottleneck is the 3" supply to bearing protection valve GTG-3017. This line would be increased to 6" and the distribution downstream of the valve needs to be evaluated by a fire protection vendor for further improvements. The likely solution will be to run a 6" trunk to the mezz level instead of 16 individual 1-1/4" lines to each bearing to reduce pressure drop.	Should major fire occur on the turbine deck, this system, in its current configuration may not be sufficient to handle such an event.
NSP-Minnesota	A.0003000.669	Reliability/Performance Enhancement	HBC0C HB CC Tool Blanket	50,001.00	2023	Tool blanket to purchase tools more than $1000 each.	Tools needed to adequately perform jobs safely. Existing tools can break or a new tool can do a task better.
NSP-Minnesota	A.0001574.313	Reliability/Performance Enhancement	SHC99-RR Return Track Crossing	48,009.80	2023	Replace wood RR crossing on the return track coming out of the Rotary Car Dumper building leading to the pocket.	These crossing are needed to get around trains when on-site. Some of these are getting pretty deteriorated, and can cause problems with heavy equipment, especially in the winter months.
NSP-Minnesota	A.0001575.172	Reliability/Performance Enhancement	HBC0 - Rmv & Rplc BFP Spare YR2	43,201.56	2023	Supervision, labor, and consumables to remove boiler feed pump and install the rotating CESP pump in it's place.	Boiler feed pumps are severe duty critical plant equipment. Periodical overhauls are required. Two pumps are currently showing indications of thrust bearing degradation.
NSP-Minnesota	A.0003000.661	Reliability/Performance Enhancement	BDS0C Tool Blanket	42,845.00	2023	This funding provides for new or replacement tools and equipment for the plant.	The addition and replacement of tools and equipment is necessary to maintain the productivity of the operating and maintenance personnel.
NSP-Minnesota	A.0001574.826	Reliability/Performance Enhancement	SHC99-3 Plow Fdr Obsolete upgrade	41,812.95	2023	Upgrade obsolete parts on #3 Rotary Plow Feeder in the bottom of the Barn. Currently Hyd Pump Controller, Travel Gearbox, and Hydraulic Motor (as a unit) are obsolete.	If we loose the capability to remove coal from the coal barn, the coal will start to spontaneously combust.
NSP-Minnesota	A.0003000.748	Renewable and New Generation	BS10-Blazing Star 1 Tools and Equip	30,168.00	2023	Tool and equipment blanket for initial O&M setup and sustainment	New site in remote location for plant support
NSP-Minnesota	A.0003000.750	Renewable and New Generation	FTW0-Foxtail Tools and Equipment	30,168.00	2023	Tool and equipment blanket for initial O&M setup and sustainment of Foxtail Wind Farm	New site in remote location for plant support
NSP-Minnesota	A.0001561.500	Reliability/Performance Enhancement	IVH Emergent Fund -Other prod	28,841.94	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001559.500	Reliability/Performance Enhancement	BLL Emergent Fund -Other prod	28,163.05	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0003000.659	Reliability/Performance Enhancement	BLL0C Tools Blanket	20,004.00	2023	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Improve testing capabilities.
NSP-Minnesota	A.0003000.657	Reliability/Performance Enhancement	ANS0C Tools and Equip Ca	20,004.00	2023	Replace toolboxes, chain hoists, misc tools, and test equipment	Improve work force efficiency and safety. Upgrade and replace old equipment.
NSP-Minnesota	A.0003000.672	Reliability/Performance Enhancement	IVH0C Misc tools and Equip	20,000.00	2023	Replace toolboxes, chain hoists, misc tools, and test equipment.	Improve work force efficiency and safety.
NSP-Minnesota	A.0003000.676	Renewable and New Generation	NBLCo Misc Tools and Equi	19,998.00	2023	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0001572.002	Reliability/Performance Enhancement	GMM0C-Investment Recovery Cap	17,672.45	2023	Proceeds from scrap sales of removed equipment	Removed equipment is sold for scrap recycling.
NSP-Minnesota	A.0003000.697	Reliability/Performance Enhancement	SER-MMR- Misc Tools & Equip	15,000.00	2023	Miscellaneous tools for plant overhauls	These tools are used for plant overhauls and troubleshooting equipment problems.
NSP-Minnesota	A.0003000.680	Reliability/Performance Enhancement	REW0C Tool Blanket	15,000.00	2023	This project will be used to purchase capital maintenance tools for the 2021 calendar year. Such equipment may include scaffolding, specialized electrical instruments, machining equipment, welding machines, etc.	This project will allow for the site to have on-hand the appropriate tools required for plant personnel to perform their work tasks efficiently and safely. Having the appropriate tools and equipment makes for a safer work environment and reduces the risk of potential industrial safety incidents. Staying current with electrical diagnostic equipment enables personnel to troubleshoot plant equipment more quickly and easily.
NSP-Minnesota	A.0003000.671	Renewable and New Generation	HNIC0 Misc Tools and Equ	15,000.00	2023	Miscellaneous tools. These tools will be used for day to day operation and in preparation for the turbine overhauls.	Necessary for continued upkeep of operating facilities.
NSP-Minnesota	A.0001574.805	Reliability/Performance Enhancement	SHC0-Coal conveyor F.P.	12,500.00	2023	From 2014 All Risk Loss Prevention Report for Sherco, Recommendation SHC P 06-11. Extend the existing sprinkler protection for the following coal conveyors to include inside the metal enclosures over selected portions of the conveyors: -Conveyor 52 located on the upper level of the east side of the Coal Storage Barn -The head end of Conveyors 4A and 4B -The tail end of Conveyors 4A and 4B -The head end of the No. 1 Emergency Reclaim conveyor - The tail and head end of Conveyor 2A - The east end of Conveyor 1A - The east end of Conveyor 55 - The head end of Conveyor 51 - The Crusher end of Conveyor 6A and 6B	Currently, these conveyors are sprinkler protected except for the enclosed portions indicated above. If a fire occurs on these conveyors inside the enclosures, there would be no sprinkler protection to control it until the fire exited the enclosure, which would result in greater damage than would otherwise occur. Therefore, this protection should be installed. Reference NFPA 850, Section 7.4. The Loss Expectancy associated with this condition is estimated at $5,000,000. The estimated cost to complete is $75,000.
NSP-Minnesota	A.0005014.142	Renewable and New Generation	BS10-Blazing Star 1 Build Furn & Eq	10,056.00	2023	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0005014.144	Renewable and New Generation	FTW0-Foxtail Building Furn & Equip	10,056.00	2023	Building equipment and office furniture blanket for O&M building initial setup and sustainment.	Furniture and equipment for new site
NSP-Minnesota	A.0003000.662	Renewable and New Generation	BRDR Small Tools Equip	9,999.00	2023	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.678	Renewable and New Generation	PLV Tools Equip	9,999.00	2023	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.667	Renewable and New Generation	GDM0C Grand Mead Cap Tool	9,999.00	2023	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0003000.128	Renewable and New Generation	CWF Tools & Misc Equipment	9,999.00	2023	Purchase specialty tools, chain hoists, and test equipment.	Required to maintain the wind farm and improve work force efficiency and safety.
NSP-Minnesota	A.0001576.500	Renewable and New Generation	GDM Emergent Fund -Wind projects	6,099.93	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.

Company	Project ID	New Grandparent	Project Name	YE Amt	Activity Year	Project Description	Project Justification
NSP-Minnesota	A.0001579.072	Reliability/Performance Enhancement	RIV0C -- Replace Water Treatment	5,000.00	2023	Design, permit, fabricate, and install one new Reverse Osmosis (RO) Water Treatment System located In the approximate area of the existing equipment so that a new building and related infrastructure is not required. The new system will remove CO2 with either a membrane separator system, or a caustic feed system. The new system will be operated from a PLC to allow for future vendor interface. The only function from the main control room is start/stop capability.	The present plant water treatment systems are a significant Operations and Maintenance burden. As plant staff is adjusted (reduced) to planned permanent levels there will not be resources available to devote to high maintenance ancillary (non-core) plant equipment. By the year 2021, the existing 1st pass RO, controls, pressure vessels, ancillary equipment, etc. will be 20 years old, and the existing 2nd pass RO will be 10 years old. The membranes will be in need of replacing - and the system will be operating at a significantly higher cost than necessary due to the lack of a CDI - deionizer system for the necessary condensate polishing. It would not be advised to update the old and antiquated system with a new CDI system addition since the controls, valves, transmitters, and operator interface equipment the existing equipment relies on is all past end of life and likely of multiple failures each year that risk availability of the generating plant due to loss of water production capability. A new 90 gpm system is recommended to be installed prior to 2022. The new estimate of 2.525 million dollars is what should be used as an estimate based on the 2019 revised scope recommendation.
NSP-Minnesota	A.0001573.070	Reliability/Performance Enhancement	BDS5C U5 Ovation System Evergreen	5,000.00	2023	This project is to replace the Black Dog Unit 5/2 Ovation System Hardware and Software.	To keep pace with advancements is the goal of the Ovation Evergreen program. This SureService customer support module provides a way to keep the Ovation system continuously up-to-date. The Evergreen program avoids a costly total system retrofit required when the components are too old to be salvaged. The Ovation Evergreen program plans for replacing the affected items, including networks, workstations, controllers and system software with the latest releases, and incorporating new I/O and security features.
NSP-Minnesota	A.0001574.173	Reliability/Performance Enhancement	SHC3C Emergent work	2,046.95	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001565.124	Environmental Enhancement	WLM2C Replace U2 Baghouse Bag	2,000.00	2023	Replace six modules (1260 total) of baghouse bags and cages. This project would also include a series of repairs to the baghouse modules including replacement of the bottom hoppers, repairs at the tops of the modules above and below the tubesheet, sand-blasting the inside of the module and coating it with an anti-corrosive coating, re-tinning and re-insulating the modules, etc.	Permit required to meet opacity standards. Bags are on a four year frequency to be changed out. The bags were on a six plus year change out in the past but it was determined that changing out the bags more frequently saves on material loss on boiler tubes. It has been determined that after four years the bags begin to blind/plug and no longer allow enough air flow to operate the units at their full potential. Because of the plugged bags the air flow through the unit is decreased causing a high differential pressure reducing load capability and allowing the flue gas to consume more of the tube material throughout the boiler.
NSP-Minnesota	A.0001574.268	Reliability/Performance Enhancement	SHC1C Emergent Projects	1,751.05	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.269	Reliability/Performance Enhancement	SHC2C Emergent Projects	239.72	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.
NSP-Minnesota	A.0001574.209	Reliability/Performance Enhancement	SHC3C 2023 Small Project Routine	41.98	2023	Labor and materials that are categorized as capital expenditures. Must meet capitalization criteria categories and include material costs greater than $2,500, but total cost less than $50,000.	These are small projects such as valve replacement, motors, etc. that have failed during plant operation.
NSP-Minnesota	A.0001564.500	Renewable and New Generation	St Anthony Falls Emergent -Other Projects	1.15	2023	This fund covers unexpected equipment failures and discovery issues from overhaul inspections.	Emergent work for unexpected and unplanned equipment failures.

NSPM Total Company

	2017 Actual	2018 Actual	2019 Actual	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Lime	$ 2,814,819	$ 2,855,981	$ 2,077,916	$ 2,582,905	$ 1,771,114	$ 1,996,188	$ 2,122,753	$ 2,117,985
Mercury Sorbent	$ 2,244,636	$ 1,023,096	$ 1,015,989	$ 1,427,907	$ 704,268	$ 449,681	$ 512,672	760,224
Ammonia	$ 2,185,677	$ 1,860,611	$ 1,339,781	$ 1,795,356	$ 855,135	$ 751,392	$ 746,954	710,954
Sulfuric Acid	$ 647,093	$ 763,803	$ 831,254	$ 747,383	$ 449,245	$ 477,580	$ 474,380	654,175
Other	$ 672,609	$ 361,645	$ 424,421	$ 486,225	$ 547,585	$ 1,235,586	$ 1,302,108	1,311,122
Total:	**$ 8,564,834**	**$ 6,865,136**	**$ 5,689,360**	**$ 7,039,777**	**$ 4,327,346**	**$ 4,910,427**	**$ 5,158,867**	**$ 5,554,460**

Minnesota Jurisdiction (Net of Interchange Billings)

	2017 Actual	2018 Actual	2019 Actual	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Lime	$ 2,071,314	$ 2,110,205	$ 1,517,591	$ 1,899,703	$ 1,294,540	$ 1,455,659	$ 1,547,952	$ 1,544,475
Mercury Sorbent	$ 1,651,738	$ 755,937	$ 742,020	$ 1,049,899	$ 514,763	$ 327,916	$ 373,850	$ 554,370
Ammonia	$ 1,608,353	$ 1,374,754	$ 978,499	$ 1,320,535	$ 625,034	$ 547,929	$ 544,693	$ 518,441
Sulfuric Acid	$ 476,170	$ 564,353	$ 607,100	$ 549,208	$ 328,361	$ 348,261	$ 345,927	$ 477,037
Other	$ 494,946	$ 267,209	$ 309,973	$ 357,376	$ 400,240	$ 901,013	$ 949,522	$ 956,095
Total:	**$ 6,302,521**	**$ 5,072,458**	**$ 4,155,183**	**$ 5,176,721**	**$ 3,162,938**	**$ 3,580,778**	**$ 3,761,945**	**$ 4,050,419**

2017-2023

Major Chemical Usage	2017 Actual	2018 Actuals	2019 Actuals	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
	[PROTECTED DATA BEGINS							
Lime (tons)								
AS King Plant								
Sherco Unit 3								
Red Wing Plant								
Wilmarth Plant								
Sub-total:								
Mercury Sorbent (tons)								
AS King Plant								
Sherco Plant								
Sub-total:								
Ammonia (tons)								
AS King Plant								
Black Dog Plant								
High Bride Plant								
Riverside Plant								
Sub-total:								

Major Chemical Price ($/ton)	2017 Actual	2018 Actuals	2019 Actuals	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Lime								
AS King Plant								
Sherco Unit 3 (Unallocated rate)								
Red Wing Plant								
Wilmarth Plant								
Mercury Sorbent								
AS King Plant								
Sherco Plant								
Ammonia								
AS King Plant								
Black Dog Plant								
High Bride Plant								
Riverside Plant								

Overall Cost	2017 Actual	2018 Actuals	2019 Actuals	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
Lime								
AS King Plant								
Sherco Unit 3								
Red Wing Plant								
Wilmarth Plant								
Sub-total:								
Mercury Sorbent								
AS King Plant								
Sherco Plant								
Sub-total:								
Ammonia								
AS King Plant								
Black Dog Plant								
High Bride Plant								
Riverside Plant								
Sub-total:								
Other Chemicals								
AS King Plant								
Black Dog Plant								
High Bride Plant								
Riverside Plant								
Sherco Plant (Allocated)								
Red Wing Plant								
Wilmarth Plant								
Sub-total:								
Total Chemical (Allocated)								

PROTECTED DATA ENDS]

2017-2023

Overall Cost By Plant ($1000)	2017 Actual	2018 Actuals	2019 Actuals	2017-19 Avg	2020 Forecast	2021 Budget	2022 Budget	2023 Budget
	[PROTECTED DATA BEGINS							
AS King Plant								
Black Dog Plant								
High Bride Plant								
Riverside Plant								
Sherco Plant (Allocated)								
Red Wing Plant								
Wilmarth Plant								
Total Chemical (Allocated)								

PROTECTED DATA ENDS]

2020						
Unit	MW	Start	End	Days	Driver	Scope
Riverside9	227	9/12/2020	10/23/2020	41	Combustion Turbine Major	Combustion Turbine Major
Wilmarth2	9	9/13/2020	9/20/2020	7	Boiler Clean	Boiler Clean
BlackDog6	212	9/14/2020	9/18/2020	4	Phase 2 Substation Work	Phase 2 Substation Work
Wilmarth1	9	9/14/2020	9/21/2020	7	Boiler Clean	Boiler Clean
Wheaton1	44	9/14/2020	9/25/2020	11	Winter Prep	Winter Prep
Wheaton2	55	9/14/2020	9/25/2020	11	Winter Prep	Winter Prep
PrairieIsland1	521	9/19/2020	10/13/2020	24	Refueling	Refueling
HighBridge7	265	9/27/2020	10/1/2020	4	Fall Condenser Cleaning	Fall Condenser Cleaning
HighBridge8	265	9/27/2020	10/1/2020	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Wheaton3	44	9/28/2020	10/9/2020	11	Winter Prep	Winter Prep
Wheaton4	47	9/28/2020	10/9/2020	11	Winter Prep	Winter Prep
Riverside10	227	10/3/2020	10/10/2020	7	Fall Condenser Cleaning	Fall Condenser Cleaning
MankatoEnergy1	315	10/3/2020	10/10/2020	7	BOP Fall Outage	BOP Fall Outage
MankatoEnergy2	315	10/3/2020	10/10/2020	7	BOP Fall Outage	BOP Fall Outage
Wheaton6	48	10/12/2020	10/23/2020	11	Winter Prep	Winter Prep
SherCo2	712	10/18/2020	10/23/2020	5	State Required Internal Boiler Inspection	State Required Internal Boiler Inspection
BlueLake7	150	10/21/2020	11/13/2020	23	BLL 7 Generator Alignment - Borescope	BLL 7 Generator Alignment - Borescope
BlueLake8	150	10/23/2020	11/20/2020	28	BLL 8 Generator Alignment - IGV Moog Servo PMs - Borescope	BLL 8 Generator Alignment - IGV Moog Servo PMs - Borescope
BlackDog6	212	11/1/2020	11/14/2020	13	Pre-warranty inspection and Phase 2 Substation Work	Pre-warranty inspection and Phase 2 Substation Work
BlackDog5	282	11/2/2020	11/21/2020	19	Phase 2 Substation Work	Phase 2 Substation Work
AngusAnson4	147	11/30/2020	12/11/2020	11	Generator Alignment to reduce number 2 Generator Bearing Temps	Generator Alignment to reduce number 2 Generator Bearing Temps
BlackDog5	282	11/30/2020	12/23/2020	23	Phase 2 Substation Work	Phase 2 Substation Work
2021						
Unit	MW	Start	End	Days	Driver	Scope
Wilmarth1	9	1/10/2021	1/20/2021	10	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
Wilmarth2	9	1/11/2021	1/21/2021	10	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
BlackDog6	212	1/13/2021	1/15/2021	2	Phase 2 Substation Work (OMC)	Phase 2 Substation Work (OMC)
Riverside9	227	1/30/2021	6/10/2021	131	Summer Prep	Summer Prep
Riverside10	227	1/30/2021	6/17/2021	138	CT Major, Unit 7 Steam Turbine, U7 Turbine valves	CT Major, Unit 7 Steam Turbine, U7 Turbine valves
RedWing1	9	1/31/2021	4/16/2021	75	Fuel Chutes, Boiler clean/inspect/repair, Turbine	Fuel Chutes, Boiler clean/inspect/repair, Turbine
RedWing2	9	2/14/2021	3/6/2021	20	Boiler clean/inspect/repair, Replace Boiler Rear Wall	Boiler clean/inspect/repair, Replace Boiler Rear Wall
SherCo1	712	3/3/2021	4/30/2021	58	Boiler overhaul,turbine valves	Boiler overhaul,turbine valves
BayFront_Boiler_1-2	20	3/5/2021	4/23/2021	49	B1 secondary superheat replacement	B1 secondary superheat replacement
BlackDog5	282	3/7/2021	3/16/2021	9	Summer Prep	Summer Prep
ASKing1	511	3/22/2021	3/26/2021	4	MATS Inspections	MATS Inspections
AngusAnson3	90	4/3/2021	4/11/2021	8	Generator Breaker Replacement	Generator Breaker Replacement
Wheaton1	44	4/5/2021	4/16/2021	11	Summer prep	Summer prep
Wheaton2	55	4/5/2021	4/16/2021	11	Summer prep	Summer prep
SherCo2	712	4/9/2021	4/25/2021	16	Dual Unit Stack Inspections/Repairs	Dual Unit Stack Inspections/Repairs
Monticello1	617	4/17/2021	5/16/2021	29	Refueling	Refueling
Wheaton3	44	4/19/2021	4/30/2021	11	Summer prep	Summer prep
Wheaton4	47	4/19/2021	4/30/2021	11	Summer prep	Summer prep
Wheaton6	48	5/3/2021	5/14/2021	11	Summer prep	Summer prep
HighBridge7	265	5/3/2021	5/23/2021	20	Summer prep, MS Block vlv replc	Summer prep, MS Block vlv replc
HighBridge8	265	5/3/2021	5/23/2021	20	Summer prep, MS Block Vlv Rplc	Summer prep, MS Block Vlv Rplc
BlackDog6	212	5/23/2021	5/29/2021	6	Borescope Inspection	Borescope Inspection
FrenchIsland2	7	9/6/2021	10/25/2021	49	Unit 2 Turbine and Generator overhaul.	Unit 2 Turbine and Generator overhaul.
ASKing1	511	9/10/2021	11/7/2021	58	LP expansion joint replacement, generator inspection, DCS upgrade	LP expansion joint replacement, generator inspection, DCS upgrade
Wilmarth2	9	9/11/2021	9/24/2021	13	Boiler Clean	Boiler Clean
Wilmarth1	9	9/12/2021	9/25/2021	13	Boiler Clean	Boiler Clean
Wheaton1	44	9/13/2021	9/24/2021	11	Winter Prep	Winter Prep
Wheaton2	55	9/13/2021	9/24/2021	11	Winter Prep	Winter Prep
Wheaton3	44	9/27/2021	10/8/2021	11	Winter Prep	Winter Prep
Wheaton4	47	9/27/2021	10/8/2021	11	Winter Prep	Winter Prep
PrairieIsland2	546	10/2/2021	10/31/2021	29	Refueling	Refueling
HighBridge8	265	10/4/2021	10/8/2021	4	Fall Condenser Cleaning	Fall Condenser Cleaning
HighBridge7	265	10/4/2021	10/8/2021	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Wheaton6	48	10/11/2021	10/22/2021	11	Winter Prep	Winter Prep
Riverside10	227	10/18/2021	10/22/2021	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Riverside9	227	10/18/2021	10/22/2021	4	Fall Condenser Cleaning	Fall Condenser Cleaning
BlackDog5	282	11/1/2021	11/7/2021	6	Winter Prep	Winter Prep
BlueLake7	150	11/8/2021	12/19/2021	41	Control System replacement	Control System replacement
BlueLake8	150	11/8/2021	12/19/2021	41	Control system replacement	Control system replacement

