PUBLIC DOCUMENT
CONFIDENTIAL DATA EXCISED

STATE OF MINNESOTA

BEFORE THE PUBLIC UTILITIES COMMISSION

In the Matter of **Otter Tail Power Company's** **2021 Integrated Resource Plan**	**PUC Docket No.** **E017/RP-21-339**

Clean Energy Organizations' Initial Comments

On Behalf Of:
Clean Grid Alliance
Fresh Energy
Minnesota Center for Environmental Advocacy
Sierra Club

September 13, 2023

TABLE OF CONTENTS

INDEX TO TABLES

INDEX TO FIGURES

INTRODUCTION

Otter Tail's system currently consists of significant fossil fuel resources, including two operating coal plants: Coyote and Big Stone. Otter Tail is a co-owner of both the Coyote and Big Stone plants. Minnesota customers are allocated over half of Otter Tail's costs of each of these plants and currently pay $35.76 million annually for the two.[1] In this IRP, Otter Tail proposes to continue its reliance on both of these coal plants for decades: the Coyote plant until 2040 and the Big Stone plant until 2046. We refer to this proposal as the "OTP Preferred 2040 Plan." Otter Tail has also identified its less-preferred plan—to still operate Big Stone until 2046 but withdraw from the Coyote plant by 2028 if faced with the need to make a "major, non-routine capital investment." We refer to this as the "OTP 2028 Plan."

With its Preferred 2040 Plan, Otter Tail proposes to continue its coal plant operations into the 2040s despite its own modeling analysis showing that withdrawing from Coyote by 2028 is the lower cost and lower risk option for its customers. Indeed, Otter Tail's modeling shows a 2028 Coyote withdrawal is the better option, even before the potential for new regulatory compliance costs at that plant are accounted for. Additionally, Otter Tail's Preferred 2040 Plan does not account for the likelihood of federal carbon regulations or ensure consistency with Minnesota's new carbon-free electricity standard. Moreover, Otter Tail's Preferred 2040 Plan causes a tremendous amount of damage to both the climate and to human health, contributing to 710 premature deaths and other serious health conditions. These health impacts would fall disproportionately on Native populations.

In contrast to Otter Tail's Preferred 2040 Plan, in these comments the Clean Energy Organizations ("CEOs") put forth a lower cost plan that exits both the Coyote and Big Stone coal plants by 2030 and builds the renewable resources required to put Otter Tail on a pathway to

[1] OTP Responses to CEO IRs 086-087.

successful decarbonization while still delivering reliable and affordable electricity (hereinafter "CEOs Preferred Plan"). Specifically, the CEOs Preferred Plan withdraws from Coyote in 2028 and from Big Stone in 2030, and adds 400 MW of solar, 1350 MW of wind, and 318 MW of battery storage through 2050. The CEOs Preferred Plan would save customers an estimated $816 million compared to Otter Tail's proposal to continue its coal plant operations into the 2040s, and would greatly reduce impacts on the climate and health, reducing premature deaths by approximately 70% as compared to Otter Tail's Preferred 2040 Plan.

Thus, comparison of Otter Tail's Preferred 2040 Plan to CEOs Preferred Plan reveals that Otter Tail has not put forth a plan that is low cost, low risk, or that avoids adverse socioeconomic and environmental impacts. In other words, Otter Tail has not put forth a plan that is consistent with the public interest under Minnesota law, and the Commission should therefore not approve it without modifications.

SUMMARY OF ARGUMENT

The CEOs Preferred Plan is put forth by the nonprofit organizations Fresh Energy, Clean Grid Alliance, Sierra Club, and the Minnesota Center for Environmental Advocacy (collectively, the "CEOs"). The CEOs plan draws upon expert technical analysis by Anna Sommer and Chelsea Hotaling of Energy Futures Group; Tyler Comings of Applied Economics Clinic; and Elena Krieger, Karan Shetty, Yunus Kinkhabwala, and Kelsey Bilsback of Physicians, Scientists, and Engineers for Healthy Energy. The CEOs' Initial Comment and discussion of our Preferred Plan, is organized as follows:

In Part I, CEOs explain how Otter Tail's Preferred 2040 Plan and lesser-preferred 2028 Plan are not in the public interest pursuant to Minn. Stat. § 216B.2422, subd. 2, and Minn. R. 7843.0500, subd. 3 because they are expensive, have significant socioeconomic and environmental harms, and fail to reduce risk.

In Part II, CEOs explain why retiring coal plants like Coyote and Big Stone by 2030 is critical to keep warming within the globally-agreed-to target of 1.5°C. CEOs additionally explain how Otter Tail's Preferred 2040 Plan, and the OTP 2028 Plan both fail to comply with the Environmental Protection Agency's ("EPA's") proposed greenhouse gas rule, and how Otter Tail's plan for compliance with Minnesota's carbon-free standard will not result in a decarbonized system.

In Part III, CEOs explain why the Commission should modify Otter Tail's 2040 Preferred Plan to withdraw Coyote Station from the resource mix after 2028. CEOs explain how Otter Tail's own modeling shows that withdrawal from the Coyote plant by 2028 is less expensive and has significantly less regulatory risk than waiting until 2040. CEOs also show how this would avoid $1.2 billion in climate damage, avoid $2.6 billion in health costs, and prevent hundreds of premature deaths otherwise attributable to Otter Tail's share of the pollution from Coyote related to generation serving Minnesota.

Part IV details CEOs' EnCompass modeling, conducted by Energy Futures Group ("EFG") in collaboration with Applied Economics Clinic ("AEC") (included with these comments as Attachment 1), which shows that an IRP that withdraws from Coyote in 2028 and Big Stone by 2030 and adds more wind and battery storage is less costly, reduces regulatory risk, and greatly reduces emissions compared to Otter Tail's Preferred 2040 Plan, while still maintaining reliability. The CEOs Preferred Plan adds a total of 400 MW of solar, 1350 MW of wind, and 318 MW of battery storage throughout the planning period (2027-2050) and meets Otter Tail's own modeled capacity and energy needs for all hours of the year throughout the planning period. CEOs' EnCompass modeling also shows that CEOs Preferred Plan is less expensive across several sensitivities, and that Coyote and Big Stone can both be exited on a timeline consistent with addressing climate change and forthcoming regulatory requirements.

Part V details several shortcomings that CEOs identified in Otter Tail's modeling. CEOs discuss how Otter Tail's modeling does not reflect the risk of Otter Tail being forced to run Coyote or Big Stone at a loss by another co-owner. CEOs also explain how Otter Tail's modeling does not comply with the Commission's order to analyze a range of carbon regulatory and externality costs, which is necessary to meet the statutory requirements under Minn. Stat. §§ 216B.2422, subd. 3 and 216H.06 to assess the full range of those costs. Next, CEOs discuss the problems with Otter Tail's decision to allow the model to engage in market purchases but not sales. Finally, CEOs explain how Otter Tail failed to examine any possibility of early retirement for Big Stone, and instead forced its 2046 retirement date into the model.

Part VI explains the carbon externality consequences of Otter Tail's plan, and documents how Otter Tail's Preferred 2040 Plan would cause $4.3 billion in cumulative climate damage, and how its 2028 Plan would cause $3.3 billion in cumulative climate damage.

Part VII presents the expert analysis of health and equity issues conducted by Physicians, Scientists, and Engineers for Healthy Energy ("PSE") (included with these comments as Attachment 2). CEOs describe the considerable harm to human health that results from continuing to run the Coyote and Big Stone plants, and the extent to which these harms fall disproportionately on vulnerable populations, especially Native communities.

Finally, in part VIII CEOs discuss why the Commission should defer a decision on the Astoria LNG proposal until Otter Tail's next IRP given that Otter Tail is still operating and has use of two large coal plants.

CEOs' recommendations to the Commission are set forth below. We respectfully request the Commission to:

1. Find that it is not prudent and not in the public interest for Otter Tail to retain its share of Coyote beyond 2028 and that Otter Tail should therefore withdraw from Coyote as soon as reasonably possible, but by no later than 2028. The Commission should also authorize Otter Tail to give contractual notice of its intent to withdraw to co-owners while declining

to explicitly find at this time that Otter Tail required Commission authorization to give this notice or that it was prudent not to give notice of withdrawal earlier.

2. Modify Otter Tail's Preferred 2040 Plan to:
   a. Include withdrawing from Coyote by no later than 2028.
   b. Find that Otter Tail has demonstrated a need for: planned wind repowers in 2025, 200 MW of surplus solar in the 2027-2028 timeframe, 350 MW of wind resources in the 2029-2031 timeframe, an additional 200 MW of surplus solar in the 2030-2032 timeframe, and 50 MW of surplus battery resources by no later than 2032.
   c. Require Otter Tail to request an Attachment Y-2 study with MISO, and perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Coyote retirement and any potential mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   d. Conduct an assessment of the value of reusing the Company's interconnection rights at Coyote, and submit that assessment in this docket within 12 months of this order.

3. Find that it is not prudent and not in the public interest for Otter Tail to retain its interest in Big Stone beyond 2030 and that Otter Tail should therefore withdraw from Big Stone as soon as reasonably possible, but by no later than 2030.

4. Find that it is prudent and in the public interest for Otter Tail to accelerate its acquisition of wind power and battery storage at a scale and pace consistent with the resources listed in this order.

5. Further modify Otter Tail's Preferred 2040 Plan to include:
   a. Withdrawing from Big Stone by no later than 2030;
   b. Finding there is a need for and approving the following resources, *additional to those in Recommendation 2.b*: 550 MW of wind resources in the 2029-2031 timeframe and 125 MW of battery resources by 2031.
   c. Requiring Otter Tail to request an Attachment Y-2 Study from MISO for the Big Stone Plant and to perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Big Stone retirement and identify any mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   d. Requiring Otter Tail to conduct an assessment of the transmission congestion present in the Big Stone area, the impact of LRTP lines and other transmission infrastructure, and the future local transmission outlook. The results of this evaluation should be filed with the Company's next Minnesota IRP.
   e. Requiring Otter Tail to conduct an assessment of the value of reusing the Company's interconnection rights at Big Stone, and to submit that assessment in this docket with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   f. Requiring Otter Tail to issue a Request for Information 6-12 months prior to filing its next IRP, seeking information from developers on projects under development in proximity to Big Stone or in proximity to potential paths for a generation-tie line. The results of the RFI should be filed with Otter Tail's next IRP.

6. In the alternative to Recommendation 5, require Otter Tail to begin planning now for a Big Stone withdrawal by no later than 2030 and to present a plan in its next Minnesota IRP that withdraws from Big Stone by no later than the end of 2030. The plan should demonstrate that Otter Tail is taking proactive steps to keep a 2030 exit on the table and is exploring the economic value of retiring the plant, including consulting with co-owners on the issue.

7. Find that it may be economic for Otter Tail to add the wind, solar and/or battery storage resources listed above before the dates specified, and therefore the Company should actively assess market conditions and project availability to bring forward economic resources when feasible, and by no later than the dates listed above.

8. Defer a decision on Otter Tail's Astoria LNG proposal until the Company's next IRP.

9. Direct Otter Tail in its next IRP to:
   a. Include an analysis of the costs of its preferred plan and its comparative plans under the full range of regulatory and externality costs specified by the Commission in its forthcoming order in docket 22-236. This analysis should include emissions both inside and outside Minnesota to the extent they are associated with generation used to serve Minnesota customers.
   b. Present modeling runs that allow a reasonable amount of both market purchases and sales.
   c. Conduct production cost modeling to obtain more detailed information to develop the portfolio PVRRs and to evaluate the dispatch of resources during specific periods of time, including during periods of challenging system conditions.
   d. Include an analysis of the health and equity impacts of its preferred plan.
   e. Include an assessment of energy efficiency, demand flexibility, and energy storage options, especially in comparison with the addition of on-site fuel storage at its Astoria facility.

10. Order Otter Tail to submit its next IRP by two years from the date of this order.

I. Otter Tail's Preferred 2040 Plan and 2028 Plan Are Not in the Public Interest

In considering Otter Tail's resource plan, the Commission may not approve a plan that is inconsistent with the public interest.[2] In assessing whether a resource or a plan is in the public interest, the Commission evaluates the resource or the plan against five factors: (1) ability to maintain or improve the adequacy and reliability of utility service; (2) ability to keep customer bills low and the utility's rates as low as practicable; (3) ability to minimize adverse socioeconomic effects and adverse effects upon the environment; (4) ability to enhance the utility's capability to

[2] Minn. Stat. § 216B.2422, subd. 2(a).

respond to changes in financial, social, and technological factors affecting its operations; and (5) ability to limit the risk of adverse effects from financial, social, and technological factors on the utility and its customers.[3]

As discussed in detail in this comment, evaluation of Otter Tail's Preferred 2040 Plan and lesser-preferred 2028 Plan against these factors shows Otter Tail's Plan is not in the public interest. In this comment, CEOs show that neither of Otter Tail's Plans satisfy the second factor regarding keeping bills and rates as low as practicable, because Otter Tail's plans require its customers to pay excessive costs to operate its expensive coal plants. In contrast, CEOs' Preferred Plan is less expensive and reduces customer bill risks by eliminating the reliance on the costly coal plants. CEOs also show that Otter Tail's plans do not satisfy the third factor regarding socioeconomic and environmental impacts due to the tremendous climate and health damages attributable to the continued use of coal in both of Otter Tail's plans. CEOs further show how both of Otter Tail's plans do not satisfy factors four or five relating to limiting risk and enhancing the utility's ability to respond to changes because Otter Tail's plans fails to align with critical climate targets and ignore significant regulatory risk. Thus, as CEOs demonstrate in this comment, Otter Tail's proposal is deeply misaligned with the public interest, and neither Otter Tail plan can be approved without critical modifications.

II. Otter Tail's Plan to Remain Dependent on Coal Power Ignores Federal and State Carbon Limits and Would Continue to Cause Tremendous Climate Damage

The most conspicuous flaw in Otter Tail's resource plan is its continued heavy reliance on the Coyote and Big Stone coal plants. Assuming that continued coal dependence is the least-cost, least-risk option ignores both the urgent need to decarbonize and the legal developments aimed at driving that decarbonization, which are likely to prevent Otter Tail's plan to run the coal plants

[3] Minn. R. 7843.0500, subd. 3.

without new environmental controls from coming to fruition. Otter Tail's plan is therefore risky for both the world and for Otter Tail's ratepayers; it would cause incredible climate damage while squandering the opportunity to save customers money by acting proactively in the Company's transition to lower cost clean energy. Otter Tail should instead use the years ahead to plan for and pursue the most beneficial path away from Coyote and Big Stone.

A. Retiring unabated coal plants by 2030 is key to meeting climate goals

Both the federal and Minnesota state governments now formally recognize the need to achieve deep reductions in greenhouse gases ("GHGs") by 2030 and to achieve net zero by the middle of the century, if we are to avoid the most catastrophic climate impacts. For example, the U.S. has pledged to cut emissions 50-52% below 2005 levels by 2030 in its Nationally Determined Contribution submitted under the Paris Agreement.[4] Similarly, Minnesota has enacted a target of 50% reductions below 2005 levels by 2030 in its newly-amended Minn. Stat. § 216H.02.[5] These near-term reduction targets align with what is needed to have a reasonable chance of limiting warming to 1.5° C, the goal embraced by the nations of the world, including the U.S., and by the state of Minnesota.[6] The goal to reach net-zero GHG emissions by 2050 is a similarly science-driven, globally-embraced target set forth in Minn. Stat. § 216H.02 and federal policy.

As important as these economy-wide GHG reduction targets are, Minnesota's electric utilities face the need to decarbonize even faster. Studies identifying society's most viable pathways for rapid decarbonization, or "pathway studies," routinely stress the need to

[4] "The United States Nationally Determined Contribution: Reducing Greenhouse Gases in the United States: A 2030 Emissions Target," submitted to NDC registry April 22, 2021. https://unfccc.int/sites/default/files/NDC/2022-06/United%20States%20NDC%20April%2021%202021%20Final.pdf.
[5] Laws of Minnesota 2023, chapter 60, article 12, section 61.
[6] *Glasgow Climate Pact,* Advance Version, para. 20 (Mar. 8, 2022), available at https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf; Minnesota Climate Action Subcabinet, *Minnesota's Climate Action Framework,* p. 13 (Sep. 16, 2022), *available at* https://climate.state.mn.us/minnesotas-climate-action-framework.

decarbonize the power sector faster than other sectors.[7] This is because the power sector already has affordable technological options and because a decarbonized grid can then decarbonize other sectors through electrification. The Biden administration has therefore set the goal of a carbon-free power sector by 2035, calling it "a crucial foundation for net-zero emissions economy-wide by 2050."[8]

The pathway studies also repeatedly emphasize how critical it is to either *retire US coal plants by 2030* or at least abate their emissions by 90 percent or more by that date.[9] For example, a study by Princeton researchers charted five different pathways to net zero emissions by 2050, and found that in all five "coal use is essentially eliminated completely by 2030."[10] A study published by the National Academies specified the retirement of "as much as 100 percent of installed coal-fired capacity by 2030" (or capturing more than 90% of coal plant emissions) as necessary to reaching our 2050 goals.[11] The International Energy Agency echoes the multiple US-focused

---

[7] *See, e.g., Accelerating Decarbonization of the U.S. Energy System*, National Academies of Sciences, Engineering, and Medicine, The National Academies Press (2021) *available at* https://www.nap.edu/catalog/25932/accelerating-decarbonization-of-the-us-energy-system (hereinafter "National Academies report") James H. Williams, et al., *Carbon-Neutral Pathways for the United States*, *AGU Advances* (2021) *available at* https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020AV000284; Eric Larson, et al., *Net Zero America: Potential Pathways, Infrastructure, and Impacts, Interim Report*, Princeton, New Jersey (2020), *available at* https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/ (hereinafter, "Larson et al."); Robbie Orvis, *A 1.5 Celsius Pathway to Climate Leadership for the United States*, Energy Innovation, at 8 (Feb. 2021), *available at* https://energyinnovation.org/wp-content/uploads/2021/02/A-1.5-C-Pathway-to-Climate-Leadership-for-The-United-States.pdf; Nathan Hultman, et al., *Charting an Ambitious U.S. NDC of 51% Reductions by 2030*, Univ. Md. Center for Global Sustainability, Technical App. at 4 (Mar. 2021), *available at* https://cgs.umd.edu/research-impact/publications/working-paper-charting-ambitious-us-ndc-51-reductions-2030;

[8] U.S. State Department and Executive Office of the President, *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050*, at 5 (Nov. 2021) available at https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf.

[9] *See* multi-sector studies listed *supra,* n. 7, and power-sector specific studies like: *2035: The Report: Plummeting Solar, Wind and Battery Costs Can Accelerate our Clean Energy Future*, Goldman School of Public Policy, at 20 (June 2020), *available at* https://www.2035report.com/electricity/; *2030 Report: Powering America's Clean Economy, A Supplemental Analysis to the 2035 Report*, Goldman School of Public Policy, at 4 (April 2021), *available at* https://gspp.berkeley.edu/faculty-and-impact/centers/cepp/projects/2030-report-powering-americas-clean-economy;

[10] Larson et al., *supra* n. 7, at 33.

[11] National Academies report, *supra* n. 7, at Table 2.3, p. 90.

studies; its roadmapping analysis concludes that all advanced nations must eliminate coal power without carbon capture by 2030 if the world is to reach net zero by 2050.[12]

In light of this, it is profoundly imprudent for any utility to assume it can continue depending on unabated coal plants beyond 2030 when the world so urgently needs to eliminate them and is acting on that need.

B. Otter Tail's 2040 and 2028 plans both fail to meet EPA's proposed GHG emission limits for coal plants

Otter Tail's two plans assume Otter Tail can continue to rely on either one coal plant (Big Stone) or two coal plants (Coyote and Big Stone) beyond 2030 without abating the plants' CO_2 emissions. Therefore, both plans fail to comply with EPA's recently proposed GHG emission limits for coal plants.

