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March 1, 2024

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RE: In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities
Docket No. E999/CI-19-704
Annual Compliance Filing

Dear Mr. Seuffert:

Otter Tail Power Company (Otter Tail) submits this annual compliance filing in the above referenced docket in response to the Minnesota Public Utilities Commission's (Commission) November 13, 2019 Order in Docket No. E-999/AA-18-373 (AAA Order), which was revised and summarized in Attachment A of the January 11, 2021 Order in Docket No. E-999/CI-19-704. Additional requirements that were listed in the Commission's Orders for Docket No. E-999/CI-19-704 dated December 1, 2021, and November 17, 2022, are also included in this filing.

Not Public Attachments 2 and 3 to this filing contain the hourly required information in Excel file format. *Due to the vast size of these files, paper copies are not provided.*

1. OVERVIEW OF ANALYSIS

Otter Tail conducted an analysis of its co-owned baseload coal units, Big Stone Plant (Big Stone) and Coyote Station (Coyote).[1] This analysis seeks to provide a reasonable quantification of the difference in the cost of running the plant versus the corresponding prevailing market energy revenues, including times of self-commitment.

For purposes of clarity, Otter Tail provides the following definitions of the terms Self-Commitment and Self-Schedule dispatch:

[1] Big Stone Plant is a 474 MW plant, of which Otter Tail is a 53.9 percent owner. Coyote Station is a 427 MW plant, of which Otter Tail is a 35 percent owner.

Definitions:

Self-Commitment dispatch: During a self-commitment, the utility requests the Midcontinent Independent System Operator (MISO) to commit the unit. The unit is committed to at least the unit's economic minimum output. MISO will commit the unit independent of market pricing assuming such a commitment does not result in a reliability concern. The unit is paid the prevailing Locational Marginal Price (LMP) market price for that unit and is not assured to be made whole to its costs. During self-commitment, MISO may dispatch the unit above minimums if market pricing is supportive of such dispatch.

Self-Schedule dispatch: Market Participants may submit self-schedules consisting of fixed quantities of energy, per hour, that may be dispatched from an online unit. If the self-schedule is less than the unit's economic maximum, the unit may be dispatched above the self-schedule on an economic basis. A self-schedule is a price taker up to the self-scheduled amount. Any cleared amount above the self-schedule is eligible to set price. A self-schedule is not a guaranteed dispatch unless the unit is designated as must-run or as a self-commitment. Otter Tail utilizes a self-schedule when units are undergoing testing and require specific generation output levels. It also uses a self-schedule when self-committing resources to ensure the economic minimum is dispatched.

2. REASONS TO SELF-COMMIT OR SELF-SCHEDULE:

Capacity Accreditation Requirements

Seasonal dispatch is not currently viable for Otter Tail generating units. In order to meet MISO Module E seasonal capacity requirements, Otter Tail utilizes, and accredits, its large baseload generation facilities for all four seasons[2] in a given planning year. Every generator that is a MISO accredited capacity resource and clears the Planning Resource Auction maintains a daily must offer requirement. This offer can be at either a self-commit offer or an economic offer. This must offer requirement does not allow Otter Tail to de-commit, meaning make the unit unavailable to MISO for commitment and dispatch, on a seasonal basis, or otherwise, except for when the unit is on mechanical outage, overhaul, testing, etc. In the event Otter Tail were to forego capacity accreditation of the Big Stone or Coyote generators for a season, Otter Tail would potentially need to procure additional capacity resources to meet the MISO Module E capacity requirements for that season. Additional methods of procuring capacity would include construction of new generation facilities, bi-lateral capacity purchases from other capacity holders, or the purchase of capacity through the annual MISO capacity auction.

[2] On August 31, 2022, FERC approved MISO Tariff revisions that include the adoption of a seasonal resource adequacy construct and capacity requirements. These changes allowed MISO to move forward with seasonal capacity auctions with each season having its own capacity requirement based on seasonal coincident peak loads and a seasonal reserve margin. Along with seasonal capacity requirements, MISO will also accredit resources on a seasonal basis. Similar to the annual auction, resources will have a must offer requirement for any season that they clear. (180 FERC ¶ 61,141 Order Accepting Proposed Tariff Revisions Subject to Condition, August 31, 2022. FERC Docket Nos. ER22-495-000, ER22-495-001).

Otter Tail utilizes a full economic commitment offer for all company generating units except for Coyote and Big Stone. The current offer practices of Coyote and Big Stone are detailed below.

Coyote Station Joint Ownership
Prior to May 2021, Coyote was exclusively offered as a "must-run" unit, meaning Otter Tail and the other co-owners scheduled their shares of the unit as self-committed at minimum output. MISO could choose to dispatch the unit higher if market and/or reliability conditions merited additional output.

At the end of April 2021, Coyote co-owners implemented coordinated offer processes that allowed for joint economic offer capability. On May 1, 2021, Coyote was economically decommitted for the first time. Coyote is co-owned by Otter Tail (35 percent), Minnkota Power Cooperative (30 percent), Montana Dakota Utilities (25 percent), and Northwestern Energy (10 percent). Otter Tail, Minnkota Power Cooperative,[3] and Montana Dakota Utilities operate within the MISO market, while Northwestern Energy operates within the Southwest Power Pool (SPP) market. The SPP and MISO markets do not coordinate the commitment nor the dispatch of jointly owned units. Both markets model the shares of a jointly owned unit as individual, separate, and distinct generators. As a result, partial commitment and dispatch of the unit, based on different co-owner shares and offers, can be a regular occurrence. Partial commitment and dispatch can result in under-recovery of startup and make whole payments to the partners whose shares are not committed or dispatched. From a practical standpoint, since the plant is one physical generator, commitment of a single owner's share of the plant will result in the commitment of all owners' shares of the plant. Per the co-owner contract, utilization of an economic offer requires unanimous agreement amongst the four co-owners. If any co-owner requests self-commitment, all other co-owners are required to self-commit their shares of the plant. Similarly, if MISO or SPP calls for a co-owner's portion of the plant, all other co-owners are obligated to self-commit their share, at least to minimum output. For 2023, Coyote coal costs were approximately **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS]** percent fixed costs and **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS]** percent variable costs. Historically, as a result of the fixed costs, there have been relatively few hours throughout a typical year where it did not make economic sense to operate the plant.

Big Stone Plant Joint Ownership
At the end of April 2020, Big Stone co-owners implemented coordinated offer processes that allowed for joint economic offer capability (i.e., the plant can be offered into both MISO and SPP markets for economic dispatch). Big Stone is co-owned by Otter Tail (53.9 percent), Montana Dakota Utilities (22.7 percent), and Northwestern Energy (23.4 percent). Big Stone maintains similar market operating complexities as Coyote. Big Stone straddles both the MISO and SPP wholesale energy markets and can be committed and dispatched by either ISO. Big Stone contractual obligations require partners to take their minimum share of the plant whenever another owner calls for commitment. Big Stone differs from Coyote in that its coal contract is structured utilizing nearly 100 percent variable costs, which results in a higher percentage of hours where MISO/SPP LMP market pricing is lower than Big Stone variable operating costs. Per the co-owner contract, offering the unit for economic dispatch

[3] Northern Municipal Power Agency owns a 30 percent share of the plant. Minnkota serves as operating agent for NMPA.

requires unanimous agreement amongst the three co-owners. If any co-owner requests self-commitment, all other co-owners are required to self-commit their share of the plant. Similarly, if MISO or SPP calls for a co-owner's portion of the plant, all other co-owners are obligated to self-commit their share, at least to minimum output.

Single Day Commitment by MISO

It should be noted that MISO utilizes a single day commitment and dispatch process. This means that market conditions for a given day, and that day only, would need to justify the economic commitment and dispatch of a unit. This often includes a large startup cost for baseload plants and may artificially increase cycling of the unit. The single day commitment and dispatch process does not consider the economics of running a baseload plant across multiple days. MISO has explored the possibility of a multi-day commitment process but does not currently have plans for development or implementation in the foreseeable future.

3. ANALYSIS APPROACH

The following reporting items in sections A-C were set forth in Attachment A of the Commission's January 11, 2021 Order. The Order, dated December 1, 2021, incorporated items D-H,[4] and the Order dated November 17, 2022, incorporated sections I-L.[4]

A. *In the investigation docket, Minnesota Power, Otter Tail, and Xcel shall provide stakeholders with the underlying data (work papers) used to complete their analyses, in a live Excel spread sheet, including, at minimum, the data points listed below for each generating unit, with the understanding that this may include protected data.*

Hourly data for all units:

a) Date and hour
b) Commit status (Null / Economic / Emergency / Must Run / Outage / Not Participating)
    i. Any hours with unavoidable self-commitment should be labeled as such, with a cause listed for the self-commitment in that hour. (Testing, contract, dispatch of co-owned generation, etc.)
c) Dispatch Status for Energy (Null / Economic / Self Schedule)
d) Cleared MW
e) Day ahead locational marginal price at unit node
f) Real time MW adjustment
g) Real time locational marginal price at unit node
h) Day ahead dispatch minimum
i) Real time dispatch minimum
j) Fuel cost ($/MWh)
    i. If a utility excludes any fuel costs from its MISO offer curves, the utility should also provide an analysis that includes all fuel costs, including those currently treated as fixed costs due to contractual terms.
k) Variable operations and maintenance costs ($/MWh)
    i. Utilities should provide Unit Fuel Costs and Unit Variable Cost as separate line items.