2022						
Unit	MW	Start	End	Days	Driver	Scope
Wilmarth2	9	1/8/2022	1/18/2022	10	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
Wilmarth1	9	1/9/2022	1/19/2022	10	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
RedWing2	9	1/16/2022	3/4/2022	47	Boiler Clean/Inspect/Repair, Turbine Overhaul	Boiler Clean/Inspect/Repair, Turbine Overhaul
RedWing1	9	1/16/2022	3/18/2022	61	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
SherCo2	712	2/26/2022	3/20/2022	22	MATS inspection, NERC testing, summer prep	MATS inspection, NERC testing, summer prep
BayFront5	18	3/4/2022	4/23/2022	50	Major overhaul; generator feeder cable replacement (6 weeks), turbine blading	Major overhaul; generator feeder cable replacement (6 weeks), turbine blading
BayFront_Boiler_1-2	20	3/4/2022	4/25/2022	52	General boiler maintenance	General boiler maintenance
BlueLake7	150	3/5/2022	4/17/2022	43	Exhaust Silencer & Air Filter Replacement	Exhaust Silencer & Air Filter Replacement
BlackDog6	212	3/28/2022	4/3/2022	6	Borescope Inspection	Borescope Inspection
HighBridge7	265	4/4/2022	4/13/2022	9	Summer Prep	Summer Prep
HighBridge8	265	4/4/2022	4/13/2022	9	Summer Prep	Summer Prep
Wheaton1	44	4/4/2022	4/15/2022	11	Summer Prep	Summer Prep
Wheaton2	55	4/4/2022	4/15/2022	11	Summer Prep	Summer Prep
InverHills3	47	4/9/2022	5/20/2022	41	Controls Upgrade	Controls Upgrade
InverHills4	47	4/9/2022	5/20/2022	41	Controls Upgrade	Controls Upgrade
Wheaton4	47	4/18/2022	4/29/2022	11	Summer Prep	Summer Prep
AngusAnson4	147	4/23/2022	5/15/2022	22	Hot Gas Path	Hot Gas Path
Riverside10	227	4/25/2022	5/4/2022	9	Summer Prep	Summer Prep
Riverside9	227	4/25/2022	5/4/2022	9	Summer Prep	Summer Prep
Wheaton6	48	5/2/2022	5/13/2022	11	Summer Prep	Summer Prep
BlackDog5	282	5/15/2022	5/21/2022	6	Summer Prep	Summer Prep
Wilmarth2	9	9/10/2022	9/25/2022	15	Boiler Clean	Boiler Clean
Wilmarth1	9	9/11/2022	9/26/2022	15	Boiler Clean	Boiler Clean
Wheaton1	44	9/12/2022	9/23/2022	11	Winter Prep	Winter Prep
Wheaton2	55	9/12/2022	9/23/2022	11	Winter Prep	Winter Prep
BlackDog5	282	9/24/2022	12/2/2022	69	Turbine HP, Turbine LP, Turbine Valves, Unit 5 Hot Gas Path	Turbine HP, Turbine LP, Turbine Valves, Unit 5 Hot Gas Path
Wheaton4	47	9/26/2022	10/7/2022	11	Winter Prep	Winter Prep
HighBridge7	265	10/3/2022	10/7/2022	4	Fall Condenser Cleaning	Fall Condenser Cleaning
HighBridge8	265	10/3/2022	10/7/2022	4	Fall Condenser Cleaning	Fall Condenser Cleaning
ASKing1	511	10/8/2022	10/25/2022	17	Boiler cleaning	Boiler cleaning
Wheaton6	48	10/10/2022	10/21/2022	11	Winter Prep	Winter Prep
PrairieIsland1	521	10/15/2022	11/8/2022	24	Refueling	Refueling
AngusAnson2	90	10/22/2022	4/21/2023	181	CT Major	CT Major
Riverside9	227	10/24/2022	10/28/2022	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Riverside10	227	10/24/2022	10/28/2022	4	Fall Condenser Cleaning	Fall Condenser Cleaning
2023						
Unit	MW	Start	End	Days	Driver	Scope
RedWing1	9	2/6/2023	2/24/2023	18	Boiler General Maintenance	Boiler General Maintenance
RedWing2	9	2/13/2023	3/3/2023	18	Boiler General Maintenance	Boiler General Maintenance
HighBridge8	265	2/18/2023	4/5/2023	46	Major Overhaul	Major Overhaul
SherCo3	900	2/25/2023	4/24/2023	58	Boiler overhaul, generator, BFPT, valves.	Boiler overhaul, generator, BFPT, valves.
BayFront_Boiler_1-2	20	3/3/2023	4/14/2023	42	General boiler maintenance	General boiler maintenance
Riverside10	227	3/6/2023	4/22/2023	47	Steam Turbine Valves & Summer Prep	Steam Turbine Valves & Summer Prep
Riverside9	227	3/6/2023	4/22/2023	47	Steam Turbine Valves & Summer Prep	Steam Turbine Valves & Summer Prep
BlackDog6	212	3/12/2023	3/18/2023	6	Borescope Inspection	Borescope Inspection
Wilmarth1	9	3/25/2023	5/5/2023	41	Boiler General Maintenance, Turbine Valves, Turbine Major, Generator Major	Boiler General Maintenance, Turbine Valves, Turbine Major, Generator Major
Wheaton1	44	4/3/2023	4/14/2023	11	Summer Prep	Summer Prep
Wheaton2	55	4/3/2023	4/14/2023	11	Summer Prep	Summer Prep
InverHills5	47	4/8/2023	5/19/2023	41	Controls Upgrade	Controls Upgrade
InverHills6	47	4/8/2023	5/19/2023	41	Controls Upgrades	Controls Upgrades
Monticello1	617	4/15/2023	5/14/2023	29	Refueling	Refueling
Wheaton3	44	4/17/2023	4/28/2023	11	Summer Prep	Summer Prep
Wheaton4	47	4/17/2023	4/28/2023	11	Summer Prep	Summer Prep
HighBridge7	265	4/24/2023	5/3/2023	9	Summer Prep	Summer Prep
HighBridge8	265	4/24/2023	5/3/2023	9	Summer Prep	Summer Prep
Wilmarth2	9	4/25/2023	5/4/2023	9	Boiler Clean/Inspect/Repair	Boiler Clean/Inspect/Repair
Wheaton6	48	5/1/2023	5/12/2023	11	Summer Prep	Summer Prep
BlackDog5	282	5/14/2023	5/23/2023	9	Summer Prep	Summer Prep
Wilmarth1	9	9/9/2023	9/16/2023	7	Fuel system/Boiler Clean/Inspect/Repair	Fuel system/Boiler Clean/Inspect/Repair
Wilmarth2	9	9/10/2023	9/17/2023	7	Fuel system/Boiler Clean/Inspect/Repair	Fuel system/Boiler Clean/Inspect/Repair
PrairieIsland2	546	9/30/2023	10/29/2023	29	Refueling outage	Refueling outage
Wheaton1	44	10/2/2023	10/13/2023	11	Winter Prep	Winter Prep
Wheaton2	55	10/2/2023	10/13/2023	11	Winter Prep	Winter Prep
HighBridge8	265	10/2/2023	11/15/2023	44	CT Major Overhaul	CT Major Overhaul
HighBridge7	265	10/9/2023	10/13/2023	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Wheaton3	44	10/16/2023	10/27/2023	11	Winter Prep	Winter Prep
Wheaton4	47	10/16/2023	10/27/2023	11	Winter Prep	Winter Prep
Riverside10	227	10/23/2023	10/27/2023	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Riverside9	227	10/23/2023	10/27/2023	4	Fall Condenser Cleaning	Fall Condenser Cleaning
Wheaton6	48	10/30/2023	11/10/2023	11	Winter Prep	Winter Prep
BlackDog5	282	11/6/2023	11/12/2023	6	Winter prep	Winter prep

Location and Capacity Rating in MWs

Plant Description	Address	Unit Type	Net Max Capacity (NMC)	Net Dependable Capacity (NDC)	Net Max Capacity (NMC)	Net Dependable Capacity (NDC)	Net Max Capacity (NMC)	Net Dependable Capacity (NDC)	Net Max Capacity (NMC)	Net Dependable Capacity (NDC)
			2017	2017	2018	2018	2019	2019	2020	2020
Base Load Coal										
Allen S King 1	1103 King Plant Road, Bayport MN 55003	FC/Steam	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0
Sherburne 1,2,3*	13999 Industrial Blvd., Becker MN 55308	FC/Steam	1879.0	1879.0	1879.0	1879.0	1879.0	1879.0	1879.0	1879.0
Intermediate										
Black Dog 2	1400 Black Dog Road, Burnsville, MN 55337	Gas CC	117.0	117.0	117.0	117.0	117.0	117.0	117.0	117.0
Black Dog 5**	1400 Black Dog Road, Burnsville, MN 55337	FC/Steam	181.0	165.0	181.0	165.0	181.0	165.0	181.0	165.0
High Bridge 7,8**	501 Shepard Road, St. Paul MN. 55102	Gas CC	370.0	304.0	370.0	304.0	370.0	304.0	370.0	304.0
High Bridge 9	501 Shepard Road, St. Paul MN. 55102	FC/Steam	236.0	226.0	236.0	226.0	236.0	226.0	236.0	226.0
Riverside 9,10**	3100 Marshall Street NE, Minneapolis, MN 55418	Gas CC	342.0	294.0	342.0	294.0	342.0	294.0	342.0	294.0
Riverside 7	3100 Marshall Street NE, Minneapolis, MN 55418	FC/Steam	160.0	160.0	160.0	160.0	160.0	160.0	16.0	16.0
Biomass / RDF										
Red Wing 1,2	801 E 5th Street, Redwing MN 55066	RDF/Steam	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Wilmarth 1,2	800 Summit Ave, Mankato MN 56001	RDF/Steam	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Wind										
Blazing Star I	600 E Railroad St, hendricks,MN 56136	Wind	0	0	0	0	0	0	200.0	33.3
Border Wind	5190 107th Street NE, Rolla, ND 58367	Wind	148.00	23.10	148.00	23.10	148.00	22.50	147.9	23.2
Courtenay Wind	1401 Hwy 9 SE, Courtenay, ND 53426	Wind	195.00	30.40	195.00	30.40	195.00	29.60	190.2	29.9
Foxtail	7208 91st SE, Kulm, ND 58456	Wind	0	0	0	0	0	0	150.0	25.0
Grand Meadow	228 Industrial Park Dr, Dexter, MN 55926	Wind	100.50	15.70	100.50	15.70	100.50	15.30	99.4	15.6
Lake Benton	1973 170th Ave Holland,MN 56139		0.0	0.0	0.0	0.0	99.0	15.5	99.0	15.5
Nobles Wind	19469 McCall Avenue, Reading, MN 56165	Wind	200.00	31.20	200.00	31.20	200.00	30.40	197.2	31.0
Pleasant Valley Wind	228 Industrial Park Dr, Dexter, MN 55926	Wind	196.00	30.60	196.00	30.60	196.00	29.80	195.8	30.7
Hydro Production										
Hennepin ISD**	31 3rd Ave SE, Minneapolis MN	Hydro	13.9	6.3	13.9	6.3	13.9	6.3	13.9	6.3
St Croix Falls**	St Croix Falls, WI	Hydro	25.9	15.0	25.9	15.0	25.9	15.0	25.9	15.0
Peaking (NDC-Summer)										
Angus Anson 2,3,4**	7100 E Rice Street, Sioux Falls, SD 57110	CT	386.0	327.0	386.0	327.0	386.0	327.0	386.0	327.0
Black Dog 6**	1400 Black Dog Road, Burnsville, MN 55337	CT	0.0	0.0	0	0	228.0	212.0	228.0	212.0
Blue Lake 1-4, 7,8**	1200 70th Street, Shakopee, MN 55379	CT	545.0	453.0	545.0	453.0	545.0	453.0	545.0	453.0
Inver Hills 1,2,3,4,5,6**	3185 117th Street, Inver Grove Heights, MN 55077	CT	371.0	282.0	371.0	282.0	371.0	282.0	371.0	282.0
Diesel Engine Peaking										
Inver Hills	3185 117th Street, Inver Grove Heights, MN 55077	Diesel	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
No generation at these locations										
Minn Valley	Hwy 212 East, Granite Falls, MN 56241	-								
Lake Benton 75	1740 US Hwy 14, Lake Benton, MN 56149	-								
Lake Benton Wind	1740 US Hwy 14, Lake Benton, MN 56149	-								
West Faribault	Co Rd 18 & Hwy 65, Faribault MN 55021	-								
Wind Storage	800 S Kniss Ave, Luverne, MN 56156	-								
Key City 2,3,4	PO Box 1090, Mankato MN 56002	-								
Granite City 1,2,3,4**	Hwy 10 & East St Germain, St Cloud MN 56302	CT	64.0	52.0	64.0	52.0	64.0	52.0	0.0	0.0
United Hospital	6300 Olson Memorial Hwy., Golden Valley, MN 55427	Diesel	4.8	4.8	0.0	0.0	0.0	0.0	0.0	0.0

* Sherco 3 capacity ratings are shown as Xcel Energy allocation
** Capacity rating is for summer dispatch

Monthly Generation
2017-2020

Net kWh	2017											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Base Load Coal												
Allen S. King 1	353510000	292454860	147255540	68123000	289990390	181603000	267663100	253888000	195011000	265482000	312942000	285424000
Sherburne Co. 1	376332000	285488000	332421000	333196000	311088000	286405000	385089000	331091000	359996000	310424000	394980000	353969000
Sherburne Co. 2	382561000	301121000	412220000	158729000	375004000	386463000	376986000	412415000	356920000	304214000	386254000	384995000
Sherburne Co. 3*	305340000	190972000	0	0	0	152452000	294273000	301533000	199495000	214114000	243005000	267351000
Sub-Total:	1417743000	1070035860	891896540	560048000	976082390	1006923000	1324011100	1298927000	1111422000	1094234000	1337181000	1291739000
Intermediate												
Black Dog 5/2	47810960	31135170	63565270	92002370	64520080	90862260	98038370	59215250	66287510	75563990	2096170	-1299020
High Bridge 7	68396000	37689000	83312000	53448000	70172000	58918000	74114000	46420000	44192000	35490000	59926000	89782000
High Bridge 8	59368000	14907000	73621000	40328000	55100000	47904000	58559000	34606000	35910000	34653000	36770000	62478000
High Bridge 9	66219000	27697000	82955000	52888000	71959000	62572000	78410000	47458000	48512000	40378000	51515000	77404000
Riverside 7	73407000	31698000	82564000	84463000	31320000	72550000	87491000	53660000	4012000	0	0	33623000
Riverside 9	75148000	40150000	81703000	78500000	22381000	62607000	79633000	51733000	2866000	0	0	35356000
Riverside 10	71683000	22584000	79016000	79249000	32344000	68089000	77781000	45364000	3590000	0	0	35458000
Sub-Total:	462031960	205860170	546736270	480878370	347796080	463502260	554026370	338456250	205369510	186084990	150307170	332801980
Biomass / RDF												
Red Wing 1	6009920	986560	0	4238630	6277760	6098280	5948810	6084490	6086090	6417880	6382270	5933020
Red Wing 2	5821090	987250	6474780	6575020	5936430	5828930	5225310	5694630	4459660	324890	0	0
Wilmarth 1	530000	2311720	0	0	0	3574530	5523480	5087000	4222500	4695890	3955920	5118400
Wilmarth 2	0	2918420	5213300	5593400	3492050	5544000	5612570	5231470	4956850	4946600	4192220	4997010
Sub-Total:	12361010	7203950	11688080	16407050	15706240	21045740	22310170	22097590	19725100	16385260	14530410	16048430
Wind												
Border	57445830	52793480	57161710	52530980	43570080	50335000	46440840	29715530	59287970	62675920	62675920	67230050
Blazing Star												
Courtenay	78425830	77740110	74715510	61222920	69412640	54216440	54861100	35678470	39714120	60305780	69652530	53944390
Foxtail												
Grand Meadow	24354750	34461150	34843950	27370240	26833010	21365220	11532780	14501220	22334080	33723640	32139130	29506470
Lake Benton												
Nobles	58312110	70411460	78488530	70331670	61190340	46032890	32040570	25501130	48660020	72403400	69692510	66962170
Pleasant Valley	67463340	84175310	83346810	71919290	71176720	58458000	37140740	44118510	67225510	85974970	83892090	78055510
Sub-Total:	286001860	319581510	328556510	283375100	272182790	230407550	182016030	149514860	237221700	315083710	318052180	295698590
Hydro Production												
St. Anthony Falls All	5396000	6057000	6947000	8300000	8070000	7229000	4335000	2667000	6822000	5997000	7291000	4570000
St. Croix Falls All	11307000	9399000	12186000	11427000	11182000	10279000	11437000	10843000	10310000	10675000	-45000	2892000
Sub-Total:	16703000	15456000	19133000	19727000	19252000	17508000	15772000	13510000	17132000	16672000	7246000	7462000
Peaking												
Angus Anson 2	-152680	-121360	-41880	-100270	783000	-80050	3836640	1025800	1835000	79700	62630	-157820
Angus Anson 3	-152680	-121360	-37030	-100270	767240	300530	1955980	697630	720000	-105080	86180	-157820
Angus Anson 4	-119810	-99070	-167900	6031990	2903710	6149690	18556740	8361600	8479000	9749100	-289140	-253220
Black Dog 6	0	0	0	0	0	0	0	0	0	0	0	0
Blue Lake 1	-109500	-54000	-56000	-27000	-30500	-25500	134000	-31500	50000	-41000	-53500	-75500
Blue Lake 2	-109500	-54000	43000	-27000	-30500	-21500	152000	-31500	42000	-41000	-53500	-75500
Blue Lake 3	-1000	-20000	-45500	-33000	-25000	-22000	226000	-25000	43000	-32000	-36000	-45000
Blue Lake 4	-1000	-5000	-45500	-33000	-25000	-22000	249000	-25000	58000	-32000	-36000	-45000
Blue Lake 7	-82000	-42000	-67000	1887000	2606000	6120000	11342000	4145000	3756000	4681000	-60000	-69000
Blue Lake 8	-138000	-85000	-112000	3604000	4392000	5516000	17952000	4960000	4335000	6034000	-108000	-145000
Granite City 1	-17780	-14260	-15040	-11540	-10300	-6600	-4000	34020	37960	-12440	-12320	-18140
Granite City 2	-17780	-14260	-15040	-11540	-10300	-3600	-8000	37020	37960	-12440	-12320	-18140
Granite City 3	-17780	-14260	-15040	-11540	-10300	-7600	-8000	24020	43960	-12440	-12320	-18140
Granite City 4	-17780	-14260	-15040	-11540	-10300	-4600	-8000	22020	55960	-12440	-12320	-18140
Inver Hills 1	-115000	-91000	27000	39000	-62000	43000	344000	560000	59000	-40000	206000	-111000
Inver Hills 2	-34000	-22000	-17000	48000	-15000	-10000	373000	200000	70000	32000	9000	-31000
Inver Hills 3	-48000	-35000	-24000	-26000	-26000	18000	150000	220000	58000	-31000	93000	-41000
Inver Hills 4	-41000	-29000	-21000	-21000	-19000	107000	394000	239000	-14000	-21000	291000	-36000
Inver Hills 5	-42000	-31000	-20000	71000	-21000	53000	240000	196000	-19000	15000	90000	-26000
Inver Hills 6	-40000	-29000	-24000	60000	-19000	68000	1119000	207000	-12000	26000	115000	-36000
Sub-Total:	-1257290	-895830	-668970	11327290	11137750	18171770	56996360	20816110	19635840	20223960	267390	-1377420
TOTAL:	2193583540	1617241660	1797341430	1371762810	1642157250	1757558320	2155132030	1843321810	1610506150	1648683920	1827584150	1942372580