The EPA rule as proposed sets emission limits based on one of four options for coal plants, with compliance dates of January 2030. Coal plant operators can meet these limits by: (1) installing 90% carbon capture and storage ("CCS") by 2030; (2) installing 40% gas-cofiring by 2030 and committing to retire the plant by 2040; (3) limiting the plant's capacity factor to 20% by 2030 and committing to retire the plant by the end of 2034; or (4) committing by 2030 to retire the plant completely by the end of 2031.[13]

Neither the OTP Preferred 2040 Plan nor the OTP 2028 Plan would comply with any of these restrictions. Although Otter Tail's IRP was filed before the EPA Rule was proposed in May, Otter Tail has not updated its plan to explain how it would comply with the proposed rule. Given the urgent and obvious need to address the carbon emissions of coal plants, it would be reckless to assume the final rule will be weakened radically enough to allow Otter Tail to keep operating

[12] *Net Zero by 2050: A Roadmap for the Global Energy Sector,* International Energy Agency, 2021 at 116. *Available at* https://www.iea.org/reports/net-zero-by-2050 .
[13] 88 Fed. Reg. 33240, 33245 (May 23, 2023).

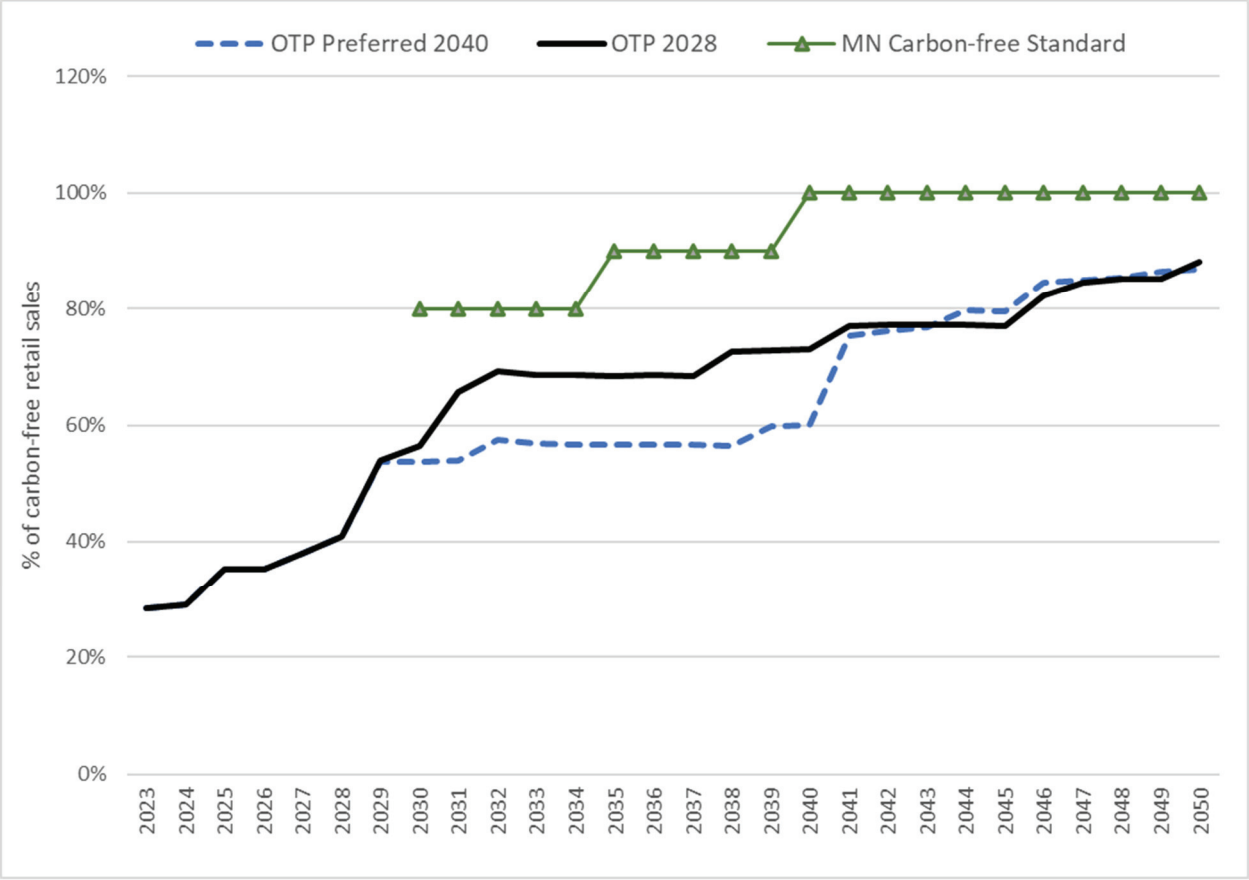
Coyote and Big Stone unabated beyond 2030. Prudence and the public interest require planning to comply with one of EPA's proposed options. In these comments, CEOs present a plan (CEOs Preferred Plan) that complies with EPA's proposed rule by having Otter Tail withdraw from both coal plants by the end of 2030, while also reducing customer costs.

C. Otter Tail's plans depend on an interpretation of Minnesota's Carbon Free Standard that renders the law meaningless for Otter Tail

Otter Tail claims in its Supplemental Resource Plan that it will be able to comply entirely with Minnesota's Carbon Free Standard ("CFS") while continuing to rely on its two polluting coal plants and without building any more carbon-free power than it otherwise plans.[14] However, as Figure 1 shows, on a system-wide basis Otter Tail is currently generating or procuring carbon-free generation amounting to only about 28% of its sales. By 2030, its carbon-free generation would amount to only 54-57% of retail sales (depending on whether it withdraws from Coyote in 2040 or 2028) rather than 80%; by 2035 its carbon-free generation would amount to only 57-68% of retail sales rather than 90%; and by 2040 its carbon-free generation would amount to only 60-73% of retail sales rather than 100%.

[14] OTP Supplemental IRP, at 26-8.

Figure 1. Otter Tail's Planned Carbon-Free Generation System Wide



Otter Tail asserts that it can make up the substantial shortfall in carbon-free generation (while continuing to run its coal plants) solely by relying on renewable energy credits ("RECs") obtained from the renewable energy it generates or plans to generate for its North and South Dakota customers. While CEOs recognize that the CFS applies only to Minnesota retail sales and allows for the use of RECs for compliance, the law requires the Commission to establish the specific criteria for demonstrating compliance with the CFS. In its implementation of the CFS the Commission must, among other things, take all reasonable actions within its authority to maximize the net benefits of the law to all Minnesota citizens, including by ensuring that statewide air emissions are reduced.[15] The Commission has not yet established CFS implementation criteria,

[15] Laws of Minnesota 2023, chapter 7, section 15.

and under its recent order in docket 23-151 it is not scheduled to take this issue up until the third quarter of 2024.[16] Otter Tail is counting on the Commission's future adoption of compliance criteria so loose that the Company can continue to rely on its current, heavily coal-dependent path. If the Commission were to do this, however, it would be failing to maximize benefits to Minnesotans, perpetuating regulatory risk, perpetuating climate damage, and seriously undermining the law's goals of reducing carbon pollution and accelerating the shift to carbon-free generation.

Accepting CEOs Preferred Plan, in contrast, would not only save customers money but would also avoid potential conflicts with the CFS, since the resulting increase in Otter Tail's percentage of carbon-free generation would unquestionably move it toward compliance with the CFS, and in a way that benefits all Minnesotans, as required. Withdrawing from Coyote in 2028 and Big Stone in 2030 would also substantially reduce statewide greenhouse gas emissions, helping the state achieve its economy-wide decarbonization goals of 50 percent by 2030 and net-zero by 2050.[17]

We also note that despite relying so heavily on "unbundled" RECs[18] for CFS compliance, Otter Tail's modeling does not assign any opportunity cost to the use of those RECs. Otter Tail could otherwise sell those unbundled RECs, and the selling price could rise significantly in the years ahead as parties seeking to take full advantage of the IRA's subsidies for green hydrogen dramatically increase the demand for RECs. Whatever implementation criteria the Commission

[16] Minn. Pub. Utils. Comm'n. *In the Matter of an Investigation into Implementing Changes to the Renewable Energy Standard and the Newly Created Carbon Free Standard under Minn. Stat. § 216B.1691,* Notice of Docket Process and Timeline, Docket No. E999/CI-23-151 (July 7, 2023).

[17] Minn. Stat. § 216H.02, subd. 1, amended by Laws of Minnesota 2023, chapter 60, article 12, section 61. The law seeks to reduce "statewide greenhouse gas emissions," which is defined to include emissions from the generation of electricity imported from outside the state and consumed in Minnesota." Minn. Stat. § 216H.01, subd. 2.

[18] CEOs use the term unbundled RECs to refer to RECs associated with renewable power not used to serve Minnesota energy demand, or in the case of a multi-state system like OTP's, RECs associated with more than Minnesota's jurisdictional share of the underlying renewable power.

adopts regarding unbundled RECs, at minimum, utilities seeking to use unbundled RECs to achieve their carbon-free obligations should be required to consider the cost, or opportunity cost, of this strategy during resource planning.

D. Both of Otter Tail's plans would cause many billions of dollars' worth of climate damage, using EPA's cost estimates

Minnesota law now requires the Commission to give far greater weight to the climate harm caused by greenhouse gases than it has in years past. It does this by requiring that the EPA's Social Costs of Greenhouse Gases be used when resources are evaluated and selected in resource proceedings, including resource plans.[19] These values are many times higher than those the Commission has been using, reflecting newer scientific findings, the growing danger of the climate crisis, and a legislative policy judgment regarding how much to discount future damages.[20]

Both of Otter Tail's plans would cause a staggering amount of climate damage. CEOs' modeling shows that the OTP Preferred 2040 Plan would result in between $2.5 and $7.7 billion in climate damage using the full range of EPA cost estimates, with a central estimate of $4.3 billion in damage.[21] The OTP 2028 Plan would cause between $1.9 and $6.0 billion in climate damage, with a central estimate of $3.3 billion in damage. These figures reflect only the costs of CO_2 emissions associated with Minnesota's share of Otter Tail's energy sales, and even so, these climate costs still exceed the system-wide revenue requirements for Otter Tails' plans, indicating that more of each plan's costs would be involuntarily borne by society rather than by Otter Tail's ratepayers.

---

[19] The Commission is required to provisionally adopt and apply the EPA's draft Social Cost of Greenhouse Gas estimates released in 2022, "including the time horizon, global estimates of damages, and the full range of discount rates from 2.5 to 1.5 percent, with two percent as the central estimate." The Commission must adopt the EPA's final estimates when available, or the estimates by the federal Interagency Working Group if higher. Laws of Minnesota 2023, chapter 7, section 18, amending Minn. Stat. § 216B.2422, subd. 3.

[20] U.S. Environmental Protection Agency, *Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances,* External Review Draft, Docket No. EPA-HQ-OAR-2021-0317 (Sep. 2022), available at https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf, (hereinafter "EPA Social Cost of GHGs Report").

[21] EFG Report, section 3.4.

(These costs also do not include the billions of dollars in health costs imposed on the public by Otter Tail's coal plants, especially by Coyote, discussed in Part VII.)

We discuss these climate costs, and the plans' CO_2 emissions, in more detail in Part VI below, as well as how withdrawing from Coyote by 2028 and Big Stone by 2030 under CEOs Preferred Plan would dramatically reduce that damage.

III. The Commission Should Modify Otter Tail's Plan to Include Withdrawing from Coyote in 2028 Because Doing So Is Lower Cost, Reduces Risks to Customers, and Greatly Reduces Externalities

Otter Tail's initial plan was to withdraw from Coyote in 2028, and the modeling Otter Tail submitted in 2021 strongly supported that withdrawal (indeed, their modeling supported withdrawing in 2026.)[22] Otter Tail's Supplemental Plan modeling continues to indicate that withdrawing from Coyote in 2028 is the least cost, least risk option. Despite its own modeling results, however, Otter Tail now proposes in its Supplemental IRP to maintain its share of Coyote until 2040, "unless and until there is a need for a large, non-routine capital investment" at the plant.[23] Otter Tail says this changed approach to Coyote is not really a significant departure from their initial plan, just a "cautious and measured approach" in response to uncertainties around MISO capacity accreditation and other factors.[24]

CEOs strongly disagree. Otter Tail's own modeling found that, even without any major capital expenditures at Coyote, retaining its share of the plant until 2040 is not in its customers' interests. Hanging onto Coyote until a major new cost is forced upon the plant is an unduly risky approach that results in higher customer costs and does not meet the standards that Minn. Stat. § 216B.2422 and the Commission's planning rule require. Economics aside, waiting until forced to

[22]OTP Initial IRP, Appendix I.
[23] OTP Supplemental IRP, at 3.
[24] *Id.*, at 12.

change is unwise for any coal plant and contrary to the public interest given the urgent need to decarbonize, the time it takes to build replacement resources, and the ongoing harm to the environment. However, Otter Tail's proposed approach is particularly imprudent in light of its contract with its co-owners that requires Otter Tail to give five-years' notice to unilaterally withdraw from the plant and the contract's provision giving any co-owner the power to force the plant to run even when other co-owners will take a loss. As discussed further in Part III.B.1, Otter Tail's proposed approach could place it in the position of facing a significant new capital expenditure without time to comply with its contractual notice requirements.

A. Otter Tail's own modeling shows that withdrawal from Coyote in 2028 is cheaper and less risky than waiting until 2040 under almost all scenarios it considers

In Appendix I of its supplemental IRP filing, Otter Tail creates 22 different future scenarios which vary a multitude of factors such as gas and energy prices, regional haze control costs, load, resource accreditation, and the costs of renewables (futures A through U, listed in Table 1 below). Otter Tail ran capacity expansion plans for each of these futures four times. The first time it ran a capacity expansion plan for all 22 futures without externalities and with a withdrawal from Coyote in 2028. The second set of runs again looked at all 22 futures without externalities, but this time with a withdrawal from Coyote in 2040. Together, these 44 capacity expansion runs were labeled "No Externalities Included," yet they excluded not just externalities but also carbon *regulatory* costs. For the third set of runs Otter Tail modeled these multiple futures[25] again but this time with what Otter Tail calls "Externalities Included" and a 2028 Coyote withdrawal. And finally, in the fourth set of runs, Otter Tail again looked at the multiple futures with "Externalities Included" but this time with a 2040 Coyote withdrawal. Despite Otter Tail's label, these "Externalities Included"

[25] The Externalities Included runs looked at 21 futures rather than 22, excluding one future from the earlier set of runs that assumed a carbon tax (Sensitivity "O").

runs exclude virtually all carbon externalities from Otter Tail's plants (the sole plant included is Solway, the one thermal plant located in Minnesota) and exclude criteria externalities from Coyote.[26] However, Otter Tail does include the regulatory costs excluded from the first two sets of runs (at the mid-range cost of $15/ton).

Rather than look at the impact these different assumptions about the future would have on the cost effectiveness of its Preferred 2040 Plan or its 2028 Plan as is typically done with sensitivities, Otter Tail allowed EnCompass to reoptimize (select a new resource mix under each set of inputs) in all of these additional runs, although certain features like the Coyote exit date, wind repowers, and Astoria fuel storage project were fixed. In other words, Otter Tail did not subject its Preferred 2040 Plan or its 2028 Plan to different assumptions about energy market pricing, regional haze costs, load forecast, etc. This means that the actual cost impact of these different futures on Otter Tail's Preferred Plans is not revealed by Otter Tail's modeling results.

Otter Tail's modeling results do, however, still make a very strong case for withdrawing from Coyote in 2028 rather than its preferred date of 2040. The results of Otter Tail's modeling are shown in Table 1 below. The table summarizes the Present Value Rate Requirement ("PVRR") results from Otter Tail's sensitivity analysis and shows the cost or savings resulting from a 2028 Coyote exit compared to a 2040 Coyote exit. As discussed above, Otter Tail allowed EnCompass to reoptimize the portfolio under each sensitivity, which means that the costs shown for sensitivities B-U are likely lower than the costs of OTP's Preferred 2040 Plan or 2028 Plan under the same assumptions.

[26] CEOs discuss Otter Tail's approach to externalities more in Section V.B.

Table 1. Summary of Otter Tail's Sensitivity Results[27]

		Cost (Savings) of 2028 Coyote withdrawal Compared to 2040 withdrawal ($000)	
	Scenario Name	No Externalities Included	Externalities Included
A	2023 Base Case	($28,173)	($105,154)
A.1	Preferred Plan	($40,007)	($113,264)
B	Natural Gas & Energy Markets (NGEM) +50%	($27,223)	($80,510)
C	NGEM +100%	$230	($54,033)
D	NGEM -50%	($41,494)	($106,873)
E	Regional Haze (RH) Mid Cost	($83,982)	($155,499)
F	RH Mid Cost NGEM +100%	($53,899)	($1,096,581)
G	RH High Cost	($103,845)	($179,189)
H	RH High Cost NGEM +100%	($72,677)	($1,115,381)
I	10% Increased Load	($13,950)	($104,668)
J	10% Increased Load NGEM +100%	$6,503	($64,565)
K	25% Increased Load	$33,386	($97,300)
L	25% Increased Load NGEM +100%	$18,516	($45,720)
M	High Renewable Accreditation	($51,225)	($114,143)
N	Low Accreditation	$37,082	($26,297)
O	Carbon Tax	($134,913)	
P	Renewable High Cost	$37,531	($85,272)
Q	Renewable High Cost NGEM +100%	$42,196	($24,053)
R	Solar and Battery Low Cost (40% ITC)	($32,992)	($113,658)
S	Low Accreditation RH High	($39,099)	($93,888)
T	25% Increased Load RH High	($39,845)	($164,207)
U	Renew High Cost RH High	($39,166)	($158,931)

As Table 1 shows, in the "Externalities Included" runs, it is less expensive to withdraw from Coyote in 2028 than in 2040 in every single scenario Otter Tail modeled, even though only a fraction of externalities was included. In the "No Externalities Included" runs, a 2028 Coyote withdrawal is less expensive in 15 of the 22 assumed futures. Furthermore, in 8 of those 15 futures where a 2028 withdrawal is less expensive, the regional haze rule compliance cost was assumed to be $0.00. In those runs, even when there are no regional haze costs, withdrawal from Coyote in

[27] OTP Supplemental IRP, Appendix I.

2028 is still less expensive than continued operation.[28] This includes Otter Tail's Base Case, in which Otter Tail has the "most confidence."[29] Moreover, none of the futures include any cost to comply with the EPA's proposed GHG rule.

In Otter Tail's Preferred Plan runs (Table 1, row A.1) which assume the same future conditions as the Base Case, Otter Tail would save $40 million by withdrawing from Coyote in 2028 compared to 2040 in the No Externalities Included runs.[30] A 2028 Coyote withdrawal would save even more—$113 million—in the Externalities Included runs, which largely reflect regulatory costs rather than externalities.

In only 7 of the assumed futures (futures C, J, K, L, N, P, and Q, when no externalities or carbon regulatory costs are modeled) does Otter Tail's modeling show it would cost less to delay withdrawal from Coyote until 2040. However, these seven scenarios assume fairly extreme deviations from Otter Tail's base forecast, which cuts against relying on these results for major resource decisions—especially when more reasonable scenarios demonstrate a greater magnitude of risk from delaying withdrawal until 2040.