[4] Docket No. E-999/CI-19-704.

ii. Utilities should include all preventative maintenance in O&M costs for reporting purposes.
iii. Future analyses of self-commitment and self-scheduling should include all production costs including fuel, variable operations and maintenance, and other variable costs associated with the plant.

l) Day ahead locational marginal price representative of utility load zone
m) Real time locational marginal price representative of utility load zone
n) Whether Day Ahead Cleared = Day Ahead Dispatch Minimum (0 or 1)
o) Actual production in MWh (for all 8,760 hours of the year)
p) Day ahead MISO payment
q) Real time MISO payment
r) Net MISO energy payment
i. Include ancillary services revenues and any other make-whole payments as a separate column in all reporting on revenue from generation.
*s) Production costs ((J+K) * O)*
t) Net cost or benefit (R-S)

<u>Monthly or annual data for all units</u>:
u) Revenue from ancillary services (monthly)
v) Fixed operations and maintenance costs (preferably monthly) or reasonable estimates in approximation thereof
w) Capital revenue requirements (annual) or reasonable estimates in approximation thereof
x) Average heat rate at economic minimum
y) Average heat rate at economic maximum
z) To the extent not already provided, utilities should provide the following:
i. Length of minimum decommit time for each unit;
ii. Number of times in the analysis period that each unit incurred losses over a duration greater than or equal to its minimum decommit time;
iii. Of the periods identified in (ii), the number of periods when losses were greater than the relevant startup cost (warm or cold startup cost, depending on the length of the period); and
iv. Sum of losses in excess of startup cost that were incurred during periods identified in (iii).

Otter Tail Response

In addition to the above points a through z, Otter Tail incorporated additional columns to the Big Stone and Coyote hourly data spreadsheet templates, allowing for further analysis and insight into these units. As noted above, Otter Tail is one of multiple co-owners, and these units participate in both the MISO and SPP markets. As a result, there are numerous hours when Otter Tail is obligated to self-commit its share of these plants outside of Otter Tail's control. The additional columns, provided in AG-AL of Attachments 2 and 3, allow for analysis of hours when Otter Tail specifically endorsed self-commitment, excluding periods where the units must operate at least at minimum for building heat and plant testing, for both Big Stone and Coyote. These columns summarize MISO energy revenues, ASM revenues, make whole payment revenues,

variable production costs, and net benefits for Otter Tail endorsed hours of self-commitment (excluding required periods of building heat and plant testing).

Furthermore, Otter Tail has included hourly day-ahead and real-time SPP LMP for both Big Stone and Coyote. This data is located in columns AN and AO of Attachments 2 and 3.

Filing Attachments:
Attachment 1 to this filing provides a summary of the monthly revenues and costs for Big Stone and Coyote, for the current period.

Attachment 2 to this filing provides the requested hourly data for Big Stone Plant for the current reporting period and an analysis of the minimum decommit time and startup costs. It also provides the data and calculations for the estimated "best-case and worst-case potential for economic commitment" for Big Stone Plant.

Attachment 3 to this filing provides the requested hourly data for Coyote Station for the current reporting period and an analysis of the minimum decommit time and startup costs. It also provides the data and calculations for the estimated "best-case and worst-case potential for economic commitment" for Coyote Station.

Attachment 4 to this filing provides the fixed monthly O&M costs for Big Stone Plant and Coyote Station, per Attachment A of the Commission's January 11, 2021 Order, part v.

Attachment 5 to this filing provides plant heat rate information as available from Big Stone Plant and Coyote Station plant per Attachment A of the Commission's January 11, 2021 Order, parts x and y.

Attachment 6 to this filing provides a summary of the minimum decommit time analysis for each plant per Attachment A of the Commission's January 11, 2021 Order, part z.

Attachment 7 to this filing provides energy MWh produced and curtailed from utility owned and contracted wind facilities.

Analysis Approach:
The following outlines Otter Tail's analysis approach and assumptions included in the requested analysis, as well as other factors not included or considered:

1. This analysis compares the 2023 market energy revenues received versus both the variable costs included in determining the plant's MISO offer curve and the variable costs included in determining the plant's MISO offer curve plus fixed fuel costs. The market energy revenues are derived by the hourly Day Ahead (DA) and Real Time (RT) LMP per MWh of production.

2. Revenues associated with participation in the Ancillary Services Market (ASM) are included in this analysis.

3. Revenues associated with unit make whole payments are included in this analysis.

4. The costs of reagents are included in this analysis as they are included as part of Otter Tail's offer curve submitted to MISO. Otter Tail began recovering reagent costs through its the FCA beginning July 1, 2022. Reagent costs were recovered in base rates prior to that date.

5. One factor that is not quantifiable is the potential impact on both market prices and the related commitment and dispatch of any other Otter Tail generating units when either Big Stone or Coyote switch between self-commitment and economic commitment offer status.

6. The large coal units require different time durations for hot, warm, and cold starts. Also, from an "on" condition, the unit must cool for different durations in order to qualify for a hot, warm and cold start. The combined duration of cool down time and start up notification time for the coal plant starts are as follows:

Table 1
Startup Times by Plant

Startup Conditions	Big Stone Plant	Coyote Station
	[PROTECTED DATA BEGINS …	
Cold Start (including cool down time)		
Warm Start (including cool down time)		
Hot Start		
		… PROTECTED DATA ENDS]

7. Otter Tail includes variable preventative maintenance costs in the Unit Variable O&M cost category and in Attachments 2 and 3.

8. On January 24, 2022, Otter Tail, Minnesota Power, and Xcel Energy met to discuss the Commission requirement that utilities "work together to develop a consistent method for estimating the best-case and worst-case potential for economic commitment for each plant." The utilities have commonly defined a "best-case" scenario to be 100 percent economic commitment (i.e., offered for economic dispatch) and a "worst-case" to be 100 percent self-commitment. Otter Tail chose to utilize the existing and reported data set for this analysis (included in Attachment 2 and Attachment 3). The Otter Tail analysis is discussed in Section 4 of this filing.

B. *Minnesota Power, Otter Tail, and Xcel Energy shall evaluate whether reducing minimum operating levels would benefit customers and to include that evaluation and discussion in the March 1, 2021 compliance report.*

Otter Tail Response
In March of 2016, Big Stone reduced its total plant economic minimums from **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. In December of 2021 and January of 2022, Big Stone conducted further testing to determine whether additional reductions to the economic minimum output could be achieved. It was determined the total plant economic minimum could be reduced from **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. This reduction was implemented on April 1, 2022. Except for testing and plant derates, and the air-quality control system (AQCS) scrubber train transition issue described below, when self-committed, the Otter Tail share of Big Stone is self-scheduled at the economic minimum.

In 2015, Big Stone completed construction and began operation of a new AQCS system that reduced nitrogen oxides and sulfur dioxide emissions by approximately 90 percent and mercury emissions by approximately 80 percent. The AQCS system requires operation of two scrubber trains when operating at high output levels and one scrubber train when operating at low output levels. The initial physical minimum limitation under two scrubber trains was **[PROTECTED DATA BEGINS…**
…PROTECTED DATA ENDS]. The current physical minimum limitation under one scrubber train is **[PROTECTED DATA BEGINS…**
…PROTECTED DATA ENDS], which is the value listed in Columns L and M of Attachment 2 to this filing. Transitioning between one and two scrubber trains requires physical plant reconfigurations that can be labor intensive, cause additional wear and tear to the AQCS system, and require a minimum of 20 minutes to complete.

The decision to transition between one and two train operation is driven by MISO market pricing. Transitions between scrubber trains comes with additional costs, complexity in timing, communication, and market pricing issues associated with updating physical plant operating limits. When market prices are high, Big Stone will move up to full output, requiring utilization of both scrubber trains and the two-train economic minimum limit. Ideally, due to physical conditions and mechanical costs associated with transitions between one and two scrubber trains, Big Stone would remain at two trains for a minimum of six hours. However, if market pricing is considerably negative, Big Stone will initiate a return to one train operation and the utilization of the one train economic minimum limit. The lower the prevailing LMP market, the quicker the plant will return to one train operations and a lower economic minimum. The process, economics, and timelines to transition from two scrubber trains to one scrubber train has been reviewed by the MISO IMM, who has determined the Big Stone Plant train transition process to be reasonable.

Minimum load at Coyote changed from **[PROTECTED DATA BEGINS…**

….PROTECTED DATA ENDS] The reason for the varying minimum load level under colder ambient conditions is the temperature into the scrubber will be reduced and a higher temperature is needed to evaporate the slurry introduced to control sulfur emissions. Therefore, at lower loads and cold ambient temperatures, the plant would risk being out of compliance with regards to sulfur emissions with limited ability to increase scrubbing to control.

C. *Utilities with co-ownership of baseload generating units shall discuss options of economically committing those units within the terms of their partnership in the March 1, 2021 compliance report.*

Otter Tail Response
Big Stone (April 2020) and Coyote (April 2021) co-owners have implemented the capability to offer these units into the MISO and SPP markets utilizing an economic offer. As previously mentioned, these units straddle both the MISO and SPP wholesale energy markets and can be committed and dispatched by either ISO. Big Stone and Coyote contractual obligations require partners to take their minimum share of the plant whenever another owner, or market, calls for commitment. Per the co-owner contract, utilization of an economic offer requires unanimous agreement amongst the co-owners. If any co-owner requests self-commitment, all other co-owners are required to self-commit their share of the plant.

Similarly, if MISO or SPP calls for a co-owner's portion of the plant, all other co-owners are obligated to self-commit their share, at least to minimum output. This results in economic decommitment occurring only when all co-owners agree to offer the unit economically *and* the MISO and SPP markets do not economically commit the unit.