*Only Xcel Portion

Monthly Generation
2017-2020

Net kWh	2018											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Base Load Coal												
Allen S. King 1	277486000	219119000	216313000	-4891000	19296000	195494000	321554000	219281000	245051000	344839000	296996000	348153000
Sherburne Co. 1	366738000	226999000	-3130000	-2085000	97760000	303417000	323327000	284916000	135015000	323055000	407110000	390582000
Sherburne Co. 2	395804000	336902000	331721000	308358000	310319000	350819000	321950000	373057000	364889000	427843000	413940000	419394000
Sherburne Co. 3*	299787000	241232000	242696000	259757000	287623000	192869000	281442000	293106000	262553000	140471000	304660000	303825000
Sub-Total:	1339815000	1024252000	787600000	561139000	714998000	1042599000	1248273000	1170360000	1007508000	1236208000	1422706000	1461954000
Intermediate												
Black Dog 5/2	-1314740	-916620	-317000	-1007000	98514000	121075000	163719000	157620000	106386000	82799000	42060040	38094040
High Bridge 7	96529000	64415000	86583000	79993000	82265000	85702670	106829840	96238000	61691000	-189000	20827000	39399000
High Bridge 8	53284000	52367000	71505000	61729000	74574490	53913240	107241270	89615000	56061000	-190000	15437000	38489000
High Bridge 9	76224000	59348000	83383000	75883000	91952000	81539000	127702000	111595000	69427000	k -	19040000	41094000
Riverside 7	59396000	63065000	98698000	86867000	37999000	87082000	107946000	106298000	102197000	56770000	61054000	34545000
Riverside 9	58713000	66289000	99823000	86751000	48111000	77081000	98990000	97653000	97924000	54981000	62499000	33312000
Riverside 10	65510000	66700000	98659000	78962000	21943000	85473000	104416000	99292000	91808000	53285000	52850000	30326000
Sub-Total:	408341260	371267380	538334000	469178000	455358490	591865910	816844110	758311000	585494000	247456000	273767040	255259040
Biomass / RDF												
Red Wing 1	6407600	6271960	5278270	3990730	6429170	6110520	6045830	6259350	5770960	6270530	6364420	5555940
Red Wing 2	0	0	0	0	5579130	6595140	5801360	7051020	5999110	6763130	6364420	6431320
Wilmarth 1	1013570	5057110	5453810	5852410	5359950	4425010	5546240	5963700	2351570	6307290	6938140	6172740
Wilmarth 2	3209630	4188060	4794130	5533600	5349250	3338170	5502050	5616300	278820	0	0	2185100
Sub-Total:	10630800	15517130	15526210	15376740	22717500	20468840	22895480	24890370	14400460	19340950	19666980	20345100
Wind												
Border	62289090	58599280	49621000	51799790	46360020	42485600	44599950	40668590	51018960	60019780	46601770	55453310
Blazing Star												
Courtenay	62773310	57713440	53701930	70502850	65318220	59401050	48980410	35204880	49071420	59395010	53944390	62773310
Foxtail												
Grand Meadow	34263240	21807810	26226450	21859140	18556000	22862790	14169090	13410210	19514280	25177090	26647540	26368110
Lake Benton												
Nobles	71507540	59118900	66423790	58565060	47533150	56867140	36702440	36709790	55070150	55191000	53917350	53597840
Pleasant Valley	85995840	61784770	71208990	64161390	51516340	62459050	46326850	42147680	61037590	67922000	72732390	69357420
Sub-Total:	316829020	259024200	267182160	266888230	229283730	244075630	190778740	168141150	235712400	267704880	253843440	267549990
Hydro Production												
St. Anthony Falls All	3226000	2993000	5817000	6267000	6682000	1985000	9096000	6799000	5783000	5086000	3933000	3483000
St. Croix Falls All	7324000	5968000	9035000	12109000	14730000	12576000	11871000	7304000	7123000	9237000	7982000	8565000
Sub-Total:	10550000	8961000	14852000	18376000	21412000	14561000	20967000	14103000	12906000	14323000	11915000	12048000
Peaking												
Angus Anson 2	-151600	-277120	-160970	827170	5076740	1408350	7801560	1757760	392890	7420	194890	65480
Angus Anson 3	930600	-277120	-160970	-111420	2142260	-79900	-86280	-85940	-53110	-122430	-103750	-114000
Angus Anson 4	-269210	-105700	264520	9787510	28209820	11158940	22725190	16512490	6196930	6671430	527260	-202240
Black Dog 6	0	0	0	9517000	38112000	20776000	32506000	25903000	12581000	19667000	5626890	2676890
Blue Lake 1	-80000	-68500	-60000	-49000	-27500	-28500	127500	-4000	0	0	0	0
Blue Lake 2	-80000	-68500	-60000	-49000	-27500	-27500	118500	-4000	0	0	0	0
Blue Lake 3	-42500	-41000	71500	-33500	-24000	-3500	-21500	164000	6000	-36500	0	-35500
Blue Lake 4	-42500	-41000	-40500	-33500	-24000	-4500	-21500	178000	36000	-36500	0	-36500
Blue Lake 7	-96000	2157000	-116000	3554000	13864000	1859000	10394000	3195000	5183000	4441000	0	-144000
Blue Lake 8	-162000	2147000	2701000	6274000	23833000	2911000	11053000	6987000	2433000	3472000	0	-210000
Granite City 1	-19640	-17220	-15000	-13980	-9580	-8220	-8140	-8160	-2420	-7380	-14840	-16420
Granite City 2	-19640	-17220	-15000	-13980	-9580	-8220	-8140	-8160	6580	-6380	-14840	-16420
Granite City 3	-19640	-17220	-15000	-13980	-9580	-8220	-8140	-8160	-2420	-7380	-14840	-16420
Granite City 4	-19640	-17220	-15000	-13980	-9580	-8220	-8140	-8160	-2420	-7380	-14840	-16420
Inver Hills 1	-57000	248000	18000	118000	1787000	84000	539000	452000	931000	-253000	-44000	-82000
Inver Hills 2	113000	-34000	-25000	17000	273000	-9000	404000	226000	49000	407000	41000	-18000
Inver Hills 3	154000	107000	-34000	7000	654000	-26000	263000	221000	-39000	-29000	39000	-31000
Inver Hills 4	109000	155000	-28000	15000	1010000	12000	520000	459000	89000	-23000	63000	-24000
Inver Hills 5	71000	-28000	-21000	-22000	539000	-15000	408000	328000	1039000	335000	37000	-30000
Inver Hills 6	149000	122000	17000	15000	464000	-13000	328000	170000	1063000	323000	55000	-19000
Sub-Total:	467230	3926180	2305580	29777340	115823500	37969510	87025910	56426670	29907030	34794900	6376930	1730450
TOTAL:	2086633310	1682947890	1625799950	1360735310	1559593220	1951539890	2386784240	2192232190	1885927890	1819827730	1988275390	2018886580

*Only Xcel Portion

Monthly Generation
2017-2020

Net kWh	2019											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Base Load Coal												
Allen S. King 1	335309000	237045000	81650000	-7465000	229658000	272070000	223992000	28327000	89477000	19897000	106358500	122860000
Sherburne Co. 1	206791000	362043000	392538000	262755000	346688000	301480000	357925000	282826000	113386000	68301000	243525000	272694000
Sherburne Co. 2	400446000	165629000	-1665000	22507000	289602000	290832000	381735000	343740000	297565000	303265000	211187000	223139000
Sherburne Co. 3*	342126000	295948000	295738000	208032000	174141000	240376000	280533000	260029000	228371000	216227000	362383000	283158000
Sub-Total:	1284672000	1060665000	768261000	485829000	1040089000	1104758000	1244185000	914922000	728799000	607690000	923453500	901851000
Intermediate												
Black Dog 5/2	55793040	66765000	115819000	143348000	123548000	106382000	177982000	177917000	123017000	149877000	91084000	164715000
High Bridge 7	96383000	124438000	113546000	116654000	66686000	85593000	101180000	108364810	87773700	92355960	75981040	89733610
High Bridge 8	10674000	120335000	104338000	113841000	56950000	76363000	113294000	109036990	80286700	105595460	64741540	92548920
High Bridge 9	54117000	124249000	115585000	135287000	73824000	102048000	146827000	137752540	104380000	117869000	77716000	100676000
Riverside 7	67577000	105350000	73651000	68772000	82623000	103236000	108068000	114655000	100242000	77222000	60434000	84395000
Riverside 9	71423000	110627000	79933000	71330000	76207000	95787000	99651000	107629000	90589000	75008000	79516000	112836000
Riverside 10	69055000	110986000	72920000	69944000	77598000	96073000	103097000	107248000	89768000	70350000	40463000	61298000
Sub-Total:	425022040	762750000	675792000	719176000	557436000	665482000	850099000	862603340	676056400	688277420	489935580	706202530
Biomass / RDF												
Red Wing 1	6621830	2628630	3660100	6321100	6013450	6490770	5374740	6134260	5903090	6738330	6377320	7022400
Red Wing 2	6490550	4882410	4339430	7046160	6475850	6955020	6388390	7617130	6284620	6919070	4248480	0
Wilmarth 1	3995300	4210600	4339620	5310980	4880880	4666400	4842910	5415480	1752400	4892460	5215350	3697800
Wilmarth 2	4299800	3445040	3989800	5102710	4293630	4171480	4470380	4899720	2141820	5979680	4624930	5160490
Sub-Total:	21407480	15166680	16328950	23780950	21663810	22283670	21076420	24066590	16081930	24529540	20466080	15880690
Wind												
Border	51793400	42860250	62089420	53146050	53091620	44741870	40392110	47821690	47257020	63413260	52743090	53023780
Blazing Star												
Courtenay	57713440	53701930	70502850	65318220	59401050	48980410	35204880	49071420	59395010	81878580	63416820	65187520
Foxtail												
Grand Meadow	27385280	18544510	28649890	26129500	23657310	15706610	11659680	10499470	21519470	27535600	26747540	27341510
Lake Benton											19777530	34024920
Nobles	59923500	49217310	65275640	49969240	60948520	39508460	36498350	29061240	52714260	71319780	62561250	57137570
Pleasant Valley	71855720	54544440	76872900	78071650	63970340	48564230	42522010	37378600	68466190	81361960	73124380	76192900
Sub-Total:	268671340	218868440	303390700	272634660	261068840	197501580	166277030	173832420	249351950			
Hydro Production												
St. Anthony Falls All	1875000	3102000	3356000	452000	6868000	7444000	8375000	8877000	7556000	6375000	5730000	4169000
St. Croix Falls All	7724000	6256000	9640000	9614000	12180000	11787000	12403000	8594000	13127000	11143000	1232200	12610000
Sub-Total:	9599000	9358000	12996000	10066000	19048000	19231000	20778000	17471000	20683000	17518000	6962200	16779000
Peaking												
Angus Anson 2	3622130	-136890	-116460	-86060	903100	-67370	1969290	-80230	742810	-76650	110500	-56740
Angus Anson 3	-124730	-136890	-116440	-86060	2258790	1132950	2694830	-80230	380430	9390	-107830	500460
Angus Anson 4	-197810	-142140	-173440	7378000	11972100	13511660	23207210	15768110	10435660	12561610	1259150	370670
Black Dog 6	2532890	8558000	5719000	37969000	18596000	26807000	61778000	51193000	21235000	47004000	7454000	4045000
Blue Lake 1	-22500	-69500	-66500	-32500	-28000	-19000	-21500	-29000	-20000	-32500	2000	-93000
Blue Lake 2	500	-69500	-66500	-32500	-28000	-19000	-21500	306000	-20000	-32500	-33000	-93000
Blue Lake 3	897000	-37500	-42500	-32500	-29500	-3500	-15500	149500	-22000	-32000	21000	-83500
Blue Lake 4	-72000	-37500	74500	-32500	-29500	-3500	-15500	187500	-22000	-32000	13000	-83500
Blue Lake 7	-252000	-141000	-156000	1611000	4612000	2645000	16118000	11679000	-129000	3000	-144000	232000
Blue Lake 8	-241000	-188000	-183000	-165000	4609000	2669000	12223000	11546000	-161000	322000	168000	149000
Granite City 1	-19280	-37240	-15280	-11880	-10620	-8100	-5540	-4480	-6360	0	0	0
Granite City 2	-19280	-37240	-15280	-11880	-10620	-8100	-5540	-4480	-6360	0	0	0
Granite City 3	-19280	-37240	-15280	-11880	-10620	-8100	-5540	-4480	-636000	0	0	0
Granite City 4	-19280	-37240	-15280	-11880	-10620	-8100	-5540	-4480	-6360	0	0	0
Inver Hills 1	290000	-104000	-45000	20000	34000	194000	-4000	-73000	-52000	-61000	-76000	-80000
Inver Hills 2	359000	-36000	0	51000	37000	225000	32000	-12000	-2000	1000	-22000	-15000
Inver Hills 3	208000	-47000	-56000	-44000	-33000	211000	311000	-26000	-18000	-33000	-30000	-23000
Inver Hills 4	225000	-40000	-39000	-26000	-20000	233000	83000	-16000	-8000	-23000	-5000	-40000
Inver Hills 5	323000	-47000	-40000	-38000	-33000	204000	290000	-24000	-16000	9000	-10000	-45000
Inver Hills 6	368000	-36000	-26000	-19000	-14000	226000	246000	-10000	-2000	31000	-1000	-34000
Sub-Total:	7838360	7140120	4605540	46387360	42764510	47913840	118852170	90460730	31666820	59618350	8598820	4650390
TOTAL:	2017210220	2073948240	1781374190	1557873970	1942070160	2057170090	2421267620	2083356080	1722639100			

*Only Xcel Portion

Monthly Generation
2017-2020

Net kWh	2020											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Base Load Coal												
Allen S. King 1	115957000	-5560000	-5390000	-5236000	-1912000	38133000	277739000	0	0	0	0	0
Sherburne Co. 1	284261000	160228000	217946000	42691000	119373000	168122000	307015000	0	0	0	0	0
Sherburne Co. 2	37092000	169788000	232217000	211680000	104276000	82538000	328043000	0	0	0	0	0
Sherburne Co. 3*	372699000	230089000	-4576000	-5129000	141243000	191610000	467681000	0	0	0	0	0
Sub-Total:	810009000	554545000	440197000	244006000	362980000	480403000	1380478000	0	0	0	0	0
Intermediate												
Black Dog 5/2	158507000	126750000	109316000	95595000	101001000	123958000	161063000	0	0	0	0	0
High Bridge 7	123389520	24908870	22376000	71908000	75848660	71646240	86045450	0	0	0	0	0
High Bridge 8	124007080	86713000	51556580	77821420	80929730	75783520	88464680	0	0	0	0	0
High Bridge 9	140338000	64886000	45282000	91623000	95668000	98328000	116514000	0	0	0	0	0
Riverside 7	95067000	80529000	65173000	33663000	36097000	68262000	84645000	0	0	0	0	0
Riverside 9	114901000	96533000	80278000	32323000	35741000	55533000	68435000					
Riverside 10	81529000	68851000	47130000	31585000	30698000	71240000	87544000					
Sub-Total:	837738600	549170870	421111580	434518420	455983390	564750760	692711130					
Biomass / RDF												
Red Wing 1	5613180	1752550	7328060	6224760	6701270	5618390	5990020	0	0	0	0	0
Red Wing 2	6895960	3487290	6082450	6696080	7451910	6954450	6653650	0	0	0	0	0
Wilmarth 1	384410	2952900	5874240	5707000	4658000	5361600	5565380	0	0	0	0	0
Wilmarth 2	1049970	4900570	5499800	5022420	5497000	5259400	5082600	0	0	0	0	0
Sub-Total:	13943520	13093310	24784550	23650260	24308180	23193840	23291650					
Wind												
Border	52039350	56530670	62391660	53016160	54351110	56651720	45294890	0	0	0	0	0
Blazing Star				53182670	64382430	59481310	41783990					
Courtenay	59494420	65129700	67130800	60766200	63703330	62757250	41120530	0	0	0	0	0
Foxtail	22255230	52911400	56268040	54657310	52013270	52370770	43531770					
Grand Meadow	22069750	23991130	16217970	17005170	20144150	19337350	9347710	0	0	0	0	0
Lake Benton	31487020	43507480	42529450	35304100	34703080	37065980	26123880					
Nobles	46156540	65708210	68133220	58261700	53741100	62285290	31934890	0	0	0	0	0
Pleasant Valley	61923750	76482670	76384000	69495370	64710990	69223240	37048590					
Sub-Total:												
Hydro Production												
St. Anthony Falls All	4490000	2548000	6749000	4589000	7094000	6301000	8326000	0	0	0	0	0
St. Croix Falls All	12618000	9904000	1412600	1327700	132772000	8221000	989600	0	0	0	0	0
Sub-Total:	17108000	12452000	8161600	5916700	139866000	14522000	9315600					
Peaking												
Angus Anson 2	-164800	406650	233620	-109120	598260	884000	4712670	0	0	0	0	0
Angus Anson 3	136430	-128260	302240	175440	662260	831000	6865280	0	0	0	0	0
Angus Anson 4	-348920	-261590	1537810	3927770	9801130	19094000	33702720	0	0	0	0	0
Black Dog 6	13910000	7636000	40085000	26555000	27033000	58822000	72880000	0	0	0	0	0
Blue Lake 1	-92500	-93500	-56000	46000	-34500	-29500	345500	0	0	0	0	0
Blue Lake 2	-92500	-93500	-56000	-46000	-34500	-29500	237500	0	0	0	0	0
Blue Lake 3	-32000	-34000	-37500	-33500	-28000	-21500	309500	0	0	0	0	0
Blue Lake 4	-32000	-34000	-37500	-33500	-28000	-21500	292500	0	0	0	0	0
Blue Lake 7	418000	5144000	2504000	7995000	6284000	13281000	33841000	0	0	0	0	0
Blue Lake 8	213000	-202000	5166000	5166000	3871000	11635000	26788000	0	0	0	0	0
Granite City 1	0	0	0	0	0	0	0	0	0	0	0	0
Granite City 2	0	0	0	0	0	0	0	0	0	0	0	0
Granite City 3	0	0	0	0	0	0	0	0	0	0	0	0
Granite City 4	0	0	0	0	0	0	0	0	0	0	0	0
Inver Hills 1	-103000	-70000	-77000	-68000	-61000	264000	2448000	0	0	0	0	0
Inver Hills 2	-36000	-7000	-24000	-18000	-9000	202000	551000	0	0	0	0	0
Inver Hills 3	-45000	-17000	-33000	-28000	-13000	623000	1767000	0	0	0	0	0
Inver Hills 4	-41000	-16000	-30000	-24000	-5000	529000	2378000	0	0	0	0	0
Inver Hills 5	-44000	-16000	-19000	-18000	-13000	213000	1291000	0	0	0	0	0
Inver Hills 6	-35000	24000	-10000	130000	0	750000	2295000	0	0	0	0	0
Sub-Total:	13610710	12237800	49448670	43617090	48023650	107026000	190704670					
TOTAL:												

*Only Xcel Portion

Rate Base 2017-2020

	2017	2018	2019	2020
Demand Prod MN Jur %	**87.4350%**	**87.6880%**	**86.9990%**	**87.2741%**
Energy Prod MN Jur %	**87.2656%**	**87.1688%**	**86.6960%**	**86.7579%**
Demand MN Co %	**84.2464%**	**84.2615%**	**83.9342%**	**83.7498%**
Demand After Interchange %	**73.6608%**	**73.8872%**	**73.0219%**	**73.0919%**
Energy After Interchange %	**73.5181%**	**73.4497%**	**72.7676%**	**72.8195%**

Plant Description	2017 Rate Base	2017 MN Jurisdiction Rate Base	2018 Rate Base	2018 MN Jurisdiction Rate Base	2019 Rate Base	2019 MN Jurisdiction Rate Base	2020 Rate Base	2020 MN Jurisdiction Rate Base
Hydro Production								
Hennepin ISD**	$ 11,141,139	$ 8,206,657	$ 10,621,077	$ 7,847,619	$ 9,939,930	$ 7,258,327	$ 8,915,896	$ 6,516,796
Lower Dam**	$ (183,496)	$ (135,164)	$ -	$ -		$ -		$ -
St Croix Falls*	$ 1,783,654	$ 1,313,854	$ 1,758,678	$ 1,299,438	$ 1,612,484	$ 1,177,467	$ 1,315,963	$ 961,862
Upper Dam**	$ 1,507,986	$ 1,110,795	$ 1,281,414	$ 946,801	$ 1,166,463	$ 851,773	$ 1,052	$ 769
Sub-Total:	$ 14,249,283	$ 10,496,141	$ 13,661,169	$ 10,093,859	$ 12,718,877	$ 9,287,567	$ 10,232,911	$ 7,479,427
Other Production								
Alliant Tech	$ (111,832)	$ (82,377)	$ -	$ -		$ -		$ -
Black Dog	$ 162,762,143	$ 119,891,961	$ 181,286,817	$ 133,947,797	$ 174,599,074	$ 127,495,587	$ 173,181,056	$ 126,581,297
Blue Lake	$ 25,469,215	$ 18,760,838	$ 22,636,749	$ 16,725,665	$ 20,694,650	$ 15,111,629	$ 21,762,493	$ 15,906,616
Blazing Star I							$ 271,251,401	$ 197,524,048
Border Wind	$ 161,170,269	$ 118,489,362	$ 148,105,211	$ 108,782,890	$ 137,480,746	$ 100,041,431	$ 126,351,830	$ 92,008,833
Courtenay Wind	$ 217,989,051	$ 160,261,466	$ 192,609,052	$ 141,470,845	$ 175,537,822	$ 127,734,650	$ 159,119,992	$ 115,870,461
Foxtail							$ 185,062,265	$ 134,761,507
Grand Meadow	$ 78,038,959	$ 57,372,780	$ 72,324,874	$ 53,122,431	$ 67,887,244	$ 49,399,914	$ 61,378,576	$ 44,695,602
Granite City	$ (2,212,834)	$ (1,629,992)	$ (2,471,393)	$ (1,826,044)	$ (2,456,644)	$ (1,793,889)	$ (2,764,758)	$ (2,020,814)
High Bridge-MERP	$ 220,295,201	$ 162,271,295	$ 223,371,066	$ 165,042,680	$ 225,439,532	$ 164,620,263	$ 221,220,571	$ 161,694,284
Inver Hills	$ 4,200,200	$ 3,093,903	$ 3,699,772	$ 2,733,659	$ 4,167,088	$ 3,042,887	$ 2,598,887	$ 1,899,576
Key City*	$ (2,340,892)	$ (1,724,320)	$ (2,357,749)	$ (1,742,075)	$ (2,192,589)	$ (1,601,070)	$ (2,522,843)	$ (1,843,993)
Lake Benton 75*	$ 624,549	$ 460,048	$ 624,558	$ 461,468	$ 653,814	$ 477,428	$ 606,857	$ 443,563
Lake Benton Wind*	$ 9,653,086	$ 7,110,544	$ 30,787,797	$ 22,748,249	$ 166,450,664	$ 121,545,462	$ 138,725,774	$ 101,397,282
Nobles Wind	$ 213,633,540	$ 157,059,376	$ 200,038,972	$ 146,928,102	$ 188,369,913	$ 137,072,254	$ 175,793,965	$ 128,012,373
Pleasant Valley Wind	$ 202,356,681	$ 148,768,841	$ 185,720,618	$ 136,411,308	$ 171,531,363	$ 124,819,246	$ 157,610,281	$ 114,771,096
Riverside-MERP	$ 176,799,186	$ 130,231,765	$ 169,853,751	$ 125,500,222	$ 162,657,540	$ 118,775,650	$ 168,565,769	$ 123,207,897
United Hospital	$ 2,333	$ 1,719	$ (46,424)	$ (34,301)	$ (24,672)	$ (18,016)	$ (11,943)	$ (8,729)
West Faribault*	$ 622,488	$ 458,530	$ 613,704	$ 453,449	$ 617,530	$ 450,932	$ 617,128	$ 451,071
Wind Storage*	$ 1,202,768	$ 885,969	$ 1,057,307	$ 781,215	$ 869,073	$ 634,613	$ 615,618	$ 449,967
Angus Anson	$ 21,348,600	$ 15,725,558	$ 25,752,888	$ 19,028,094	$ 27,686,594	$ 20,217,281	$ 27,553,262	$ 20,139,198
Sub-Total:	$ 1,491,502,710	$ 1,097,407,265	$ 1,453,607,572	$ 1,070,535,654	$ 1,519,968,743	$ 1,108,026,253	$ 1,886,716,181	$ 1,375,941,134
Steam Production								
Allen S King	$ 332,633,926	$ 245,020,943	$ 319,755,762	$ 236,258,657	$ 295,849,112	$ 216,034,686	$ 273,443,381	$ 199,864,919
Black Dog	$ 2,349,893	$ 1,730,951	$ 707,976	$ 523,104	$ 3,258,419	$ 2,379,360	$ (9,040,119)	$ (6,607,593)
Coal Cars		$ -		$ -		$ -		$ -
High Bridge	$ (21,091)	$ (15,536)	$ (26,865)	$ (19,850)	$ (32,417)	$ (23,672)	$ (37,916)	$ (27,714)
Minn Valley*	$ (13,043,491)	$ (9,607,945)	$ (10,929,646)	$ (8,075,612)	$ (9,775,022)	$ (7,137,909)	$ (9,566,645)	$ (6,992,441)
Red Wing	$ 8,644,723	$ 6,367,776	$ 9,898,564	$ 7,313,774	$ 7,948,393	$ 5,804,069	$ 8,658,343	$ 6,328,546
Riverside	$ 7,311,356	$ 5,385,606	$ 7,068,998	$ 5,223,086	$ 6,827,147	$ 4,985,314	$ 6,569,680	$ 4,801,903
Sherburne	$ 350,702,968	$ 258,330,751	$ 328,993,549	$ 243,084,201	$ 301,852,431	$ 220,418,424	$ 280,570,981	$ 205,074,616
Wilmarth	$ 4,185,293	$ 3,082,922	$ 8,812,711	$ 6,511,467	$ 7,599,400	$ 5,549,227	$ 6,154,639	$ 4,498,542
Sub-Total:	$ 692,763,576	$ 510,295,468	$ 664,281,047	$ 490,818,826	$ 613,527,463	$ 448,009,500	$ 556,752,344	$ 406,940,778
Total Production:	$ 2,198,515,568.64	$ 1,618,198,874.86	$ 2,131,549,788.45	$ 1,571,448,339.15	$ 2,146,215,083.23	$ 1,565,323,321.23	$ 2,453,701,436.06	$ 1,790,361,340.13