1. The Otter Tail scenarios that indicate a 2040 Coyote withdrawal is cheaper all rely on extreme and/or unreasonable assumptions

The minority of scenarios that found it was lower cost to continue Coyote's operation until 2040 (the "No Externalities Included" versions of futures C, J, K, L, N, P, and Q) rely in various combinations of four extreme assumptions: a 100% increase in both gas prices and energy market prices, a 10-25% increase in load, persistently high renewable energy costs, and unreasonably low resource accreditations. Resource decisions should not be made based on unlikely edge cases and must consider the totality of the evidence and weigh risks that fall in both directions. For a number

[28] OTP Supplemental IRP, Appendix I, Sensitivities A, A.1, B, D, I, M, O, and R.
[29] OTP Supplemental IRP, at 30.
[30] OTP Supplemental IRP, Appendix I, Sensitivity A.1, "Preferred Plan 2040" vs. "Preferred Plan 2028."

of reasons, it is not reasonable to suggest that these seven scenarios demonstrate that relying on Coyote until 2040 is a less risky approach than proactively planning for withdrawal.

a. Natural gas and energy price assumptions

First, the "very high" natural gas and energy price assumptions used in four of these scenarios[31] are extreme, and the potential cost risk these scenarios presents is far outweighed by the cost *savings* of a 2028 exit in the low market price scenarios. Since Otter Tail's forecast was done, gas prices have dropped, and with them, expectations for the future: prices have been between $2-$2.50 per MMBtu for most of this year and market futures expect roughly between $3 and $4 per MMBtu in the near term.[32] Thus, current pricing and near-term forecasts fall between Otter Tail's base and low (-50%) forecasts. In contrast, Otter Tail's high market price scenario assumes gas prices above [**Trade Secret Data Begins**]

.[33] [**Trade Secret Data Ends**]

It is also important to point out that the potential savings of $230,000 gained with a 2040 Coyote exit in the "very high" price scenario ("NGEM +100%" or future C) is orders of magnitude lower than the modeled savings that would result from a 2028 Coyote exit under the low, base, and even the "high" market price scenarios (futures D, A, and B) — a savings range of $27.2 million (when prices are increased 50% under future B) to $41.5 million (when prices are decreased 50% under future D).[34] CEOs summarize the information from Appendix I related to these market price sensitivities in Table 2 below. Clearly, the risk of staying in Coyote until 2040 exceeds the risk of

[31] OTP Supplemental IRP, Appendix I, Sensitivities C, J, L, and Q.
[32] EIA, Henry Hub Spot Prices, available at: https://www.eia.gov/dnav/ng/hist/rngwhhdm.htm; CME Group, Henry Hub Futures, Settlement on 8/10/23, available at: https://www.cmegroup.com/markets/energy/natural-gas/natural-gas.settlements.html#tradeDate=08%2F10%2F2023
[33] OTP Supplemental IRP, Appendix F, at 6.
[34] OTP Supplemental IRP, Appendix I.

withdrawing in 2028 even when weighed against the "worst case" market price scenarios Otter Tail considers.

Table 2. Cost (Savings) from Exiting Coyote in 2028 vs 2040 in Otter Tail's Market Price Sensitivities[35]

	A	B	C	D
	2023 Base Case	**Natural Gas & Energy Markets (NGEM) +50%**	**NGEM +100%**	**NGEM -50%**
Cost (Savings) from 2028 exit vs 2040 exit (NPVRR)	($28,173,000)	($27,223,000)	$230,000	($41,494,000)

b. High renewable energy and battery storage costs

The second problem with relying on these futures is that two of these seven scenarios (Futures P and Q) assume substantially higher renewable and battery costs throughout the analysis period than in Otter Tail's Base Case—a 25% increase in battery storage and wind costs and a 50% increase in solar costs.[36] We do not challenge Otter Tail's high forecast for near term use; in fact, CEOs' modeling used Otter Tail's "high renewable energy price" forecast for near-term additions to reflect the recent higher prices seen in wind and solar markets. But it is unreasonable to assume such high costs will persist in the long term.

These high renewable costs are unreasonable in the medium to long-term in part because (as discussed further in Section IV.A.1 and in the attached EFG and AEC report[37]), Otter Tail's base assumptions understate the tax credits available to these resources and how long they would be available. For example, Otter Tail's base renewable energy costs assume IRA tax credits will

[35] OTP supplemental IRP, Appendix I, "No Externalities Included."
[36] OTP Response to Department of Commerce IR 013, Attachment "00_RenewHighCost_NOTPUBLIC" (CEOs received permission from Otter Tail to publicly cite the percentage increase used to calculate the high cost scenario).
[37] EFG and AEC Report, Section 1.1.1.

disappear for projects coming online after 2032, despite the ability to use "safe harbor" provisions to take tax credits until 2035, among other issues. And the already unreasonable medium to long-term costs in the Base Case become even more unreasonable when inflated by 25-50% in the renewable "high cost" futures (P and Q).

c. Increased load forecast

Third, three of these futures (J, K, and L) rely on assuming a 10% or 25% increased load forecast over the planning period.[38] Otter Tail points to recent additions of new large agricultural processing customers and what CEOs understand to be crypto-currency mining customers as reasons to model sensitivities representing additional future increases to load.[39] Two of these futures (J and L) model increased load alongside a 100% increase in energy market prices, which we have already shown to be an unreasonable basis on which to make consequential planning decisions. Future K looks exclusively at a 25% load increase and finds a savings from remaining in Coyote until 2040. However, Future I, which models a 10% load increase, finds that a 2028 Coyote withdrawal is preferable. It is not reasonable or prudent to perpetuate coal dependence in anticipation of hypothetical future customers, particularly given the volatility in the crypto currency industry. The crypto market has changed significantly in the past 12 months and is under increasing pressure to avoid energy-intensive data mining methods as well as to ensure it is served

[38] OTP Supplemental IRP, Appendix I, Sensitivities J, K, and L.
[39] OTP Supplemental IRP, at 12-13; OTP Response to OAG IR 015. These new customers are already included in OTP's base load forecast.

by carbon-free electricity.[40] Many crypto companies and related service industries are pledging to achieve carbon-free or net-zero carbon operations by 2030.[41]

Similarly, Otter Tail notes that its new large agricultural customers are "similar to what we have seen historically, albeit with different methods, intended to produce carbon neutral products."[42] Maintaining operations in a baseload coal plant is antithetical to the goal of serving customers seeking to be carbon neutral. Additionally, several of the large load customers Otter Tail has recently added or expects to add are curtailable; as of May 1, 2023, Otter Tail expected the interruptible portion to account for more than **[Trade Secret Data Begins]** **[Trade Secret Data Ends]** of the anticipated increase in peak demand.[43] Thus, even if energy demand continues to increase as a result of new industrial customers of this type, it is likely that upward pressure on Otter Tail's capacity requirements can be substantially mitigated through the use of non-firm demand contracts and that additional energy requirements can be met with a combination of new renewables, battery storage, and existing resources. In short, Otter Tail will have options aside from its coal plants to meet load additions of this scale, if they materialize. The Company will also have the ability to re-examine this issue in its next IRP if a very high load forecast becomes more likely.

---

[40] See for example, White House, *Fact Sheet: Climate and Energy Implications of Crypto-Assets in the United States*, Sep. 08, 2022, *available at*: Fact Sheet: Climate and Energy Implications of Crypto-Assets in the United States; Renee Cho "AI's Growing Carbon Footprint," Columbia Climate School, June 9, 2023; David Mytton, "Hiding greenhouse gas emissions in the cloud," Nature Climate Change, Correspondence, July 13, 2020

[41] See for example: Crypto Climate Accord," website, *available at*: https://cryptoclimate.org/supporters/; Google Environmental Report 2019, *available at:* https://services.google.com/fh/files/misc/google_2019-environmental-report.pdf; Smith, B. Microsoft will be carbon negative by 2030. Official Microsoft Blog, *available at:* https://blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030/; Amazon announces $2 billion climate pledge fund to invest in companies building products, services, and technologies to decarbonize the economy and protect the planet. *Available at:* https://press.aboutamazon.com/news-releases/news-release-details/amazon-announces-2-billion-climate-pledge-fund-invest-companies.

[42] OTP Supplemental Plan, p. 13

[43] OTP Response to OAG IR 15 (Trade Secret).

d. MISO resource accreditation

Fourth, Otter Tail points to uncertainty in MISO's changing resource adequacy construct and the risk of lower future renewable energy accreditations as a reason to remain in Coyote until 2040.[44] Otter Tail's "low accreditation" scenario (Future N) is one of the seven that shows it could cost less to maintain an interest in Coyote until 2040. Otter Tail's Base Case and Preferred Plan use its most recent actual capacity accreditation values—numbers for the 2023-24 Planning Year—and apply these percentages across the planning period. These figures take into account the new MISO seasonal resource adequacy construct and seasonal accreditation differences, but further changes to accreditation are very likely. In its low accreditation scenario, Otter Tail cut accreditation values for wind, solar, and battery in each season by **[Trade Secret Data Begins] [Trade Secret Data Ends]**.[45] (In its high accreditation scenario (Future M), Otter Tail increased seasonal accreditations for these resources by **[Trade Secret Data Begins] [Trade Secret Data Ends]** compared to the base case.[46]) Figure 2 below shows the capacity accreditation values assumed in Otter Tail's high, base, and low accreditation scenarios.

[44] OTP Supplemental IRP, p. 8-9 and 12-13.
[45] OTP Response to DOC IR 013, Attachment 00_Accred_Low_NOTPUBLIC.
[46] OTP Response to DOC IR 013, Attachment 00_Accred_High_NOTPUBLIC.

[Trade Secret Data Begins]

[Trade Secret Data Ends]

MISO's resource adequacy and accreditation methodologies are in flux and there is a risk that renewable energy accreditations will drop in future years depending on MISO's final revised accreditation methodology. However, there are problems with the way Otter Tail modeled this sensitivity that underscore the importance of not basing resource decisions on one unlikely or "worst case" scenario. While Otter Tail reduces resource accreditations for wind, solar, and batteries by **[Trade Secret Data Begins]** **[Trade Secret Data Ends]** in the "low accreditation" scenario, it does not adjust the thermal units' accreditation nor the Company's seasonal planning reserve margin requirements ("PRMR").[47] This is a critical point: the changes MISO is

[47] OTP Supplemental IRP, Appendix I, and Otter Tail responses to DOC IR 13, Attachments 00_Accred_Low_NOTPUBLIC and 00_Accred_High_NOTPUBLIC.

contemplating to non-thermal resource accreditation will also impact the PRMR, utility capacity obligations, and thermal resource accreditation.[48]

CEOs acknowledge that these impacts may not have been known when Otter Tail developed its Supplemental Plan. MISO originally intended to only update the accreditation methodology for non-thermal resources, and the understanding of the impact on the PRMR has only begun to emerge in recent months.[49] Nonetheless, by reducing non-thermal accreditation values without corresponding adjustments to other factors, Otter Tail's low accreditation scenario paints a one-sided and incomplete picture. Additionally, cutting accreditation values for all three clean energy resources (wind, solar and batteries) in all four seasons by a flat **[Trade Secret Data Begins] [Trade Secret Data Ends]** is arbitrary. Based on the most recent information provided by MISO, it appears that an updated direct loss of load ("DLOL") methodology may lead to sizable accreditation changes for wind, solar, and thermal resources, but with large seasonal variation in the scale of change.[50] On the other hand, indicative DLOL accreditations for battery storage thus far remain stable around 94-95%.[51] Additionally, several stakeholders in collaboration with Astrape Consulting proposed specific modifications to MISO's DLOL methodology in August 2023, which could change this picture yet again.[52]

Thus, significant uncertainty remains about resource accreditation, but it is clear that Otter Tail's "low accreditation scenario" is incomplete and likely to be more pessimistic for clean energy resources than is reasonable. Instead, looking at the best resource accreditation information we

[48] MISO Resource Adequacy Subcommittee Meeting August 22-23, 2023, Accreditation Reform Presentation (link), slides 5-8.
[49] MISO Resource Accreditation White Paper, May 2023 (link); MISO Resource Adequacy Subcommittee Meeting July 11-12, 2023, Accreditation Reform Presentation, slides 12-18.
[50] MISO Resource Adequacy Subcommittee Meeting August 22-23, 2023, Accreditation Reform Presentation, slide 5.
[51] *Id*.
[52] MISO Resource Adequacy Subcommittee Meeting August 22-23, 2023, DLOL Enhancements Proposal.

have today (Otter Tail's actual resource accreditations for the current planning year as reflected in its Preferred Plan), Otter Tail's modeling demonstrates that a 2028 withdrawal from Coyote is lower cost than remaining in the plant until 2040.

e. Failure to include any environmental compliance costs

Finally, the seven runs that purport to show savings by delaying withdrawal from Coyote until 2040 all fail to reflect *any* costs to comply with the federal regional haze rule, or any costs related to carbon regulation. Based on the landscape of current and proposed regulations, these assumptions are simply not reasonable. CEOs discuss regulatory risk in greater detail in section B below.

2. When considering the minimum carbon regulatory costs that the Commission requires, it is cheaper to retire Coyote in 2028 in all scenarios

CEOs retained EFG, with additional support from AEC, to analyze Otter Tail's EnCompass generation capacity expansion modeling and to conduct additional modeling on CEOs' behalf. EFG and AEC's analysis and findings are provided in a separate report in Attachment 1 ("EFG Report"). CEOs asked them to re-run Otter Tail's seven scenarios that showed a cost advantage in delaying withdrawal from Coyote to 2040.

CEOs' runs made only one change: we added the $15/ton mid-range carbon regulatory cost to the model starting in 2025. (As we discussed in Part III.A, Otter Tail did not include regulatory costs in its "No Externalities Included" runs at all, and while it included them in its "Externalities Included" runs, it combined them with externalities, meaning there is no estimate of the plans' actual PVRR in the Supplemental Plan.) This mid-range regulatory cost is the least that the Commission's 2020 carbon regulatory cost order requires in a utility's reference case,

which must reflect either the mid-range or high regulatory cost.[53] We did not add externality costs to these runs or make any of the other corrections we describe later in these comments. With the single change of adding a mid-range carbon regulatory cost to Otter Tail's modeling, the cost advantage in all seven of these scenarios flipped so that it was now lower cost to withdraw from Coyote in 2028 rather than 2040.[54]

In summary, in the large majority of Otter Tail's sensitivities, withdrawal from Coyote in 2028 is a clearly superior course of action. The few scenarios that show the opposite are underpinned by extreme and unlikely scenarios: energy market and natural gas prices doubling over the (relatively high) base forecast; load increasing by 25% over the base forecast; resource accreditations for wind, solar, and storage being cut in half; and renewable energy prices remaining at recent highs for the full planning period. Of course, these runs also fail to reflect the impact of EPA's proposed GHG rule, which would only provide further support for the 2028 retirement date. CEOs' re-runs of these scenarios show that even under the most extreme assumptions about the future, it only appears financially advantageous to delay withdrawal from Coyote if one ignores any potential future regional haze compliance and any carbon regulatory costs. It is clear then that delaying withdrawal from Coyote until 2040 is simply not reasonable.

B. Withdrawing from Coyote in 2028 or sooner greatly reduces the regulatory cost risk faced by Otter Tail

Coyote has an enormous impact on the environment, even compared to other coal plants. It is thus particularly exposed to regulatory developments in the near future that will very likely require Coyote to deal not just with its CO_2 emissions but also with its high sulfur dioxide ("SO_2"),

[53] Minn. Pub. Utils. Comm'n, *In the Matter of Establishing an Updated 2020 Estimate of the Costs of Future Carbon Dioxide Regulation on Electricity Generation under Minn. Stat. § 216H.06,* Order Establishing 2020 and 2021 Estimate of Future Carbon Dioxide Regulation Costs, Docket Nos. E-999/CI-07-1199, E-999/DI-19-406, at 9 (Sep. 30, 2020).
[54] EFG and AEC Report, section 1.1.4.

nitrogen oxides (NOx), and mercury emissions if it is to operate beyond 2028. The costs of complying with these regulations would make this coal plant—which Otter Tail's own modeling shows is already uneconomic to operate in the long term—even more uneconomic.

Otter Tail has already acknowledged that it would be imprudent to maintain its share of Coyote in the event any large, non-routine capital expenditure is required.[55] If such an expenditure is needed to comply with environmental laws or to operate the plant, Otter Tail notes there would be an "especially strong case" to exit the plant.[56] The expected regulatory requirements that will impact Coyote and likely require large, non-routine capital investments in order for Coyote to continue operating include:

1. EPA's Regional Haze rule, which requires compliance in 2028;
2. EPA's proposed GHG rule for existing plants, which would require compliance action (and likely capital investment) by 2030 or retirement by the end of 2031; and
3. EPA's proposed Mercury and Air Toxics Standard, which would require compliance by 2027 but possibly as early as 2025.

Each of these issues is discussed further below.

1. Otter Tail's proposed plan to operate Coyote until 2040 is unduly risky in light of likely regional haze compliance requirements

Otter Tail specifically cites the Regional Haze Rule when saying it will withdraw from Coyote in 2028 if a major environmental compliance investment is needed,[57] and its modeling supports that early withdrawal. However, if Otter Tail fails to give notice of this withdrawal in 2023, it could still be exposed to regional haze compliance costs due to the five-year notice provision of its contract with the Coyote plant co-owners. And as we discuss below, those regional haze compliance costs will likely be far higher than Otter Tail has estimated. Otter Tail's proposed "wait-and-see" approach is therefore unduly risky and runs counter to its customers' interests.

[55] OTP Supplemental IRP, at 3.
[56] *Id.*
[57] *Id.*

North Dakota submitted its proposed Regional Haze State Implementation Plan ("SIP") to EPA in August of 2022. Despite Coyote's high emissions of SO_2 and NOx—two pollutants that are major contributors to haze formation—North Dakota's SIP does not propose requiring Coyote to install more effective SO_2 and NOx pollution controls.

In June 2022, the National Parks Conservation Association, Sierra Club, and Badlands Conservation Alliance (collectively, "Conservation Organizations") submitted comments on the North Dakota Department of Environmental Quality's ("DEQ's") proposed SIP, identifying serious problems with it. Those comments[58] found that North Dakota DEQ's proposal impermissibly exempted Coyote from technically feasible, cost-effective controls. Specifically, in order to comply with the regional haze provisions of the Clean Air Act, the Conservation Organizations noted Coyote should be required to install selective catalytic reduction ("SCR") controls to reduce its NOx emissions, and that the plant should be required to install a dry scrubber system to control SO_2 emissions.[59]

The EPA has not yet determined whether to accept North Dakota's proposed SIP, but EPA explicitly warned the state before it submitted the SIP that the state should reassess its determination that SO_2 and NOx controls are not warranted for Coyote.[60] On August 26, 2023, Sierra Club and other signatories sent EPA a Notice of Intent to Sue for EPA's failure to issue a final determination on North Dakota's proposed SIP by the required date.

[58] The Conservation Organizations' comments and expert report are included with this comment as Attachment 3.
[59] Attachment 3, Conservation Organizations' comments, at 24.
[60] EPA Comments on the North Dakota State Implementation Plan for Regional Haze (RH SIP) – Draft for Federal Land Manager Review, June 1, 2022, p. 6. These comments are included as an embedded attachment in the North Dakota Regional Haze SIP, App. D.6-583, available at https://deq.nd.gov/aq/planning/RegHaze.aspx.

It is important to note that this round of the Regional Haze Rule has a compliance deadline of 2028.[61] Yet, Otter Tail's IRP Base Case and Preferred 2040 Plan assume that additional controls on Coyote Station will not be required.[62] Instead, Otter Tail modeled sensitivities to assess the cost-effectiveness of continuing to operate Coyote in the event EPA requires upgrades and new controls to comply with the Regional Haze Rule requirements.[63] Otter Tail used "mid" and "high" capital compliance cost assumptions of **[Trade Secret Data Begins]**

[Trade Secret Data Ends].[64] Under the mid cost run (and in the absence of any externality or carbon regulatory costs), Otter Tail's modeling found that continued operation of Coyote past 2028 was $84 million more expensive than retiring the plant; under the high cost run, Otter Tail's modeling found that continued operation of Coyote was $104 million more expensive.[65] Based on these runs, Otter Tail concludes that it should exit Coyote in the event that such expenditures are required.

However, Otter Tail's regional haze compliance cost assumptions are too low. As noted above, the Conservation Organizations' expert recommended that EPA require both SCR technology and a dry scrubber at Coyote.[66] His detailed analysis estimated that a new SCR would cost $185 million and that a dry scrubber replacement would cost $193 million, for a total of $378 million.[67] Otter Tail's share of that cost would be $132 million. Even Otter Tail's own compliance cost analysis, performed by Sargent & Lundy, estimated Otter Tail's share of compliance costs would be between $51.1-93.5 million (assuming a NOx control technology far less effective than

[61] OTP Supplemental IRP, at 38.
[62] OTP Supplemental IRP, at 43.
[63] *Id*.
[64] OTP Response to DOC IR 13, Attachments 00_HazeHigh_NOTPUBLIC and 00_Mid_NOTPUBLIC.
[65] OTP Supplemental IRP, Appendix I, "No Externalities Included" (Sensitivities E and G).
[66] Attachment 3.
[67] Attachment 3, Joe Kordzi report, attached to Conservation Organizations' comments, p. 11, 28.