As of April 2020 for Big Stone and as of April 2021 for Coyote, co-owners have been meeting regularly to discuss and coordinate unit offer practices. In these meetings, co-owner marketing teams meet with Big Stone and Coyote operations staff to discuss the health of the unit, operational considerations, historical, current, and projected market conditions (in both the SPP and MISO markets), weather forecasts, and potential adjustments to the economic offer curves. Co-owners will then indicate their offer preference, and duration of, for either an economic offer or self-commitment. In the event one co-owner calls for self-commitment, all other co-owners are required to self-commit their share at minimum output.

The Big Stone and Coyote co-owner marketing teams meet regularly to discuss market conditions and offer strategy. The periodicity of the meetings is adjusted, as appropriate, during times of low market pricing (extended decommitment) or high market pricing (extended commitment). Co-owner marketing teams maintain communication between regularly scheduled meetings in the event market conditions call for updated offer parameters.

D. *Minnesota Power, Otter Tail, and Xcel Energy shall file in their March 1, 2021 filing a complete analysis of the costs and benefits of economic or seasonal dispatch relative to self-scheduling at the following facilities:*

a. Coyote Station
b. Big Stone Plant

Otter Tail Response
Otter Tail provides the updated analysis in Section 4 of the current filing.

E. *Otter Tail shall provide a discussion of the options of changing its current coal contract at Coyote Station and evaluation of how potential costs of changing the*

contract compare to Coyote Station's past and forecast operating losses in Docket No. E-999/CI-19-704.

Otter Tail Response
Coyote is a mine mouth generating facility, meaning that it was conceived, sited, designed, and constructed to have a long-term, integrated relationship with an immediately adjacent mine serving the plant. The mine is typically intended to serve just the mine-mouth plant with which it contracts, and it is therefore typically much smaller than the large mines that serve numerous delivered-fuel plants, such as the mines in the Powder River Basin that serve Big Stone. As noted in prior filings in this docket Coyote is the only mine-mouth generation facility regulated by the Commission; all other coal generation facilities regulated by the Commission are delivered-fuel plants.

One of the primary benefits of a mine-mouth plant, in contrast to a delivered-fuel plant, is that it is not dependent on the rail systems or other transportation systems, over which the coal necessary to fuel the plant must be transported. Of course, without having a secure and consistent long-term relationship with the adjacent mine, a mine-mouth plant would be exposed to fuel shortages; conversely, without a long-term relationship, the supplying mine would typically not make investments necessary to ensure the extraction of a consistent supply of coal necessary to fuel the plant. Without consistent fuel, the plant would not be reliable and would not be accreditable for capacity.

Mine/plant contracts for mine-mouth plants have very different fixed/variable components when contrasted with delivered-fuel plants. These differences are due to the nature of the relationship and what each party requires from the relationship. The mine, in the case of a mine-mouth plant, must recoup its fixed costs (the costs of investments in opening the mine, the equipment, reclamation, etc.) and its variable costs (certain costs that vary with the volumes produced) generally from a single customer with which it has a long-term relationship. The larger fixed components of these contracts when compared to delivered fuel contracts are not because the transacting parties have different desires about the way the plant should operate, etc. Similarly, the plant requires a long-term relationship with its supplier, to ensure a consistent supply of fuel at a known cost (it cannot replace that fuel from the market if the supplier were to increase its prices or become unreliable in some other way). These are economic attributes applicable to mine-mouth plants, and they are the reasons for the differences in fuel contracts. These attributes have been the subject of significant academic study, often under the term "asset specificity," (*see, e.g.*, Paul L. Joskow, "Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets", *American Economic Review*, March 1987); and several works of Nobel Laureate, O.E. Williamson.

Consistent with the foregoing explanation of contracting for mine mouth plants, Coyote obtains its fuel through an all-requirements Lignite Sales Agreement (LSA) with Coyote Creek Mining Company, L.L.C (CCMC), a subsidiary of North American Coal. Under the LSA, CCMC is responsible for developing, constructing, operating and eventually reclaiming the mining facility, the costs of which are reflected in the terms of the LSA. Coyote's co-owners and CCMC

entered into the LSA in 2012 with a term through the end of 2040.[5] The long term of the LSA reflects the unique nature of mine mouth facilities as noted above.

Given the nature of mine-mouth agreements, there are few, if any, options for changing the terms of the LSA to address fluctuating market conditions. As one of several co-owners, Otter Tail lacks the ability, by itself, to seek changes to the terms of the LSA. Any effort to change the terms of the contract would require the co-owners to act in concert, and even then, the co-owners together lack the ability to make changes to the LSA without the agreement of the seller. Therefore, any changes to the LSA would need to be secured through negotiations. In short, changes to the LSA would require at least two agreements: (1) an agreement among co-owners to pursue changes, to include an agreement on acceptable trade-offs and costs necessary to secure negotiated contract changes, and (2) an agreement between the co-owners and CCMC (and North American Coal) to change terms. In addition, any changes to the relationship would require approval of CCMC lenders. In sum, there are significant barriers to seeking changes to a mine-mouth supply agreement, especially in the context of joint-ownership of the generation facility.

A discussion concerning options for changing the LSA and an "evaluation of how potential costs of changing the contract compare to Coyote's past and forecast operating losses" should also address the concept of operating losses. Otter Tail has previously noted in this docket and in Otter Tail's most recent general rate case that an operating or production cost loss analysis has significant flaws.[6] While comparisons of MISO revenue and production costs is a useful measure of a generation plant's flexibility in responding to changing market conditions, it is not indicative of a generation plant's cost effectiveness. Whether a generation facility is cost effective requires a broader analysis involving market price forecasts and other forecasts, capacity expansion modelling and other considerations generally considered in IRP proceedings. There are many cost-effective plants that have limited operational flexibility that would show production losses, including most non-dispatchable renewable resources and many base load generators. This issue is addressed more fully in the "Additional Discussion" section below.

F. *The Commission carries forward all the requirements from prior orders in Docket Nos. E-999/AA-18-373 and E-999/CI-19-704 and requires inclusion of the following in future reports:*

a. Information on annual carbon dioxide emissions

The following table provides 2023 carbon dioxide emissions and plant output for Big Stone and Coyote.

[5] In Docket No. E017/D-13-795, the Commission approved extending the remaining life of Coyote Station by 8.4 years to 27.4 years, with an AYFR of 2041 to correspond with the anticipated duration of the LSA.

[6] As used in this docket operation or production losses refers to a comparison of MISO revenues received for the plant and production costs. Among other problems this analysis does not account for Coyote Station's significant capacity function. It also incorrectly assumes Otter Tail would rely on the spot market in the absence of Coyote Station, rather than securing replacement resources. See Docket No. E017/GR-20-719, Gerhardson Rebuttal at 16-21.

Table 2
Plant CO_2 Emissions Data

Year	Big Stone Plant (total plant data)			Coyote Station (total plant data)		
	CO_2 tons	Net MWh	CO_2 Rate, lbMWh	CO_2 tons	Net MWh	CO_2 Rate, lbMWh
2023	2,094,916.3	1,566,638	2,674	3,209,506.0	2,578,425	2,490

Although the above data was used to calculate each plant's annual average rate of CO2 emitted per megawatt-hour, the rate produced for any given hour is dependent on several variable operating conditions, such as load level and coal quality. Therefore, although a high-level estimate of avoided CO2 emissions will be made by multiplying the annual average CO2 rates by economic commitment hours, an exact number cannot be determined.

b. Reasons for unavoidable self-commit status designations

Attachments 2 and 3 contain hourly unavoidable self-commitment status designations.

The following list describes some of the reasons for unavoidable self-commitment at Coyote Station and Big Stone Plant:

- Co-owner request
- Building heat requirements
- SPP market conditions
- Testing
- Maintenance and operational logistics
- Safety
- Emission requirements
- Third party obligation (i.e., steam contracts)

In the 2023 filing, Otter Tail added, or perhaps delineated, building heat requirements as a main reason for required self-commitment. While building heat has always been necessary for reliable operations during winter months, this reason for self-commitment had previously been included within the category of co-owner request. The understanding being that co-owners would almost always call for self-commitment during winter operating conditions. The addition of a building heating category, and the monitoring of necessary building heat conditions, will help to better pinpoint when building heating requirements are truly necessary.

During the winter season, building heat is required for Big Stone Plant and Coyote Station to operate. Failure to provide building heat would result in freezing plant components and reduced reliability. Building heat is primarily provided through standard plant operations. While both Big Stone Plant and Coyote Station maintain building heat that is independent of plant operations, called the auxiliary boiler, it is considered a back-up heating system and is not designed to be the primary source of heat for the plant. The auxiliary boiler was designed and sized to initiate unit startup after being offline. When the

plant is online and committed, the auxiliary boiler functions as intended, as a back-up heating system for emergency situations.

In cold weather temperatures, if the plants are not operating, the risk to Big Stone Plant and Coyote Station is twofold. First, if the auxiliary boiler fails, there is no redundant heating system. Second, and more importantly, if the auxiliary boiler fails, there would not be a means to initiate startup of the power plant. If the auxiliary boiler trips for any reason it must be immediately repaired. Based upon experience, Otter Tail knows it would take up to a week to bring in a temporary boiler to heat the plant, and it would not be possible to avoid component freezing and damage in that scenario.

From a winter operations standpoint, the likelihood of Big Stone Plant and Coyote Station being available to respond to a winter storm event is much higher if the plants are already online. If the plants have been offline for a period of time, the chance of a smooth startup and commitment is lower, reducing plant reliability.

Based on observation of internal and external temperatures, plant engineers determined that at an average daily temperature of 35 degrees the plant would retain enough residual heat to prevent any damage to its components. At this average daily temperature, the plant could be safely shut down and would not require the auxiliary boiler to run for plant heat.