*No generation at these locations
**Saint Anthony Falls

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
JANUARY 2017									
BayFrnt_G6	Forced	Other Fire Protection System Problems	01/01/2017	01/02/2017	**1**	Substation Fire Protection System	System did not fail, it was an emergent capital project to replace the deluge valves, wiring and sensors at transformers. Old system was failing with no replacement parts		Fire protection system was replaced under capital project.
SHERCO_G1	Forced	Opacity - Fossil Steam Units	01/03/2017	01/11/2017	**8**	Scrubber Modules	Upper wet ESP fields had become dirty requiring derates to avoid exceeding opacity limitations. Recent power supply upgrades on the fields to increase particle removal efficiency have resulted in the need for more aggressive cleaning.		ESP field cleaning was accelerated to allow a baseline point to establish a new more aggressive cleaning schedule. Time during overhauls will be used to effectively allow further cleaning of modules.
Redwing_2	Forced	Lack Of Fuel (outside management control)	01/01/2017	01/03/2017	**2**	Lack Of Fuel (outside management control)	The vendor failed to adequately estimate the fuel they would receive for processing and delivery to Red Wing for burning.		The vendor has a yearly contract minimum to deliver and as of the date of this report (9/1/17) they are well on their way to meeting that amount.
SHERCO_G1	Forced	Boiler Recirculation Piping including downcomers	01/17/2017	01/19/2017	**2**	Boiler Circ Pump trim piping	Following the failure of a 1" schedule 160, SA106 grade B, mild steel pipe (trimp piping) around the 24 boiler circulation pump (BCP) TEAM Industrial Services conducted digital radiography on the piping on U1 December 7-8, 2016. TEAM submitted their final NDE report on December 14, 2016. The lowest thickness was recorded on the piping surrounding the trim piping on 14 BCP at 0.032". This was a significant loss in wall thickness from an original design thickness of 0.250". Unit was taken off line to replace piping.		Four pipes were replaced to eliminate the risk of pipe failure. Maintenance made preparations prior to the shutdown to efficiently complete welding. All fillet welds were inspected and approved by a Certified Weld Inspector per ASME B31.1 weld inspection requirements.
SHERCO_G2	Forced	Other Forced Draft Fan Problems	01/23/2017	01/28/2017	**4**	22 FD Fan	22 FD Fan developed excessive vibration at elevated unit load. Derate was submitted to allow troubleshooting and testing of the fan to prevent further failures. Thrust bearing clearance was found out of design spec .008-.002 inches. We found it at .046 -.050 inches. Review of historical data showed that fan room temperature stratification may have an affect on vibration.		Ventilation modifications have been made to create more even temperatures in the fan room. Operators are biasing fan damper position to avoid vibration incidents. A new bearing has been ordered, once on site, it will be installed at the next available opportunity.
FEBRUARY 2017									
SHERC3	Forced	Condensate/hotwell Pumps	02/01/2017	02/25/2017	**24**	32 Condensate pump	Condenser shaft failure due to water hammer events. Prior to this failure, a water hammer event was occurring while this pump was in service. A vent line from the pump can to the condenser was found closed and may have resulted in air-intrusion into the pump causing water hammers. In addition, these pumps have had an issue since original construction with water hammer on startup when there is vacuum in the condenser. Due to elevation and discharge head design, a void forms in the upper portion of the pump resulting in water impacting the stuffing box area upon startup.		A modification was performed to the 31 pump in 1990 to mostly fill this area and appeared to correct this issue. However the spool pieces were never installed in the 32 and 33 pumps and the parts are currently in the warehouse. It was decided in 1990 to defer installation until a future inspection was needed due to cost and complexity. The modification may be installed in the future on the 32 and 33 CDP but it requires considerable work to not only remove the motor and pump but to disassemble the columns and shaft and perform the welding. Improvements are being made to original valve checklist to eliminate inadequacies. A contributor to this issue is the capacity of each pump being ~47% of full load since the uprate in 2011. Since that time, a third condensate pump must be started when the unit is brought above ~900 MW gross to maintain DA level. This more frequent starting and resulting water hammers likely contributed to the shaft failure. The short term solution to this issue to is to have the 31 CDP be the last in and first out going forward since it has the modification installed. This will result in 32 and 33 CDPs being in service at all times and therefore not have the water hammer on startup.
Wilmart_1	Forced	Fly Ash Handling	02/05/2017	02/06/2017	**1**	Dustmaster collection mixer	Transmission oil seal failure resulting in loss of oil and equipment being unable to run.		Motor and seal replaced. Scheduled for capital replacement in 2018