SCR and depending on the level of scrubber replacement).[68] Otter Tail thus appears to be seriously understating the compliance cost risks for this regulation in the sensitivities where it considers them. Yet, even using Otter Tail's unduly low-cost estimates for Regional Haze Rule compliance, its own sensitivity modeling shows that retirement of Coyote in 2028 is $84-104 million less expensive on a PVRR basis than continuing to operate the plant.[69]

It is highly unlikely that Coyote will be permitted to continue to operate beyond 2028 without new pollution controls. Coyote is one of the most polluting coal plants in the nation when measured by its rate of haze-causing SO_2 and NOx emissions per MWh.[70] In 2021 Coyote emitted SO_2 at a rate at least eight times higher than any coal plant in Minnesota or South Dakota, and it emitted NOx at a rate at least three and a half times higher than any coal plant in Minnesota or South Dakota. It is hardly surprising then that Coyote faces the prospect of having to install costly SO_2 and NOx pollution controls in the near future. The surprise is that it has been allowed to operate for so long without them.

Otter Tail notes that, "[i]f significant upgrades are required, the work of making those upgrades will likely need to begin well before 2028 so that they can be operational by the time of the anticipated compliance deadline of December 2028."[71] And yet, in its Five Year Action Plan, Otter Tail proposes to "[c]ontinue to monitor need for large capital investment in Coyote Station and commence withdrawal if such investment becomes necessary."[72] Given the five-year notice period for a unilateral withdrawal from Coyote, this approach exposes Otter Tail customers to an unreasonable level of risk regarding compliance costs of this shared asset. For example, if Otter

[68] OTP Response to CEO IR 26, Attachment 1, at 69 and 71.
[69] OTP Supplemental IRP, Appendix I, Sensitivities E and G.
[70] Data on SO_2 and NOx emissions is taken from the EPA's eGRID data for 2021, released Jan. 30, 2023 and available here: https://www.epa.gov/egrid/download-data
[71] OTP Supplemental IRP, at 43.
[72] *Id.*, at 47.

Tail "monitors" the situation for two more years and then finds out it must install pollution controls by 2028, it would need to either: (1) sell its share to an entity willing to take on these costs, (2) violate its co-owners contract's five-year notice requirement, or (3) violate federal environmental laws. Otter Tail has not explained in its IRP how it would handle such an occurrence if it seeks a buyer but is unable to find one. And any of these three avenues presents significant risk to Otter Tail's customers and provides prospective buyers significant leverage. Thus, the least-risk course is for the Commission to provide clear direction to Otter Tail now, in this case, to notice withdrawal now and begin the process of withdrawal as soon as possible.

2. Otter Tail's plan to operate Coyote with unabated CO_2 emissions until 2040 fails to meet the emission limits in the proposed EPA GHG Rule

As we discussed in Part II.B, the proposed EPA GHG rule sets emission limits for coal plants based on when they plan to retire. For Coyote's co-owners to comply with these proposed limits they must either (1) install 90% CCS by 2030, (2) cofire with 40% gas by 2030 and then retire Coyote by 2040, (3) cut Coyote's capacity factor to 20% by 2030 and then retire Coyote by 2035, or (4) retire Coyote by December 31, 2031. Otter Tail's Preferred 2040 Plan does not comply with any of these pathways for Coyote (or for Big Stone). In response to an information request from the Department about the proposed EPA rule, Otter Tail indicated that "[a]t a minimum, it is estimated that there will need to be either a significant capital investment made to continue to operate the [coal] plants, or an earlier retirement than what is currently assumed."[73]

Early retirement appears especially necessary for Coyote because it is not a good candidate for CCS. Otter Tail notes in Appendix D of its Supplemental IRP its understanding that "the current CCS technologies require very high levels of control of sulfur-dioxide prior to routing the flue gas to the CCS equipment. Therefore, the Coyote Station sulfur-dioxide scrubber would first

[73] OTP Response to the Department's IR 018.

need to be upgraded to the high-control scenario being considered by the Regional Haze Rule . . . before employing carbon capture technology."[74] This type of technology is needed because CCS requires eliminating the emissions of other pollutants before the CO_2 can be captured. This scrubber upgrade is the same large, non-routine capital investment Otter Tail has already decided is too costly to make at Coyote for regional haze purposes, even before it faces the large, non-routine costs of adding CCS.

As for the option of cofiring with natural gas at Coyote, Otter Tail has stated in its recent comments to EPA on the proposed GHG rule that Coyote does not have access to natural gas. Gaining that access, it writes, would require building an approximately 30-mile pipeline, costing an estimated $153.7 million.[75] Otter Tail also points to the "not insignificant cost" of studying whether co-firing is feasible at any given coal unit and stresses the cost of firm access to natural gas supplies.[76] And the third option, reducing Coyote's capacity factor to 20%, would likely make it even more uneconomic to keep operating the plant beyond 2028, and in this scenario, the plant would still have to retire by 2035.

Thus, given this likely forthcoming regulation, early retirement of Coyote reduces Otter Tail's regulatory risk, especially when CEOs Preferred Plan shows the availability of a cost-saving, reliable, clean energy option. Indeed, retiring Coyote early may be the only financially feasible option of the four that EPA presents.

---

[74] OTP Supplemental IRP, Appendix D: Potential Resources, at 3.
[75] Letter from Mark Thoma, Otter Tail Power Company, to EPA Docket Center, Docket ID No. EPA-HQ-OAR-2023-0072, Aug. 8, 2023, p. 30, available at https://www.regulations.gov/search/comment?filter=epa-hq-oar-2023-0072.
[76] *Id.*, p. 31.

3. Coyote also faces cost increases under the MATS rule

The EPA has also recently proposed a new Mercury and Air Toxics Standard ("MATS") for power plants.[77] The proposal focuses particularly on bringing mercury emissions from lignite-fired coal plants like Coyote down to the level of other coal plants. Coyote has one of the highest rates of mercury emissions among US coal plants.[78] It emitted mercury in 2022 at a rate approximately three to five times higher than any other coal plant in Minnesota and South Dakota. The EPA proposes reducing allowable mercury emissions from lignite-fired plants to 1.2 lb/TBtu, well below Coyote's 2022 emission rate of 2.28 lb/TBtu.[79]

Achieving this more stringent emissions limitation would require changes in the operation of existing mercury pollution controls which would increase the variable operating costs at Coyote.[80] The proposed compliance date is three years from the rule's effective date, but EPA is soliciting comment on whether more than one year is needed to comply.[81] If the rule is finalized in 2024, and if the shorter compliance deadline is chosen, Coyote's co-owners could be faced with new compliance costs to meet the tighter mercury limit and other requirements of the MATS rule as soon as 2025. Even if the longer compliance deadline is chosen, it would require MATS compliance by 2027. Otter Tail has not yet developed estimates for how this proposal would increase O&M costs at Coyote.[82] Thus, none of its modeling accounts for how this rule change

[77] 88 Fed. Reg. 24,854 (April 24, 2023).
[78] Data on mercury emission rates is taken from the EPA's Table of Annual Emissions, Emission Rates, Heat Input: 2021 vs. 2022, available here: https://www.epa.gov/power-sector/facility-level-comparisons#Annual.
[79] 88 Fed. Reg. 24,857.
[80] The EPA assumes that the lignite plants will comply by replacing the standard powdered activated carbon (PAC) sorbent they use today in their Activated Carbon Injection systems with halogenated PAC sorbent, at a higher operating cost. EPA, *Regulatory Impact Analysis for the Proposed National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review,* April 2023, at ES-6, 3-7, *available at* https://www.epa.gov/system/files/documents/2023-04/MATS%20RTR%20Proposal%20RIA%20Formatted.pdf.
[81] 88 Fed. Reg. 24,887.
[82] OTP Response to CEO IR 074.

would impact Coyote's economics. Given that Otter Tail's own modeling already shows how uneconomic it is to keep its share of Coyote beyond 2028, any additional control costs will make Coyote even more uneconomic.

C. Withdrawing from Coyote in 2028 rather than 2040 would avoid an estimated $1.2 billion in climate costs, $2.6 billion in health costs, and 230 premature deaths otherwise attributable to Minnesota load served by Otter Tail

We discuss the overall climate and health damage associated with Otter Tail's preferred plans in Parts VI and VII. Here we stress the climate and health damage that would be caused simply by delaying Otter Tail's withdrawal from Coyote from 2028 to 2040.

If allowed to continue operating without CO_2 limits, under Otter Tail's Preferred 2040 Plan Otter Tail's share of Coyote's total CO_2 emissions between 2029 and the end of 2040 would be roughly 11.9 million tons (counting only the 50% of Otter Tail's generation that serves Minnesota customers). The central estimate of externality costs from these emissions would be roughly *$1.2 billion*, with a range of $660 million to $2.1 billion.[83]

Meanwhile, the public health costs attributable to Otter Tail's share of Coyote's criteria pollution between 2029 and 2040 is *$2.6 billion*. Much of this cost is associated with the *230 premature deaths* attributable to Otter Tail's share of Coyote's emissions between 2029 and 2040. And these health costs and deaths reflect only the share of Coyote emissions that serve Minnesota customers, as discussed in part VII below; Otter Tail's full share of Coyote's emissions (serving all three states) would cause twice the costs and premature deaths.

Otter Tail's Supplemental IRP indicates that it would prefer to hang on to Coyote until 2040, but also that the plant is not worth making a "large, non-routine capital investment" of the sort that might be needed to cut its emissions.[84] If it can avoid such an investment, Otter Tail says

[83] EFG and AEC Report, section 3.4, Table 17.
[84] OTP Supplemental IRP, at 3.

that keeping its share of Coyote "preserves flexibility to respond to uncertainties."[85] CEOs disagree. Remaining dependent on Coyote—an old and especially polluting coal plant subject to unique contractual entanglements and obvious regulatory and market risk—does not preserve flexibility. Withdrawing from Coyote and moving ahead with acquiring clean replacement resources compatible with a decarbonized future will provide Otter Tail with far more flexibility.

However, even if delaying withdrawal from Coyote did provide some additional flexibility, the price of the damage to our climate and to human health paid by society for this supposed flexibility would be tremendous. It is clearly not worth this price, especially when the CEOs Preferred Plan shows that Otter Tail has clean and reliable options that actually save the Company money.

D. Prudence required Otter Tail to have given co-owners notice of its withdrawal from Coyote already, without waiting for the Commission to explicitly authorize or require it

Otter Tail asks the Commission to authorize it to withdraw from the Coyote plant in the event it is required to make a major non-routine capital investment in the plant, and it interprets its contract with the co-owners to require five years of advance notice in order to unilaterally withdraw.[86] CEOs do not oppose Otter Tail being authorized to give this notice as soon as possible. However, we contest Otter Tail's assertion that it needs to wait for the Commission to authorize it to give this notice. Otter Tail has always had an obligation of prudence, and given the multiple problems connected to coal power in general, but especially to Coyote, it would have been prudent for Otter Tail to have begun the process of withdrawing from Coyote years ago.

[85] *Id*.
[86] OTP Supplemental IRP, at 11, 39.

As CEOs stated in our letter to the Commission last year after the comment period for this docket was extended,[87] Otter Tail had every reason to know in 2021 that a 2026 withdrawal from Coyote was prudent, yet it chose not to give its co-owners notice of withdrawal. Otter Tail's modeling in its initial IRP, submitted in 2021, showed that withdrawing from Coyote in 2026 yielded even greater savings than withdrawing from it in 2028, and this was true not just for Otter Tail's Base Case and its Preferred Plan but for almost all cost futures considered, even when completely ignoring the potential for future carbon regulatory costs.[88] Moreover, the self-commit docket also provided ample evidence of the financial risks faced at Coyote due to having a co-owner that could force Otter Tail to run the plant at a market loss, as discussed in Part V.A. This financial risk was not reflected in Otter Tail's 2021 modeling, but the 2021 modeling still showed the financial benefits of retiring Coyote in 2026. Other risks Otter Tail was aware of include the obvious regulatory risks attached to Coyote's carbon and criteria emissions, including the cost of Regional Haze Rule compliance, which Otter Tail has discussed in regulatory filings since at least 2018.

While Otter Tail now takes the position that it needs the Commission's approval to give contractual notice, notably, Otter Tail did *not* ask for Commission approval to enter into the unusual and risky Lignite Supply Agreement contract that effectively extended Otter Tail's financial commitment to Coyote. Coyote is a mine-mouth plant that depends on the local lignite mine. In 2012, despite the obvious need to reduce coal power emissions in response to climate change and the obvious changes in the economics of coal power relative to natural gas and renewable energy, Otter Tail decided to make a *multi-decade commitment* to this aging coal plant by expanding the co-located lignite mine and even agreeing to take over the mine and its liabilities if

[87] CEOs' Nov. 15, 2022, letter to Commission in this docket.
[88] OTP's Initial IRP, Appendix I, at 1-2.

Coyote's need for the coal ended before 2040. The fact that Otter Tail was willing to make a high-risk long-term extension of its *commitment* to Coyote without prior Commission approval stands in stark contrast to Otter Tail's current position that it must wait for a Commission order *to get out of its commitment* to Coyote. When a utility finds itself party to a risky and uneconomic contract, prudence requires it to promptly take steps to get out of that contract, even without Commission approval, and any liabilities that result from failure to do so should not be passed on to Minnesota ratepayers.

E. The Commission should modify Otter Tail's resource plan to include a withdrawal from Coyote as soon as reasonably possible and by no later than 2028

For the reasons stated herein, the Commission should modify Otter Tail's resource plan to include withdrawal from Coyote by 2028 or, given the plant's impact on the climate and on human health, even sooner if feasible. Given that this resource plan modification may lead Otter Tail to give co-owners notice of intent to terminate the operating agreement and may thus prompt the plant's retirement, Otter Tail should also take steps to evaluate the reliability impacts of plant retirement and options for re-using its valuable interconnection rights.

When a MISO market participant is considering retirement options for a generating unit, it may request an Attachment Y-2 Study from MISO. "An Attachment Y-2 study is a non-binding assessment of the Transmission System reliability for the potential suspension or retirement of a Generation Resource(s). The results of the study are not definitive, and the analysis is to provide information to the Market Participant to assist them in evaluating their options. However, it does not commit the Market Participant to proceed with plans for suspension or retirement."[89] For a generator with an *identified* retirement or suspension date, the market participant must request an

[89] Minnesota Power, 2021 Integrated Resource Plan, Appendix F Part 9 – MISO Attachment Y-2 Study, February 1, 2021, Docket No. E015/21-33, pp. 2-3.

Attachment Y study, which provides definitive reliability results and may designate a unit as a System Support Resource if the study identifies reliability issues that cannot be mitigated by the intended date.[90] Market participants must submit an Attachment Y Notice at least 26 weeks prior to the anticipated retirement or suspension date, or at least one year prior if replacement resources are planned.[91] If a resource is designated as a System Support Resource, MISO may require it to operate past the intended retirement or suspension date and assign costs of this operation to the load serving entities who require the unit's operation for reliability.[92] An indicative Attachment Y-2 study can therefore help prevent this undesirable outcome by providing adequate time to cost-effectively address any reliability needs.

Otter Tail's resource plan and CEOs' foregoing analysis demonstrate that there is a reasonable possibility Coyote will cease operations in or around 2028 due to the costs of environmental compliance and/or due to a request from Otter Tail to terminate the operating agreement. It would therefore be prudent for Otter Tail to request an Attachment Y-2 study to identify the types and scale of reliability challenges a potential retirement could pose, and if any such issues are identified, to begin work to define mitigations to those issues. Therefore, we suggest the Commission also order Otter Tail to request an Attachment Y-2 study based on the resources approved in this resource plan and file it with the Commission upon completion.

Specifically, CEOs request that the Commission take the following steps with respect to Coyote:

1. Find that it is not prudent and not in the public interest for Otter Tail to retain its share of Coyote beyond 2028 and that Otter Tail should therefore withdraw from Coyote as soon as reasonably possible, but by no later than 2028. The Commission should also authorize Otter Tail to give contractual notice of its intent to withdraw to co-owners while declining

[90] *Id.*
[91] Xcel Energy, Response to XLI IR 185, 2019 Integrated Resource Plan, Docket No. E002/19-368.
[92] FERC Decisions E-3, E-4, Docket Nos. EL14-34-001, EL14-103-000, February 19, 2015.

to explicitly find at this time that Otter Tail required Commission authorization to give this notice or that it was prudent not to give notice of withdrawal earlier.

2. Modify Otter Tail's Preferred 2040 Plan to:
   a. Include withdrawing from Coyote by no later than 2028.
   b. Find that Otter Tail has demonstrated a need for: planned wind repowers in 2025, 200 MW of surplus solar in the 2027-2028 timeframe, 350 MW of wind resources in the 2029-2031 timeframe, an additional 200 MW of surplus solar in the 2030-2032 timeframe, and 50 MW of surplus battery resources by no later than 2032.
   c. Require Otter Tail to request an Attachment Y-2 study with MISO and perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Coyote retirement and any potential mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   d. Conduct an assessment of the value of reusing the Company's interconnection rights at Coyote and submit that assessment in this docket within 12 months of this order.

IV. The Commission Should Modify Otter Tail's Plan to Include Additional Renewable Energy and Storage Resources and to Include Planning for a Big Stone Withdrawal by 2030

A. CEOs' EnCompass modeling demonstrates that Otter Tail's plan to retain an ownership stake in Coyote until 2040 and Big Stone until 2046 is not in the public interest

CEOs' EnCompass modeling, which is based on the Company's modeling but uses updated information and adjusts inappropriate constraints and other shortcomings in Otter Tail's methodology, found that a generation resource expansion plan that exits Coyote by 2028 and Big Stone by 2030 and that adds more wind and battery storage can meet Otter Tail's energy and capacity needs. It is also significantly lower cost compared to Otter Tail's Preferred 2040 Plan or its 2028 Plan. Moreover, given the financial and policy risks presented by continuing Otter Tail's participation in the two coal plants beyond 2030, and the misalignment with national decarbonization pathways and Minnesota policy preferences, the CEOs Preferred Plan – detailed in this section – is more squarely aligned with Minnesota law, policy, and the public interest than Otter Tail's Preferred 2040 Plan or its 2028 Plan.

1. CEOs Preferred Plan is based on reasonable changes and corrections to Otter Tail's modeling

To develop the CEOs Preferred Plan, our experts at EFG and AEC undertook a two-step process. First, they analyzed Otter Tail's EnCompass assumptions and modeling approach and made changes to them based on updated information, corrected errors, and more supportable methodological choices. Using these changes and corrections, EFG ran EnCompass to develop an optimal resource plan that meets the same energy and capacity requirements that Otter Tail modeled, including consideration of MISO's current seasonal capacity construct. This plan was dispatched against the same 8,760 hourly, chronological profile that the Company used in order to demonstrate that hourly energy requirements can be met economically throughout all years of the planning period. That optimized generation resource expansion plan is referred to as the CEOs Preferred Plan. Otter Tail provided no similar hourly analysis of their plan, and in fact did not submit any production cost modeling with their IRP filing.[93]

Next, EFG ran the OTP Preferred 2040 Plan and 2028 Plan through EnCompass and through production cost modeling, with the same input and assumption changes used in the CEOs Preferred Plan. These versions are referred to as the "Revised OTP Preferred 2040 Plan" and "Revised OTP 2028 Plan" in the EFG Report. These versions of Otter Tail's plan represent the modeling runs that are fair and reasonable to compare with the CEOs Preferred Plan because the cost inputs, forecasts, and modeling approach are the same in order to isolate the impact of resource choices. The changes and corrections made to Otter Tail's modeling assumptions are explained in full detail in Section 1 of the EFG Report. Material changes can be summarized as follows:

1. **Withdrawal dates for Coyote and Big Stone:** The EFG-AEC modeling included a 2028 withdrawal date for Coyote and a 2030 withdrawal date for Big Stone. We used Otter

[93] See further discussion at EFG and AEC Report, sections 2.1 and 5.1.5.