Starting in October of 2023 Otter Tail began recording daily 7-day temperature forecasts at both Big Stone Plant and Coyote Station. As noted above, if the 7-day average temperature forecast is less than 35 degrees (average of the daily high and daily low averaged across 7 days), self-commitment is determined to be required for building heat purposes. For this 2023 filing, for days prior to recording the 7-day plant temperature forecasts, any daily average historical temperature (average of daily high and daily low) less than 35 degrees was recorded as requiring self-commitment for building heat purposes. In future filings, Otter Tail will continue to record 7-day plant temperature forecasts and designate building heating self-commitment requirements as appropriate.

Finally, it should also be noted it is possible that multiple unavoidable self-commitment reasons may be present at any given time. For example, non-Otter Tail co-owners may request continued self-commitment due to expected SPP market conditions.

c. Plant startup conditions (e.g. cold, warm, or hot)

Attachments 2 and 3 identify designations for plant startup conditions for each startup occurrence.

d. Equivalent Forced Outage Rate information to be tracked over time

The following table provides the Equivalent Forced Outage Rate for both Big Stone and Coyote for the past ten years and by month in 2023. The method

and formula for calculating Equivalent Forced Outage Rate can be found on the NERC website.[7]

Table 3
Equivalent Forced Outage Rates

Year	Big Stone Plant	Coyote Station
	[PROTECTED DATA BEGINS…	
2014		
2015		
2016		
2017		
2018		
2019		
2020		
2021		
2022		
2023		

…PROTECTED DATA ENDS]

2023	Equivalent Forced Outage Rate (EFOR)	
Month	Big Stone	Coyote
	[PROTECTED DATA BEGINS…	
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		
Total		

…PROTECTED DATA ENDS]

[7] https://www.nerc.com/pa/RAPA/gads/Pages/Data%20Reporting%20Instructions.aspx.

e. Descriptions of changes to operating procedures and physical modifications to units to ensure plants are becoming more flexible to meet upcoming challenges as applicable.

Otter Tail continually assesses operating procedures and physical modifications to both Big Stone and Coyote to increase flexibility. These types of changes often involve operating outside the original design parameters of the units or operating in conditions that have not been experienced previously. Every potential change is well thought out and designed and requires testing and validation under extended periods of operation. Therefore, small changes over long periods of time are required to ensure that negative impacts do not outweigh the positive results.

In April 2016, Big Stone lowered the minimum operating load from **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. Procedure changes required to accommodate this included shutting down one scrubber train and one boiler feed pump. These lower loads contributed to ash build up in the flue gas duct at the boiler exit. In October 2020, modifications were made to the duct to reduce the ash build up. After months of operation, it was determined that this modification was successful in reducing the ash accumulation.

To further increase flexibility, Big Stone performed more testing in late 2021 to reduce the minimum load from **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. Control logic and procedure changes were required, including reducing the boiler minimum air flow trip setting after consulting with Boiler OEM, modifying the boiler excess air curve, and valving in auxiliary steam from the main steam drum. The Big Stone Plant co-owners approved operations at the new minimum load effective April 1, 2022.

Coyote also tested and successfully implemented the lowering of its minimum operating load from **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. Lowering the minimum operating load was made possible by the replacement of a bottom ash handling system that was completed in compliance with Coal Combustion Residual rules in 2019. Similar to Big Stone, Coyote tested a new minimum load of **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS]. This new minimum at Coyote is now in place at ambient temperatures greater than 32 degrees F.

Another change implemented to increase flexibility at Coyote is the installation of fuel analysis equipment in 2019. This equipment provides Coyote staff the ability to instantly analyze the quality of coal delivered to the plant from the adjacent mine. If coal quality is unacceptable, Coyote staff notifies the mine and higher quality coal is delivered. The result of installing the new equipment and implementing procedures to work with the mine has

significantly reduced fuel related limitations on boiler cleanliness across all load ranges.

G. *The Commission directs Xcel Energy, Minnesota Power, and Otter Tail to develop a methodology, that is consistent to the extent possible, for splitting fuel costs such that one part depends on the megawatt-hour (MWh) production (i.e. variable cost) and the other part is independent of the MWh generated (i.e. fixed cost) and update the reporting template accordingly.*

Otter Tail Response
Representatives from Minnesota Power, Otter Tail, and Xcel Energy met on January 24, 2022, to discuss a consistent methodology for reporting the required data. Column N in a plant's *Self-Commitment Hourly Template* tab will be used to provide variable portions of fuel costs and column O will be used to provide fixed portions of fuel costs if applicable. The Otter Tail fixed fuel costs, column O, have been converted into an hourly value (total monthly fixed costs divided by total monthly MWhs produced) for calculation purposes and to fit the hourly reporting format. It is Otter Tail's understanding, based on the conversations among the utilities, that Otter Tail is the only company that would have fixed fuel cost components factored into the analysis.

H. *The Commission requires the utilities to work together to develop a consistent method for estimating the best-case and worst-case potential for economic commitment for each plant.*

Otter Tail Response
During the meeting on January 24, 2022, the utilities discussed methods for estimating the best-case and worst-case potential for economic commitment. Otter Tail's analysis is included in Section 4 of this filing.

I. *The Commission requires the inclusion of MISO and SPP market conditions in determining its self-commitment endorsement and show net benefit results in addition to the analysis provided by otter tail in tables 6 and 8 of its 2021 filing.*

Otter Tail Response
MISO market conditions are included in Attachment 2 and Attachment 3. Net benefits for Otter Tail are based on MISO market pricing and are discussed in Section 4 and detailed in Attachment 2 and Attachment 3. Otter Tail has also included SPP hourly LMP pricing for Big Stone and Coyote in columns AN and AO of Attachment 2 and Attachment 3.

J. *The Commission requires the inclusion in its 2023 and 2024 annual reports an update on its progress toward implementing the Total Plant Offer Optimization Plan and Combined Modeling of MISO Co-Owner Generation Shares Plan at Big Stone Plant and Coyote Station.*

Otter Tail Response
The Total Plant Offer Optimization Plan and Combined Modeling of MISO Co-Owner Generation Shares Plan are potential initiatives, suggested by Otter Tail to the other co-owners, that may improve efficiencies and overall economic plant performance.

All co-owners maintain historical awareness of these potential initiatives and have each considered the pros and cons of advancement. Moving forward with either of these initiatives would require unanimous consent from all co-owners (less Northwestern Energy on the Combined Modeling of MISO Co-Owner Generation Shares Plan). In February 2024, Otter Tail again inquired of each co-owner regarding their interest in pursuing one or both plans. In response to the Otter Tail February 2024 inquiry, none of the other co-owners supported advancing either proposal.

K. *The Commission requires the inclusion of avoided carbon dioxide emissions due to economic commitment along with plant level carbon dioxide emissions in subsequent filings using the Department's recommended method.*

Otter Tail Response
Using the Department's recommended method, the calculated avoided carbon dioxide emissions due to economic commitment were 65,346 tons at Big Stone[8] and 4,482 tons at Coyote. Plant level carbon dioxide emissions are presented in Table 2.

L. *The Commission requires the inclusion of energy MWh produced and curtailed from utility owned and contracted wind facilities monthly for each facility*

Otter Tail Response
Attachment 7 provides energy MWh produced and curtailed from utility owned and contracted wind facilities. Monthly MWh production is provided for each facility, and monthly curtailment is provided for contracted wind facilities. The curtailment for Otter Tail owned facilities is provided as an annual total for each facility.

4. ANALYSIS RESULTS:

For the 2023 reporting period, the market revenues and plant costs for market operations at Big Stone and Coyote are detailed in the narrative and summary tables below.

General 2023 Market Conditions

The ten-year history of average, annual, day ahead, LMP pricing at Big Stone and Coyote pricing nodes are reflected in Table 4 below:

Table 4
DA LMP Average Hourly Price History

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Big Stone Plant	$28.56	$20.57	$19.08	$21.20	$25.30	$20.08	$13.74	$15.54	$19.40	$13.30
Coyote Station	$28.91	$20.26	$17.44	$20.34	$24.82	$20.39	$13.30	$25.76	$38.27	$25.37

[8] Calculated by multiplying the annual average carbon dioxide emission rate in Table 2 of 2,674 lb/MWh by the minimum Big Stone output by the number of hours on economic commitment at zero megawatts.

The historically low 2020 LMP pricing levels were driven by several factors, including, but not limited to, low natural gas markets, continued renewable resource penetration, and impacts to load driven by the COVID-19 pandemic. System wide 2021 prices increased as compared to pricing in 2020, largely driven by natural gas price increases. The 2022 pricing increased substantially over 2021 due to further increases in the natural gas markets, reduced natural gas storage levels, and market uncertainty across the winter season due historical winter storm events. 2023 market pricing experienced a reduction in pricing, once again driven by reduced natural gas pricing and increased levels of natural gas storage. While Coyote tends to follow market wide pricing patterns more closely, elevated system congestion at Big Stone remained, keeping localized LMP pricing suppressed lower than the rest of the market. As mentioned in previous filings, as renewable resource penetration continues to grow, it is necessary to upgrade the transmission system. These upgrades often result in long-term, yet temporary, line outages, which act to exacerbate already constrained areas, increasing congestion within those transmission pockets. Big Stone is located within such a pocket. As Big Stone regional transmission system upgrades and outages are completed, congestion in this transmission constrained region should improve but only if the rate of transmission export expansion exceeds the rate of new generation siting.