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
MARCH 2017									
SHERCO_G1	Forced	Other Pulverizer Problems	03/05/2017	03/21/2017	**17**	11 and 14 coal mill	Rocks in the coal supply from the mines caused increased wear on the crusher hammers, increasing the gap and hence size of the pulverized coal. This allowed large chunks of coal to enter the mills, causing either pluggage in the cone or hideout by the air inlet vanes. This resulted in puffing or spontaneous combustion in the classifier in the mill causing damage.		Concerns have been expressed to the mine about quality and our expectations that they need to improve in this aspect. We have recently tested Belle Ayre coal in all three units and are in the process of qualifying this as suitable replacement as a hedge against the mine sending us poor quality coal. Crusher amp indication has been set up in OSI PI software for real time indication to give early detection wear on crusher hammers and the need to readjust classifier plates. Yard operations is monitoring belts for increased coal size and will adjust classifying plates on this condition based assessment as opposed to previous frequency based adjustments.
King_G1	Forced	High Pressure Heater Tube Leaks	03/01/2017	03/04/2017	**3**	16B High Pressure Feedwater Heater	Tube failure inside Feedwater Heater.		5 leaking tubes were plugged during the forced outage. During the 2017 Spring overhaul stabilizers were installed in the Feedwater heater per OEM guidance to eliminate tube fretting which was the root cause of the tube failures.
Anson_G4	OMC	Gas Turbine - Gas Fuel System	03/01/2017	03/27/2017	**26**	Gas Turbine	This is not a forced outage **** NG Curtailment Seasonal		Seasonal Occurrence
King_G1	Forced	Slag-tap (cyclone Furnace)	03/04/2017	03/08/2017	**4**	Bottom Ash Slag Tank	Unable to sluice bottom ash from tank. Contributing factors included lower load operation and a sluicing assist process change.		Changed slag tank operating parameters in 2016. Modifications made to the slag tank during the 2017 spring outage to improve ash moving capability.
Blue_Lk_G7	OMC	Lack of fuel (within management control)	03/01/2017	03/27/2017	**26**	NA	This is not a forced outage **** NG Curtailment Seasonal		Seasonal Occurrence
Blue_Lk_G8	OMC	Lack of fuel (within management control)	03/01/2017	03/27/2017	**26**	NA	This is not a forced outage **** NG Curtailment Seasonal		Seasonal Occurrence
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	03/02/2017	03/06/2017	**3**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	03/23/2017	03/27/2017	**4**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
APRIL 2017									
SHERCO_G1	Forced	Other Pulverizer Problems	04/01/2017	04/27/2017	**27**	12 and 14 coal mill	Rocks in the coal supply from the mines caused increased wear on the crusher hammers, increasing the gap and hence size of the pulverized coal. This allowed large chunks of coal to enter the mills, causing either pluggage in the cone or hideout by the air inlet vanes. This resulted in puffing or spontaneous combustion in the classifier in the mill causing damage.		Concerns have been expressed to the mine about quality and our expectations that they need to improve in this aspect. We have recently tested an alternative coal in all three units and are in the process of qualifying this as suitable replacement as a hedge against the mine sending us poor quality coal. Crusher amp indication has been set up in OSI PI software for real time indication to give early detection wear on crusher hammers and the need to readjust classifier plates. Yard operations is monitoring belts for increased coal size and will adjust classifying plates on this condition based assessment as opposed to previous frequency based adjustments.
Anson_G4	Forced	Main Transformer	04/01/2017	04/05/2017	**4**	Main Transformer	Transformer conservator tank low oil level		Added oil to tank. New transformer, oil level decrease to to cold weather.
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	04/05/2017	04/07/2017	**2**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	04/20/2017	04/21/2017	**1**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
French_2	Forced	Economizer Leaks	04/01/2017	04/27/2017	**27**	Boiler	Hand hole leak due to thermal fatigue		The plant normally runs on a Monday through Friday basis and any leaks such as this one are repaired on the weekends while the plant is off line. Due to contractual requirements of burning refused derived fuel, it was necessary to run through the weekend in this instance. The unit had to be taken off line the following week when the size of the leak increased to the point where the unit could not be operated. The issue with the contractual requirements has been resolved so going forward, this type of maintenance can be performed when the unit is not in service on the weekends.
Redwing_1	Forced	Bottom Ash Systems (wet Or Dry)	04/19/2017	04/21/2017	**1**	#11 Traveling Grate Bed	Grate Bed Seized due to FME jammed between Bars		Replaced/Repaired missing grate weight closure components & double nutted all hold down hardware.
SHERCO_G2	Forced	Second Reheater Leaks	04/05/2017	04/08/2017	**4**	Boiler reheater Tube #4 on assembly 101.	Tube leak - long term overheating due to the combined effects of buildup of inside diameter surface oxide scale, it was concluded that the tube failed due to long term overheating (creep) with an oxide thickness of at least 25 mils.		Repaired original leak and five other surrounding tubes due to collateral damage. Inspection and subsequent proactive repairs/replacement to this area will be completed during the next planned overhaul in 2019.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G2	Forced	Turbine Gland Seal System	04/16/2017	04/27/2017	**11**	21 Gland Steam Exhauster	Shortly after the unit came offline for economy shutdown, the 21 Gland Steam Exhauster tripped with turbine seals still in service. This caused water to accumulate in the turbine oil to a point which caused grounds in insulated bearings 8,9,10 and the generator end H2 seal which precluded a restart. During disassembly of the bearings, which is required for moisture removal, preexisting electrolysis was found on #10 bearing. This bearing needed to be sent out for repair, which caused additional outage duration.		Tygon tubing was added to the exhauster fan casing and piping to monitor for moisture build up, which could cause the fan to trip. High speed recorder has been put in place for improved monitoring of motor amps.
MAY 2017									
PR_ISLD_1	Forced	Main Transformer	05/21/2017	06/01/2017	**10**	Hot Spot Identified on Main Step Up Transformer Bus Duct Support	The hot spot identified was beyond acceptable limits. A Unit down power was required in order to reduce the hot spot temperature to an acceptable level. The Unit was ultimately taken offline in order to repair the condition. The cause of the hot spot was due to undersized bonding jumpers for the application. The original plant drawings did not contain the specifications for the proper sized jumpers.		The bonding jumpers were replaced with the correct size jumpers. Actions 500000275548, 500000275549, and 500000275574 have been generated to update the plant drawings/vendor manual for the transformers with the correct size jumpers.
Blue_Lk_G7	Maintenance	Other Voltage Protection Devices	05/23/2017	05/24/2017	**1**	7GSU Relays	This was not a forced outage*** Maintenance Outage to Upgrade to new style of relays		
Blue_Lk_G8	Maintenance	Other Voltage Protection Devices	05/25/2017	05/26/2017	**1**	8GSU Relays	This was not a forced outage*** Maintenance Outage to Upgrade to new style of relays		
French_1	Forced	Air Supply Duct Expansion Joints	05/10/2017	05/15/2017	**5**	Expansion Joint Failure	Metal Corrosion of expansion joint.		Replaced expansion joint with stainless steel to prevent corrosion failure.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	05/18/2017	05/22/2017	**4**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
Redwing_2	Forced	Boiler - Other Internal And Structural Problems	05/30/2017	06/01/2017	**1**	Boiler	Superheater Tube Leak		Repaired Leak - Capital Replacement in 2018
SHERCO_G1	Forced	Boiler inspections - scheduled or routine	05/12/2017	05/16/2017	**5**	Unit 1 boiler -State of MN required inspection	State of MN required inspection. Historically the plant has performed these required inspections coincident with forced outage opportunities during a 3 year overhaul cycle. However, due to major boiler improvements in recent years, opportunities to perform these inspections have become more infrequent. Due to enhanced overhaul boiler inspections the state has granted us extensions in the past to avoid a separate outage. In this case, this extension was not granted and resulted in this outage.		Xcel Energy is working with the MN state boiler inspector to introduce legislation in the next session to allow 3 year inspections if the owner performs enhanced boiler inspections at that frequency, as Sherco currently does.
JUNE 2017									
SHERCO_G1	Forced	Primary Air Fan	06/10/2017	06/22/2017	**12**	11 PA fan motor	11 PA fan motor stator overheating. This motor along with 12 PA fan motor are original equipment and nearing end of life and have been in service for 45 years.		11 PA fan motor was sent out and rewound and placed back in service. 12 PA fan motor will be rewound during the 2018 overhaul.
Blue_Lk_G7	Forced	12-15kv Circuit Breakers	06/02/2017	06/05/2017	**3**	7 Generator Breaker	Loss of SF6 Gas Pressure.		Added Gas
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	06/16/2017	06/20/2017	**4**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	06/22/2017	06/26/2017	**4**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
PR_ISLD_1	Forced	Main Transformer	06/01/2017	06/02/2017	**2**	Hot Spot Identified on Main Step Up Transformer Bus Duct Support (CONTINUATION)	Continuation of outage beginning on 5/21/17. See explanation above.		Continuation of outage beginning on 5/21/17. See explanation above.
Wheaton_1	Forced	Generator Bearings And Lube Oil System	06/12/2017	06/22/2017	**10**	Dowel pins and sealing gaskets on generator shaft.	Worn pins and bolts created oil leak by collector rings on generator.		New dowel pins and gaskets installed.
Wheaton_2	Forced	Circuit Breakers	06/29/2017	07/01/2017	**2**	SSS clutch	SSS clutch wouldn't engaged turning gear.		New SSS clutch installed on unit.
JULY 2017									
Wilmart_1	Forced	First Superheater Leaks	07/11/2017	07/14/2017	**3**	Boiler superheat tube	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
Anson_G4	Forced	Switchyard System Protection Devices - external (OMC)	07/06/2017	07/14/2017	**9**	Line insulator	Failed Insulator on Overhead to underground structure. Also found bad terminations which didn't need immediate replacement.		Insulator was replaced. Termination replacement scheduled for October of 2018.
Blk_Dog_G52	Forced	Unit Auxiliaries Transformer	07/28/2017	07/30/2017	**2**	Station Auxiliary Transformer	Sudden Pressure Relay for transformer erroneously opened.		Replaced failed relay.
Blue_Lk_G7	Forced	Generator Voltage Control	07/20/2017	07/26/2017	**6**	VT4 Potential Transformer Failure	Internal Failure of Component causing indication failure.		Replaced voltage transformer.
French_1	Forced	Waterwall (Furnace wall)	07/13/2017	07/17/2017	**3**	Boiler water wall	It had multiple leaks from corrosion of tubes.		The water wall was replaced during a planned maintenance outage in October of 2017.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	07/20/2017	07/24/2017	**4**	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
French_2	Forced	Forced Draft Fan Motors	07/26/2017	08/01/2017	**5**	Forced draft fan motor	The motor had cracked windings.		Motor was rewound and placed back in service. We increased the frequency that the motor is inspected.
SHERC3	Forced	Forced Draft Fan Drives (other Than Motor)	07/18/2017	07/19/2017	**2**	32 Forced Draft Fan	Instrument tubing that was installed during the 2017 overhaul as an enhancement to provide monitoring for hydraulic positioner condition failed at the Swagelock fitting due to cycle fatigue from vibration causing an oil leak.		The hydraulic instrumentation lines were capped on this fan and 31 forced draft fan. Future design considerations will include a flexible/braided hose design.
SHERCO_G1	Forced	Air Heater (regenerative)	07/22/2017	07/23/2017	**1**	11 Air Preheater Drive Motor	Electrical Failure of the motor.		Replaced Motor. We will check magnetic coupling every overhaul for proper alignment. We will replace motor every 6 years, We will replace motor bearings in the overhaul year when the motor is not being replaced.
SHERCO_G2	Forced	First Reheater Leaks	07/26/2017	07/28/2017	**3**	Rear Reheat Assembly #107, Tube #2	Longitudinal Tube Leak due to sootblower erosion.		Sootblower lance rotated 90 degrees to change the helical pattern.
Wheaton_2	Forced	Circuit Breakers	07/01/2017	07/28/2017	**27**	Generator Breaker Stabs	Breaker stabs were leaking insulating compound		Contractor (L&S Electric) rebuilt the components on all 4 GE Frame 7 units.
AUGUST 2017									
Wilmart_1	Forced	First Superheater Leaks	08/26/2017	08/29/2017	**3**	Boiler superheat tube	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
French_2	Forced	Forced Draft Fan Motors	08/01/2017	08/08/2017	**7**	Forced draft fan motor	The motor had cracked windings.		Motor was rewound and placed back in service. Increased frequency that the motor is inspected.
Redwing_2	Forced	First Superheater Leaks	08/01/2017	08/05/2017	**4**	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
SHERCO_G1	Forced	Turbine Gland Seal System	08/12/2017	08/15/2017	**3**	11 Steam Gland Exhauster	Motor drive end shaft bearing failure.		Motor was sent to L&S for emergency repair and reinstalled. New exhauster assembly installed during the 2018 overhaul. We have adjusted inspection frequency of blower assembly to every 3 years.
SHERCO_G1	Forced	Fire protection system instrumentation and control	08/15/2017	08/16/2017	**1**	Intercept Valve Proximity Switch	Following a unit trip during startup due to loss of ignitors from a false fire protection flow switch activation, the generator output breakers did not open automatically as designed. This was due to the design of the intercept valve proximity switch linkage which showed the valves as being open.		Design using upgraded attachment brackets installed during the 2018 overhaul. Units 2 and 3 already have the upgraded design.
SEPTEMBER 2017									
SHERCO_G2	Forced	Wet Scrubber Mist Eliminators/demisters & Washdown	09/25/2017	09/30/2017	**5**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needs to be derated to perform cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	09/01/2017	09/05/2017	**4**	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.
French_1	Forced	In-bed reheat tubes (fbc Only)	09/11/2017	09/12/2017	**1**	Boiler	Tube failure due to erosion.		The tubes were flipped in March of 2018 to address this problem.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	09/14/2017	09/18/2017	**3**	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.
PR_ISLD_2	Forced	Turbine Lube Oil System Valves And Piping	09/18/2017	09/20/2017	**2**	PI Unit 2 Turbine Lube Oil Piping	On Prairie Island Unit 2, an oil leak on the weld from the Turbine Main Lube Oil Pump discharge feed to the Turbine Auto Stop Oil System was discovered. Based on the leak rate continuing to increase and temporary repairs not considered to be feasible, a decision was made to reduce power and take the Turbine offline to make the repairs. The generator was taken offline and a weld repair was performed for the defective joint. The unit was then returned to 100% power. The reactor remained at power throughout the repair.		An inspection of the lube oil and seal oil piping for the Unit 2 turbine was performed. Prior to this, the Unit 1 piping was also walked down. A hand over hand inspection of all accessible portions of seal oil and lube oil piping was performed. Weld quality was examined, along with pipe stability and supports. The final weld repair for the defective weld under WO 700026968 replaced the failed weld as well as the welds neighboring the failure. No additional welds of similar poor quality were identified during the inspections. Note: This was determined to be an original construction weld from initial plant start up.
Redwing_2	Forced	First Superheater Leaks	09/01/2017	09/03/2017	**2**	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Redwing_2	Forced	First Superheater Leaks	09/10/2017	09/12/2017	**2**	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Redwing_2	Forced	First Superheater Leaks	09/22/2017	09/27/2017	**4**	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Redwing_2	Forced	First Superheater Leaks	09/30/2017	10/01/2017	**0**	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Wilmart_1	Forced	First Superheater Leaks	09/14/2017	09/17/2017	**3**	Boiler superheat tube	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
OCTOBER 2017									
King_G1	Forced	Wet Coal (OMC)	10/01/2017	10/08/2017	**7**	This is not a forced outage situation. This was a derate due to wet coal.	There was no equipment failure involved.		During signicant rain/snow events coal loading of crushers, belts, chutes and other equipment can result in a derate that is out of operational control.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G1	Forced	Waterwall (Furnace Wall)	10/12/2017	10/15/2017	3	Waterwall tube leak between blowers C23 and C24. Also discovered a front reheat tube leak while off line, pendant #99 tube #4.	Waterwall leak was from sootblower erosion due to an inoperable rotational motor on C23. Reheat tube was a longitudinal crack due to sootblower erosion.		Replaced tubes. Checked operation of all sootblowers, aligned all wallblowers, replaced remaining thin tubes in area during 2018 overhaul. Due to the impending 2026 retirement date of the unit, reheat section tube leaks will be managed via O&M repair/replace vs a large capital investment to replace this boiler section.
SHERCO_G1	Forced	Waterwall (Furnace Wall)	10/16/2017	10/18/2017	2	Management decisison to conservatively keep pressure lower following tube leak repair to avoid exposing new repairs and other suspected thin tubes to full pressure until Unit 2 tube leak repair could be completed.	Tubes adjacent to tubes replaced during the last unit 1 overhaul suspected as thin. The unit was kept at a lower pressure to mitigate potential tube failure while unit 2 was offline for tube leak repair.		Replaced tubes. Checked operation of all sootblowers, aligned all wallblowers, replaced remaining thin tubes in area during 2018 overhaul. Due to the impending 2026 retirement date of the unit, reheat section tube leaks will be managed via O&M repair/replace vs a large capital investment to replace this boiler section.
SHERCO_G1	Forced	Turbine Gland Seal System	10/19/2017	10/23/2017	4	11 Steam Gland Exhauster	Motor drive end shaft bearing failure. Unit was derated with an alternate steam exhaust path until a new motor arrived and then taken off line for repair.		Motor was sent to L&S for emergency repair and reinstalled. New exhauster assembly installed during the 2018 overhaul. Adjusted inspection frequency of blower assembly to every 3 years.
SHERCO_G2	Forced	Wet Scrubber Mist Eliminators/demisters & Washdown	10/01/2017	10/12/2017	12	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G2	Forced	Waterwall (Furnace Wall)	10/12/2017	10/17/2017	4	Management decisison to avoid a dual unit outage by keep unit 2 available in a derate by lowering pressure until Unit 1 was restored to operation due to a tube leak repair.	Leak on offset tubes for wallblower 2A15 that could be managed with lower boiler pressure until the tube leak was repaired on unit 1.		Replaced tube. We will inspect non-pressure to pressure part connections at sootblower openings during the unit 2 2019 overhaul for similar failures.
SHERCO_G2	Forced	Waterwall (Furnace Wall)	10/17/2017	10/18/2017	2	Waterwall tube leak near A15 soot blower.	Leak on offset tubes for wallblower 2A15. The leak propagated at the termination of the membrane to tube weld at the sootblower offset tubing.		Replaced tube. We will inspect non-pressure to pressure part connections at sootblower openings during the unit 2 2019 overhaul for similar failures.
SHERC3	Forced	Turbine control valves	10/03/2017	10/06/2017	3	Turbine Control Valve #2	The valve closing spring seat was installed incorrectly within the spring can with an eye bolt still attached. Eventually the eye bolt became free and became lodged within the valve internals, preventing complete closure.		These control valves were serviced in the spring of 2017 by MD&A. The valves were removed and installed on-site during the overhaul by GE.
SHERC3	Forced	Blowdown System Piping	10/10/2017	10/11/2017	1	18 inch plant drain pipe	Drain pipe from the blowdown tank had become plugged due sediment buildup. This limited boiler blowdown caused a delay in water cleanup and increased plant startup time.		WOMA was used to clean out enough to prevent any more backup of water. Entire section will be completely cleaned out during 2020 overhaul. Annual cleaning maintenance plan to be put in place for cleaning of sediment traps in piping vaults.
Wilmart_1	Forced	First Superheater Leaks	10/07/2017	10/11/2017	4	Boiler superheat tube	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
Wilmart_1	Forced	First Superheater Leaks	10/20/2017	10/23/2017	2	Boiler superheat tube	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
Wilmart_1	Forced	First Superheater Leaks	10/28/2017	10/31/2017	3	Boiler superheat tube leak	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
Wilmart_1	Forced	First Superheater Leaks	10/31/2017	11/01/2017	1	Boiler superheat tube leak	Boiler superheat tube leak		Superheater section was replaced during the spring outage 2018.
Redwing_2	Forced	First Superheater Leaks	10/01/2017	10/03/2017	2	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Redwing_2	Forced	First Superheater Leaks	10/05/2017	10/07/2017	1	Boiler	Superheater Tube Leak		Superheater section was replaced during the 2018 outage.
Redwing_2	Forced	Gen. Stator Windings, Bushings, And Terminals	10/07/2017	11/01/2017	25	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker was replaced and the Generator was rewound.
French_1	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	10/20/2017	10/24/2017	4	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.
French_2	Maintenance	Minor Boiler Overhaul (less Than 720 Hours)	10/13/2017	10/16/2017	4	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.
NOVEMBER 2017									
SHERCO_G1	Forced	Flue Gas Expansion Joints	11/18/2017	11/19/2017	2	12 and 13 ID fan outlet expansion joints	Tears in the joints caused by flow turbulence encountered from being physically located close to the damper.		Temporary repair put in place at time of failure. Joints were replaced during the 2018 overhaul and deflector plates were added to minimize turbulence issue.
SHERCO_G1	Forced	Other Boiler Instrumentation and Control Problems	11/23/2017	11/28/2017	5	Distributed Controls System	Unit 1 controls replacement was completed during the 2015 overhaul. We experienced a hidden system response which caused fuel and air swings contributing to already existing opacity issues requiring conservative action.		We are working with our controls vendor to optimize tuning for boiler response.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G2	Forced	Other Pulverizer Problems	11/01/2017	11/05/2017	**4**	22 Coal Mill Classifier	Classifier drive belt failure.		Alternative design drive belt installed allowing for faster changeout, however, we are finding they only last about 9 months compared to 3 years for the original. Original style belt will be installed during next mill overhaul as it lasts longer.
SHERCO_G2	Forced	Opacity - Fossil Steam Units	11/07/2017	11/12/2017	**5**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G2	Forced	Opacity - Fossil Steam Units	11/23/2017	11/27/2017	**4**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERC3	Forced	High Pressure Heater Tube Leaks	11/02/2017	11/15/2017	**13**	Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. This time period is the derate required with the heater out of service until unit was taken off line for repairs on 11/15/2017.		This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	High Pressure Heater Tube Leaks	11/15/2017	11/17/2017	**2**	36-2 High Pressure Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. One failed and two missing pop-a-plugs discovered.		The three failed plugs were replugged using welded plugs and stabilizer cables installed. 3 other tubes were plugged in the surrounding area based on inspection results. This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	Condensate/hotwell Pumps	11/19/2017	11/30/2017	**11**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, upon re-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifications to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
French_2	Forced	Circulating Water Pumps	11/01/2017	11/30/2017	**30**	#2 circulating water pump	Circulating water impeller was replaced.		This was a planned outage to address a possible de-rate condition on unit 2 turbine generator due to normal degradation of the circulating water pump.
Redwing_2	Forced	Gen. Stator Windings, Bushings, And Terminals	11/01/2017	11/30/2017	**30**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker		Generator output breaker replaced and the Generator was rewound.
Wilmart_1	Forced	Minor Boiler Overhaul (less Than 720 Hours)	11/26/2017	11/30/2017	**4**	walking floor replacement	Walking floor at end of life.		Walking floor slates replaced during this outage and future install of distribution plate finalized to extend life of the floor. Replacement of slates scheduled for 2023.
DECEMBER 2017									
SHERC3	Forced	Condensate System	12/01/2017	12/31/2017	**31**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, upon re-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifications to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	12/26/2017	12/27/2017	**1**	26 Coal Mill Classifier	Classifier drive belt failure.		Alternative design drive belt installed allowing for faster changeout; however, we are finding they only last about 9 months compared to 3 years for the original. Original style belt will be installed during next mill overhaul as it lasts longer.
SHERCO_G1	Forced	Wet Scrubbers	12/29/2017	12/31/2017	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
Wilmart_1	Forced	Boiler Overhaul and Inspections	12/01/2017	12/03/2017	**3**	walking floor replacement	Walking floor at end of life.		Walking floor slates replaced during this outage and future install of distribution plate finalized to extend life of the floor. Replacement of slates scheduled for 2023.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
Wilmart_2	Forced	Boiler Overhaul and Inspections	12/01/2017	12/03/2017	**3**	walking floor replacement	Walking floor at end of life.		Walking floor slates replaced during this outage and future install of distribution plate finalized to extend life of the floor. Replacement of slates scheduled for 2023.
Redwing_1	Forced	Controls\Slag and Ash Removal	12/06/2017	12/08/2017	**3**	Traveling Grate Bed	Carrier chain within traveling grate bed failed.		Repaired the chain and performed PM inspection during February 2018 major boiler outage.
King_G1	Forced	Circulating Water Systems (OMC)	12/07/2017	12/10/2017	**3**	Intake traveling screens	Frazil ice caused blockage at the intake traveling screens resulting in a loss of vacuum to the main turbine and a subsequent trip.		This event is classified as Outside of Management Control (OMC) due to the atmospheric conditions required for the formation of frazil ice.
JANUARY 2018									
King_G1	Forced	Reheater plugged derate	01/21/2018	01/24/2018	**3**	First Reheater Slagging Or Fouling	Fouling/plugging of the Reheater section of the boiler resulted in high differential pressure.		The contributing factors were; extended high load operation, higher sodium content coal and higher FEGT operations. Actions taken; operational procedures are in place to ensure that an adequate load reduction and subsequent slag shed occur during extended high load operations. Fuels is restricting the amount of high sodium coal delivered.
SHERCO_G1	Forced	Unit derate to 530 MWn due to cleaning on U/L fields	01/01/2018	01/02/2018	**1**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G1	Forced	Derate to HOL of 420 MW net. (7) scrubber module operation for HV cleaning and flushing.	01/06/2018	01/08/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G1	Forced	Derate to HOL. Scrubber module HV cleaning, flushing and NOx reduction.	01/27/2018	01/29/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G2	Forced	Derate due to 5 coal mill operation.	01/09/2018	01/13/2018	**4**	24 Coal Mill	While 23 mill was out of service for a gearbox inspection, 24 coal mill removed from service due to excessive spillage.		Mill floor clamp ring segment came loose and lodged under journal. The segment was replaced and bolted back into place. Bolts likely failed due to mechanical fatigue or possibly due to tramp metal going through the mill
SHERCO_G2	Forced	Derate to HOL. Scrubber module HV cleaning, flushing and NOx reduction.	01/27/2018	01/29/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emmissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERC3	Forced	31 Condensate Pump Issues. Pump removed from service.	01/01/2018	01/31/2018	**31**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, upon re-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifactions to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
French_1	Maintenance	U1 Boiler Cleaning and Inspection	01/26/2018	01/30/2018	**3**	Boiler	Preventative maintenance outage for periodic cleaning and inspection.		Preventative maintenance cycle to periodically address boiler fouling, fuel delivery system and other components to aid reliable operation.
Redwing_2	Forced	Generator Rewind Needed	01/01/2018	01/31/2018	**30**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker replaced and the Generator was rewound.
CCRiverside1	Forced	Hydrogen leak on U7 steam turbine generator required unit shut down and de-gas of generator for repairs	01/04/2018	01/08/2018	**4**	Unit 7 Steam Turbine Generator, NOTE: CCRiverside 1 refers to Unit 9 Combustion Turbine plus 1/2 of Unit 7 Steam Turbine. Steam turbine is common to both combustion turbines.	Following the Fall 2017 Major Steam Turbine Overhaul a hydrogen leak developed on the generator end bells. Thus, the steam turbine and generator were unavailable until repaired which also makes both combustion turbines unavailable.		Generator end bells were inspected and re-secured , no leakage issues expereinced since.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
CCRiverside2	Forced	Hydrogen leak on U7 steam turbine generator required unit shut down and de-gas of generator for repairs	01/04/2018	01/08/2018	**4**	Unit 7 Steam Turbine Generator, NOTE: CCRiverside 2 refers to Unit 10 Combustion Turbine plus 1/2 of Unit 7 Steam Turbine. Steam turbine is common to both combustion turbines.	Same event as Riverside1, above.		Same event as Riverside1, above. Corrective actions to unit 7 address both Riverside1 and Riverside2 events.
King_G1	Forced	Unit to come offline to repair 17A HP Feedwater Heater leak	01/06/2018	01/07/2018	**1**	17A Feedwater Heater	Four previously install tube plugs were leaking		The leaking plugs were replaced with welded plugs.
King_G1	Forced	Reheater plugged - offline to clean	01/24/2018	01/27/2018	**3**	First Reheater Slagging Or Fouling	First Reheater Slagging Or Fouling.		The contributing factors were; extended high load operation, higher sodium content coal and higher FEGT operations. Actions taken; operational procedures are in place to ensure that an adequate load reduction and subsequent slag shed occur during extended high load operations. Fuels is restricting the amount of high sodium coal delivered.
FEBRUARY 2018									
SHERCO_G1	Forced	Circulating Water Systems	02/11/2018	02/22/2018	**11**	11 Boiler Circulating Water Pump Motor	Motor Elecrical Failure		This motor was scheduled to be replaced with a rewound motor during the overhaul but failed two weeks early. Replacement occurred during the overhaul.
SHERCO_G2	Forced	Wet Scrubbers	02/10/2018	02/12/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERCO_G2	Forced	Wet Scrubbers	02/24/2018	02/25/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. We are testing a chemical additive in one of the modules that may reduce the amount of time a module has to be out of service for manual cleaning.
SHERC3	Forced	Condensate System	02/01/2018	02/28/2018	**27**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, uponre-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifactions to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
Wilmart_1	Forced	Slag and Ash Removal	02/11/2018	02/27/2018	**15**	C-9, DC conveyor, RDF Scalper	Main RDF fuel supply to the plant broken pans causing scalper to be unable to run.		Repaired broken pans on scalper. Scheduled for replacement in 2022
Wilmart_2	Forced	Boiler Fuel Supply to Bunker	02/19/2018	02/27/2018	**7**	RDF Scalper	Main RDF fuel supply to the plant broken pans causing scalper to be unable to run.		Repaired broken pans on scalper. Scheduled for replacement in 2022
King_G1	Forced	Boiler Tube Fireside Slagging or Fouling	02/05/2018	02/10/2018	**5**	First Reheater Slagging Or Fouling	First Reheater Slagging Or Fouling		The contributing factors were; extended high load operation, higher sodium content coal and higher FEGT operations. Actions taken; operational procedures are in place to ensure that an adequate load reduction and subsequent slag shed occur during extended high load operations. Fuels is restricting the amount of high sodium coal delivered.
French_1	Forced	Generator	02/06/2018	02/28/2018	**22**	Generator	The rotor windings retaining blocks were breaking causing high vibrations.		All retaining blocks on the generator rotor were replaced.
Redwing_2	Forced	Generator	02/01/2018	02/28/2018	**27**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker replaced and the Generator was rewound.
MARCH 2018									
SHERCO_G2	Forced	Boiler Air and Gas Systems	03/01/2018	03/02/2018	**1**	24 ID Fan	Broken inlet damper linkage. The threaded stud which connects the west inlet damper clevis to the damper operating mechanism had broken just where the thread met the existing weld. It was noted that there had been an existing crack evidenced by oxidation. Due to years of operation, constant motion, the stud failed. Condition based wear likely due to cycling/load follow operations.		Thourough inspection of ID fan linkages will be performed during the 2019 overhaul. Inspections were completed on the Unit 1 linkages during the 2018 overhaul.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	03/12/2018	03/13/2018	**1**	22 Coal Mill	Mill and transport line fire. Damage to transport line gaskets, classifier bearings, classifier rotor, mill floor, and mill liners. Derate until 21 mill which had been out for maintenance could be restored.		Classifier was completely rebuilt, piping gaskets were replaced, and mill liners were repaired/replaced. Hot spots, which ignite mill fires, typically occur near areas of worn liners. Plant plans to continually to inspect all mills annually as a minimum.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	03/19/2018	03/20/2018	**2**	21 Coal Feeder motor	Failed clutch on the motor. Loss of redundancy with 22 mill out of service following fire event.		Clutch was replaced.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	03/26/2018	03/31/2018	**5**	25 Coal Mill	Bowl hub cover had come loose and pyrite skirt was badly damaged due to tramp metal going through the mill. Repairs completed while 22 Mill was unavailable due to repairs sustained during the fire event resulting in only 5 coal mills being available.		The bowl hub cover and the pyrite skirts were repaired. Sherco Coal Yard is taking steps to identify areas that may have tramp iron and to segregate from rest of coal pile.
SHERC3	Forced	Condensate System	03/01/2018	03/31/2018	**30**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, upon re-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifactions to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
Redwing_2	Forced	Generator	03/01/2018	03/31/2018	**30**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker replaced and the Generator was rewound.
APRIL 2018									
SHERCO_G2	Forced	5 Mill Coal operation due to high door temps on 25 Mill	04/01/2018	04/28/2018	**27**	25 Coal Mill	Bowl hub cover had come loose and pyrite skirt was badly damaged due to tramp metal going through the mill. Repairs completed while 22 Mill was unavailable due to repairs sustained during the fire event resulting in only 5 coal mills being available. 25 mill returned on 4/13/2018 at which time 27 mill was taken out for overhaul as we anticipated it would fail prior to 22 mill return.		The bowl hub cover and the pyrite skirts were repaired. Sherco Coal Yard is taking steps to identify areas that may have tramp iron and to segregate from rest of coal pile.
SHERC3	Forced	31 Condensate Pump Issues. Pump removed from service.	04/01/2018	04/30/2018	**29**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, uponre-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifactions to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
Anson_G4	Forced	LCI power supply	04/18/2018	04/21/2018	**3**	Power Supply	Complete Loss of functionality.		Power Supply Replaced.
Redwing_2	Forced	Generator Rewind Needed	04/01/2018	04/30/2018	**29**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker replaced and the Generator was rewound.
MAY 2018									
King_G1	Forced	High Pressure Turbine	05/29/2018	05/31/2018	**2**	High Pressure Turbine	Turbine over thrust event which occurred during system testing.		Complete review of logic associated with turbine trip restoration for consistency with Alstom guidance specifically as it pertains to turbine flow paths. Placed moratorium on the practice of relatching the steam turbine following a turbine trip from 3600 RPM.
CCRiverside1	Forced	Circulating Water Systems	05/25/2018	05/31/2018	**6**	#6 Circulating Water Pump	Circulating Water Pump developed high vibrations requiring the pump to be removed for inspection. With warmer river temperatures (above 50 F) condenser vacuum can not be maintained when running both Riverside units. Therefore, one CT must be held out of service.		Condition based wear on #6 Circulating Water Pump wchich was sent off site for inspection and repair. Bearings were replaced. Going forward, each of the two circulating water pumps will be overhauled every two years during the winter months to minimize impact of pump outages.
SHERCO_G1	Forced	Boiler Fuel Supply from Bunkers to Boiler	05/18/2018	05/30/2018	**12**	12 PA Fan	Unit derate to to high vibration until troubleshooting efforts could be completed.		Rotor indications were blend-grinded, four of which required weld repair. Replaced outboard bearing. Corrected inlet vane rubbing issue, the vanes were removed and the shafts were trimmed. Tightened loose motor hold-down bolts.
SHERCO_G1	Forced	Boiler Fuel Supply from Bunkers to Boiler	05/30/2018	05/31/2018	**2**	12 PA Fan	Unit off-line to repair fan. Completed NDE inspections of the rotor, inspections of the inlet vanes, outlet vanes, ductwork, fan inlets (pantlegs), inlet cones,etc. Discovered several indications on the rotor (likely original fabrication defects). 4 of the 12 inlet vanes on the inboard side of the fan were threaded too far into the collar allowing the inlet vane shafts to rub on the main fan shaft.		Rotor indications were blend-grinded, four of which required weld repair. Replaced outboard bearing. Corrected inlet vane rubbing issue, the vanes were removed and the shafts were trimmed. Tightened loose motor hold-down bolts.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	05/01/2018	05/31/2018	**31**	27 Coal Mill	27 coal mill taken out of service to complete needed mill overhaul while 22 coal mill was out of service for fire event repairs		This was not a failure. 27 mill was taken out for a needed overhaul while 22 was out for repairs to avoid any damage which would extend out of service time and increase cost.
SHERCO_G2	Forced	Boiler Tube Leaks	05/17/2018	05/19/2018	**2**	Waterwall leak near B23	Tube adjacent to the west offset tube for wallblower B23 brought the unit offline due to a leak. The tube leak was repaired with the through-wall repair strategy.		We will inspect tubes near wall blowers for thinning and cracking during the 2019 overhaul.
SHERC3	Forced	Condensate System	05/01/2018	05/04/2018	**4**	31 Condensate Pump	The motor had been removed to resolve a chronic leak, upon re-install the pump failed to deliver flow. The pump shaft failed along with first stage impeller key resulting in additional damage to the pump.		Pump was rebuilt by a vendor including modifications to change the pump head. A new spare pump is being purchased from the OEM to minimize future down time.
SHERC3	Forced	Boiler Fuel Supply from Bunkers to Boiler	05/04/2018	05/10/2018	**6**	310 Coal Mill	Discovered one rotating throat segment where all three bolts had failed and the lower support clip had broken off, allowing it to rub against the mill wall. They also found several other sheared rotating throat bolts that all required repair. In addition to the bolts, they found that many of the lower support clips under the rotating throat assembly had cracked welds where they attach to the extension ring.		Repaired failed rotating throat bolts, replaced lower support clips and added additional weld to strenghten the connection to the ring seat. The OEM has proposed a design modification that should mitigate these bolt and clip failures. This design modification will be installed in the next mill overhaul.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
Anson_G3	Forced	Miscellaneous (Gas Turbine)	05/25/2018	05/31/2018	**7**	Turbine Vibration	High Vibration due condition based wear.		Unit held out until completion of Major Overhaul Scheduled for September 2018
CC Highbridge2	Forced	HRSG Boiler Piping System	05/09/2018	05/11/2018	**2**	U8 HRH Bypass Valve	Bypass Valve stuck due to magnetite binding between plug and guide bushing.		Plant has ordered modified valve trim with an integral strainer and modified plug to extend valve maintenance interval without sticking.
Redwing_2	Forced	Generator	05/01/2018	05/04/2018	**4**	Main Generator	Generator synched out of phase due to a delayed closure of the output control breaker.		Generator output breaker replaced and the Generator was rewound.
CCRiverside1	Planned	Miscellaneous (Balance of Plant)	05/09/2018	05/24/2018	**16**	This is not a Forced Outage. Plant performed a Planned Outage during this time window.	No equipment failures.		Not applicable. Planned outage.
CCRiverside2	Planned/Mainten	Miscellaneous (Balance of Plant)\Circulating Water Systems	05/07/2018	05/24/2018	**17**	Planned Outage for entire plant from 5/9 - 5/24 (see line item above for Riverside1). The dates of 5/7-5/8 were a maintenance outage	Maintenance outage portion related to #6 Circulating Water pump issues (see line 112 above). Pump developed high vibration and needed to be repaired.		Maintenance outage portion is the same event as Riverside1, see line item 112 above. Corrective actions to address both Riverside1 and Riverside2.
CCRiverside2	Forced	Miscellaneous (Gas Turbine)	05/30/2018	05/31/2018	**2**	#6 Circulating Water Pump	Continuation of previous event. Circulating Water Pump developed high vibrations requiring the pump to be removed for inspection. With warmer river temperatures (above 50 F) condenser vacuum can not be maintained when running both Riverside units. Therefore, one CT must be held out of service.		Condition based wear on #6 Circulating Water Pump wchich was sent off site for inspection and repair. Bearings were replaced. Going forward, each of the two circulating water pumps will be overhauled every two years during the winter months to minimize impact of pump outages.
JUNE 2018									
SHERCO_G1	Forced	Circulating Water Systems	06/07/2018	06/30/2018	**23**	11 Boiler Circulating Water Pump	Excessive vibration on the pump required removal from service and subsequent derate. Currently suspect a bent shaft or wear ring alignment issue.		Pump will be removed during the upcoming chemical clean outage in September 2018 and repairs made. Corrective actions will be taken once the failure mechanism is understood.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	06/01/2018	06/02/2018	**2**	27 Coal Mill	27 coal mill taken out of service to complete needed mill overhaul while 22 coal mill was out of service for fire event repairs.		This was not a failure. 27 mill was taken out for a needed overhaul while 22 was out for repairs to avoid any damage which would extend out of service time and increase cost.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	06/06/2018	06/07/2018	**1**	25 Coal Mill Classifier	Classifier drive belt failure.		Alternative design drive belt installed allowing for faster changeout, however, we are finding they only last about 9 months compared to 3 years for the original. Original style belt will be installed during next mill overhaul as it lasts longer.
SHERCO_G2	Forced	Boiler Fuel Supply from Bunkers to Boiler	06/20/2018	06/21/2018	**2**	27 Coal Mill	High Vibration. Unit was derated to perform troubleshooting on this mill.		27 mill taken out of service for internal inspection. No issues were identified that could cause high vibration.
SHERC3	Forced	Feedwater System	06/01/2018	06/05/2018	**4**	36-1 High Pressure Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. This time period is the derate required with the heater out of service until unit was taken off line for repairs on 6/5/2018.		This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	Feedwater System	06/05/2018	06/08/2018	**3**	36-1 High Pressure Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. One new leaking tube, one leaking welded plug and eight previously plugged tubes missing plugs discovered.		Leaking tube and three surrounding plugged and missing plugs replaced. Stabilizer cable installed on inlet side of leaking tube. This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	Feedwater System	06/08/2018	06/10/2018	**2**	36-2 High Pressure Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. This time period is the derate required with the heater out of service until unit was taken off line for repairs on 6/10/2018.		This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	Feedwater System	06/10/2018	06/13/2018	**3**	36-2 High Pressure Feedwater Heater	Due to single block isolation valve arrangement on these heaters, the unit had to be removed from service to facilitate repairs. One failed welded plug and one failed pop-a-plug discovered.		Leaking plugs welded, eight additional pitted tube plugged. This heater is original equipment. All four high pressure feedwater heaters are nearing end of life and are scheduled to be replaced in the 2020 and 2023 overhauls. A double isolation valve arrangement will also be installed in 2020 to facilitate on line repairs.
SHERC3	Forced	Boiler Air and Gas Systems	06/25/2018	06/26/2018	**1**	32 Secondary Air Heater	Motor Electrical Failure		Replaced Motor. Check magnetic coupling every overhaul for proper alignment. Replace motor every 6 years, Replace motor bearings in the overhaul year when motor is not being replaced.
Wilmart_2	Forced	Boiler Tube Leaks	06/23/2018	06/27/2018	**4**	Boiler superheat tube	Boiler superheat tube leak		Superheater scheduled replacement during fall outage 2018.
King_G1	Forced	Boiler Tube Leaks	06/20/2018	06/29/2018	**9**	Secondary Superheater (SSH) boiler tube	Final SSH section on the leading edge of the tube. There was moderate collateral damage to the surrounding tubes.		Damaged boiler tubes were replaced or repaired. Six sections of tube needed to be replaced and 5 pad welds on surrounding tubes.
French_2	Forced	Circulating Water Systems\Boiler Tube Leaks	06/22/2018	06/27/2018	**5**	Boiler economizer	Tube leaks.		It is scheduled for replacement in fall of 2018.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
CC Highbridge2	Forced	HRSG Boiler Piping System	06/06/2018	06/07/2018	**1**	U8 HRH Bypass Valve	Bypass Valve stuck due to magnetite binding between plug and guide bushing.		Plant has ordered modified valve trim with an integral strainer and modified plug valve to reduce frequency of sticking. Installation Fall 2018.
CC Highbridge2	Forced	Condensate System	06/08/2018	06/10/2018	**2**	U8 LP Preheater in HRSG	Tube leak at lower header due to corosion fatigue cracking.		Major NDE inspection with ultrasonic phased array testing to identify additional cracks requiring repair is planned for Fall 2018.
CC Highbridge2	Forced	HRSG Boiler Internals and Structures	06/22/2018	06/25/2018	**2**	U8 HP steam drum door	Steam leak on drum door		New style gasket installed that is designed to handle thermal cycling was installed. New 6 bolt drum doors have been ordered and will be installed in Fall 2018 outage.
CCRiverside1	Forced	Auxiliary	06/03/2018	06/05/2018	**2**	Unit 9 Hydraulic Pump fitting failure.	Hydraulic oil line fitting developed leak which required the unit to be removed from service for repair and oil clean up.		Root cause was a failed o-ring. O-ring was replaced along with checking other fittings to ensure no other issues identified.
JULY 2018									
BayFrnt_G6	Forced	Exciter\Boiler Tube Leaks	07/28/2018	07/31/2018	**3**	1) Reserve Exciter 2) Boiler #2 Superheat Tubes	1) The brushes on the reserve exciter failed causing a loss of the unit 2) There were 2 leaks found in the secondary superheat tubes		1) Increased inspections of reserve exciter brushes 2) Boiler #2 Superheat tubes (primary and secondary) were replaced in September - October 2018 as a planned capital project.
SHERCO_G1	Forced	Circulating Water Systems	07/01/2018	07/31/2018	**30**	11 Boiler Circulating Pump	The thrust disc assembly un-bonded during the initial startup of the pump indicating a manufacturing defect of the thrust disc assembly. This in turn caused high vibrations on the pump.		Thrust disc assembly and other resultant damage to the pump was refurbished by Hayward Tyler. A blanking plate was purchased to facilitate removal of a pump and returning to on line status during any future required repairs to all the boiler circ pumps.
Anson_G3	Forced	Miscellaneous (Gas Turbine)	07/01/2018	07/31/2018	**30**	Turbine	High vibration on turbine bearings		A major, rotor out overhaul was conducted and the unit was put back into service in May of 2019
Blk_Dog_G6	Forced	Auxiliary	07/01/2018	07/02/2018	**1**	Turbine Hydraulic Oil	Hydraulic manifold developed a leak and required the unit to be held out of service and the turbine compartment to be cleaned.		Hydraulic manifold was inspected and loose plug was found. Plug was reinstallated and torqued properly and verified.
French_1	Forced	Generator	07/05/2018	07/09/2018	**4**	Generator	High Vibrations		We performed a balance shot.
French_1	Forced	Boiler Overhaul and Inspections	07/26/2018	07/30/2018	**4**	Boiler	This was a maintenance outage for periodic cleaning and inspection.		RDF fuel causes boiler fouling. We believe we are cleaning at appropriate intervals.
French_2	Forced	Boiler Tube Leaks	07/18/2018	07/23/2018	**5**	Boiler	Boiler tube leaks.		We have replaced the tubes that were worn.
Redwing_1	Forced	Miscellaneous Boiler Tube Problems	07/10/2018	07/13/2018	**2**	Boiler	Boiler tube fouling		Cleaned boiler
Redwing_2	Forced	Miscellaneous Boiler Tube Problems	07/08/2018	07/12/2018	**4**	Boiler	Boiler tube fouling		Cleaned boiler
SHERCO_G2	Forced	Boiler Tube Leaks	07/28/2018	07/31/2018	**3**	Sootblower Supply Piping	Unit taken off line to repair a previously identified leak in the penthouse. Leak was on the sootblower supply piping coming off of the west inlet SH pendant platen header on the fillet weld of the stub tube to the header.		Through wall weld repair completed on the leak. MT survey was completed on the rest of the welds on the piping system. Four more welds were identified to have linear crack-like indications which were also repaired.
AUGUST 2018									
King_G1	Forced	Boiler Piping System\Controls	08/21/2018	08/31/2018	**10**	12 superheaeter attemperator spray	12 superheater attemperator packing leak		12 superheater attemperator valve along with other attemperator valves were repacked to prevent future issues.
SHERCO_G1	Forced	Boiler Piping System	08/18/2018	08/22/2018	**5**	11 Boiler Circulating Pump	Unit taken off line to install blanking plate which was recently purchased from Hayward Tyler to facilitate removal and repair to 11 Boiler Circulating Pump while returning the Unit to an on line status. Unit was restored to on line on 8/20/18. The following day, 8/21/18, the installed blanking plate developed a leak on the drain plug which forced the unit off line for repair.		Seal welded the drain plug in the blanking plate. Blanking plate will remain on site as a contingency to facilitate removal of a pump and returning to on line status during any future required repairs to all the boiler circ pumps.
SHERCO_G2	Forced	Boiler Tube Leaks	08/01/2018	08/02/2018	**1**	Sootblower Supply Piping	Unit taken off line to repair a previously identified leak in the penthouse. Leak was on the sootblower supply piping coming off of the west inlet SH pendant platen header on the fillet weld of the stub tube to the header.		Through wall weld repair completed on the leak. MT survey was completed on the rest of the welds on the piping system. Four more welds were identified to have linear crack-like indications which were also repaired.
SEPTEMBER 2018									
BayFrnt_G5	Forced	Boiler Internals and Structures	09/01/2018	09/03/2018	**2**	Boiler #1 Grating System - Corrected Dates to 9/1/18 - 9/3/18	The retaining pins on 2 of the boiler grates failed causing the grates to jam up.		Inspected retaining pins on other grates and replaced those showing wear. The entire boiler grating system was replaced in March 2019 as a planned capital project.
King_G1	Forced	Controls	09/01/2018	09/02/2018	**1**	Feedwater transmitter braided hose	Feedwater transmitter braided hose failure		All feedwater transmitter braided hoses were hard piped and fittings replaced to prevent future failure
Blue_Lk_G7	Forced	Electrical	09/19/2018	09/21/2018	**2**	Generator Circuit Breaker Charging Motor Power Supply Breaker	Component Failed		Breaker Replaced
Blue_Lk_G8	Forced	Generator	09/17/2018	09/30/2018	**13**	#1 Generator Bearing	High Temperature		Alignment Adjustment