Tail's cost assumptions for the 2028 Coyote exit and did not include exit costs for Big Stone because Big Stone is a delivered coal plant and thus does not have the same level of contract complexity or withdrawal cost schedule as Coyote Station.[94]

2. **Updated cost assumptions for wind, solar, and battery storage:** EFG and AEC developed an alternative cost forecast for new wind, solar PV, and battery storage resources available in EnCompass. Upon reviewing Otter Tail's price forecasts, we discovered that the Company's base case may actually underestimate pricing in the near term while significantly overestimating costs in the medium and long term. Actual recent pricing has been unusually high due to supply chain constraints, continuing transmission interconnection issues, inflation and rising interest rates.[95] However, in our experts' view, it is not reasonable to believe that these trends will continue indefinitely and that no re-balancing toward the pre-covid long-term trends will occur.[96] Our experts' report includes detailed support for the revised price forecast they used in their modeling.[97]And as discussed earlier, Otter Tail's price forecast ignored the ability to use IRA incentives beyond 2032.

   The revised forecast developed by EFG and AEC uses Otter Tail's "high renewable energy price" scenario, a 25% increase in battery storage and wind costs, and a 50% increase in solar costs above Otter Tail's base price forecast, for the years 2023-2026.[98] From 2027-2029, the forecast gradually rebalances to long-term price forecasts provided by National Renewable Energy Laboratory's ("NREL") Annual Technology Baseline ("ATB"), which is the basis for our forecast from 2029-2050. We use the "conservative" or high-priced forecast from NREL ATB as the basis for the CEOs' renewable energy and storage cost forecast over that entire period. Thus, CEOs' price assumptions for wind, solar, and storage are likely conservative in both the near term (using Otter Tail's high-price forecast) and the long term (using NREL's high-price forecast).

3. **Corrected treatment of tax credits through the Inflation Reduction Act (IRA):** Otter Tail's price forecasting incorrectly cuts off renewable energy tax credits after 2032. However, the IRA also includes a safe harbor provision which will allow projects that begin construction by 2035 to utilize the full ITC or PTC value. Therefore, there is no scenario in which the IRA tax credits will end as early as 2032.[99] The EFG-AEC updated price forecast discussed above therefore starts to phase out tax credits in the earliest possible year, 2036.

---

[94] OTP Supplemental IRP, Appendix K, at 1-3

[95] LevelTen Energy, Q2 2023 PPA Price Index, Executive Summary, available at: https://www.leveltenenergy.com/post/q2-2023-na-ppa-price-index-report

[96] See for example, https://www.canarymedia.com/articles/clean-energy/chart-global-renewables-deployments-to-hit-record-levels-in-2023; https://www.pvxchange.com/Price-Index showing an all-time low price for solar modules in July 2023.

[97] EFG and AEC Report, Section 1.1.1.

[98] OTP Response to Department's IR 013, Attachments, "00_RenewHighCost_NOTPUBLIC." (CEOs received permission from Otter Tail to publicly cite the percentage increase used to calculate the high cost scenario).

[99] IRS Notice 2022-61, November 30, 2022.

4. **Resource options available to the model:** Like Otter Tail, our experts modeled three types of resource additions that reflect different interconnection methods: generic resources, which require a new interconnection, "surplus" resources that are added alongside an existing facility, and "replacement" resources which replace a retiring generator. Surplus and replacement resources typically require no or minimal new interconnection facilities, though surplus resources may not receive accredited capacity due to the injection limit at the point of interconnection. Additionally, surplus and replacement resources are limited to specific locations and generators where these opportunities exist.

   EFG adjusted Otter Tail's resource options to remove non-material constraints and added resources to the data set to represent replacement opportunities at both Coyote and Big Stone after these units leave the portfolio. This was done to illustrate the potential value of reusing Otter Tail's interconnection rights at these locations when the facilities retire. However, EFG also calculated the cost of the exact same resource portfolio assuming these additions require new interconnections (i.e., are generic resources and not contingent on unit retirement), and the CEOs Preferred Plan is still significantly less expensive than the Revised OTP Preferred 2040 Plan or the Revised OTP 2028 Plan.

5. **Battery Storage:** For a portion of the Big Stone replacement resources discussed above, EFG fixed 150 MW of four-hour storage into the model. EnCompass was allowed to optimize the remaining 100 MW of capacity that comprises Otter Tail's share of the unit's installed capacity.[100] This decision was made due to a recognition that additional battery storage will be needed for portfolio diversity, load following, and reliability services when Otter Tail exits both coal plants. Otter Tail has approximately 350 MW of existing peaking resources but currently no energy storage.[101] The OTP Preferred 2040 Plan and OTP 2028 Plan includes just 25 MW of surplus battery capacity, to be added in 2032.[102] Our modeling added 150 MW of storage to evaluate whether this, in combination with other additions, would be an effective replacement energy and capacity resource for Big Stone.

   EFG made a number of other more minor changes to how EnCompass modeled batteries, which are described in the EFG Report, but include: allowing selection of partial units, removing a dispatch adder that Otter Tail had applied to all battery resources, and allowing batteries to dispatch at levels between 0 MWh and their maximum state of charge, rather than only allowing dispatch at the maximum.[103]

6. **MISO Market Exchange:** Otter Tail's modeling allowed for purchases from the MISO market but not sales to MISO. As discussed below in Part V.C, this modeling choice tends to lead to a smaller capacity expansion plan, and when used for production cost

[100] EFG and AEC Report, section 1.1.2.
[101] OTP Supplemental IRP, Appendix C: Existing Resources, at 1.
[102] OTP Supplemental IRP, at 7.
[103] EFG and AEC Report, section 1.1.2.

runs will overstate costs, especially for plans with significant renewable generation, by ignoring sales revenue. EFG changed this constraint to allow for market sales using the same hourly and annual limits that Otter Tail modeled for purchases.[104]

7. **Externality Costs:** As discussed in part V.B below, when Otter Tail modeled externality costs, it excluded all CO_2 costs resulting from generators located outside of Minnesota (i.e., all thermal units except Solway) and excluded criteria emission externality costs from any units more than 200 miles from Minnesota (Coyote), even though those generators are fundamental to Otter Tail delivering retail sales in Minnesota.

   To provide a more realistic picture of actual externalities, EFG's modeling used a uniform treatment of externality costs across all units. Specifically, EFG calculated a "partial PVSC" using the Commission's estimates of SO_2, NOx, and $PM_{2.5}$ externality costs, and separately calculated carbon costs using the EPA social cost of carbon, to reflect new statutory requirement.[105] Sections 3.2 and 3.4 of the EFG-AEC Report describe our externality cost methodology in greater detail.

Otter Tail made two other material assumptions that EFG and AEC did not change, but which may overstate Otter Tail's capacity and energy requirements and are therefore important to note. These are:

1. **Wind generation profile for new resource additions:** Otter Tail used historical wind generation to develop output profiles for its existing resources, but applied one generation profile to any new wind resources added by EnCompass.[106] This is the typical method utilities employ in resource planning, but as the Minnesota Commission has pointed out in previous cases,[107] it underestimates the capacity factor and energy availability provided by a diverse portfolio of new wind resources.

   The 2006 Minnesota Wind Integration Study found significant benefits for wind output and capacity factors of a wind fleet with increasing geographic dispersion: "[i]dealized wind energy geographic dispersion analysis revealed that a progressive increase in the distribution of wind production, utilizing four widely spaced generation areas, substantially reduces the hourly frequency when little or no power was being produced, and increases the hourly frequency of production in the general capacity factor range of 20 to 80% for the ensemble of wind plants."[108] NREL has noted that the modeling approach

[104] EFG and AEC Report, section 1.1.3.
[105] Laws of Minnesota 2023, chapter 7, section 18, amending Minn. Stat. § 216.2422, subd. 3.
[106] EFG and AEC Report, section 4.1.
[107] Minn. Pub. Utils. Comm'n, *In the Matter of the 2020-2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel Energy,* Order Approving Plan with Modifications and Establishing Requirements for Future Filings, Docket No. E002/RP-19-368 (April 15, 2022), Order Point 3(C).
[108] Final Report - 2006 Minnesota Wind Integration Study Volume I, Prepared for the MN Public Utilities Commission, November 30, 2006, p. xvi.

of scaling one output profile to approximate a larger fleet, while common, leads to less realistic results.[109]

EFG and AEC did not adjust the hourly profile for new wind resources in the modeling, which means that both our modeling and Otter Tail's underestimate the value offered by a geographically dispersed portfolio of wind resources.

2. **Energy conservation forecast:** Otter Tail's energy efficiency forecast assumes 1.9-2.0 percent annual savings in Minnesota, consistent with the Department of Commerce's 2018 Minnesota Energy Efficiency Potential Study.[110] The Company's 2024-26 ECO Plan was filed on June 30, 2023 and initial comments were filed August 16, 2023 in Docket E017/CIP-23-94. In this new ECO Plan, "Otter Tail has proposed [an] energy savings goal at the 3.0 percent level, net of ECO-exempt sales,"[111] which the Company notes "greatly exceed the 1.9 percent level suggested by the 2018 potential study."[112]

   Otter Tail's IRP forecast therefore understates the scale of actual energy conservation Otter Tail plans to achieve in the next three years by one-third, inflating energy requirements by 1% annually. There is reason to believe Otter Tail will continue to exceed 1.9-2% annual energy savings beyond this three-year triennial plan. Otter Tail has habitually exceeded required energy savings levels through the Minnesota Conservation Improvement Program ("CIP") and in recent years has achieved annual savings rates around 3-4%.[113] We did not adjust Otter Tail's assumptions on this issue, though we believe it is likely that the IRP forecast understates energy savings.

EFG and AEC retained a number of other assumptions from Otter Tail's modeling. CEOs do not necessarily agree with these assumptions but found them acceptable for the purposes of our initial modeling. These include: (1) the cost of interconnection and grid upgrades for generic wind, solar and battery storage resources; (2) annual wind, solar, and battery capacity factor assumptions, which are used in the calculation of annual levelized cost of energy ("LCOE") price forecasts; (3) MISO seasonal planning reserve margin requirements and capacity accreditation values, including Otter Tail's decision to assign the maximum potential cost of capacity (i.e., the

[109] Michael Milligan et al., Cost-Causation and Integration Cost Analysis for Variable Generation, National Renewable Energy Laboratory at 27-28 (June 2011), https://www.nrel.gov/docs/fy11osti/ 51860.pdf
[110] Otter Tail Power, 2024-26 Energy Conservation and Optimization Triennial Plan, Docket No. E017/CIP-23-94, June 30, 2023, p. 8.
[111] *Id*., p. 2.
[112] *Id*., p. 8.
[113] See for example, Department of Commerce, Decision, July 6, 2023, Docket E017/CIP-20-475, showing an annual savings rate of 2.99% for 2022, and Department of Commerce, Decision, July 7, 2022, Docket E017/CIP-20-475, showing an annual savings rate of 4.07% for 2021.

cost of new entry or "CONE") to any capacity imports EnCompass might select; and (4) the base load forecast, and forecasts for energy efficiency, interruptible customer loads and demand response.

B. CEOs' EnCompass modeling shows that exiting Big Stone in 2030 (in addition to exiting Coyote in 2028) and adding more wind and battery storage will cost less, reduce regulatory risk, and greatly reduce externalities compared to Otter Tail's plan to depend on Big Stone until 2046

Using these changes and corrections to Otter Tail's EnCompass modeling assumptions, EFG developed an optimal resource plan that meets the same energy and capacity requirements that the Company modeled and provides energy to meet Otter Tail's load for the load shape they provided, which accounts for all hours of the year throughout all years of the planning period. That plan, which we refer to as the CEOs Preferred Plan, replaces Coyote (by 2028) and Big Stone (by 2030) with a combination of wind, solar, and storage resources, and does not add any new fossil fuel generation. Total generation capacity additions in the CEOs Preferred Plan through the planning period (2027-2050) include 400 MW of solar, 1350 MW of wind, and 318 MW of battery storage, as shown in Figure 3 below, which compares these additions to OTP's Preferred 2040 Plan and 2028 Plan. The specific type and timing of generation resources in the CEO Preferred Plan through 2032 is provided below in Table 3.[114]

[114] EFG and AEC Report, section 3.1.

Figure 3. Cumulative Installed Capacity (MW) Between 2027 and 2050

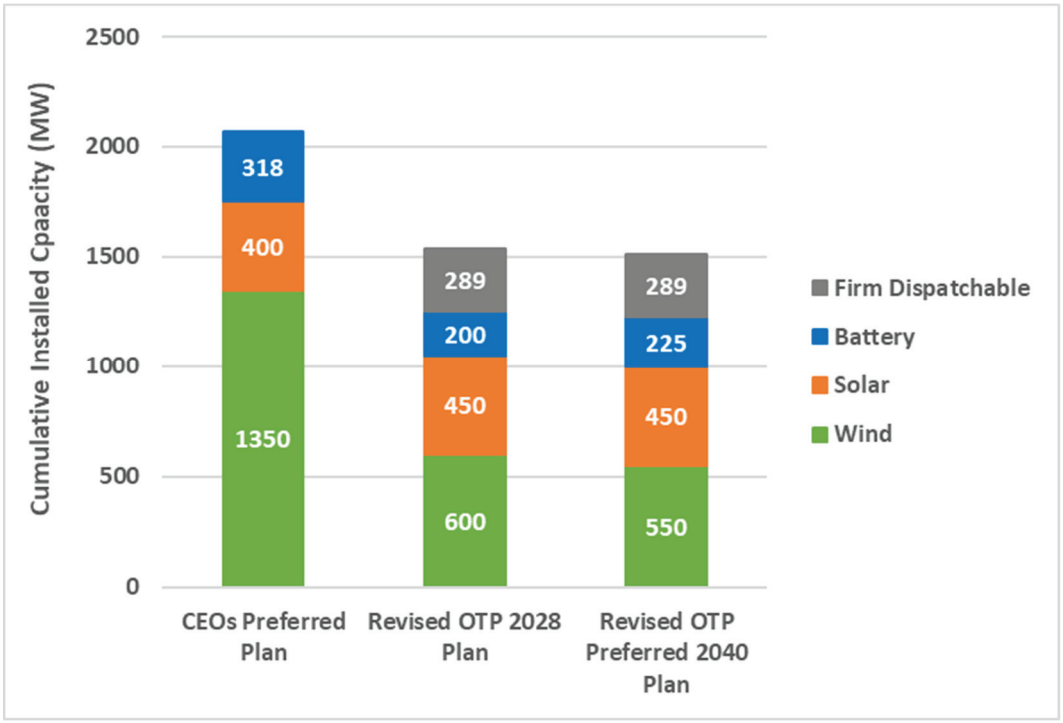


Table 3. CEOs Preferred Plan (Installed Capacity, MW)

	2027	2028	2029	2030	2031	2032
New Resource Additions:						
Surplus and Capacity Solar	100	50	0	0	0	0
Surplus Solar	0	50	0	100	0	100
Replacement Wind Coyote	0	0	150	0	0	0
Generic Wind	0	0	500	0	150	0
Replacement Wind Big Stone	0	0	0	0	100	0
Replacement Battery Storage Big Stone	0	0	0	0	150	0
Surplus Battery Storage	0	0	0	0	0	25
Withdraw:						
Coyote		-150				
Big Stone				-256		

EFG compared the resource additions in CEOs Preferred Plan to Otter Tail's Preferred 2040 Plan and the OTP 2028 Plan. All three plans include the same near-term resource additions through 2029. The OTP 2028 Plan adds another 250 MW of wind and solar in 2030-31 to replace Coyote's capacity. CEOs Preferred Plan includes those resources and makes more additions after

each of the coal plant exits. The near-term builds in both CEOs' plan and the OTP 2028 Plan include: 200 MW of surplus solar in 2027-28, 200 MW generic wind in 2029, 100 MW of surplus solar in 2030, 150 MW of wind in 2031, and 25 MW surplus battery in 2032. To replace energy and capacity after the coal plant exit dates, our plan builds an additional 450 MW of wind in 2029 and 100 MW of wind and 150 MW of battery storage in 2031. The table below summarizes the near-term (2027-32) resource additions in the OTP Preferred 2040 Plan in the left-hand column, with the additional resources in the OTP 2028 Plan in the middle column, and additional resources in CEOs Preferred Plan in the right-hand column. (CEOs' plan includes the resources in all columns).

Table 4. Near Term Resource Additions Timeline (2025-32)

Year	OTP Preferred 2040 Plan	Additional Resources in OTP 2028 Plan	Additional Resources in CEOs Preferred Plan
2025			
2026			
2027	100 MW Surplus+Capacity Solar		
2028	50 MW Surplus+Capacity Solar 50 MW Surplus Solar	-150 MW at Coyote	
2029	200 MW Generic Wind		300 MW Generic Wind 150 MW Replacement Wind (Coyote)
2030		100 MW Surplus Solar	-250 MW at Big Stone
2031		150 MW Generic Wind	100 MW Replacement Wind (Big Stone) 150 MW Replacement Battery (Big Stone)
2032	100 MW Surplus Solar 25 MW Surplus Battery		

The cumulative additions in OTP's 2028 Plan and CEOs Preferred Plan from 2027-32 are shown by resource type in Table 5. The OTP Preferred 2040 Plan includes the same near-term additions as the OTP 2028 Plan, with the exception of 100 MW of surplus solar in 2030 and 150 MW of generic wind in 2031, and with the retention of Coyote. These resources are colored green in the table below for ease of reference.

Table 5. Resource Additions 2027-32 by Type (ICAP MW)

Resource Type	Revised OTP 2028 Plan	CEOs Preferred Plan
Solar	400 MW Solar in 2027-2032 • 200 MW using surplus interconnection in 2027-28 (150 MW receives capacity accreditation) • 200 MW using surplus interconnection in 2030-2032	400 MW Solar in 2027-2032 • 200 MW using surplus interconnection in 2027-28 (150 MW receives capacity accreditation) • 200 MW using surplus interconnection in 2030-2032
Wind	350 MW Wind in 2029-31 • 200 MW in 2029 • 150 MW in 2031	900 MW Wind in 2029-31 • 650 MW in 2029 • 250 MW in 2031
Battery Storage	25 MW Battery in 2032 • 25 MW using surplus interconnection	175 MW Battery in 2031-32 • 150 MW replacement or generic in 2031 • 25 MW using surplus interconnection in 2032
Coal	-150 MW Coal at Coyote in 2028	-400 MW Coal in 2028-30 • -150 MW at Coyote in 2028 • -250 MW at Big Stone in 2030
Totals (ICAP)	**775 MW Clean Energy Additions -150 MW Coal**	**1,475 MW Clean Energy Additions -400 MW Coal**

1. CEOs Preferred Plan would save Otter Tail customers more than $816 million (27%) over the planning period

EFG found that, compared to either the Revised OTP Preferred 2040 Plan or the Revised OTP 2028 Plan, the CEOs Preferred Plan has significantly lower costs and CO2 emissions. And as discussed above, these versions of Otter Tail's plans use the same cost and modeling assumptions as the CEOs Preferred Plan to ensure that plan costs reflect resource choices rather than inputs. EFG ran all three of these plans through the production cost function within EnCompass to provide a more accurate cost comparison. This was done because production cost modeling assesses the dispatch of a resource portfolio in each hour of each year in the planning period, while capacity expansion modeling uses a smaller number of sample hours to keep the problem size manageable. (Otter Tail performed capacity expansion modeling but not production cost modeling.) Table 6 shows the costs of each plan in PVRR, which does not include externality costs. EFG found that the CEOs Preferred Plan, which exits both coal plants by 2030, would save

customers more than $816 million (27%) over the planning period compared to the Revised OTP Preferred 2040 Plan which continues coal plant operations into the 2040s. The CEOs Preferred Plan would save around $625 million (22%) over the planning period compared to the Revised OTP 2028 Plan that includes withdrawing from Coyote in 2028 but remaining in Big Stone until 2046.[115]

Table 6. PVRR Results for CEO Modeling ($000)

	PVRR	Cost or (Savings) Provided by CEOs Preferred Plan	Percent Cost or (Savings) Compared to Each OTP Plan
CEOs Preferred Plan	$2,196,616		
Revised OTP 2028 Plan	$2,822,359	$(625,743)	(22%)
Revised OTP Preferred 2040 Plan	$3,012,835	$(816,219)	(27%)

EFG also found that, even if replacement interconnection was not available at either Coyote or Big Stone and those resource additions in CEOs Plan were made through generic wind and battery procurements instead, the CEOs Preferred Plan would *still* cost $716 million less (23% less) for Otter Tail customers than the Revised OTP Preferred 2040 Plan, and $525 million less (18.6% less) than the Revised OTP 2028 Plan. Our modeling shows the net present value of the combined interconnection rights (as well as the energy community tax credit bonuses that would apply to replacement resources) to be nearly $100 million over the planning period. Table 7 below shows the PVRR of each preferred plan and the difference in cost when CEOs' plan adds generic resources (CEOs Preferred Plan, Generic) instead of utilizing replacement interconnection at Coyote and Big Stone.