Big Stone Plant

For the 2023 reporting period, the revenues, costs, and net benefits/costs of market operations for Big Stone are reflected in Table 5 below. Table 5 compares the Big Stone market revenues against both variable costs and variable costs combined with fixed fuel costs.

Table 5
Big Stone Plant Net Benefit/Cost Summary 2023

Revenue	Variable Costs	Variable Cost Net Benefit / Cost	Variable Costs Plus Fixed Fuel Costs	Variable Costs Plus Fixed Fuel Costs Net Benefit / Cost
[PROTECTED DATA BEGINS…				
				…PROTECTED DATA ENDS]

Revenues include MISO energy payments, ASM payments, and make whole payments. These revenues are reported on an hourly basis in columns T, U, and AA of the *Self-Commitment Hourly Template* tab in Attachment 2. Monthly summaries for Big Stone are included in Attachment 1 to this filing.

Variable costs include fuel for generation, reagents (i.e., lime, activated carbon, ammonia), emission allowances, and miscellaneous operation and maintenance costs (largely water treatment chemicals). Variable costs are reported on an hourly basis in column AC of the *Self-Commitment Hourly Template* tab in Attachment 2. Due to the co-ownership of Big Stone, and varying commitment and dispatch patterns of each co-owner, Otter Tail reports variable costs using an average per MWh cost by month which can be found in columns N, P, and Q of the *Self-Commitment Hourly Template* tab in Attachment 2.

Fixed fuel costs include train lease costs. Variable costs plus fixed fuel costs are reported on an hourly basis in column AD of the *Self-Commitment Hourly Template* tab in Attachment 2. Like variable costs, Otter Tail reports fixed fuel costs using an average per MWh cost by month (total fixed monthly fuel costs divided by MWhs generated in the month) which can be found in column O of the *Self-Commitment Hourly Template* tab in Attachment 2.

Figure 1 provides a year-over-year comparison for Big Stone revenues and total costs from 2017-2023. It shows that Big Stone's costs of operations have remained stable over the period, and that Markets have turned higher following lows in 2020. We expect markets will be more volatile and uncertain in the future.

Figure 1
Big Stone Revenue and Fuel Cost

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Once again, it should be emphasized that Big Stone is a co-owned unit, operating in two markets, and that Otter Tail is obligated to self-commit its share of the plant if any other co-owner, MISO, or SPP commits a co-owner's share of the unit.

At the end of 2019, Otter Tail led the development of Big Stone economic offer capability for the co-owners. This capability was implemented near the end of April 2020. In 2023, Big Stone co-owners utilized economic offers in the months of April and November.

Big Stone experienced two extended outages in 2023. The first extended outage was due to turbine vibration issues beginning November 5, 2022, and lasting through February 9, 2023. The second extended outage was for fall maintenance from September 28 through October 24.

It should also be emphasized that for significant periods of 2023, Otter Tail was obligated to self-commit its share of the plant. The largest drivers in forced self-commitment were due to

building heat requirements during cold winter months and co-owner requests to self-commit. Co-owner self-commitment requests were often driven by higher LMP pricing in the SPP market. At the Big Stone node, SPP day ahead market pricing was nearly 77 percent higher than MISO pricing. The 2023 day ahead Big Stone pricing in SPP averaged $23.61 per MWh versus $13.30 per MWh in MISO. This considerable price difference can result in significantly divergent commitment and dispatch patterns.

In this 2023 filing Otter Tail has identified days and hours of plant operation that were obligated to maintain self-commitment due to building heat requirements. While building heat requirements have always been present, in past filings those days and hours were generally included within the co-owner request category of self-commitment.

In past filings, Otter Tail provided additional analysis comparing Big Stone Plant Actual performance against Otter Tail endorsed hours of self-commitment. In this 2023 filing, this analysis has been greatly simplified as there was only one day in 2023 where Otter Tail called for Big Stone self-commitment outside of needs for building heat and plant testing. That day occurred on April 24th, 2023. On that day, the net benefit, based on variable costs, was $20,566. Table 6 reflects total hours, revenue, variable costs, and net benefit. Hourly calculations for this analysis can be found in columns AG through AL of the *Self-Commitment Hourly Template* tab in Attachment 2.

Table 6
Big Stone Plant Performance under OTP Endorsed Self-Commitment Hours – Outside of Required Building Heat and Plant Testing Periods
2023

Scenario	Hours	Revenue	Variable Costs	Variable Cost Net Benefit / Cost
	[PROTECTED DATA BEGINS…			
2023 OTP Endorsed Hours of Self-Commitment				
				…PROTECTED DATA ENDS]

Throughout 2023, outside of building heat and plant testing requirements, Otter Tail has consistently called for utilization of an economic offer at Big Stone Plant. The above analysis primarily demonstrates that Otter Tail is making prudent self-commitment decisions for Big Stone. However, it should be noted and emphasized that Otter Tail recommendations for economic commitment are often superseded by other co-owner requests for self-commitment.

In summary, periods of lower LMP pricing driven by reduced natural gas markets, combined with additional hours of co-owner requests for self-commitment, resulted in marginally negative 2023 net benefits (market revenues less production costs). While periods of economic offers and economic decommitment were limited, the plant's ability to ramp between minimum and maximum output during market fluctuations worked to optimize economic performance. Otter Tail will continue to work with its co-owners to improve and enhance future plant performance.

Coyote Station
Table 7 below compares the Coyote market revenues against both variable costs, and variable costs combined with fixed fuel costs, for the 2023 reporting period.

Table 7
Coyote Station Net Benefit/Cost Summary 2023

Revenue	Variable Costs	Variable Cost Net Benefit / Cost	Variable Costs Plus Fixed Fuel Costs	Variable Costs Plus Fixed Fuel Costs Net Benefit / Cost
[PROTECTED DATA BEGINS…				
				…PROTECTED DATA ENDS]

Revenues include MISO energy payments, ASM payments, and make whole payments. These revenues are reported on an hourly basis in columns T, U, and AA of the *Self-Commitment Hourly Template* tab in Attachment 3.

Variable costs include the variable component of the mine fuel invoice for delivered lignite **[PROTECTED DATA BEGINS…** **…PROTECTED DATA ENDS]**, reagents costs (i.e., lime and activated carbon), coal conversion tax, and miscellaneous variable operation and maintenance costs (largely water treatment costs). Variable costs are reported on an hourly basis in column AC of the *Self-Commitment Hourly Template* tab in Attachment 3. Due to the co-ownership of Coyote, and varying commitment and dispatch patterns of each co-owner, Otter Tail reports variable cost using an average per MWh cost by month which can be found in columns N, P, and Q of the *Self-Commitment Hourly Template* tab in Attachment 3.

Fixed fuel costs include the fixed component of the mine fuel invoice for delivered lignite **[PROTECTED DATA BEGINS…** **…PROTECTED DATA ENDS]**. Variable costs plus fixed fuel costs are reported on an hourly basis in column AD of the *Self-Commitment Hourly Template* tab in Attachment 3. Like variable costs, Otter Tail reports fixed fuel costs using an average per MWh cost by month (total fixed monthly fuel costs divided by MWhs generated in the month) which can be found in column O of the *Self-Commitment Hourly Template* tab in Attachment 3.

Figure 2 provides a year-over-year comparison for Coyote revenues and total costs (fixed and variable) from 2017-2023. Like Figure 1 did for Big Stone, Figure 2 shows that Coyote's costs of operations have remained stable over the period and that Markets have turned higher following lows in 2020. We expect markets will be more volatile and uncertain in the future. Taken together, Figures 1 & 2 demonstrate that the perceived "net benefit/costs" of Big Stone and Coyote in this docket have largely been driven by the prices available in the energy markets (which have been highly variable) not by the production costs of the plants (which have been very stable).

Figure 2
Coyote Revenue and Fuel Cost

[PROTECTED DATA BEGINS…

…PROTECTED DATA ENDS]

As reported in the above section describing the Coyote fuel contract, Coyote is fueled by the Coyote Creek mine. As a result of this fuel source, and the contract structure described above, much of the fuel costs for Coyote are fixed. This means Otter Tail is obligated to pay for these costs whether or not the fuel is consumed to generate electricity. These fixed costs equate to sunk costs and do not play a role in appropriately developing market offers on a day-to-day basis. As such, Otter Tail maintains it is appropriate to judge Coyote's commitment and dispatch decisions based on variable costs, not variable costs plus fixed fuel costs.

Throughout 2020 and early 2021, the co-owners worked toward the development of Coyote economic offer capability. At the end of April 2021, Coyote co-owners implemented coordinated offer processes that allowed for joint economic offer capability. On May 1, 2021, Coyote was economically decommitted for the first time.

Once again it should be emphasized that Coyote is a co-owned unit, operated in two markets, and that Otter Tail is obligated to self-commit its share of the plant if any other co-owner or either MISO or SPP commit a co-owner's share of the unit. In 2023, the largest drivers in forced self-commitment were due to building heat requirements during cold winter months and co-owner requests to self-commit. This resulted in significant periods where Otter Tail was obligated to self-commit its share of Coyote. In 2023, Coyote co-owners utilized economic offers in the month of April. At the Coyote node, SPP market pricing was approximately 10 percent higher than MISO pricing. The 2023 Coyote pricing in SPP averaged $28.04 per MWh versus $25.37 per MWh in MISO. MISO market congestion at Coyote was reduced in 2022 and 2023 as compared to 2020 and 2021. As a result, Coyote LMP pricing in MISO and SPP have become considerably more aligned, including periods where MISO pricing equaled or exceeded SPP pricing.