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G1	Forced	Boiler Piping System	09/05/2018	09/08/2018	**2**	11 Boiler Circulating Pump	This was a maintenance outage to remove the recently installed blanking plate and restore the refurbished 11 Boiler Circulating Pump to service prior to the planned boiler chemical clean outage.		Thrust disc assembly and other resultant damage to the pump was refurbished by Hayward Tyler. A blanking plate was purchased to facilitate removal of a pump and returning to on line status during any future required repairs to all the boiler circ pumps.
SHERCO_G1	Forced	Boiler Tube Leaks	09/29/2018	09/30/2018	**1**	Steam Cooled Wall Screen Tube	Vibration snubber originally installed on the unit had deteriorated through the years. This caused the initiating failure of both this and the 1/17/19 event to be the #5 steam cooled wall screen tube due to reverse bending fatigue failure. In addition, there was signifigant collateral damage to the primary superheat assemblies. However, during this first event, the evidence found in the damage lead engineering to believe the initiating event was on the leading edge tube of the primary superheat from short term overheating precipitated by oxide blockage. The sheared steam cooled wall screen tube was originally thought to be caused by the impact of the superheat rupture which careened the U-bend into the team cooled wall screen tube.		Tube replacements consisting of 23 total tube welds and 12 pad welds were completed. An air test was completed to confirm no further leads were present.
OCTOBER 2018									
BayFrnt_G5	Forced	Condensing System	10/01/2018	10/19/2018	**19**	Condenser Low Vacuum Trip Bellows - Note that outage started 9/4/2018	Leak developed in the condenser low vacuum trip bellows assembly - could not draw a vacuum in the condenser		Replaced the low vacuum trip bellows assembly and purchased a spare unit.
Blk_Dog_G52	Forced	Total site gas supply outage to install relief valves	10/07/2018	10/16/2018	**9**	Gas supply regulating station	Gas supply regulating station outage to install additional overpressurization protection in the fuel gas yard. Work scope was added to the fall outage plan. Outside of plant jurisdiction.		Equipment was installed as planned during the outage.
SHERCO_G1	Forced	Boiler Tube Leaks	10/01/2018	10/06/2018	**6**	Steam Cooled Wall Screen Tube	Vibration snubber originally installed on the unit had deteriorated through the years. This caused the initiating failure of both this and the 1/17/19 event to be the #5 steam cooled wall screen tube due to reverse bending fatigue failure. In addition, there was signifigant collateral damage to the primary superheat assemblies. However, during this first event, the evidence found in the damage lead engineering to believe the initiating event was on the leading edge tube of the primary superheat from short term overheating precipitated by oxide blockage. The sheared steam cooled wall screen tube was originally thought to be caused by the impact of the superheat rupture which careened the U-bend into the team cooled wall screen tube.		Tube replacements consisting of 23 total tube welds and 12 pad welds were completed. An air test was completed to confirm no further leads were present.
SHERC3	Forced	Boiler Tube Leaks	10/04/2018	10/14/2018	**10**	Finishing Superheat Tube	Initiating tube failure was short term overheating due to oxide exfoliation pluggage, tube #14 on assembly #41. Significant collateral damge spread across 3 assemblies on the finishing superheat.		19 Tube replacements were completed in additon to pad welding on 4 other tubes. An air test was completed prior to returning the unit to service. Continue practice of ramping through the 50-100 MW range druing startup to avoid oxide collection in the superheat section.
SHERC3	Forced	Boiler Tube Leaks	10/16/2018	10/22/2018	**6**	Finishing Superheat Tube	Initiating tube failure was short term overheating due to oxide exfoliation pluggage, tube #3 on assembly #74. Collateral damage was minimal because the leak was identified immediately. Following analysis of the oxide sample removed during this outage, it was determined that the source of the oxide was from the outlet headers downstream of the finishing superheat assemblies. This indicates the oxide traveled backwards from the headers into the pendants. It is theorized this could happen during boiler air tests, during shutdowns when the steam inside the pendants and header are condensing, or during boiler drains when vents and drains are manipulated.		Tube section was replaced. TEAM Industrial Services was brought in to perform digital readiography on a select number of lower loops on the finishing superheat. If the 5 assemblies, two tubes were found with oxide pluggage on Pendant 42, loops 4 and 5. These tubes were cut, oxide removed, and welded back together. Oxide sample sent to Xcel metallurgist for analysis.
Redwing_2	Forced	Circulating Water Systems	10/21/2018	10/24/2018	**2**	Condenser	Took unit 2 off-line to coincide with river dredging near plant intake screenhouse		Completed dredging and returned unit to service.
NOVEMBER 2018									
BayFrnt_G4	Forced	T4-Generator Rotor Failed Inspction/Waiting retirement approval	11/15/2018	11/30/2018	**15**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found during the boresonic inspection of the generator rotor		Decision was made to retire the unit due to age and cost to replace the rotor