[115] EFG and AEC Report, section 3.2.

Table 7. PVRR Results Without Utilizing Replacement Interconnection ($000)

	PVRR	Cost/(Savings) Provided by CEOs Preferred Plan
CEOs Preferred Plan, Generic	$2,296,579	
Revised OTP 2028 Plan	$2,822,359	$(525,780)
Revised OTP Preferred 2040 Plan	$3,012,835	$(716,256)
Value of replacement interconnection and energy community resources		$(99,963)

Because the CEOs Preferred Plan was developed after allowing the model to engage in sales, EFG also calculated the PVRR of both plans if they excluded sales revenue. This was done to ensure that the savings in PVRR shown above was not being driven by a reliance on market sales. Table 8 below shows the PVRR results for each portfolio when sales revenue is not considered. This indicates that while market sales provide significant value in both our plan and Otter Tail's, the cost advantage of CEOs Preferred Plan remains even if all market sales revenue is ignored.[116] In this sensitivity, CEOs Preferred Plan still delivers $407 million in cost savings for Otter Tail customers compared to the Revised OTP Preferred 2040 Plan, and $224 million in savings compared to the Revised OTP 2028 Plan.

Table 8. PVRR Results When Excluding MISO Revenue ($000)

	PVRR	Cost/(Savings) Provided by CEOs Preferred Plan
CEOs Preferred Plan	$2,808,893	
Revised OTP Preferred 2040 Plan	$3,215,976	$(407,083)
Revised OTP 2028 Plan	$3,032,574	$(223,681)

Thus, EFG's modeling shows that Otter Tail should be planning to exit both coal plants by 2030 and replace this energy and capacity with more wind and battery storage between 2029-2032,

[116] EFG and AEC Report, section 3.2.

regardless of whether replacement interconnection is available. However, Otter Tail must take seriously the possibility of re-using its interconnection rights at each coal plant. CEOs are well aware of the contractual complexities at both facilities, but this modeling shows that Otter Tail's share of these interconnection rights is of substantial value. It is not reasonable to ignore these assets. Nonetheless, under either scenario, a shift from coal to clean energy is significantly cheaper for customers, even when just looking at revenue requirements. When considering emissions and externality costs, as discussed in more detail later in this comment, the advantage of CEOs' plan is even clearer.

2. CEOs Preferred Plan is reliable, meets the same load and capacity requirements Otter Tail modeled, and provides sufficient energy availability during winter peak and low wind days

EFG conducted an hourly analysis of the CEOs Preferred Plan to demonstrate that our portfolio has adequate energy available to meet demand at all hours of the year after exiting Coyote in 2028 and Big Stone in 2030. This production cost modeling demonstrates that the CEOs Preferred Plan has sufficient energy to meet demand for all hours throughout the planning period (2023-2050), and as noted previously, EFG's modeling used the same seasonal reserve margin requirements and capacity accreditation assumptions that Otter Tail used.

EFG calculated the winter accredited capacity values for the CEOs Preferred Plan, the Revised OTP Preferred 2040 Plan, and the Revised OTP 2028 Plan. Table 9 below highlights the results for two key years in our resource plan—2029 and 2031, the years following each coal plant withdrawal that we model. CEOs' plan actually provides more accredited winter capacity than the Revised OTP 2028 Plan in both years, and provides more than the Revised OTP Preferred 2040 Plan in 2029, and roughly the same amount in 2031.[117]

[117] EFG and AEC Report, Section 3.1.

Table 9. Winter Capacity Accreditation, MW

	CEOs Preferred Plan	Revised OTP Preferred 2040 Plan	Revised OTP 2028 Plan
2029	1251	1212	1070
2031	1172	1185	1099

EFG also evaluated hourly dispatch of the CEO plan during several peak winter days in the years after exiting Coyote and Big Stone to evaluate whether our plan would provide sufficient energy during days that represent a sort of "worst case" of high demand and low wind availability—such as those seen during Winter Storm Uri in 2021. We find that our plan does in fact provide sufficient energy availability even on winter peak days with low wind availability.[118]

The two figures below show the hourly energy mix modeled by EnCompass on each peak winter day evaluated in 2029. This data is trade secret due to containing Otter Tail Power's forecasted hourly load shape. On the first peak winter day we evaluated in 2029 when Big Stone is still available, CEOs' resource portfolio is able to export energy to MISO in nearly every hour and has surplus capacity. Otter Tail has an additional 350 MW of peaking units and approximately 130 MW of winter demand response resources which are not called on.

[118] EFG and AEC Report, Section 4.

[Trade Secret Data Begins]

[Trade Secret Data Ends]

The second day we investigated was both a peak day and had low wind output, especially for the new wind resources added by CEOs' plan. On this day, EFG adjusted the market price forecast upwards to ensure that Otter Tail's resources were dispatched before the model turned to market purchases in order to better reflect a "worst case" high priced winter day. This lead to additional contributions from peaking units and demand response compared to the first winter peak day. Market purchases on this day account for on average 2% of Otter Tail's hourly demand.

[Trade Secret Data Begins]

[Trade Secret Data Ends]

In 2031, after both coal units are removed from Otter Tail's fleet, CEOs Preferred Plan is still able to provide energy availability during winter peak and low wind generation days. Even on a low wind availability day, we see significant energy contribution from Otter Tail's growing wind fleet, as well as solar and batteries. On both of the winter peak days evaluated in 2031, EFG elevated market prices so that Otter Tail's existing thermal fleet and demand response resources would dispatch before EnCompass turned to market purchases in order to reflect a "worst case" high priced winter day. On both days, we see contributions from Otter Tail's peaking facilities as well as from wind, solar, batteries, and demand response. On these two days, market purchases on average account for 21% and 17%, respectively, of Otter Tail's hourly demand.

The two figures below show the hourly energy mix modeled by EnCompass on each peak winter day evaluated in 2031. This data is trade secret due to containing Otter Tail's forecasted hourly load shape.

[Trade Secret Data Begins]

[Trade Secret Data Ends]

In recent years Otter Tail has purchased between 22-40% of its annual energy requirements from the MISO market.[119] CEOs Preferred Plan caps such purchases at 25% of annual energy requirements. The purchases seen on these days, while possibly expensive, are reasonable in scale—and part of the optimized, least-cost resource plan for Otter Tail developed by the model.

3. It is reasonable and prudent for Otter Tail to add more wind and battery resources than its current resource plans call for

Otter Tail must be much more ambitious with regard to wind and storage procurements than it has been historically—and more ambitious than either the OTP Preferred 2040 Plan or its 2028 Plan indicates. As discussed above, doing so can be expected to save customers over $800 million over the next 27 years. And as discussed in Section II.A., retiring or decarbonizing all coal capacity and adding significant volumes of new renewable energy and storage resources by 2030 is crucial to meeting the science-based decarbonization target of net-zero emissions economy-wide by 2050—a goal that has been adopted by the federal government, the state of Minnesota, and governments around the world.

Wind power is a logical and beneficial resource for Otter Tail for several reasons. The Company's service territory and location in MISO's northern Zone 1 puts Otter Tail near some of the nation's best wind resources and highly skilled wind development companies. The generation profile of wind and its higher winter capacity accreditation fits well with Otter Tail's winter-peaking demand profile. While transmission constraints are currently a bottleneck, the timing of Otter Tail's resource need appears to coincide well with the availability of new transmission capacity—all Zone 1 Long Range Transmission Planning lines have in-service dates between 2028-

[119] Otter Tail Power, Petition for Annual True-Up Rate for its Energy Adjustment Rider, February 28, 2023, Docket No. E017/AA-21-311, pp. 11-18 (calculated 2021 actuals: 43.9%) and Otter Tail Power, Petition for Approval of the Annual Forecasted Rates for its Energy Adjustment Rider, May 2, 2022, Docket No. E017/AA-22-214, p. 6.

2030. And as discussed below in Section IV.B.4, MISO is currently developing LRTP Tranche 2 transmission projects based on assumptions that 4,524 MW of new wind resources will be built in Otter Tail's service territory over the next ten years.

In Otter Tail's 2016 IRP, the Commission ordered the Company to proceed with its proposed five-year action plan including a 200 MW wind procurement in 2018-2020, and approved an additional 100-200 MW of wind to be procured in 2022-2023, with a further note that "[t]his does not preclude additional wind during the five-year action plan period."[120] Since that time, Otter Tail has acquired only 150 MW of wind via the Merricourt project in North Dakota, which began operation in late 2020.[121]

CEOs are concerned by Otter Tail's sluggish wind procurement. There is a 150-200 MW gap between the Company's actual wind additions and Commission-directed wind additions from the last IRP. Otter Tail has argued that the 150 MW Merricourt project satisfies the IRP order point to acquire 200 MW of wind due to its high expected capacity factor (52 percent), which should allow it to achieve similar energy generation results as the modeled 200 MW facility.[122] Nonetheless, Merricourt does not fully replace the accredited capacity value of a 200 MW facility nor the additional 100-200 MW of wind the Commission directed Otter Tail to acquire in 2022-23.

Otter Tail also suggests that in 2019-2020, at the time it would have had to acquire a project to be online by 2022-2023, production tax credits were scheduled to expire in 2020, and therefore such a project did not appear cost effective.[123] CEOs disagree that this should have precluded Otter

---

[120] Minn. Pub. Utils. Comm'n, *In the Matter of Otter Tail Power Company's 2017-2031 Integrated Resource Plan,* Order Approving Plan with Modifications and Setting Requirements for Next Resource Plan, Docket No. E017/RP-16-386 (April 26, 2017), Order point 4 and 5, p. 10. The earlier discussion on this topic indicates that the Commission direction to acquire an additional 100-200 MW of wind in the 2022 to 2023 timeframe is qualified by the phrase "if needed and cost-effective." p. 8.
[121] OTP Supplemental IRP, Appendix C: Existing Resources.
[122] Minn. Pub. Utils. Comm'n, *In the Matter of Otter Tail Power Company's 2017-2031 Integrated Resource Plan,* Order Extending Deadline for Filing Resource Plan, Docket No. E017/RP-16-386 (Dec. 13, 2018), at 2.
[123] OTP Response to OAG IR 032.

Tail from identifying cost effective wind projects between then and now, especially because the production tax credit was extended at the end of 2020 at a level of $18/MWh for 2021.[124] Additionally, NREL's 2019 Cost of Wind Energy Review found that the LCOE for a representative land-based wind project commissioned in 2019—before considering tax credits—was $37/MWh,[125] and the same review in 2020 found a cost of $34/MWh.[126] NREL's representative project is assumed to be located in a moderate wind resource area, and likely has a higher LCOE than projects in MISO Zone 1 available to Otter Tail. Notably, the NREL Review's costs are *lower* than the wind pricing assumptions for 2019-2020 used in Otter Tail's 2016 IRP, and that IRP modeling found the additional wind in 2022-2023 to be economic.[127]

If the Company had added the wind resources to its system that parties, including Otter Tail, agreed in 2017 were part of a least-cost plan,[128] the level of additions required in the latter part of this decade might be reduced. As it stands, Otter Tail is already behind in acquiring wind resources and needs to move decisively to catch up. While CEOs forecast relatively higher wind pricing in the next several years, which drives a large acquisition in 2029, there may be advantages to Otter Tail spreading out this wind acquisition over time slightly. CEOs recommend that the Commission direct Otter Tail to proactively look for cost-effective wind projects between now and 2030, and plan to procure a total of 900 MW of wind by the end of 2032 as reflected in CEOs Preferred Plan.

---

[124] U.S. EIA, "U.S. wind energy production tax credit extended through 2021" https://www.eia.gov/todayinenergy/detail.php?id=46576.

[125] Stehly, Tyler, Philipp Beiter and Patrick Duffy. 2020. 2019 Cost of Wind Energy Review. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5000-78471. https://www.nrel.gov/docs/fy21osti/78471.pdf

[126] Stehly, Tyler and Patrick Duffy. 2021. 2020 Cost of Wind Energy Review. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5000-81209. https://www.nrel.gov/docs/fy22osti/81209.pdf

[127] Minn. Pub. Utils. Comm'n, *In the Matter of Otter Tail Power Company's 2017-2031 Integrated Resource Plan,* Staff Briefing Papers for March 16, 2017 Hearing, Docket Number E017/RP-16-386, at 27.

[128] *Id.* at 19, and Decision Option 4.

Similarly, the transition of its generation fleet requires that Otter Tail pursue battery storage resources more aggressively than it is planning to under either the OTP Preferred 2040 Plan or the OTP 2028 Plan. As renewable penetration grows, the capacity value and reliability services provided by storage become especially valuable. Otter Tail's two plans would each add just 25 MW of four-hour storage, and not until 2032, while EFG's modeling demonstrates that 175 MW of battery storage would contribute to a lower-cost, lower-emissions plan.

CEOs also note that capacity expansion models such as EnCompass likely undervalue battery storage due to the difference between battery operations and modeling methodology. Batteries can respond essentially instantaneously to provide ancillary services in response to grid conditions and can arbitrage (sell power at a higher price than was used to charge) in real time power markets, which use 5-minute pricing intervals.[129] EnCompass and similar models use an hourly price forecast which approximates the day-ahead energy market and essentially smooths out that real-time variability into hourly averages. This obscures much of the economic opportunity a battery would see in a real-world application. Similarly, the value of sub-hourly ancillary services and load following that battery storage can provide are not captured with an hourly planning resolution.[130]

Otter Tail already has the ability to add surplus battery storage resources at existing facilities, including approximately 50 MW at its **[Trade Secret Data Begins]**

[Trade Secret Data Ends].[131] Otter Tail made this 50 MW battery resource available to EnCompass in its "base case" modeling (the fully optimized capacity expansion runs), and the full 50 MW was

[129] EFG and AEC Report, section 1.1.2.
[130] See: U.S. DOE Training "State of the Art Practices for Modeling Storage in Integrated Resource Planning," October 12, 2021; Portland General Electric, 2016 IRP, Chapter 8, p. 236 for discussion of PGE's real time modeling approach for operational value; and 5Lakes Energy Technical Workshop: Integrating Batteries into Resource Planning , April 13, 2022 (included as Attachment 4 to CEO comments).
[131] OTP Responses to OAG IR 009 and CEO IR 054.

selected in 2031-32. However, Otter Tail's Preferred 2040 Plan and its 2028 Plan include only 25 MW of this resource in 2032. CEOs' understanding is that this choice was made in order to "start small" with a resource that will be new to the Company. However, the battery market is growing rapidly, and grid-scale batteries will be far from "new" in the early 2030s. Otter Tail must be more ambitious. CEOs recommend that the Commission direct the Company to pursue this 50 MW surplus battery storage opportunity and seek to acquire a total of 175 MW of battery resources by 2032, as demonstrated by the CEOs Preferred Plan to be an important component of a least-cost plan.

4. CEOs Preferred Plan is more consistent than either OTP plan with the decarbonized future that MISO is planning for

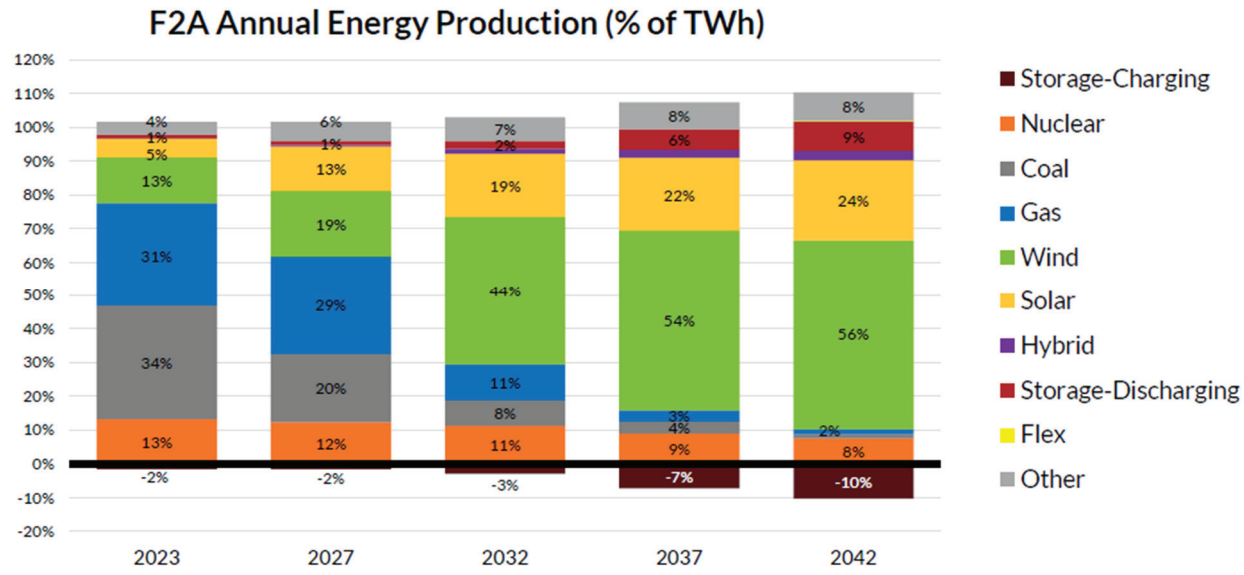
The CEOs Preferred Plan is consistent with MISO's planning assumptions about the future, as our plan retires both coal units and increases Otter Tail's wind and storage builds substantially. Otter Tail's plans, by contrast, are significantly more conservative than the electricity system MISO anticipates and is implementing multi-billion-dollar transmission plans to serve.

MISO is in the second round of a lengthy collaboration with stakeholders in which it develops future scenarios aiming to capture likely changes in the regional resource mix. MISO then selects one of these futures as the basis for a portfolio of transmission projects under its Long Range Transmission Planning ("LRTP") initiative. Tranche 1 of the LRTP initiative, approved in 2022, was based on Future 1. Tranche 2 of the LRTP initiative is now in planning stages and is based on an updated version of MISO's Future 2, called Future 2A, which assumes a much faster rate of decarbonization than previously assumed in Future 1.[132]

[132] *See* MISO, "MISO Futures Report," April 2021, updated December 2021, which provides a broad overview of the assumptions used in MISO's three main future scenarios. *See also* slides 3-4, MISO, "Futures Refresh Update," *available at* https://cdn.misoenergy.org/20221129%20PAC%20Item%2007a%20Futures%20Refresh%20Update627143.pdf, which provides an overview of updated assumptions and a comparison of the original Future 2 with an updated version, called Future 2A.