Similar to Big Stone Plant, in this 2023 filing Otter Tail has identified days and hours of Coyote Station operation that were obligated to maintain self-commitment due to building heat requirements. While building heat requirements have always been present, in past filings those days and hours were generally included within the co-owner request category of self-commitment.

In past filings, Otter Tail provided additional analysis comparing Coyote Station actual performance against Otter Tail endorsed hours of self-commitment. In this 2023 filing, this analysis has been greatly simplified as there was only one day in 2023 where Otter Tail called for Coyote Station self-commitment outside of needs for building heat and plant testing. That day occurred on April 2nd, 2023. On that day, the net benefit, based on variable costs, was $35,987. Table 8 reflects total hours, revenue, variable costs, and net benefit. Hourly calculations for this analysis can be found in columns AG through AL of the *Self-Commitment Hourly Template* tab in Attachment 3.

Table 8
Coyote Station Performance under OTP Endorsed Self-Commitment Hours – Outside of Required Building Heat and Plant Testing Periods
2023

Scenario	Hours	Revenue	Variable Costs	Variable Cost Net Benefit / Cost
	[PROTECTED DATA BEGINS…			
2023 OTP Endorsed Hours of Self-Commitment				
				…PROTECTED DATA ENDS]

Throughout 2023, outside of building heat and plant testing requirements, Otter Tail has consistently called for utilization of an economic offer at Coyote Station. The above analysis primarily demonstrates that Otter Tail is making prudent self-commitment decisions for Coyote Station. However, it should be noted and emphasized that Otter Tail recommendations for economic commitment are often superseded by other co-owner requests for self-commitment.

In summary, as compared to 2022, periods of lower LMP pricing driven by reduced natural gas markets and reduced localized market congestion at Coyote resulted in lowered 2023 net benefits (market revenues less production costs). While periods of economic offers and economic decommitment were limited, the plant's ability ramp between minimum and maximum output during market fluctuations worked to optimize economic performance. Otter Tail will continue to work with its co-owners to improve and enhance future plant performance.

Item Z
The following reporting item z, was set forth in Attachment A of the Commission's January 11, 2021 Order in Docket No. E-999/CI-19-704:

z) To the extent not already provided, utilities should provide the following:
- *i. Length of minimum decommit time for each unit;*
- *ii. Number of times in the analysis period that each unit incurred losses over a duration greater than or equal to its minimum decommit time;*
- *iii. Of the periods identified in (ii), the number of periods when losses were greater than the relevant startup cost (warm or cold startup cost, depending on the length of the period); and*
- iv. *Sum of losses in excess of startup cost that were incurred during periods identified in (iii).*

Item z, i, length of minimum decommit time for each unit, which Otter Tail interprets as the combined cool down time and startup notification time, were described earlier in this filing and are listed in Table 1.

In Otter Tail's review of the 2020 filing requirements, items z, ii through z, iv were ambiguous and difficult to answer. Otter Tail was uncertain about how to accurately develop the requested analysis. Prior to completion of the 2020 compliance filing, Otter Tail brought the issue to the other utilities, stakeholders, and the Department, as part of the required data template compliance filing meetings. Through these joint discussions, the utilities and stakeholders agreed that the language of item z was not specific enough to provide adequate direction to develop the requested analysis. Ultimately, Fresh Energy and The Sierra Club agreed to define and develop a calculation methodology for items z, ii through z, iv, which they then shared with the utilities and the Department. After a few relatively minor utility revisions, all parties came to agreement on the new item z calculation methodology. This new calculation directly utilizes the data provided within the agreed upon compliance filing template. For the 2023 compliance filing, Otter Tail continues to use the jointly developed, 2020, item z calculation methodology. Item z data and calculations can be found in Attachments 2 and 3 on the *Consecutive Hours* and *Item Z Summary* tabs.

The item z calculation essentially asks four questions relating to 2023 operations:
1. How many times throughout the 2023 operating year did the unit maintain consecutive hours of operating losses greater than the minimum downtime of the plant (cool down time plus startup notification time)?
2. What were the cumulative operating losses of the occurrences identified in item 1?
3. How many of the occurrences in item 1 had operating losses greater than the startup cost of the unit?
4. What were the cumulative operating losses of the occurrences identified in item 3?

Note that this analysis does not account for additional startup costs that would be incurred with cycling the plant on and off.

The item z analysis was applied to both a variable cost scenario and a variable cost-plus-fixed-fuel cost scenario. Otter Tail completed the requested item z calculation utilizing a cold minimum downtime (hot to cold cooldown and cold startup notification times). Table 9 summarizes the item z analysis for Big Stone Plant and Coyote Station.

Table 9
Big Stone Plant and Coyote Station Item Z Summary Table

		Big Stone Plant		Coyote Station	
		Variable Costs	Variable Costs Plus Fixed Fuel	Variable Costs	Variable Costs Plus Fixed Fuel
Line		**[PROTECTED DATA BEGINS…**			
1	No. of Occurrences Consecutive Hours of Operating Loss Exceeds Min Downtime				
2	Cumulative Operating Losses of Hours Identified in Line 1				
3	No. of Occurrences in Line 1 Where Operating Losses Exceeded Startup Costs				
4	Cumulative Operating Losses of the Occurrences Identified in Line 3				
			…PROTECTED DATA ENDS]		

While Otter Tail appreciates the intent of the above analysis, it is not representative of actual operational effectiveness or historical performance at Big Stone or Coyote. At both Big Stone and Coyote, many of the above occurrences are a result of the SPP market, building heat requirements, or co-owner requests, requiring the Otter Tail share of these jointly owned units to remain online and self-committed.

Economic Commitment Best and Worst-Case Estimate
On January 24, 2022, Otter Tail, Minnesota Power, and Xcel Energy met to discuss the Commission requirement that "utilities are to work together to develop a consistent method for estimating the best-case and worst-case potential for economic commitment for each plant." The utilities have commonly defined a "best-case" scenario to be 100 percent economic commitment and a "worst-case" to be 100 percent self-commitment. Otter Tail chose to utilize the existing and reported data set for this analysis (included in Attachment 2 and Attachment 3), while the other two utilities chose other processes to complete their analysis. The Otter Tail analysis is discussed below.

It is important to note, and emphasize, the results of the analysis below are estimates. It is not possible for Otter Tail to precisely calculate how the MISO and SPP market might have been committed and dispatched differently under different offer assumptions.

Otter Tail developed three cases for both Big Stone and Coyote utilizing historical 2023 market data.

1. Self-Commitment: In this analysis, the Otter Tail share of the plant was self-committed, on a 24-hour calendar day basis, whenever the unit was not in an outage. Unit dispatch above minimum output was based on historical DA and RT LMP pricing, utilizing the unit's heat input curve and cost of fuel and reagents. Market revenues were determined based on cleared DA and RT generation and historical

2023 DA and RT LMP pricing. The unit was not available for commitment and dispatch during historical 2023 outage periods. Whenever the unit returned from outage, cold startup costs were applied.

2. Economic – Otter Tail share is assumed to be independently committable and dispatchable: In this analysis the Otter Tail share of the unit is assumed to be its own unique generator, independent of co-owner operational considerations. When the unit was online, future commitment and dispatch occur when market revenues exceed variable production costs. When the unit was offline, future commitment and dispatch occur when market revenues exceed variable production costs plus startup costs. Commitment decisions were based on a 24-hour calendar day basis. Commitment and dispatch decisions were based on historical DA and RT LMP pricing, utilizing the unit's heat input curve and cost of fuel and reagents. Market revenues were determined based on cleared DA and RT generation and historical 2023 DA and RT LMP pricing. The unit was not available for commitment and dispatch during historical 2023 outage periods. Whenever the unit returned from offline status, cold startup costs were applied.

3. Economic – Otter Tail share constrained by unavoidable self-commitment: Case 3 is the same as case 2 except case 3 accounts for instances of unavoidable self-commitment. When 2023 historical instances of unavoidable self-commitment occur, the unit is required to come online regardless of prevailing market conditions. In this analysis, the unit can be committed by either favorable MISO market conditions or unavoidable self-commitment requirements.

Due to the complexities of commitment and dispatch analysis, several simplifying assumptions were required to model the above three case scenarios. Those assumptions are summarized below:

1. Unit commitment decisions were based on a calendar day basis, not an hour-by-hour basis.
2. The unit is only committable in the DA market, not the RT market (theoretically a baseload coal unit could be committed in the RT, but in practice this has very rarely occurred for Otter Tail units).
3. Co-optimization of ancillary services is not considered in this analysis. Commitment, dispatch, and market revenues are only based on energy.
4. Ramp rates are not accounted for in this analysis. Hour by hour dispatch was determined solely by market pricing, the unit's heat input curve, and cost of fuel and reagents.
5. Historical derates are not accounted for. It is assumed the unit maintains its full range of normal dispatch, econ min to econ max, for every hour the unit is not on outage. Economic minimum constraints associated with the Big Stone AQCS scrubber train transitions are not accounted for.
6. When an operating day contained one or more hours of outage, the unit's outage was assumed to be for the entire calendar day.
7. Minimum cool down and startup times are not considered in the analysis.
8. The analysis utilizes fuel costs and heat input curves in effect on October 20, 2023 for Coyote Station and December 18, 2023 for Big Stone Plant.

It should be emphasized case 2 is not a possible, or even reasonable, operating status for the Otter Tail shares of Big Stone and Coyote. As discussed earlier in this filing, Otter Tail is obligated to self-commit our share of both Big Stone and Coyote whenever a co-owner requests, or MISO/SPP calls for, commitment of either unit. As such, Otter Tail included case 3 analysis to illustrate a more realistic measure of full economic offer capability. It should be further highlighted this analysis assumes all the economies of scale, associated with the total plant output of Big Stone and Coyote, would be achievable for plants sized equal to the Otter Tail ownership share. It is highly unlikely that smaller, independent, coal resources, sized equal to the Otter Tail ownership share, would maintain equivalent economies of scale.