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G2	Forced	Scrubber module cleaning and maintenance.	11/09/2018	11/10/2018	**1**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance. With 2 modules out for major clean at a time we lose our normal redundancy.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean.
SHERCO_G2	Forced	9 Module operation - loss of 203 Spray pump.	11/17/2018	11/19/2018	**1**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance. With 2 modules out for major clean at a time we lose our normal redundancy.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean.
King_G1	Forced	Forced outage due to generator pot transformer issues	11/09/2018	11/12/2018	**3**	Generator pot transformer fuse	Generator pot transformer fuse clip failure		Installlation of new style clip for holding fuses in place were installed preventing the stretching that occurred on old style clips
SHERC3	Forced	repair steamleak on DP supply line	11/01/2018	11/03/2018	**2**	Deaerator Steam Supply Piping	Crack in the weld on the aux steam supply piping to the deaerator about eight inches long, in a weld at the end of a 60 degree elbow.		Damaged area was excavated and re-welded. Other welds on the elbow were inspected for cracking. Additional inspections are planned for upcoming overhauls to ensure this condition is corrected.
DECEMBER 2018									
BayFrnt_G4	Forced	Miscellaneous (Generator)	12/01/2018	12/14/2018	**14**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found (November 2018) during the boresonic inspection of the generator rotor		Awaiting approval for retirement of unit
BayFrnt_G4	Forced	Miscellaneous (Generator)	12/17/2018	12/31/2018	**14**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found (November 2018) during the boresonic inspection of the generator rotor		Awaiting approval for retirement of unit
BayFrnt_G4	Forced	Boiler Piping System	12/14/2018	12/17/2018	**3**	Boiler 2 Attemperator Valve	Valve body material failed		Valve was replaced
SHERC3	Forced	Boiler Fuel Supply from Bunkers to Boiler	12/13/2018	12/18/2018	**5**	301 Coal Mill Motor	306 Mill was out for major overhaul and 302 mill was out for internal inspections when this motor failed which forced us into a derate with only 7 mlls available.		Motor was swapped with the motor previously on 306 mill. Original motor was sent to Lewis Motor for refurbishment.
SHERCO_G1	Forced	Wet Scrubbers	12/01/2018	12/03/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance. With 2 modules out for major clean at a time we lose our normal redundancy. In this instnace, 24 hour high voltage cleans needed to be completed.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean. When high voltage cleans are required, which typically is every thirty days on each module, we can normally wait until the weekend and perform multiple high voltage cleans during that time period.
SHERCO_G1	Forced	Wet Scrubbers	12/08/2018	12/10/2018	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance. With 2 modules out for major clean at a time we lose our normal redundancy. In this instnace, 24 hour high voltage cleans needed to be completed.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean. When high voltage cleans are required, which typically is every thirty days on each module, we can normally wait until the weekend and perform multiple high voltage cleans during that time period.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
JANUARY 2019									
BayFrnt_G4	Forced	Miscellaneous (Generator)	01/01/2019	01/31/2019	**31**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found (November 2018) during the boresonic inspection of the generator rotor		Awaiting approval for retirement of unit
SHERCO_G1	Forced	Loss of 12 Transfer Hopper Feeder Belt - Only able to maintain coal in 3 coal silos.	01/02/2019	01/03/2019	**1**	12 Transfer Hopper Feeder Belt	Tensioner on 12 feeder belt failed causing the belt to run off the pulley, damaging the belt to an unusable state.		The belt and tensioner were replaced. Maintenance plans created to inspect feeder belts and tensioners on the units.
SHERCO_G2	Forced	Must remove 22 FD fan from service. Duct work / lagging damage.	01/07/2019	01/08/2019	**1**	22 Forced Draft Fan ductwork lagging	Large section of ductwork lagging was found hanging/loose in the Unit 2 fan room. Due to safety implications, 22 forced draft fan was removed from service so loose tin could be accessed by scaffold and removed.		Loose tin was removed. Permanent repair made during the Febuary 2019 maintenance outage.
SHERCO_G2	Forced	Sherco 2 derate due to Reheater tube leak. Derate to MWn to reduce boiler Reheat pressure.	01/20/2019	01/31/2019	**11**	Reheat Tube leak	Unit 2 had a known reheat leak which was being monitored with the projection that we could operate until the 2/9/19 schedule maintenance outage. Unit 1 was forced off line for its own tube leak on 1/17/19. The rate of degradation on the Unit 2 reheater leak increased, so a management decision was made to conservatively derate the unit to lower reheat pressure to prevent a second Sherco Unit from being forced off line. Once Unit 1 was stabile following its return, the derate was terminated.		Tube #2 on assembly #1 was repaied during the scheduled maintenance outage along with minor repairs to the rear reheat, mainly leading edge tube shields. The failure was caused by sootblower tube thinning.
SHERC3	Forced	Derated due to max steam flow limitations with Unit 1 being offline and supplying steam to PAS header.	01/24/2019	01/31/2019	**7**	Aux Steam header supply valve	PAS 2701, pegging aux steam supply valve from Unit 2 was inoperable. With Unit 1 off line for tube leak repair and extreme cold temperatures, building heating needed to be supplied by steam from Unit 3. This caused us to challenge our environmental administrative steam flow limit. The unit needed to be derated to maintain compliance until Unit 1 returned to service.		PAS 2701. aux steam header supply valve, was repaired during the Unit 2 overhaul.
Redwing_2	Forced	Repair rails on DC conveyor	01/21/2019	01/21/2019	**1**	Distribution Conveyor - Corrected date, about 4 hour outage on 1/21/2019	Chain Derailment		Modified load rails for better chain tracking
CC Highbridge1	Forced	Circulating Water Systems Work	01/18/2019	01/19/2019	**1**	Circ Water T-screens	Plugged with Frazil Ice		None
SHERCO_G1	Forced	Unit coming off line because of tube leak	01/17/2019	01/31/2019	**15**	Steam Cooled Wall Screen Tube	Vibration snubber originally installed on the unit had deteriorated through the years. This caused the initiating failure of both this and the 1/17/19 event to be the #5 steam cooled wall screen tube due to reverse bending fatigue failure. In addition, there was signifigant collateral damage to the finishing superheat assemblies.		Total of 23 tube replacements and 7 pad welds completed between the steam cooled wall screen tube and finishing superheat tube damage. A vibration snubber consiting of stainless steel angle iron affixed to the tubes with staninless steel U-bolts was completed to add rigidity to the tubes. Vibration snubber for Unit 2 was inspected during the 2019 overhauland found to be intact.
Wheaton_3	Forced	Turbine Heaters failed	01/25/2019	01/26/2019	**1**	Turbine heater	Turbine heater electric contractor coil failed.		Rebuilt the contactor for the heater.
Wheaton_3	Forced	GF STP VLV OPN TO NOT 20FG TRIP	01/30/2019	01/31/2019	**1**	Stop Valve	Control air supply to purge valves contained water and froze which prevented valves from operating.		Constructed temporary structure and heating to thaw piping and blew down with nitrogen. Installing heat tape and insulation for long term correction.
FEBRUARY 2019									
King_G1	Forced	Feedwater	02/18/2019	02/20/2019	**1**	Feedwater line radiograph plug	Feedwater line radiograph plug leak		Repaired leaking plug, inspected piping and replaced section that was found to have areas that had thin spots to prevent future leaks.
BayFrnt_G4	Forced	Miscellaneous (Generator)	02/01/2019	02/28/2019	**28**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found (November 2018) during the boresonic inspection of the generator rotor		Awaiting approval for retirement of unit
SHERCO_G2	Forced	Boiler Tube Leaks	02/01/2019	02/05/2019	**5**	Reheat Tube leak	Unit 2 had a known reheat leak which was being monitored with the projection that we could operate until the 2/9/19 schedule maintenance outage. Unit 1 was forced off line for its own tube leak on 1/17/19. The rate of degradation on the Unit 2 reheater leak increased, so a management decision was made to conservatively derate the unit to lower reheat pressure to prevent a second Sherco Unit from being forced off line. Once Unit 1 was stabile following its return, the derate was terminated.		Tube #2 on assembly #1 was repaied during the scheduled maintenance outage along with minor repairs to the rear reheat, mainly leading edge tube shields. The failure was caused by sootblower tube thinning.
SHERC3	Forced	Other Operating Environmental Limitations	02/01/2019	02/03/2019	**3**	Aux Steam header supply valve	PAS 2701, pegging aux steam supply valve from Unit 2 was inoperable. With Unit 1 off line for tube leak repair and extreme cold temperatures, building heating needed to be supplied by steam from Unit 3. This caused us to challenge our environmental administrative steam flow limit. The unit needed to be derated to maintain compliance until Unit 1 returned to service.		PAS 2701. aux steam header supply valve, was repaired during the Unit 2 overhaul.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
King_G1	Forced	Feedwater	02/20/2019	02/22/2019	**3**	Feedwater line radiograph plug	Feedwater line radiograph plug leak		Repaired leaking plug, inspected piping and replaced section that was found to have areas that had thin spots to prevent future leaks.
SHERCO_G1	Forced	Boiler Tube Leaks	02/01/2019	02/03/2019	**3**	Steam Cooled Wall Screen Tube	Vibration snubber originally installed on the unit had deteriorated through the years. This caused the initiating failure of both this and the 1/17/19 event to be the #5 steam cooled wall screen tube due to reverse bending fatigue failure. In addition, there was signifigant collateral damage to the finishing superheat assemblies.		Total of 23 tube replacements and 7 pad welds completed between the steam cooled wall screen tube and finishing superheat tube damage. A vibration snubber consiting of stainless steel angle iron affixed to the tubes with staninless steel U-bolts was completed to add rigidity to the tubes. Vibration snubber for Unit 2 was inspected during the 2019 overhauland found to be intact.
MARCH 2019									
SHERC3	Forced	Miscellaneous (Pollution Control Equipment)	03/09/2019	03/16/2019	**6**	33 Baghouse	High dp and high opacity in 33 baghouse due to aging bags.		Capital project to begin bag replacement in 2020 was moved up to this year and is in progress.
King_G1	Forced	Exciter	03/18/2019	03/19/2019	**1**	Exciter	High vibrations on exciter		The exciter collector rings and brush assemblies were repairedr. Generator shaft bearings and associated seals were also repaired. The plant has limited ramp rate in an attempt to prevent future failure.
King_G1	Forced	Exciter	03/19/2019	03/31/2019	**12**	Exciter	High vibrations on exciter		The exciter collector rings and brush assemblies were repairedr. Generator shaft bearings and associated seals were also repaired. The plant has limited ramp rate in an attempt to prevent future failure.
Wilmarth_1	Forced	Ash building roof collapsed, cannot haul out ash, unit off line.	03/10/2019	03/14/2019	**4**	Ash load out building/discharge from C-9	03/09/2019 - Heavy unseasonable rainfall following snow storms caused excessive weight on building roof causing it to colapse		Emergent capital project 2019 to replace structure. Continue structureal inspections per SAP maintenance plan 10012853.
Wilmarth_2	Forced	Ash building roof collapsed, cannot haul out ash, unit off line.	03/09/2019	03/14/2019	**4**	Ash load out building/discharge from C-9	03/09/2019 - Heavy unseasonable rainfall following snow storms caused excessive weight on building roof causing it to colapse		Emergent capital project 2019 to replace structure. Continue structureal inspections per SAP maintenance plan 10012853.
APRIL 2019									
BayFrnt_G4	Forced	T4-Generator Waiting retirement approval	04/01/2019	04/30/2019	**30**	Unit 4 Generator Rotor	During unit overhaul multiple cracks were found (November 2018) during the boresonic inspection of the generator rotor		Awaiting approval for retirement of unit. Retirement was approved and unit officially retired on 6/01/2019.
SHERC3	Forced	Boiler Fuel Supply from Bunkers to Boiler	04/23/2019	04/26/2019	**3**	308 Coal Mill	306 Mill was out for major overhaul and 302 mill was out for a coal leak repair. 308 mill was removed from service for internal inspection. 3 bolts and welds on the rotating throat assembly had failed.		This was an upgraded design provided by the OEM installed after a previous failure, however, the bolts used were Grade 8. We have sweitched to a more ductile bolt, Grade 5 Heavy Duty.
King_G1	Forced	Unit Tripped due to excier, issues are on going	04/01/2019	04/30/2019	**30**	Exciter	High vibrations on exciter		The exciter collector rings and brush assemblies were repairedr. Generator shaft bearings and associated seals were also repaired. The plant has limited ramp rate in an attempt to prevent future failure.
MAY 2019									
King_G1	Forced	Exciter	05/07/2019	05/16/2019	**9**	Exciter	High vibrations on exciter		The exciter collector rings and brush assemblies were repairedr. Generator shaft bearings and associated seals were also repaired. The plant has limited ramp rate in an attempt to prevent future failure.
SHERCO_G2	Forced	Boiler Air and Gas Systems	05/02/2019	05/03/2019	**1**	22 Primary Air Fan motor	Broken connection on the motor side of the A-phase connector.		Motor was meggered to ensure motor winding integrity and connector was replaced.
King_G1	Forced	Exciter	05/01/2019	05/07/2019	**6**	Exciter	High vibrations on exciter		The exciter collector rings and brush assemblies were repairedr. Generator shaft bearings and associated seals were also repaired. The plant has limited ramp rate in an attempt to prevent future failure.
SHERC3	Forced	Boiler Fuel Supply from Bunkers to Boiler	05/23/2019	05/24/2019	**1**	306 Coal Mill	Excessive slag buildup was noted on the burners of 306 mill during the internal boiler inspection due to the long duration 306 mill had been out for overhaul.		Slag buildup was removed. Different options are being looked at to imporve mill overhaul turn around time.
SHERC3	Forced	Boiler Tube Leaks	05/27/2019	05/31/2019	**4**	Finishing Superheat Tube	Initiating tube failure was short term overheating due to oxide exfoliation pluggage. It is hypothesized that the source of this oxide is from the outlet headers downstream of the finishing superheat assemblies. This indicates the oxide traveled backwards from the headers into the pendants. It is theorized this could happen during boiler air tests, during shutdowns when the steam inside the pendants and header are condensing, or during boiler drains when vents and drains are manipulated.		Eight tubes were identified for replacement; tubes 10 through 15 on pendant 80 and tubes 10 and 11 on pendant 79. Ultrasonic thickness testing (UT) was performed on surrounding tubes to identify collateral damage that did not result in a tube rupture. Four tubes were identified for pad welding; tubes 16 and 17 on pendant 80 and tubes 9 and 12 on pendant 79. Changes to the startup procedure were made to incorporate a strategy of maximizing steam velocity to sweep debris from the pendants including runing at full load and steam flow for six hours following a startup.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
JUNE 2019									
NONE					0				
JULY 2019									
Redwing_1	Forced	Unit 1 OFA fan motor failure	07/06/2019	07/09/2019	3	Over Fired Air Fan	Motor Failure		Replaced motor
CCRiverside1	Forced	Significant rain/river debris resulted in trip of No. 6 Circ Water pump and loss of vacuum on steam turbine.	07/15/2019	07/16/2019	1	#6 Debris Filter	Backwash discharge valve failed in closed position which prevented backwashing of the debris filter screen. The filter screen plugged to the point that #6 circulating water pump had to be removed from service. With 1 of 2 circulating pumps out of service, condenser vacuum could not be maintained and the steam turbine (unit 7) tripped off line. With the steam turbine not available, both combustion turbing units are also not available.		Valve plug was removed during this short forced outage to allow for continuous backwashing of the debris filter. The valve will be replaced during the next planned outage (October 14-18, 2019).
CCRiverside2	Forced	Significant rain/river debris resulted in trip of No. 6 Circ Water pump and loss of vacuum on steam turbine.	07/15/2019	07/16/2019	1	#6 Debris Filter	Backwash discharge valve failed in closed position which prevented backwashing of the debris filter screen. The filter screen plugged to the point that #6 circulating water pump had to be removed from service. With 1 of 2 circulating pumps out of service, condenser vacuum could not be maintained and the steam turbine (unit 7) tripped off line. With the steam turbine not available, both combustion turbing units are also not available.		Valve plug was removed during this short forced outage to allow for continuous backwashing of the debris filter. The valve will be replaced during the next planned outage (October 14-18, 2019).
AUGUST 2019									
NONE									
SEPTEMBER 2019									
Blk_Dog_G52	Forced	Forced Outage due to the failure of 5 GSU protective relay DPR-102	09/23/2019	09/25/2019	2	Generator Transformer Protective Relay DPR-102	Protective relay was found to be in alarm and required the unit to be taken out of service. The relay was replaced.		A new protective relay was installed.
Blue_Lk_G7	Forced	gas valve dcs issue	09/03/2019	09/30/2019	28	Emergency Gas Isolation Valve Solenoid	Lightning Stike Caused U7 & U8 Solenoids to Fail		Spares are in Stock now due to long lead time
Blue_Lk_G8	Forced	gas valve dcs issue	09/03/2019	09/30/2019	28	Emergency Gas Isolation Valve Solenoid	Lightning Stike Caused U7 & U8 Solenoids to Fail		Spares are in Stock now due to long lead time
OCTOBER 2019									
SHERC3	Forced	Loss of Mills due to water valve open	10/26/2019	10/30/2019	4	Wash Water introduced into coal silos 308,309,and 310.	Water was being used by employees cleaning 4 transfer house, drain line was left open in 32 cascade house after wash pump was shut down. When pump was restarted later, water entered 308, 309, and 310 coal silos, inhibiting the ability to reach full load.		Training for new employees has been restructured to include wash water and system interconnections.
Blue_Lk_G7	Forced	gas valve dcs issue\B-disconnect fail	10/01/2019	10/31/2019	31	Emergency Gas Isolation Valve Solenoid	Lightning Stike Caused U7 & U8 Solenoids to Fail		Spares are in Stock now due to long lead time
Blue_Lk_G8	Forced	gas valve dcs issue	10/01/2019	10/28/2019	27	Emergency Gas Isolation Valve Solenoid	Lightning Stike Caused U7 & U8 Solenoids to Fail		Spares are in Stock now due to long lead time
SHERC3	Forced	Boiler tube leak. Must begin immediate unit shutdown.	10/11/2019	10/20/2019	9	Finishing Superheat Tube	Initiating tube failure was short term overheating due to oxide exfoliation pluggage. It is hypothesized that the source of this oxide is from the outlet headers downstream of the finishing superheat assemblies. This indicates the oxide traveled backwards from the headers into the pendants. It is theorized this could happen during boiler air tests, during shutdowns when the steam inside the pendants and header are condensing, or during boiler drains when vents and drains are manipulated.		Twenty tubes were identified for replacement; tubes 5 through 10 on pendant 48, tubes 8 through 10 on pendant 49, tubes 7 through 11 on pendant 66, tubes 5 through 10 on pendant 67, and tubes 8 and 9 on pendant 68. In addition to the changes in the startup procedure and maximation of steam flow velocity as implemented previously, the shutdown procedure has been modified in the boiler cooldown section to minimize any condensate flashing occuring in the pendants which may be causing the exfoliation to be carried from the header into the pendants.
NOVEMBER 2019									
SHERCO_G1	Forced	112 module	11/09/2019	11/11/2019	1	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emmissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G2	Forced	Scrubber module High Voltage cleaning	11/16/2019	11/18/2019	**2**	Scrubber Modules	Ash buildup on fields, spargers, and other components resulting in inefficient particulate removal and high stack opacity. Aging of equipment requires regular maintenance. Unit needed to be derated to perform other normal cleaning functions such as flushing, high voltage cleaning, and manual nightly cleaning. Upgrades to emmissions control equipment have resulted in the need for more aggressive cleaning in addition to normal equipment maintenance.		Cleaning frequency for each scrubber module (12 total per unit) has increased from once a year to once every 8 months. This strategy will still require some smaller derates to complete all required cleaning evolutions but these smaller derates should be limited mainly to the spring and fall when energy prices are historically less. There will also be derates due to loss of other module components during times which we need to have two major cleans in progress at once due to the loss of reduncancy. We are persuing ways of minimizing the amount of time required to complete a major clean.
SHERCO_G1	Forced	8N17 Breaker Failure (OMC)	11/03/2019	11/05/2019	**1**	GCB 8N17 345KV Generator Output Breaker	During startup of Unit 1, with the generator field breaker closed, generator output breaker 345KV 8N17 experienced a failure on the B phase. Resultant of this failure was a lockout on Sherco 345KV Bus 2 due to incorrect settings on secondary relays, and generator lockouts on all 3 Sherco Units due to auto transfer of 345KV bus pot paralleling scheme being in an off normal configuration.		B Phase of 8N17 has been replaced. Team has been formed to improve communication with transmission and the plant for abnormal substation configurations.
Anson_G4	Forced	Exhaust Repairs	11/08/2019	11/15/2019	**7**	Exhaust Silencer Baffles	Maintenance overhaul to repair silencers that are degrading and failing causing foreign material to escape out the stack during equipment operation		Boilermakers were brought in to do weld repairs as they are every fall. The degradation was worse than previous years and 3 of the baffles had to be removed as they were beyound repair. A capital project for replacement is in place for 2021 and 2022
Redwing_2	Forced	Boiler Air and Gas Systems	11/22/2019	11/30/2019	**8**	Boiler	Routine boiler cleaning due to tube fouling. This is a planned evolution which occurs multiple times per year.		Routine Boiler Cleaning
DECEMBER 2019									
Redwing_2	Forced	VFD for Unit 2 ID fan faulted	12/01/2019	12/31/2019	**31**	Induced Draft Fan Variable Frequency Drive	VFD faulted		Replaced unit 2 ID Fan VFD
JANUARY 2020									
NONE									
FEBRUARY 2020									
SHERCO_G1	Forced	PA Fan operation after start-up	02/21/2020	02/22/2020	**1**	11 PA Fan would not start - electricians investigating	Fan motor received a lockout due to a degraded connection on a single phase on the motor side of an Elastimold connector.		Elastimold connector was replaced.
SHERC3	Forced	7 COAL MILL OPERATION	02/12/2020	02/13/2020	**1**	coal feeder motor being replaced.	Electrical clutch on the feeder motor was not engaging.		Feeder motor was replaced.
MARCH 2020									
NONE									
APRIL 2020									
CC Highbridge1	Forced	having stability issues at high loads and warm weather.	04/17/2020	04/23/2020	**7**	Refurbished fuel nozzles installed during Major overhaul by Mitsubishi	Fuel nozzles resulted in high dynamics and NOx emissions at high loads. Mitsubishi retuned combustor and activated a 20 degree exhaust temperature bias resulting in derate.		Fuel Gas Temperature was raised to 400 F for Summer which alleviated the derate. Working with Mitsubishi on replacement fuel nozzles as the issue will resurface with the return of cold weather in Fall 2020
MAY 2020									
SHERC3	Forced	Dry Scrubbers\Performance	05/26/2020	05/28/2020	**3**	CEMS (Continuous Emissions Monitoring System)	Increasing SO2 emissions required the unit to derate until the cause could be discovered and corrected. There is a lag time on knowing actual SO2 emissions as our official reporting method is from coal samples which are sent off stie to be analyzed. Our in line SO2 detector which is used for control cannot be certified due to duct configuration.		Issue with the SO2 inlet analyzer was discovered which wasn't allowing the correct amount of flow through the analyzer. This was corrected by our technician. We are exploring the possiblilty of relocation of the inlet analyzer so it could be certified.
JUNE 2020									
SHERCO_G1	Forced	Scrubber Module operation	06/01/2020	06/02/2020	**2**	Derated due to 9 Scrubber Module operation	102 scrubber module out for major clean, we experienced a low flow condition on 103 module spray pump and a soft start module failure on 108 module spray pump which causesed the derate.		103 module was opened up and the reaction tank cleaned up to the suction strainer due to plugging. 108 module spray pump soft start module was replaced.
SHERC3	Forced	Feedwater heater tube leak	06/01/2020	06/02/2020	**1**	Feedwater heater tube leak on HP Heater 37-1. Heater string removed from service.	This feedwater heater had just been replaced during the spring overhaul as part of a capital project replacement. Following placinng in service, a pin hole leak developed on the nitrogen blanket port which is a plug that is threaded in place and seal welded at the factory.		Plug was re-seal welded.
SHERC3	Forced	high amp and fan stall alarms	06/08/2020	06/10/2020	**2**	Derated due to high amp and fan stall alarms for 31 & 32 FD Fans.	Plugged secondary air preheat air coils caused high amps and fan stall alarms on the forced draft fans resulting in a unit derate.		Ash buildup in the coiils was able to be pressure washed clean.
SHERC3	Forced	Tube leak	06/10/2020	06/12/2020	**3**	Tube leak on HP Feedwater Heater 36-1 requires feedwater string to be isolated.	Tube (54-4) was found to be leaking, tube (2-1) had a failed plug from a previous repair, and some minor tube plug weld leaks in the outlet on the right hand corner of the heater.		Leaking tubes and their surrounding tubes were plugged with welded plugs. Heater was air tested. This heater is original equipment. Both 36-1 and 36-2 heaters are scheduled to be replaced in 2023. The 37 heaters were just replaced during the 2020 overhaul.

Unit Outage Information

Unit	Outage Category	Primary Reason for outage	Outage Dates Start	Outage Dates End	Duration (Days)	Equipment that resulted in the forced outage	Description of Equipment Failure	Change in Energy Costs ($s)	Steps Taken to Alleviate Reoccurrence
SHERCO_G1	Forced	DA steam leak repair	06/25/2020	06/30/2020	**6**	Deareator	There was a single leak point in the weld between one of the downcomers and the DA shell. This was a partial penetration weld that had a defect in it that went almost to the inside surface of the DA. Some erosion took place and resulted in removal of weld material such that it connected to the defect resulting in a through wall leak		Area was excavated and rewelded. The excavated area was approximately 3" long and ½" deep. Grinding was started with another check for cracking. Air pressure was applied to the weep hole where the steam was initially coming out of, the inside surface was inspected with snoop and only the one spot had any air leakage. Further excavation was performed and the flaw in the weld remained localized to the area. Once fully excavated, it was seen that the weld contained a defect and no cracking was observed.
JULY 2020									
SHERCO_G1	Forced	3 scubber modules unavailable requiring immediate derate.	07/14/2020	07/16/2020	**2**	Scrubber Modules	112 scrubber module out for major clean, failed inlet damper linkage on 111 module requiring off line repair, 105 module bleed pump flush valve..		111 module inlet damper linkage repaired during the Septermber 5th maintenance outage. 105 module bleed pump flush valve was replaced.
SHERCO_G1	Forced	Air emmision control/ opacity reduction, 8 scrubber modules in service.	07/16/2020	07/21/2020	**6**		112 scrubber module out for major clean, failed inlet damper linkage on 111 module requiring off line repair, 102 module spray pump soft start. Needed to take modules out for flushing and cleaning to maintiain in service srrubbers operational.		111 module inlet damper linkage repaired during the Septermber 5th maintenance outage. 102 module spray pump soft start module was replaced.
SHERCO_G1	Forced	Air emission control - 3 Scrubber modules out of service - 102 (soft start), 111 (inlet damper), and 112 (major)	07/21/2020	07/24/2020	**2**		112 scrubber module out for major clean, failed inlet damper linkage on 111 module requiring off line repair, 102 spray pump module soft start.		111 module inlet damper linkage repaired during the Septermber 5th maintenance outage. 102 module spray pump soft start module was replaced.
SHERCO_G1	Forced	Derate needed because of failure of thickener drive rake mech.	07/24/2020	07/31/2020	**8**	Unit 1 Thickener Gear Box	Gearbox on Unit 1 Thickener failed. One of two thickeners is available for service to serve the needs of both Units 1 and 2 scrubber modules. Derate of both units required to permit time to prep and fill the redundant, Unit 2 thickener.		Unit 2 Thickener placed in service. Gearboxes are nearing end of life. Capital replacement is being persued for the Unit 1 thickener gear box.
SHERCO_G2	Forced	CMILL internal fire. Suspect failed Classifier. Only 5 CMILLs in service.	07/01/2020	07/14/2020	**14**	27 Coal Mill	Internal mill fire caused damage to the rotating classifier vanes.		All rotating classifier vanes were replaced.
SHERCO_G2	Forced	26 Coal Mill roll issue, removed from service. Down to 4 coal mills in service.	07/06/2020	07/09/2020	**3**	26 Coal Mill	Bearing failure on one mill roll assembly.		Replaced roll with assembly from 27 Mill which was OOS due to fire. Damaged Roll assembly was sent to Riley Power for rebuild. 26 Mill is next for Level II Capital Overhaul.
SHERCO_G2	Forced	Derate needed because of failure of thickener drive rake mech.	07/24/2020	07/31/2020	**8**	Unit 1 Thickener Gear Box	Gearbox on Unit 1 Thickener failed. One of two thickeners is available for service to serve the needs of both Units 1 and 2 scrubber modules. Derate of both units required to permit time to prep and fill the redundant, Unit 2 thickener.		Unit 2 Thickener placed in service. Gearboxes are nearing end of life. Capital replacement is being persued for the Unit 1 thickener gear box.
SHERC3	Forced	Available 860 MWN due to Fan Stall Alarms coming in.	07/06/2020	07/31/2020	**25**	Derated due to high amp and fan stall alarms for 31 & 32 FD Fans.	Plugged secondary air preheat air coils caused high amps and fan stall alarms on the forced draft fans resulting in a unit derate.		Ash buildup in the coiils was able to be pressure washed clean.
SHERC3	Forced	Abnormal noise in 310 coal mill. Following burning out coal silo, remove from service resulting in 7 coal mill operation.	07/09/2020	07/15/2020	**6**	310 coal mill	Rotating throat assembly failure.		As mills experience failures and during mill overhauls, we will be going back to a bolted lower support bracket design as opposed to a pinned attachement. This will restrict movement of the rotating throats.
King_G1	Forced	Wet Coal. Heavy rains resulted in wet coal pile.	07/26/2020	07/31/2020	**5**	Stockfeeders/coal silos	Unable to keep coal feeding from coal silos to stockfeeders and unable to keep stockfeeders from plugging up		Work with yard on maintaining coal live pile levels higher when the chance of major precipitation is expected. Work with fuel supply to turn over storage piles so that reclaim coal doesn't become as saturated from sitting on the group for extended periods of time.
SHERCO1_ G1	Forced	Unit required offline for DA steam leak repair	07/01/2020	07/03/2020	**2**	Deareator	Continuation of 6/25/2020 event. There was a single leak point in the weld between one of the downcomers and the DA shell. This was a partial penetration weld that had a defect in it that went almost to the inside surface of the DA. Some erosion took place and resulted in removal of weld material such that it connected to the defect resulting in a through wall leak		Continuation of 6/25/2020 event. Area was excavated and rewelded. The excavated area was approximately 3" long and ½" deep. Grinding was started with another check for cracking. Air pressure was applied to the weep hole where the steam was initially coming out of, the inside surface was inspected with snoop and only the one spot had any air leakage. Further excavation was performed and the flaw in the weld remained localized to the area. Once fully excavated, it was seen that the weld contained a defect and

Xcel Energy	XES 2.600
Energy Supply Policy System	**Revision: 5.3**
TITLE: *Event Assessment & Root Cause Analysis*	Page 1 of 13

1.0 PURPOSE

This policy establishes the requirements for Event Assessments and Root Cause Analysis (RCA), provides guidelines for conducting a RCA, establishes a forum for the dissemination and engagement in analysis, and an exchange of lessons learned throughout the Energy Supply Organization.