Future 2A projects the installation of 286 GW of new renewable capacity and 31 GW of new battery storage capacity over twenty years.[133] Much of this renewable power will be from the dramatic expansion of wind, which Future 2A projects will go from providing 13% of MISO's annual energy production today to 44% by 2032 and 56% by 2042, as shown in Figure 8 below.[134]

Figure 8. Evolution of Energy Production Under MISO's Future 2A



A disproportionate amount of this new wind is projected to be built in the Dakotas, given their world-class wind resources. In fact, MISO's Future 2A modeling projects that 588 MW of wind will be built *within Otter Tail's service territory*, mostly in North Dakota, in the first five years of the forecast (by 2027).[135] Under MISO's assumptions, in ten years 4,524 MW of wind would be built within Otter Tail's service territory, and in 15 years 5,701 MW of wind would be built. MISO's Future 2A modeling also projects 630 MW of new battery storage being built in Otter Tail's service

[133] MISO, "Future 2A Energy Adequacy and Siting," April 28, 2023, updated May 5 and July 5, 2023, slide 7, available at: https://cdn.misoenergy.org/20230428%20LRTP%20Workshop%20Item%2003b%20Future%202A%20Siting%20Presentation628726.pdf
[134] *Id.*, slide 10.
[135] Derived from MISO spreadsheet, *20230428 LRTP Workshop Item 03b Future 2A Siting for Posting628702*, available at https://www.misoenergy.org/events/2023/long-range-transmission-planning-lrtp-workshop----april-28-2023/

territory within 15 years.[136] By contrast, Otter Tail's Preferred 2040 Plan would build only 200 to 350 MW of new wind in the next 15 years (depending on whether they withdraw from Coyote in 2040 or 2028), repower 40 MW worth of wind resources, and build only 25 MW of batteries in that time frame.[137]

To be clear, MISO's projected wind and battery build in Otter Tail's service territory represents resources that could be built by market participants aside from Otter Tail and serve customers aside from Otter Tail's. A large share of the wind generation that MISO forecasts would likely be exported from Otter Tail's service territory to other utilities in the region, and MISO is currently planning the long-range transmission projects needed to make that export possible. Still, MISO's modeling clearly indicates the importance of aggressively developing wind power and battery storage within the area served by Otter Tail, and Otter Tail's own ratepayers should surely be among the beneficiaries of that development.

In addition to modeling a huge buildout of wind in Otter Tail's territory, MISO has modeled unit retirements associated with Future 2A, between 2023 and 2042.[138] As Figure 8 above shows, the contribution of coal power to the MISO grid is expected to drop steeply from 34% now to 20% by 2027, to 8% in 2032, and continuing to fall through the 2030s. Among the many coal plants included in MISO's list of modeled retirements in Future 2A are Coyote and Big Stone, both of which MISO models as retiring by 2027. The retirements in MISO's table do not yet reflect

---

[136] *Id.* MISO's Future 2A assumes 31 GW of new storage resources overall, which is very likely a severe underestimation of the actual development new storage resources. In MISO's 2022 interconnection queue, storage accounted for 32.3 GW. Accounting for the typical 20 percent success rate seen in projects that enter the interconnection queue, it would take only 5 years for storage to meet the estimate of 31 GW of new storage that Future 2A anticipates for the next 20 years. *See* https://cdn.misoenergy.org/2022%20GIQ%20Submission%20Statistics626443.pdf; *see also* slide 7 of https://cdn.misoenergy.org/20230428%20LRTP%20Workshop%20Item%2003b%20Future%202A%20Siting%20Presentation628726.pdf

[137] OTP Supplemental IRP, Appendix I.

[138] MISO spreadsheet, *20230428 LRTP Workshop Item 03b MISO F2A Retirements628701*, data as of 04/26/2023. Available here: https://www.misoenergy.org/events/2023/long-range-transmission-planning-lrtp-workshop----april-28-2023/

updated accreditation values or load forecasts, and MISO warns they are "purely speculative." However, MISO also states that its projections are based on "MISO Futures assumptions and stakeholder feedback," and "age-related retirement assumptions."[139]

It is hardly surprising that Future 2A would assume widespread coal retirements in the 2020s and beyond. The lower natural gas and renewable energy prices that have reduced coal dependence over the past decade continue. And of course, coal retirements are critical to substantially reducing grid emissions. By basing its Tranche 2 transmission planning around Future 2A, MISO is helping enable that future to emerge. The CEOs Preferred Plan would align Otter Tail with that regional vision of progress and allow it to participate in its benefits.

C. Withdrawing from Big Stone in 2030 rather than 2046 would avoid an estimated $925 million in climate damage and 9 premature deaths otherwise attributable to Minnesota load served by Otter Tail, and promote compliance with the EPA's GHG rule and Minnesota's CFS

We discuss the overall climate and health costs of Otter Tail's plans, and the relative advantages of the CEOs Preferred Plan, in Sections VI and VII below. Here we stress the climate damage and health damage caused just by operating Big Stone from 2030 to 2046.

Both of Otter Tail's preferred plans would continue to depend on Big Stone until 2046, while the CEOs Preferred Plan would withdraw from Big Stone by 2030. The total CO_2 emissions from Otter Tail's 54% share of Big Stone between 2031 and 2046 would be roughly 9.6 million tons (counting only the 50% of Otter Tail's generation that serves Minnesota customers). The central estimate of externality costs from these emissions would be roughly $925 million, with a range of $518 million to $1.6 billion.[140] In addition, Otter Tail's share of Big Stone's public health impacts due to its contribution to fine particulate matter concentrations between 2031 and 2046 is estimated

[139] *Id.*
[140] EFG and AEC Report, section 3.4, Table 18.

to be 9 premature deaths and over $90 million in health costs (see health cost discussion in Section VII).[141] It is clearly very much in the public interest to avoid these climate and health damages, especially when it can be done reliably and at a cost savings, as the CEOs Preferred Plan shows.

Withdrawal from the Big Stone coal plant by no later than 2030 would also reduce regulatory risk and costs by letting Otter Tail avoid having to install CCS or gas cofiring at the plant or operate it at a 20% capacity factor, as the EPA's proposed rule would otherwise require. And replacing Big Stone with carbon free power, as the CEOs' modeling would do, would also greatly increase the share of Otter Tail's generation that qualifies as carbon-free under Minnesota's carbon-free standard.

D. The Commission should order Otter Tail to plan to withdraw from Big Stone by no later than 2030

Continuing Otter Tail's reliance on coal past 2030 harms the climate and human health, misses out on the opportunities presented by the transition to clean energy, and puts the Company and its customers in a position of significant risk with regard to cost and potential regulation. Big Stone faces a narrow suite of options under the EPA's proposed greenhouse gas rules. Additionally, Big Stone presents unusual market risk for Otter Tail due to its presence in two regional markets and its co-ownership arrangement, under which one co-owner can force Big Stone to run even when not warranted by market prices, causing some or all co-owners to experience a financial loss. (We discuss this issue in more detail in Section V.A).

Furthermore, Otter Tail's customers, employees, the surrounding community, and Otter Tail's co-owners could all benefit from the certainty of an exit date. The Commission has recognized the benefits of long-range planning and timing certainty before coal retirements in

[141] *See also* PSE Report, at 16, Attachment 2 to CEOs' comments. CEOs have reduced the values reported by PSE by 50% to focus on emissions from generation that serves Minnesota load.

previous resource plans.[142] Waiting until the plant is or may soon be out of compliance with federal law opens the door to a potentially urgent situation that does not serve Otter Tail customers, plant workers, or the community around Big Stone. Planning proactively for the transition away from coal is the responsible thing to do. Otter Tail should start doing so now.

Thus, with respect to Big Stone, CEOs ask the Commission to:

1. Find that it is not prudent and not in the public interest for Otter Tail to retain its interest in Big Stone beyond 2030 and that Otter Tail should therefore withdraw from Big Stone as soon as reasonably possible, but by no later than 2030.

2. Find that it is prudent and in the public interest for Otter Tail to accelerate its acquisition of wind power and battery storage at a scale and pace consistent with the resources listed in this order.

3. Modify Otter Tail's Preferred 2040 Plan to include:
   a. Withdrawing from Big Stone by no later than 2030.
   b. Finding there is a need for and approving the following resources, in addition to those resources Otter Tail has included in the OTP 2028 Plan[143]: 550 MW of wind resources in the 2029-2031 timeframe and 125 MW of battery resources by 2031.
   c. Requiring Otter Tail to request an Attachment Y-2 Study from MISO for the Big Stone Plant and to perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Big Stone retirement and identify any mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   d. Requiring Otter Tail to conduct an assessment of the transmission congestion present in the Big Stone area, the impact of the LRTP lines and other transmission infrastructure, and the future local transmission outlook. The results of this evaluation should be filed with the Company's next Minnesota IRP.
   e. Requiring Otter Tail to conduct an assessment of the value of reusing the Company's interconnection rights at Big Stone, and to submit that assessment in this docket with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   f. Requiring Otter Tail to issue a Request for Information 6-12 months prior to filing its next IRP, seeking information from developers on projects under development in proximity to Big Stone or in proximity to potential paths for a generation-tie line. The results of the RFI should be filed with Otter Tail's next IRP.

---

[142] Minn. Pub. Utils. Comm'n, *In the Matter of Minnesota Power's 2021-2035 Integrated Resource Plan,* Order Approving Plan and Setting Additional Requirements, Docket No. E015/RP-21-33 (Jan. 9, 2023), p. 9-10 and Order Point 1.

[143] Those resources are listed in number 2.b of the CEO's Recommendations in our Conclusion, and include: planned wind repowers in 2025, 200 MW of surplus solar in the 2027-2028 timeframe, 350 MW of wind resources in the 2029-2031 timeframe, an additional 200 MW of surplus solar in the 2030-2032 timeframe, and 50 MW of surplus battery resources by no later than 2032.

4. In the alternative to recommendation number 3, require Otter Tail to begin planning now for a Big Stone withdrawal by no later than 2030 and to present a plan in its next Minnesota IRP that withdraws from Big Stone by no later than the end of 2030. The plan should demonstrate that Otter Tail is taking proactive steps to keep a 2030 exit on the table and is exploring the economic value of retiring the plant, including consulting with co-owners on the issue.

V. Otter Tail's Modeling Undervalues Renewable Energy and Underestimates the Costs and Risk of its Coal Plants

CEOs discuss above a number of changes we made to Otter Tail's modeling and why we made them. Here we discuss in more detail some of the inappropriate constraints and other shortcomings in Otter Tail's modeling that unduly minimize the costs of ongoing coal dependence and that undermine the model's selection of renewable energy and storage. These include: failing to reflect the risks of a co-owner forcing Coyote or Big Stone to operate at a market loss, not complying with the Commission's order to model a range of carbon regulatory and externality costs, blocking all market sales, and failing to offer the model the option of retiring Big Stone before 2046.

A. Otter Tail's preferred plan fails to reflect the significant risk that Otter Tail could be forced by a co-owner to run Coyote and Big Stone at a loss, consistent with past practice

Otter Tail's modeling makes assumptions about future MISO energy prices, which in turn determine when its plants will be dispatched and how much revenue the plants will generate. This would be a realistic way to model the economic dispatch of a plant owned by a MISO member under normal circumstances, but it does not reflect the unique market risks attached to Coyote and Big Stone because their dispatch is not determined solely by MISO prices. Both Coyote and Big Stone have multiple co-owners, including NorthWestern Energy, which owns 10% of Coyote and 23.4% of Big Stone.[144] NorthWestern sells its share of the plants' output into the Southwest

[144] OTP Supplemental IRP, at 34-35.

Power Pool ("SPP") market rather than into MISO. Otter Tail and the other co-owners of the plants are members of MISO. Thus, both Coyote and Big Stone must be offered into two markets and can be dispatched by either.

Historically, both plants were operated year-round except for limited periods for maintenance and testing, using a practice called "self-commitment" or "must run," in which a generator requires MISO take a certain minimum amount of power and is a price-taker (but can also be economically dispatched at a higher level). In the past several years, Otter Tail worked with its co-owners to develop a process to allow the plants to utilize MISO's economic commitment and dispatch options,[145] which are analogous to the economic commitment and dispatch decisions made in capacity expansion modeling. However, as Otter Tail states in its IRP, from a practical standpoint and a contractual one, "if one owner calls on its share of the plant, all owners are required to take their share of the total minimum output,"[146] meaning that if any one owner wishes to offer a plant as must-run, the other owners must agree to do the same with their shares. If all co-owners agree to economically commit and dispatch their shares, either of the plants' dispatch can be determined by either MISO or SPP prices.

The economic risks posed by this unusual situation—of multiple co-owners, each with the power to force the plant to operate, and each selling into markets with different prices—has been discussed at length with the Commission in its docket investigating utilities' self-commitment and self-scheduling practices ("the self-commit docket").[147] In recent years, SPP prices have tended to be higher on average than MISO prices, which has sometimes led to economic commitments of

[145] Otter Tail Power, *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities,* Annual Compliance Filing, Docket No. E999/CI-19-704 (Mar. 1, 2023).
[146] OTP Supplemental IRP, at 35.
[147] Minn. Pub. Utils. Comm'n., *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities,* Order Accepting Reports and Setting Additional Requirements, Docket No. E-999/CI-19-704 (Dec. 1, 2021).

these plants in SPP and uneconomic commitments in MISO. In these situations, Otter Tail and the other co-owners that sell into MISO are obligated to sell their shares of the plants' output at a loss. In high-price periods, such as much of 2021-2022, the risk posed by this contractual arrangement is less visible because MISO prices are higher than marginal costs. But in low-price periods, such as 2016-2017 and 2019-2020, Otter Tail customers can see net annual losses, even on a marginal basis.

In the self-commit docket, Sierra Club showed that in 2020 both Big Stone and Coyote were self-committed uneconomically more than half of the time, causing a significant revenue loss at both plants, and the Office of the Attorney General's ("OAG's") analysis in that docket indicated that Coyote in particular ran at a loss for 85% of its hours in 2020. In 2021 and 2022, market prices were higher in both MISO and SPP, which resulted in better market revenues for both plants.[148] However, even in high price conditions, the operational arrangements at these coal units put Otter Tail customers at risk. In its review of Otter Tail's most recent report in the self-commit docket, the Department of Commerce found that both plants operated with a must-run commitment status for the large majority of the year, and that co-owner requests were a major driver of this commitment decision – around 70% of must-run hours at Big Stone and 60% of must-run hours at Coyote.[149] The Department stated, "it does seem OTP could have reduced its net costs [at Big Stone] by reducing operations during the first few months of the year," and "the analysis shows that the co-owners of Big Stone and Coyote would benefit from better aligning their financial incentives to allow more flexible operations of the unit in the future."[150]

---

[148] See for example, Otter Tail Power, *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities,* Annual Compliance Filing, Docket No. E999/CI-19-704 (Mar. 1, 2023).
[149] Department of Commerce, *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities,* Initial Comments, Docket No. E999/CI-19-704 (May 31, 2023), at 19-24.
[150] *Id.* at 20, 27.

The Commission has acknowledged this issue and stated in its 2021 order in the self-commit docket that "any issue that poses a significant risk to ratepayers deserves the Commission's attention."[151] It declined to address that risk at the time, however, deciding that "the issues raised by the Sierra Club and OAG will continue to be developed in Otter Tail's upcoming resource plan and other contexts as well."[152] This docket is Otter Tail's first resource plan since that order.

It is important to note that the risk that Big Stone and Coyote will continue to be forced to dispatch uneconomically into the MISO market as a result of this unusual situation is not reflected in Otter Tail's modeling, nor is it reflected in CEOs' modeling. In both cases, modeling was done assuming the plants would dispatch economically, following price signals from MISO. As a result, CEOs' modeling results showing that Big Stone and Coyote are uneconomic are conservative. In considering whether Otter Tail's resource plan is in the public interest, the Commission should recognize the ongoing nature of this unquantified and potentially substantial market risk of continued uneconomic operations of the coal plants. This contractual situation disadvantages Otter Tail's customers and represents yet another reason why Otter Tail should withdraw from both coal plants sooner rather than later.

B. Otter Tail's supplemental IRP filing does not comply with the Commission's order to analyze a range of carbon regulatory and externality costs, making it impossible for the Commission to consider the full range of those costs as specified by statute

The Commission requires utilities in their resource plans to analyze resources under a range of assumptions about future regulatory and externality costs.[153] Utility compliance with this

---

[151] Minn. Pub. Utils. Comm'n., *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities,* Order Accepting Reports and Setting Additional Requirements, Docket No. E-999/CI-19-704 (Dec. 1, 2021), at 7.
[152] *Id.*
[153] Minn. Pub. Utils. Comm'n, *In the Matter of Establishing an Updated 2020 Estimate of the Costs of Future Carbon Dioxide Regulation on Electricity Generation under Minn. Stat. § 216H.06,* Order Establishing 2020 and 2021

order is needed so that the Commission can consider the full range of carbon regulatory and externality costs in resource proceedings—two cost categories the law specifically highlights for consideration.[154]

The Commission, in its most recent order on the subject, specifies five distinct sets of cost assumptions utilities must consider, paraphrased below:[155]

A. Scenarios using for all years the low end of the Commission's range of CO_2 externality costs and no regulatory costs;

B. Scenarios using the high end of the Commission's range of CO_2 externality costs and no regulatory costs;

C. Scenarios using the low end the Commission's range of CO_2 externality costs but substituting in 2025 and beyond the low end of the range of regulatory costs;

D. Scenarios using the high end of the Commission's range of CO_2 externality costs but substituting in 2025 and beyond the high end of the range of regulatory costs; and

E. A reference case scenario incorporating the Commission's middle or high values of the established environmental and regulatory cost ranges.

Otter Tail's supplemental IRP does not include any analysis of its Preferred Plans (or the other plans it considers) using the low or high end of the Commission's range of externality values coupled with no regulatory costs, failing to comply with the assumptions under A and B.[156] It also does not include any analysis of what costs would be under the low end of the externality and regulatory costs, the assumptions required under C, or the high end of the externality and regulatory costs, required under D. It does include, in its Appendix I "Externalities Included" runs,

---

Estimate of Future Carbon Dioxide Regulation Costs, Docket Nos. E-999/CI-07-1199, E-999/DI-19-406 (Sep. 30, 2020)(hereinafter "2020 Regulatory Costs Order").

[154] Minn. Stat. § 216B.2422, subd. 3 and Minn. Stat. § 216H.06.

[155] 2020 Regulatory Costs Order, *supra* n. 153, at 9.

[156] As discussed in Section VI, the legislature now requires the Commission to assess carbon externality costs using the EPA's draft social cost of carbon numbers. Otter Tail did not provide this assessment either.

the mid-range CO_2 externality cost as required under E, but Otter Tail only applies this cost to its single thermal plant located within Minnesota, as discussed more below. This externality cost is then replaced in 2025 by the mid-range regulatory cost ($15/ton), the minimum regulatory cost required under E.[157] We note that the Commission's 2020 order does not explicitly authorize the substitution of regulatory costs for externality costs in reference case scenario E,[158] though other utilities have similarly made that substitution.

Otter Tail did conduct model runs using the assumptions specified under C and D in its original IRP filing in 2021.[159] However, it excluded them from its supplemental IRP modeling despite rerunning many other scenarios and altering its preferred plan. Moreover, when running the Commission's Scenarios C and D in its initial filing, Otter Tail allowed EnCompass to select a new optimal resource mix in response to the low and high carbon regulatory costs. As a result, Otter Tail has not included any run, in either its initial or supplemental filing, in which it held its Preferred 2040 Plan or its 2028 Plan constant to determine what their total PVRRs would be with the higher carbon regulatory costs or what their total PVSCs would be with the higher externalities value. (Nor, apparently, has Otter Tail ever conducted such runs for its own information, given its response to CEOs' information request on the subject.[160]) This modeling choice fails to provide the Commission with either of the Preferred Plans' full carbon regulatory risk or their full range of externality costs—two cost ranges explicitly highlighted by the legislature for Commission consideration under state statute.[161]

[157] OTP Response to CEO IR 64.
[158] 2020 Regulatory Costs Order, *supra* n. 153 at 8-9.
[159] *See* OTP Initial IRP, Appendix I, at 5, rows T and U.
[160] OTP Response to CEO IR 062.
[161] Minn. Stat. § 216B.2422, subd. 3 and Minn. Stat. § 216H.06.