Table 10 shows the tabular results of the modeled Big Stone 2023 best and worst-case economic commitment estimate analysis. Figures 3 and 4 show the same data in graphical format while also comparing the modeled data against the 2023 actual results reported in Table 5.

Table 10
Big Stone Plant 2023 Best and Worst-Case Economic Commitment Estimate

Case	Market Revenues	Startup Costs	Variable Production Costs	Net Market Revenues Less Variable Production and Startup Costs	Variable Plus Fixed Production Costs	Net Market Revenues Less Variable Plus Fixed Production and Startup Costs
[PROTECTED DATA BEGINS…						
…PROTECTED DATA ENDS]						

Figure 3
Big Stone Plant 2023 Best and Worst-Case Economic Commitment Estimate
Variable Production Costs

[PROTECTED DATA BEGINS…

…PROTECTED DATA ENDS]

Figure 4
Big Stone Plant 2023 Best and Worst-Case Economic Commitment Estimate
Variable Plus Fixed Production Costs

[PROTECTED DATA BEGINS…

…PROTECTED DATA ENDS]

Table 11 shows the tabular results of the modeled Coyote 2023 best and worst-case economic commitment estimate analysis. Figures 5 and 6 show the same data in graphical format while also comparing the modeled data against the 2023 actual results reported in Table 7.

Table 11
Coyote Station 2023 Best and Worst-Case Economic Commitment Estimate

Case	Market Revenues	Startup Costs	Variable Production Costs	Net Market Revenues Less Variable Production and Startup Costs	Variable Plus Fixed Production Costs	Net Market Revenues Less Variable Plus Fixed Production and Startup Costs
[PROTECTED DATA BEGINS…						
…PROTECTED DATA ENDS]						

Figure 5
Coyote Station 2023 Best and Worst-Case Economic Commitment Estimate
Variable Production Costs

[PROTECTED DATA BEGINS…

…PROTECTED DATA ENDS]

Figure 6
Coyote Station 2023 Best and Worst-Case Economic Commitment Estimate
Variable Plus Fixed Production Costs

[PROTECTED DATA BEGINS…

…PROTECTED DATA ENDS]

In some instances, the 2023 actual net benefits fall outside of the "best-case" scenario of 100 percent economic commitment and a "worst-case" scenario of 100 percent self-commitment. As previously noted, modeling assumptions and simplifications are necessary to develop the above analysis and can drive divergence from actual net benefits. Even though the actual net benefits don't always fall within the bandwidth of the "best-case" and "worst-case" scenarios, they do fall close to those bandwidths, supporting the reasonableness of the modeling construct. It was also notable that under the Coyote variable production cost scenario the 100 percent economic commitment did not fare as well as the 100 percent self-commitment scenario. While the modeled net benefits of these scenarios were similar, the reversal was driven by reduced market revenue/production cost deltas and increased startup costs in the 100 percent economic commitment scenario.

Hourly details for the Big Stone and Coyote 2023 best and worst-case economic commitment estimate analysis are included in Attachment 2 and Attachment 3, respectively, on the *Econ Commit BestWorst* tab.

Additional Discussion

Within the context of this docket, Otter Tail believes it is vital to highlight, and explain, the analytical value of comparing a plant's production costs against market revenues, and for what purposes that comparison is useful. Otter Tail believes there is potential for a misapplication of the production-cost-comparison-to market-price analysis in this docket. This comparison is useful in assessing the flexibility of a plant, but there are many cost-effective plants that have limited operational flexibility and would show "production cost losses", including most non-dispatchable renewable resources and many base load generators.

For illustration, Otter Tail performed the same production-cost-comparison-to-market-price for its wind PPA, Langdon II.[9] The results are proportionally greater production cost losses for the Langdon II PPA than either Coyote or Big Stone:

Table 12
Langdon II PPA Revenues and Costs
(OTP MN)

Year	Total Revenues[10]	PPA Cost	Net Gain / (Loss)
	[PROTECTED DATA BEGINS…		
2018			
2019			
2020			
2021			
2022			
2023			

…PROTECTED DATA ENDS]

Otter Tail expects that all its wind PPAs (and other utilities' wind PPAs) would show similar if not larger negative results under this analysis. But this does not mean the Langdon II wind PPA or other PPA's are not cost-effective contributors to Otter Tail's resource portfolio. It means that they are not able to respond flexibly to market prices, which is not a surprise, as they were not conceived or designed for that purpose. Wind generators frequently operate at times when market prices are low, and they are frequently unavailable at times when market prices are high, but they produce energy at consistent prices over time and contribute cost-effectively to Otter Tail's resource portfolio.

The same has generally been true also for Otter Tail's baseload resources: they are limited in their ability to respond to market prices, but they too were not conceived or designed for that purpose. Like the wind generators, they have been able to produce energy at consistent prices over time and they contribute cost effectively to Otter Tail's resource portfolio.

The questions in this docket are aimed at whether baseload resources might be operated more flexibly, given that increased flexibility might increase market opportunities in very low market conditions. And it is useful to consider these questions and consider how flexibility might be increased for the baseload units. But, again, they were not generally conceived or designed for flexibility. If flexibility was the sole operational goal for generation resources, all generators would be natural gas peakers or other highly flexible alternatives. Neither renewable generators nor baseload generators fare well under these criteria.

The point of the illustration in Table 12 for the Langdon II PPA is to critique the implication that "production losses" are determinative of cost effectiveness. They are not. They are only determinative of whether a generator is highly responsive to market prices, and many generators have not been designed for that purpose. Whether any such generator is cost

[9] The Langdon II PPA is intended to serve as a reasonable proof for the point made by this illustration.
[10] Energy, ancillary services, congestion, capacity and other.

effective requires other analyses of the types generally considered in resource plan proceedings. It involves market price forecasts and other forecasts, capacity expansion modelling and other considerations.

Another way to give perspective to the usefulness of the production-cost-comparison-to-market-price analysis is to consider how it would be applied to non-dispatchable renewables, natural gas peaking generators, and baseload generators—which might be considered as representative of the spectrum of flexibility in generation resources. The non-dispatchable renewables would fare most poorly, with no ability to respond to the market and, for wind generators, likely with a high degree of inverse correlation to market price. On the opposite end of the spectrum are natural gas peaking generators, which would fare most favorably, as they are the most able to dispatch flexibly in response to changes in market prices. Baseload generators fall somewhere in the middle, as they were not designed to be flexible, but they are somewhat dispatchable depending on their specific design characteristics and other considerations. It is certainly a reasonable endeavor to consider whether it may be possible to increase their flexibility, but the lack of flexibility is not a fair indictment (when taken in isolation) of either renewables or baseload generation units.

The goal of a utility's resource planning is to manage a portfolio of resources in a way that meets cost, risk, and other objectives. If we were to focus on cost alone as a resource planning objective, we would focus on the performance of the portfolio of resources under a variety of circumstances over time. Table 13 below reflects the actual cost of energy paid by Otter Tail's customers since 2013. It shows that Otter Tail's customers have benefitted from Otter Tail's consistent and cost- effective portfolio of resources over that period.

Table 13
Net Cost of Energy Paid by Otter Tail Customers since 2013

Calendar Year	Net System Cost of Energy ($/MWh)
2013	23.48
2014	25.15
2015	24.73
2016	23.06
2017	23.78
2018	24.14
2019	23.93
2020	20.30
2021	21.68
2022	25.89
2023	20.75[11]

The production-cost-comparison-to-market-price used in this docket is useful in considering how greater responsiveness might improve the cost of energy. It should not suggest that

[11] Calculation as proposed in Otter Tail's FCA true-up filing being submitted March 1, 2023, in Docket No. E017/AA-22-214.

renewables and baseload resources should be avoided because they are not adequately responsive to market prices.

Capital Requirements

Attachment A of the January 11, 2021, Order in Docket No. E-999/CI-19-704 requires the Company to provide the capital revenue requirements, or reasonable estimates in approximation thereof, for all generation units. Otter Tail operates its system as a whole unit, and while it is possible to approximate a single rate base item, in this case generating units, carving out a single item is a narrow view of the overall impact on the cost of service. Otter Tail provides Table 14 in compliance with this Order Point utilizing December 2021 FERC Form 1 information, which provides the gross plant in service less asset retirement costs [Line 1] per steam plant.[12] The accumulated depreciation [Line 2] was taken from depreciation records as of December 31, 2021. Minnesota share allocation factor is calculated using the base / peak split between E1 and D1. The 2021 allocation factors and rate of return were approved in the 2020 MN Rate Review[13] and are used for Table 14 calculations.

Table 14
Estimate of capital revenue requirements
Rate Base 2022

	A	B	C
		Coyote	**Big Stone**
Line		**[PROTECTED DATA BEGINS…**	
1	Plant in Service		
2	Accumulated Depreciation		
3	Net Plant in Service		
4	Minnesota Accumulated Deferred Income Tax		
5	Rate Base		
6	Rate of Return Allowed on Rate Base		
7	Estimated Capital Revenue Requirement (OTP Share)		
8	MN Share		
9	Estimated Capital Revenue Requirement (OTP MN)		
			…PROTECTED DATA ENDS]

[12] FERC Form 1, page 402, Total Cost [Line 17] less Asset Retirement Costs [Line 16] by steam plant.
[13] In the Matter of the Application of Otter Tail Power Company for Authority to Increase Rates for Electric Service in Minnesota MPUC Docket No. E017/GR-20-719.