2.0 APPLICABILITY

All Energy Supply personnel

3.0 RESPONSIBILITIES

3.1 Business Area Management, General Managers, and Plant Directors are responsible to initiate and conduct Event Assessments, RCA and complete corrective actions, as required by this policy.

3.2 All Business Areas ***SHALL*** be responsible for assistance in analysis and lessons learned for incidents where they have expertise.

3.3 Plant Management ***SHALL*** notify the Hazard Insurance Department of any physical damage loss in excess of $100,000 or any fire involving activation or malfunction of a fixed fire extinguishing or detection system.

3.4 Plant Management and Fleet Engineering ***SHALL*** determine if a Generator trip was due to a generator Protection System misoperation. Generator trips will be investigated in accordance with EPR 5.730P01 Protection System Failure and Misoperation Reporting Procedure. The plant will forward the Corrective Action Plan for any Generator Protection System misoperation to Fleet Engineering who will forward to Energy Supply Compliance.

4.0 REQUIREMENTS

4.1 Energy Supply Management reserves the right to initiate or exclude for analysis an incident based on perceived value to the organization.

4.2 All personnel injury and safety related near miss events shall follow the Event Learning process led by Corporate Safety as specified in XES 4.103 Safety/Health Event Reporting and Investigation Policy. Safety events will not be entered into APM (Meridium) for tracking and records retention purposes.

4.3 The following events require an Event Assessment Report be completed:

4.3.1 Unplanned unit outage or unit derate which limits the unit as required for GADS reporting.

4.3.2 Any environmental non-compliance (including exceedances and deviations (i.e. EPA, State)).

4.3.3 Any plant/equipment casualty or re-work (fire, catastrophic equipment failure, explosion, etc.).

4.4 The following events require an Event Assessment Report to be completed and a formal Root Cause Analysis be conducted to determine the cause of the event:

4.4.1 Unplanned unit outage or unit derates in which the unplanned loss of capacity exceeds 48 equivalent hours.

4.4.2 Any environmental event in which a permit limit is exceeded and/or notification to a Regulatory Agency (e.g. Environmental Protection Agency, Minnesota Pollution Control Agency etc.) is required.

4.4.3 Equipment and/or property damage that costs >$250,000 to repair or replace.

4.4.4 Other off-normal events that warrant a formal root cause analysis as determined by Site Management.

4.5 All Event Assessments required per section 4.3 of the policy ***SHALL*** be entered into the APM (Meridium) Event Assessment module.

4.6 Root Cause Analyses required per section 4.4 of the policy shall be entered into APM (Meridium) either as a reference document in the event assessment, on the event assessment root cause tab or in the APM Root Cause module. The Energy Supply Root Cause Investigation Report (XES 2.600_A02) is a tool that ***MAY*** be used to document the root cause investigation.

4.7 Initial Event Assessment Process

4.7.1 When an event assessment is required, the initial assessment ***SHALL*** be conducted by the assigned plant personnel as soon as practical following the event. The initial assessment ***SHALL*** include:

4.7.1.1 Interviewing personnel involved in the event to capture all pertinent information associated with the event (this information should be documented by writing employees statements, etc.).

4.7.1.2 Collecting all documentation associated with the event (e.g. log entries, Work Orders, etc.).

4.7.1.3 Inputting all collected information into the Event Assessment module in APM (Meridium). Information can be changed at a later time.

4.7.1.4 Making the determination of any immediate corrective actions required to place the plant and/or personnel in a stable, safe condition and entering the information in the Event Assessment module on the Corrective Action datasheet.

4.7.2 Once information is populated in the Event Assessment module in APM (Meridium), change the state from Pending to Request for Review. This will trigger an e-mail notification to the applicable department Manager that the Event Assessment is ready for review. Draft event assessments ***SHALL*** be completed by the responsible plant supervisor and ready for the applicable department Manager to review within 48 hours of initiating the investigation.

4.8 Upon receipt of the notification that the Event Assessment is ready for review, the applicable department Manager ***SHALL***:

4.8.1 Review the draft Event Assessment to ensure completeness and accuracy.

4.8.2 Review any/all supporting documentation pertinent to the event.

4.8.3 Determine if the event warrants a formal Root Cause Analysis, based on the complexity of the event and severity of the event consequences.

4.8.4 Initiate a 30-Day Event Assessment clock to ensure the Event Assessment is completed and submitted for review and approval within 30 calendar days.

4.9 If the event meets the criteria that requires a formal Root Cause Analysis, in accordance with the criteria in section 4.3 of this policy, the responsible Department Manager SHALL:

4.9.1 Assign personnel to a Root Cause Team; including personnel involved in the event, subject matter experts, Fleet and/or Reliability engineers and other resources to ensure the analysis and resulting conclusion and recommendations are as accurate as possible.

NOTE: The responsible department Manager may delegate the leadership of the RCA Team, although the Manager retains accountability for proper and timely completion of the analysis and Event Assessment Report.

4.10 The Root Cause Team SHALL:

4.10.1 Utilize proper assessment and analytical techniques which may include the following:

- Staircase (WHY) Analysis
- Barrier Analysis
- Task Analysis
- Failure Mode & Effects Analysis (Fishbone)
- Change Analysis
- Fault Tree Analysis
- Pareto Analysis

4.10.2 Focus on the accurate determination of the root cause of the event and any contributing factors.

4.10.3 Determine appropriate corrective/improvement actions to prevent event recurrence.

4.11 The result of the Root Cause Analysis ***SHALL*** be documented in APM (Meridium), either as a reference document in the event assessment, on the

event assessment root cause tab or in the APM Root Cause module. All completed root cause events ***SHALL*** include:

4.11.1 A complete and accurate description of the event including date and time.

4.11.2 Identification of all personnel involved in the event.

4.11.3 Identification of the person in charge of the activity at the time of the event.

4.11.4 Identification of any/all procedures, Work Orders, etc., pertinent to the event.

4.11.5 Identification of equipment (components, system, tools, etc.).

4.11.6 Identification of the personnel involved in the event assessment process.

4.11.7 The problem statement or undesirable results of the event.

4.11.8 The apparent cause and contributing factors.

4.11.9 The root cause and contributing factors (required for all events that require a formal Root Cause Analysis).

4.11.10 Identification of corrective/improvement actions recommended as a result of the event.

4.12 Report Review and Approval

4.12.1 Upon completion of the final Event Assessment, the responsible Department Manager ***SHALL***:

4.12.1.1 Forward the completed Event Assessment to the site Management and the Site Human Performance Team for review.

4.12.2 Following review of the final Event Assessment Report, the responsible Department Manager ***SHALL:***

4.12.2.1 Verify the completion of the Event Assessment Report by providing or obtaining a Site Management Team electronic approval status in APM (Meridium).

4.12.2.2 Ensure the Site Human Performance team reviews and electronically acknowledges the Event Assessment in APM (Meridium).

4.12.3 Following approval of the Plant Director and Performance Optimization Director the document(s) required in section 4.3 will be reviewed by peer members of each organization and by the next level of management in both organizations, to confirm that the accurate determination of the root cause and appropriate corrective/improvement actions have been identified to prevent reoccurrence.

4.13 Tracking Event Assessment Action Items

4.13.1 All Action Items assigned as a result of Event Assessments ***SHALL*** be tracked to completion though APM (Meridium). APM (Meridium) will send electronic reminders via e-mail to those responsible for completion of action items.

4.13.2 The list of current open Event Assessment Action Items should be reviewed on a monthly basis. These items can be viewed in APM (Meridium).

4.14 Environmental Permit Deviations

4.14.1 Plant directors will notify the General Manager of each region within 24 hours of a confirmed permit deviation.

4.14.2 The Plant Director of the facility with the permit deviation will contact the Plant Environmental Analyst (PEA) and determine a time in the immediate future (not to exceed 72 hours) to conduct a conference call with senior management to discuss the event. The Plant Director will schedule the call with senior management. Attendees, at a minimum, will include the Plant Director, PEA and other designated representatives from the facility. Other attendees must include the General Manager from each region, the Senior Director of Environmental Services and the Director of Environmental Services for the region.

4.14.3 The Plant Director, or designee, will complete the initial event assessment in accordance with Section 4.7 and send notification it is complete prior to the senior management call. During the call, staff will discuss the event to include deviation, potential cause, corrective actions and next steps to include completion of a RCA and timing. GMs from the other regions will assess whether the potential for a similar occurrence exists in their region and implement appropriate preventative measures commensurate with the risk.

4.14.4 The facility with the deviation will then complete a RCA for the event in accordance with Section 4.9. Additionally, the facility will develop a one page summary of the event using the designated template (Attachment 3) to include the following:

- Event Details
- Cause
- Corrective Actions
- Next Steps

4.14.5 The RCA will be entered in APM (Meridium) and tracked for completion of actionable items.

4.14.6 On a monthly basis, permit deviations will be discussed during the ES Process Performance Call administered by Energy Supply. The discussion will include the following:

- The permit deviations for the previous month will be presented by the appropriate facility or group utilizing the one page summary (Attachment 3) of the event. The facility will answer questions and share any lessons learned.
- Actions items from previous RCAs listed in APM (Meridium) will be reviewed and tracked for completion.

Based on the information shared through this process, the GMs from the other regions will determine if preventative measures are needed to prevent a similar occurrence in their region and implement as needed or required.

4.14.7 Documentation for each monthly call will be maintained with ES Process Performance Call information.

4.14.8 This same process will be followed if the permit deviation is attributable to another group outside Energy Supply plant operations (Energy Supply support organizations). In this scenario, plant directors will be replaced by the Director in the area of responsibility.

5.0 REQUIRED RECORDS

5.1 All records ***SHALL*** be retained in APM (Meridium). All Event Assessments will be entered in APM (Meridium) Event Assessment module. All Root Cause Analyses will be documented in APM (Meridium), either as a reference document in the event assessment, on the event assessment root cause tab or in the APM Root Cause module.

6.0 DEFINITIONS & REFERENCES

6.1 Definitions

6.1.1 Root Cause Analysis is the process of determining, using facts, data, and logic, the cause and effect relationships that result in an undesirable event occurring and determination of effective and efficient corrective actions to break the cause and effect chain to prevent recurrence. It is a Management System tool to determine how to prevent those things that stand in the way of continuous improvement in business processes.

6.1.2 Net Maximum Capacity is defined by the North American Electric Reliability Council (NERC), Generating Available Data System, Data Reporting Instructions. ODMS Cause Code Impact and Event Summary reports provide calculation of Equipment Hours and Lost MWhs for forced outages, maintenance outages, and forced deratings. These calculations are after the fact, to provide for timely initiation of RCA and estimate should be used.

6.1.3 Generator Protection System Misoperations is 1) failure of a relay to operate for a fault when it should, 2) operation of a relay when it shouldn't operate either a fault outside of its zone of protection or when no fault exists (aka spurious trip).

6.2 References

6.2.1 XES 2.600_A02 - Energy Supply Root Cause Investigation Report

6.2.2 Event Assessment and Root Cause Assessment Development process flowchart – Attachment 1

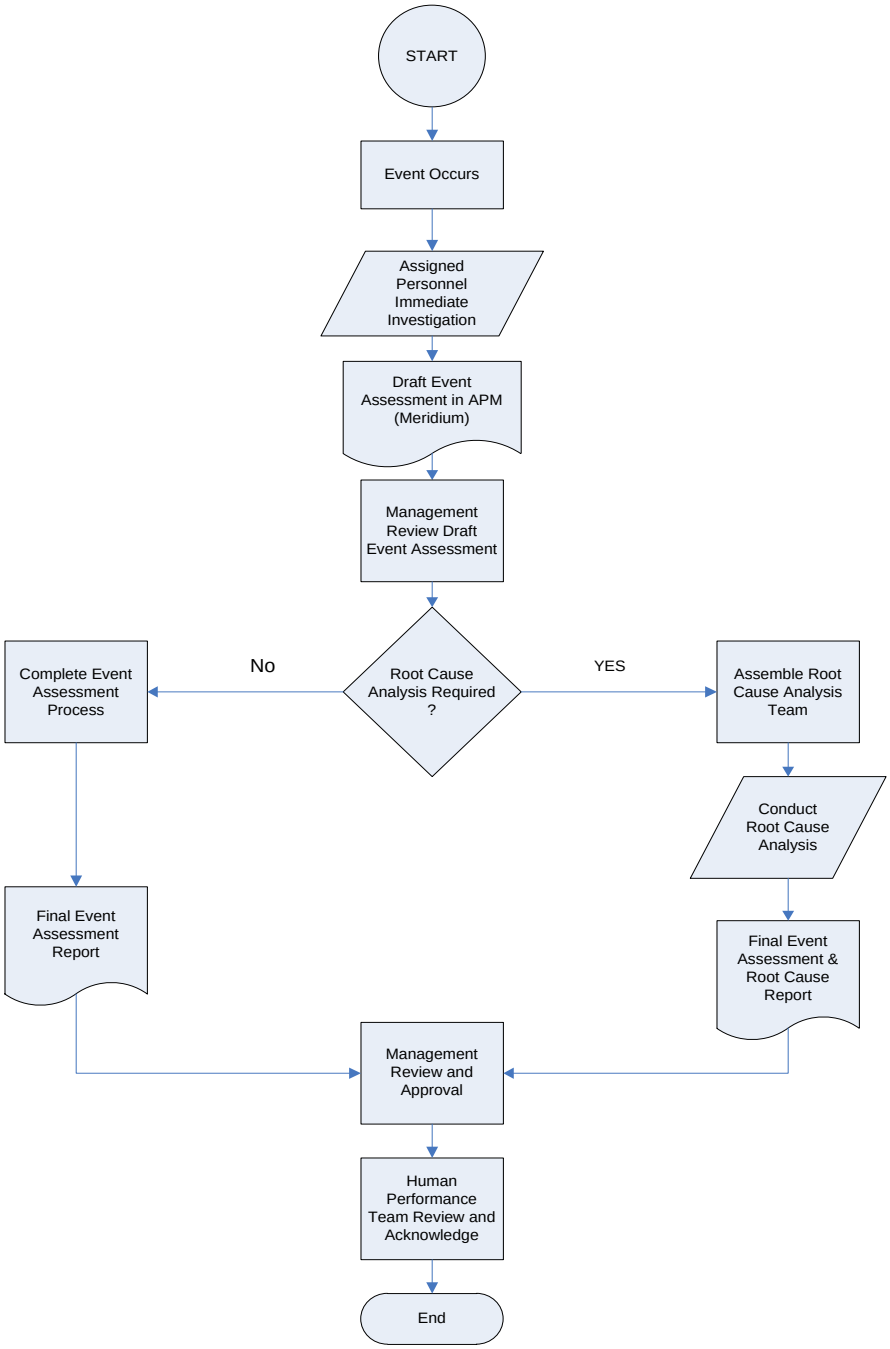
6.2.3 Event Assessment Process Flowchart – Attachment 2

6.2.4 XES 4.103 Safety/Health Event Reporting and Investigation policy

7.0 REVISION HISTORY

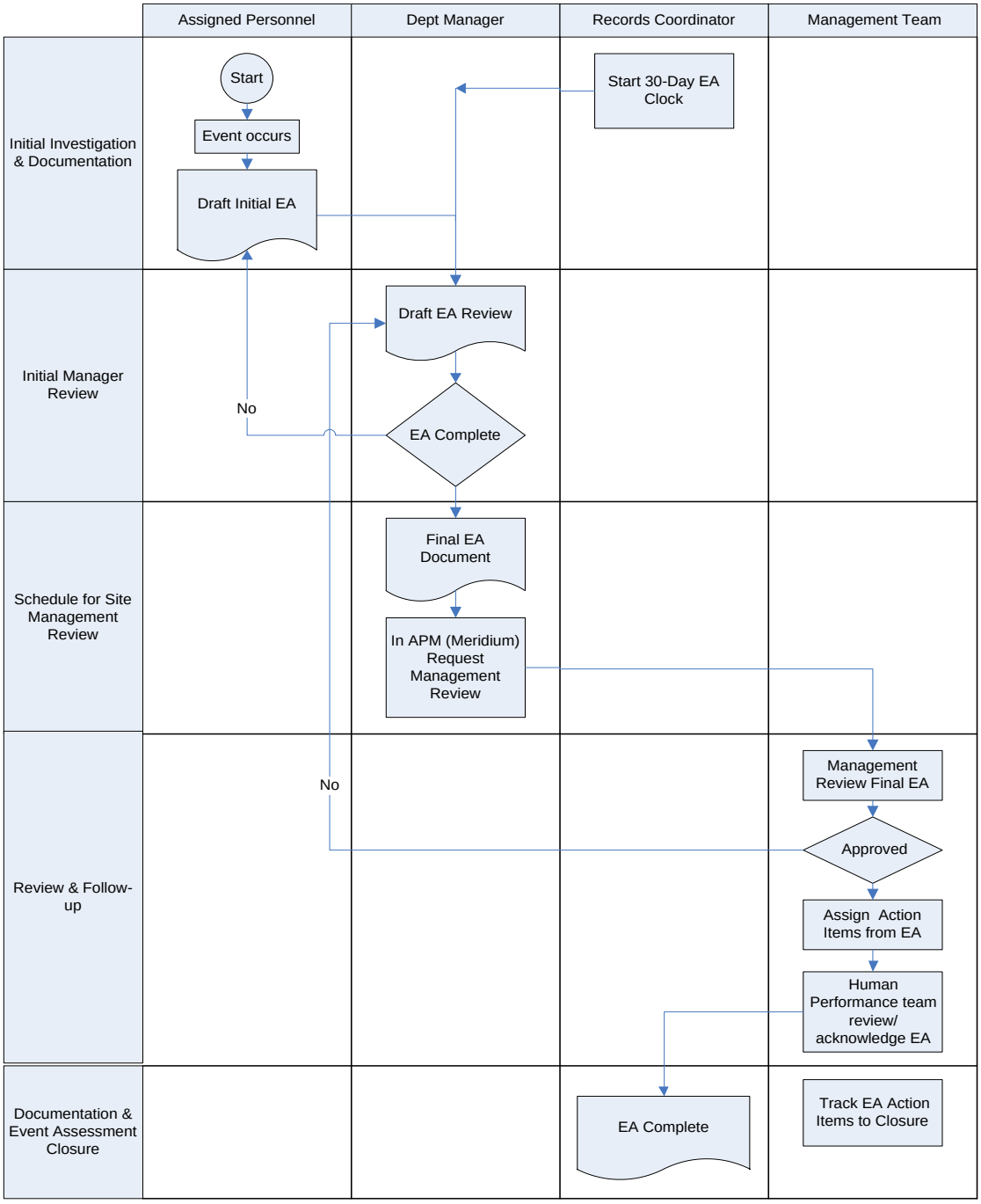
Date	Revision	Change Description
	1.0	Original Issue
01-06-2012	3.0	Major rewrite
04-06-2016	4.0	All safety events referred to XES 4.103 Safety/Health Event Reporting and Investigation policy. Several sections rewritten and process map updated to reflect change in process to enter all event assessments in Meridium and any RCA to be attached or entered into the Meridium RCA module.
01-22-2018	5.0	Revised to include for tracking and evaluating environmental permit deviations.
4-1-2019	5.1	Very minor grammatical changes added
03-04-2020	5.2	Reworded requirement for Safety events and near misses to indicate they will follow the Event Learning process led by Corporate Safety and that safety events will not be entered into APM (Meridium). Clarified some wording on RCA documentation requirements. Updated Meridium references to APM (Meridium).
07-10-2020	5.3	Revised 4.12.3 Requires Performance Optimization review and approval of all EA's.

Attachment 1 Event Assessment and Root Cause Development Process



Author: Timothy Laplant	Revised by: Don Baxa	Approved By: Teresa Mogensen (electronic approval on file)
Effective Date: 4/12/2012	Date: 7/10/2020	Approved Date: 4/1/19

Attachment 2 Event Assessment Flow Chart



Attachment 3 – Environmental Permit Deviation Summary

Responsible by Nature

Environmental Permit Deviation Review

Event: (enter title)

Event Details

Cause

Corrective Action(s)

Next Steps

Location: PSCo

Content Author:

Date:

Xcel Energy