5. CONCLUSION

The following conclusions can be drawn from the analysis conducted:

1. Market pricing in 2023 softened as compared to 2022 but remains considerably higher than 2020 (historical lows). The decrease in LMP pricing was driven primarily by reduced natural gas pricing and increased natural gas storage levels. As a result, market revenues paid to both Big Stone Plant and Coyote Station experienced a reduction from 2022 levels.

2. Even before factoring all other benefits of reliable and dispatchable baseload resources, Coyote Station provided a significant net benefit to Otter Tail customers on a variable cost basis. Big Stone Plant, while generating marginally negative net benefits on a variable cost basis, also provided reliable and dispatchable baseload energy.
3. Otter Tail continues to work with its Big Stone and Coyote co-owners to further optimize plant performance.

Big Stone and Coyote have both provided over four decades of reliable, dispatchable, and economical energy. Over this time, Otter Tail has utilized co-ownership to capture economies of scale, shared benefits, and reduced risk to the benefit of our customers.

Various portions and attachments to this filing contain information that Otter Tail considers trade secret. Otter Tail believes this filing comports with the Commission's Notice relating to Revised Procedures for Handling Trade Secret and Privileged Data, pursuant to Minn. R. 7829.0500. As required by the revised procedures, a statement providing the justification for excising the trade secret data follows this letter.

Otter Tail has electronically filed this document with the Commission. In compliance with Minn. R. 7829.1300, subp. 2, Otter Tail is serving a copy of this filing on the Minnesota Department of Commerce- Division of Energy Resources and the Minnesota Office of Attorney General-Residential Utilities Division and all parties on the attached service list. A Certificate of Service is also enclosed.

If you have any questions regarding this filing, please contact me at 218-739-8282 or at cbyrnes@otpco.com.

Sincerely,

/s/ CHRIS BYRNES
Chris Byrnes
Supervisor, Regulatory Analysis
Regulatory Economics

sjw
Enclosures
By electronic filing
c: Service List

STATEMENT REGARDING JUSTIFICATION FOR EXCISING TRADE SECRET INFORMATION

Please note that Otter Tail Power Company has marked the following portions of this filing with the caption **NOT PUBLIC DOCUMENT – NOT FOR PUBLIC DISCLOSURE**, according to Minn. Stat. § 13.37, subd. 1(b). This statute protects certain "government data," as that term is defined at Minn. Stat. § 13.02, Subd. 7, from being disclosed by an administrative agency to the public.

- Tables 1, 3, 5, 6, 7, 8, 9, 10, 11, 12, and 14 in the filing letter – Plant specific economic information.
- Figures 1-6 in the filing letter – Plant specific economic information
- Attachment 1 in its entirety – Plant specific economic information
- Attachment 2 in its entirety – Plant specific economic information
- Attachment 3 in its entirety – Plant specific economic information
- Attachment 4 in its entirety – Plant specific operating information
- Attachment 5 in its entirety – Plant specific economic information
- Attachment 6 in its entirety – Plant specific economic information
- Attachment 7 in its entirety – Facility specific economic information

The information being supplied in this filing is considered to be a "compilation" of data that (1) was supplied by Otter Tail Power Company, (2) is the subject of reasonable efforts by Otter Tail Power Company to maintain its secrecy, and (3) derives independent economic value, actual or potential, from not being generally known to or accessible to the public. Otter Tail has contractual obligations to maintain the confidentiality of this information, and this information, if publicly disclosed, could put Otter Tail Power Company at a competitive disadvantage to the detriment of the Company's customers.

It is Otter Tail Power Company's understanding that marking the filing in this manner is consistent with the revised procedures for handling trade secret and privileged data, as announced in the joint memorandum of the Office of Energy Security and Public Utilities Commission dated August 18, 1999, and which became effective September 1, 1999.

2023 Actual Big Stone Plant Performance Under Variable Costs

Row Labels	Net MISO Energy Payments [PROTECTED DATA BEGINS...	ASM Payments	Make Whole Payments	Variable Production Costs	Net Variable (Cost) or Benefit
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

2023 Actual Big Stone Plant Performance Under Variable and Fixed Costs

Row Labels	Net MISO Energy Payments [PROTECTED DATA BEGINS...	ASM Payments	Make Whole Payments	Variable & Fixed Production Costs	Net Variable & Fixed (COST) or Benefit
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

2023 Big Stone OTP Endorsed Self Commitment Performance (Outside of Required Buiiding Heat and Plant Testing Periods): Utilization of Variable Costs

Row Labels	Net MISO Energy Payments [PROTECTED DATA BEGINS...	ASM Payments	Make Whole Payments	Variable Production Costs	Net Variable (Cost) or Benefit
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

2023 Actual Coyote Station Performance Under Variable Costs

Row Labels	Net MISO Payments [PROTECTED DATA BEGINS...	ASM Payments	Make Whole Payments	Variable Production Costs	Net Variable (Cost) or Benefit
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

2023 OTP Endorsed Self Commit Coyote Station Performance Under Variable Costs

Row Labels	Net MISO Energy Payments [PROTECTED DATA Begins...	ASM Payments	Make Whole Payments	Variable & Fixed Production Costs	Net Variable & Fixed Production Costs
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

2023 Actual Coyote Station OTP Endorsed Self Commitment Performance (Outside of Required Building Heat and Plant Testing Periods): Utilization of Variable Costs

Row Labels	Net MISO Energy Payments - OTP Endorsed Self Commit Hours [PROTECTED DATA BEGINS...	ASM Payments - OTP Endorsed Self-Commit Hours	Make Whole Payments - OTP Endorsed Self-Commit Hours	Variable Production Costs - OTP Endorsed Self-Commit Hours	Net Variable (Cost) or Benefit - OTP Endorsed Self-Commit Hours
Jan					
Feb					
Mar					
Apr					
May					
Jun					
Jul					
Aug					
Sep					
Oct					
Nov					
Dec					
Grand Total					

...PROTECTED DATA ENDS]

Annual Non-Fuel Variable Expenses
(Reagents, Water, Emissions Allowances)

Plant	2023
Big Stone	**[PROTECTED DATA BEGINS...**
Coyote	
	...PROTECTED DATA ENDS]

Annual Fixed O&M Expenses

Plant	2023
Big Stone	**[PROTECTED DATA BEGINS...**
Coyote	
	...PROTECTED DATA ENDS]

Otter Tail Power Company
Plant Heat Rates

Big Stone Plant	2023
	[PROTECTED DATA BEGINS...
Average Heat Rate at economic minimum	
Average Heat Rate at economic maximum	
Coyote Station	**2023**
Average Heat Rate at economic minimum	
Average Heat Rate at economic maximum	...PROTECTED DATA ENDS]

Big Stone Plant Actual Operations

			Only Variable Costs			
Start	End	Hour Range	Costs: Number of Occurences	Costs: For the Occurences Range	Costs: Number of Occurences with costs > cold start cost	Costs: For the Occurences with costs > cold start cost
[PROTECTED DATA BEGINS...						
						...PROTECTED DATA ENDS]

Includes fixed fuel costs (Unit + Remaining Fuel + VOM)			
Costs: Number of Occurences	Costs: For the Occurences Range	Costs: Number of Occurences with costs > cold start cost	Costs: For the Occurences with costs > cold start cost
[PROTECTED DATA BEGINS...			
			...PROTECTED DATA ENDS]

	Start Up Costs	Start Up Time	Cool-down time
	[PROTECTED DATA BEGINS...		
Cold			
Warm			
			...PROTECTED DATA ENDS]

Coyote Station Actual Operations

			Only Variable Costs			
Start	End	Hour Range	Costs: Number of Occurences	Costs: For the Occurences Range	Costs: Number of Occurences with costs > cold start cost	Costs: For the Occurences with costs > cold start cost
[PROTECTED DATA BEGINS...						
						...PROTECTED DATA ENDS]

Includes fixed fuel costs (Unit + Remaining Fuel + VOM)			
Costs: Number of Occurences	Costs: For the Occurences Range	Costs: Number of Occurences with costs > cold start cost	Costs: For the Occurences with costs > cold start cost
[PROTECTED DATA BEGINS...			
			...PROTECTED DATA ENDS]

	Start Up Costs	Start Up Time	Cool-down time
	[PROTECTED DATA BEGINS...		
Cold			
Warm			...PROTECTED DATA ENDS]

2023 PURCHASED POWER AGREEMENTS - WIND PURCHASES (MWh)

COMPANY	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
[PROTECTED DATA BEGINS...													

...PROTECTED DATA ENDS]

2023 PURCHASED POWER AGREEMENTS - CURTAILMENTS (MWh)

COMPANY	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL
[PROTECTED DATA BEGINS...													
-													
-													
-													

...PROTECTED DATA ENDS]

2023 NET GENERATION - OTTER TAIL OWNED (MWh)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
	[PROTECTED DATA BEGINS...												
Langdon Wind													
Ashtabula Wind													
Luverne													
Merricourt													
Ashtabula III Wind													
													...PROTECTED DATA ENDS]

CURTAILMENT (MWh)

2023

	[PROTECTED DATA BEGINS...
Langdon Wind	
Ashtabula Wind	
Luverne	
Merricourt	
Ashtabula III Wind*	
	...PROTECTED DATA ENDS]

*When Ashtabula III was purchased the curtailment tag was not included in the Purchase Agreement. Because of this OTP does not have access to the wind curtailment data. OTP requested the data from Nextera, but there are issues with SCADA and Nextera was unable to provide it at the time of filing.