In addition, Otter Tail did not model any externality costs for carbon emitted outside of Minnesota, thereby excluding the vast majority of its carbon emissions, which come from Coyote, Big Stone, and Astoria.[162] (Otter Tail also assigned no externality cost to criteria emissions occurring 200 miles from Minnesota, thereby excluding Coyote[163].) In doing this, Otter Tail was presumably relying on a 1997 Commission order declining to require quantification of externalities from carbon emissions outside the state. The order cited various factors, including the Commission's lesser confidence in CO_2 cost estimates and that the lower cost estimate (30 cents/ton) was so small it hardly mattered.[164] Even then, however, the Commission stated that "it will continue the qualitative evaluation of the CO_2 associated with such generation." Today, Minnesota statute specifies the precise carbon values to apply when assessing resources, down to the range of discount rates, and they are not small. It is inconceivable that the legislature intended the Commission to ignore these costs if the emissions occur outside the state, especially when those emissions are no less damaging to Minnesota than emissions within the state, and when they are caused by electricity generated to meet Minnesota retail sales. We note that Minnesota's GHG reduction goals—which seek to reduce statewide GHG emissions 50% by 2030 and to net zero by 2050—define "statewide greenhouse gas emissions" to include carbon dioxide "from the generation of electricity imported from outside the state and consumed in Minnesota."[165]

Otter Tail's failure to comply with the Commission's 2020 order, to conduct any modeling to estimate the costs of its Preferred Plans under higher carbon regulatory and externality costs, or to estimate the costs of emissions outside Minnesota shows a troubling lack of concern

[162] OTP Supplemental IRP, Appendix F, at 12.
[163] *Id.*
[164] Minn. Pub. Utils. Comm'n, *In the Matter of Quantification of Environmental Costs Pursuant to Laws of Minnesota 1993, Chapter 356, Section 3,* Order Affirming in Part and Modifying in Part Order Establishing Environmental Cost Values, Docket No. E-999/CI-93-583, at 4-5 (July 2, 1997).
[165] Minn. Stat. § 216H.01, subd. 2, and 216H.02, subd. 1, as amended by Laws of Minnesota 2023, chapter 60, article 12, section 61.

regarding the costs and risks attached to its CO_2 emissions. Moreover, the lack of the required analysis prevents the Commission from assessing the full risk of continuing to rely on the Coyote and Big Stone plants and is yet another reason why the Commission should not approve either of Otter Tail's Preferred Plans. The Commission should explicitly require Otter Tail to include in its next Minnesota IRP an analysis of the impact of the full range of CO_2 externality costs and regulatory costs associated with generation serving Minnesota, in compliance with the Commission's forthcoming order in docket 22-236 (the docket currently updating estimated carbon regulatory costs).[166] It should also require Otter Tail to apply the specified externality costs to carbon emissions regardless of whether they occur inside or outside the state, to the extent they are associated with generation used to serve Minnesota customers. And while allowing the model to pick a new resource mix in response to future regulatory costs provides interesting information, Otter Tail should be instructed to hold its Preferred Plan (and other scenarios it is analyzing) steady in order to calculate likely total costs under the Commission's range of different regulatory and externality cost assumptions.

C. Otter Tail's asymmetrical treatment of MISO purchases and sales understates the value of participation in the regional market

Otter Tail's capacity expansion modeling did not consider sales of energy to MISO, while allowing up to 25% of annual energy requirements to be supplied by market purchases.[167] This asymmetry undervalues the benefits of participation in a regional market. As a member of MISO, Otter Tail sells its generation to and purchases energy from the market and will continue to do so. MISO energy revenues are an important component of Otter Tail's (and other MISO utilities')

[166] *In the Matter of Establishing an Updated 2023 and 2024 Estimate of the Costs of Future Carbon Dioxide Regulation on Electricity Generation Under Minn. Stat. § 216H.06,* Docket Nos. E-999/CI-07-1199 and E-999/DI-22-236.
[167] Otter Tail says that it blocks all *capacity* sales to ensure capacity is built only for our customers. OTP Supplemental IRP, at 23. We do not see an explanation of why it blocks all energy sales.

system operations, and ignoring this revenue in modeling has the effect of increasing PVRR and/or reducing model-built resources.

We recognize that there are situations where eliminating exports may be a useful simplification, and that modelers may limit sales in the capacity expansion step or to ensure the model does not overbuild resources driven by market sales in a way that puts ratepayers at undue risk. However, even when making this choice, it is valuable to provide modeling results that do consider both purchases and sales to understand how market interaction impacts the scale of the resource plan.

In recent years, Otter Tail has relied on purchased power for a large share of its energy requirements—as high as 44% in 2022.[168] The Company's recent fuel and purchased power forecasts indicate that it expects to purchase approximately 22.9% of its energy in 2023[169] and 43.1% in 2024.[170] In a low-price market environment, a high percentage of market purchases may benefit customers. CEOs point out the relatively high percentage of purchases simply to note that there is potential for cost risk with both purchases and sales, and given Otter Tail's current reliance on purchases, offering the model the potential for sales as well could result in a more risk-balanced resource plan.

We also stress that the CEOs Preferred Plan does not put ratepayers at undue risk due to the inclusion of sales. Our modeling allowed market sales only equivalent in volume to Otter Tail's market purchase assumptions, as discussed in Section IV.A.1. EFG also calculated the PVRR of our plan both with and without market sales revenue to ensure that CEOs' Plan's cost advantage was

[168] Otter Tail Power, Petition for Annual True-Up Rate for its Energy Adjustment Rider, February 28, 2023, Docket No. E017/AA-21-311, pp. 11-18 (calculated 2021 actuals: 43.9%).
[169] Otter Tail Power, Petition for Approval of the Annual Forecasted Rates for its Energy Adjustment Rider, May 2, 2022, Docket No. E017/AA-22-214, p. 6.
[170] Otter Tail Power, Petition for Approval of the Annual Forecasted Rates for its Energy Adjustment Rider, May 1, 2023, Docket No. E017/AA-23-181, p. 6.

not contingent on exports. This shows that even without exporting any power, Otter Tail customers would save over $400 million with CEOs Preferred Plan compared with the Revised OTP Preferred 2040 Plan, and would save $224 million when compared with the Revised OTP 2028 Plan.[171] When including market sales revenue, however, the CEOs Preferred Plan would save Otter Tail's ratepayers twice as much—over $800 million dollars compared to the Revised OTP Preferred 2040 Plan, or $625 million compared to the Revised OTP 2028 Plan.[172]

CEOs also highlight that modeling both market sales and purchases better reflects the value of a regional power system, particularly for a decarbonizing grid. As the generation mix across the region shifts toward wind, solar, and other weather-dependent resources, regional and inter-regional transfers of energy become even more important for reliability and affordability. In hours when Otter Tail's fleet is generating more than the Company needs, it can share that energy with other utilities, and vice versa. This regional view is essential to consider as Otter Tail plans for a carbon-free system. There are circumstances where modeling without market sales is reasonable, but CEOs find that the asymmetry in Otter Tail's treatment of the MISO market understates 1) the reliability value and cost savings Otter Tail customers receive from its participation in MISO and 2) the growing importance of energy exchange across large geographies for the energy transition. We therefore recommend the Commission ask Otter Tail to present modeling runs in its next IRP that allow a reasonable amount of both market purchases and sales.

D. Otter Tail failed to examine any early retirement dates for Big Stone

The continued operation of the Big Stone coal plant was a fixed decision in every one of the many modeling runs that Otter Tail conducted. The Company did not present any resource

[171] EFG and AEC Report, section 3.2, Table 11.
[172] EFG and AEC Report, section 3.2, Table 10.

scenarios where it examined an earlier Big Stone exit, nor did it allow EnCompass the option of selecting an earlier Big Stone exit.

Otter Tail is already far out of step with other utilities serving Minnesota in planning to rely on coal power until as late as 2046. Its failure to allow the model to consider an earlier retirement date for Big Stone—despite the widespread recognition of the cost-effectiveness of cleaner alternatives and the need to reduce emissions—is troubling. It is also a squandered opportunity to truly plan for the regulatory, economic, and technological changes ahead.

VI. Otter Tail's Preferred 2040 Plan Would Cause $4.3 Billion in Cumulative Climate Damage, and its 2028 Plan Would Cause $3.3 Billion in Cumulative Climate Damage, Using EPA's Central Cost Estimate

EFG's production cost modeling calculated the projected CO_2 emissions for the CEOs Preferred Plan, the Revised OTP 2028 Plan, and the Revised OTP Preferred 2040 Plan (that is, both Otter Tail plans modeled using our updates and corrections). EFG also estimated the social cost of these CO_2 emissions using the EPA social cost estimates as now required by state law. This analysis shows that withdrawing from both plants under CEOs Preferred Plan would reduce cumulative climate costs by many billions of dollars.

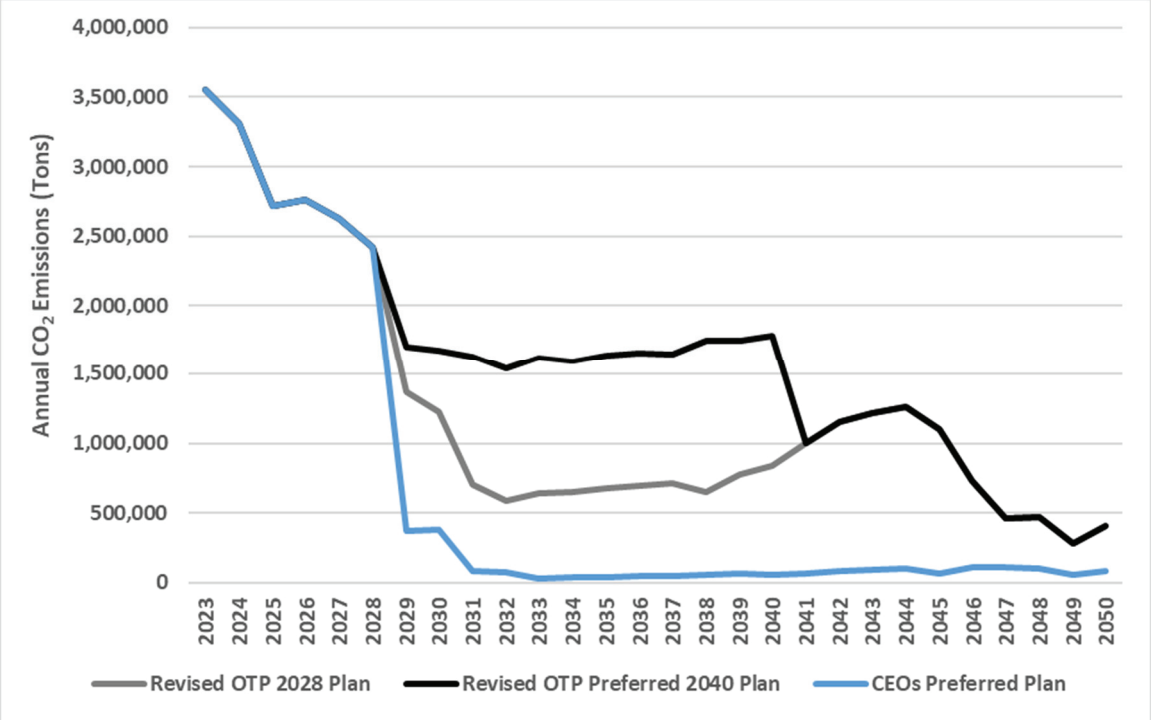
Figure 9, taken from EFG's report,[173] compares the annual CO_2 emissions of the three plans through 2050. All three plans deliver emissions reductions between 2023 and 2029. This is partially due to planned new carbon-free resources, but also partially because, consistent with the Commission's current order regarding carbon regulatory costs, EFG's modeling includes a mid-range regulatory carbon cost of $15/ton starting in 2025. This regulatory cost of carbon has the effect of suppressing carbon emissions in all three cases; if this carbon cost is not actually imposed

[173] EFG and AEC Report, section 3.3, Figure 6.

in 2025, coal plant emissions can be expected to exceed these projections. (None of the modeling runs reflect the impact of the proposed EPA GHG rule or the state CFS).

Large differences between the three plans appear after 2028 (when Otter Tail exits Coyote under the CEOs Preferred Plan and under the OTP 2028 Plan) and especially after 2030 (when Otter Tail exits Big Stone under the CEOs Preferred Plan). Under the Revised OTP Preferred 2040 Plan, carbon emissions largely plateau in the 2030s and show a rise by the end of the decade. Under the Revised OTP 2028 Plan, carbon emissions continue to drop until 2032, though not as steeply as under the CEOs Preferred Plan, and then begin to climb again until the mid-2040s. The CEOs Preferred Plan, by contrast, reduces emissions dramatically in 2029 and again in 2031, and emissions remain very low thereafter. By reducing coal plant emissions to zero by 2030 and dramatically reducing overall CO_2 emissions, CEOs Preferred Plan is in sync with the pathway to U.S. GHG reduction goals charted by the federal government and numerous scientific and energy industry studies.

Figure 9. Comparison of Annual CO_2 Emissions



On a cumulative basis, the CEOs Preferred Plan would result in 25,909,995 fewer tons of CO_2 emissions between 2023 and 2050 compared to the Revised OTP Preferred 2040 Plan (see Table 10). Compared to the Revised OTP 2028 Plan, the CEOs Preferred Plan would result in 15,540,587 fewer tons of CO_2 emissions between 2023 and 2050. The benefits of the CEOs Preferred Plan are particularly stark in the 2030s. In that decade, CEOs plan would reduce emissions by 16,072,722 tons compared to the Revised OTP Preferred 2040 Plan (a reduction of 97%), or by 6,397,487 tons (a reduction of 92%) compared to the OTP 2028 Plan.

Table 10. Cumulative Carbon Emission Comparison (Tons)[174]

Plan	Cumulative (2023 -2050)	CO_2 Avoided by CEOs Plan	Cumulative (2023-2030)	CO_2 Avoided by CEOs Plan	Cumulative (2031-2040)	CO_2 Avoided by CEOs Plan
CEOs Preferred Plan	**19,573,688**	**-**	**18,157,494**	**-**	**538,494**	**-**
Revised OTP 2028 Plan	**35,024,275**	**15,540,587** 44%	**19,993,298**	**1,835,804** 9%	**6,935,981**	**6,397,487** 92%
Revised OTP Preferred 2040 Plan	**45,483,683**	**25,909,995** 57%	**20,776,229**	**2,618,735** 13%	**16,611,216**	**16,072,722** 97%

Minnesota law now specifies what externality costs to apply when considering carbon emissions. Amendments to Minn. Stat. § 216B.2422, subd. 3 specifically require the use of EPA's September 2022 externality (or "social cost of GHGs") values, "including the time horizon, global estimates of damages, and the full range of discount rates from 2.5 to 1.5 percent, with two percent as the central estimate."[175] Table 11 provides the cumulative climate externality costs for CO_2 emitted through 2050 under each of the three plans, using all three of the discount rates used by EPA and specified by Minnesota statute.

[174] EFG and AEC Report, section 3.3, Table 14.
[175] Laws of Minnesota 2023, chapter 7, section 18.

We note that the emissions presented in Table 10 above reflect all of Otter Tail's share of its unit CO_2 emissions, presented on a system-wide basis, consistent with the system-wide approach reflected in Otter Tail's and CEOs' modeling. However, the emissions and costs in Table 11 below have been cut in half to reflect only the share of emissions attributable to Minnesota sales. (Otter Tail has specified that 50% of its energy serves Minnesota customers, while the rest serves North and South Dakota customers.[176]) The carbon externality costs associated with Otter Tail's system-wide generation, therefore, would be double the values below.[177]

Table 11. Carbon Externality Costs Compared[178]
(Minnesota's Share Only)

	Revised OTP Preferred 2040 Plan	**Revised OTP 2028 Plan**	**CEOs Preferred Plan**
Cumulative CO_2 emissions, 2023-2050 (tons)	22,741,842	17,512,138	9,786,844
Associated externality costs, central estimate (2% discount rate) ($000)	$4,285,230	$3,307,774	$1,883,743
Range of associated externality costs (1.5% to 2.5%) ($000)	$2,464,507 to $7,695,530	$1,919,210 to $5,951,124	$1,127,834 to $3,399,622

As Table 11 shows, carbon emissions under the Revised OTP Preferred 2040 Plan would cause a central estimate of *$4.3 billion* in climate damage, within a cost range of $2.5 to $7.7 billion. Emissions under the Revised OTP 2028 Plan would cause a central estimate of *$*3.3 *billion* in climate damage, within a cost range of *$*1.9 to $6.0 billion.

CEOs urge the Commission, when assessing whether a resource plan is in the public interest, to give these costs the weight they are due, in recognition of the amended Minnesota law, the climate crisis, and the larger struggle to decarbonize fast enough to address that crisis. Costs

[176] OTP Supplemental IRP, p. 33.
[177] These system-wide carbon costs are also set forth in the EFG and AEC Report, section 3.4.
[178] EFG and AEC Report, section 3.4.

of this magnitude, even at the low end of the statutory range of discount rates, demonstrate the extreme importance of withdrawing from the Coyote and Big Stone coal plants as fast as reasonably possible. This would be true even if withdrawing from the plants increased costs to ratepayers, but it is especially true given that the CEOs Preferred Plan shows how those plants can be replaced in Otter Tail's portfolio *at a cost savings* and without sacrificing reliability (and in a way that, as discussed in Section VII, saves many lives by reducing criteria pollutants).

The CEOs Preferred Plan would reduce the climate damage caused by the Revised OTP 2040 Plan by $2.4 billion, and would reduce climate damage caused by the Revised 2028 Plan by $1.4 billion (using central estimates). These are dramatic cost reductions by any measure and should be steadfastly pursued. Of course, the CEOs Preferred Plan's cumulative carbon externality cost of $1.9 billion is still extremely high, because not withdrawing from Coyote until 2028 or from Big Stone until 2030 involves substantial ongoing carbon emissions. CEOs would therefore certainly support Otter Tail withdrawing from Coyote and Big Stone *before* 2028 and 2030 if feasible. Given the ongoing damage caused by these plants, the Commission should encourage Otter Tail to pursue the earliest feasible withdrawal dates.

We recognize that withdrawing these coal plants from its Minnesota resource plan or ending Otter Tail's ownership at these plants does not necessarily reduce their emissions since other co-owners may continue to operate them at the same level, or other utilities may buy Otter Tail's shares. However, the focus of Minnesota law is the externalities caused by generation used to serve Minnesota customers.[179] This is therefore the appropriate focus of the Commission's analysis when considering Otter Tail's resource plan.

[179] Minn. Stat. § 216B.2422, subd. 3; Minn. Stat. § 216H.01, subd. 2.

VII. CEOs' Health and Equity Modeling Shows that Otter Tail's Coal Plants Have Staggering Public Health and Mortality Impacts, Which are Disproportionately Borne by Native Populations

A. The Commission should take health and equity into account when examining Otter Tail's resource plan

The Commission evaluates resource plans, in part, for their ability to "minimize adverse socioeconomic effects and adverse effects upon the environment,"[180] and ultimately, the Commission is tasked with choosing a resource plan in the public interest.[181] As the State of Minnesota moves to decarbonize our energy sector, utility resource planning has major implications for public heath, environmental justice, and equity. In this docket, the Commission is considering the future of two key resources in Otter Tail's existing fleet—the Coyote and Big Stone coal plants. Decisions about the future of these two coal plants should not be made without carefully considering the public health and equity impacts of these resources.

CEOs commissioned a report from Physicians, Scientists, and Engineers for Healthy Energy ("PSE") to include as part of CEOs' filing. "PSE is a multidisciplinary, nonprofit research institute dedicated to supplying evidence-based scientific and technical information on the public health, environmental, and climate dimensions of energy production and use."[182] The purpose of this report is to evaluate the public health and equity impacts of Otter Tail's Preferred 2040 Plan and the OTP 2028 Plan, particularly the continued operation of the coal plants.

CEOs have included this report from PSE to provide one example of how health and equity implications of resource plan decisions can be quantified, evaluated, and considered in resource planning proceedings. Here, we summarize PSE's findings on: (1) population demographics and existing burdens in the immediate vicinities of Otter Tail's coal plants, and (2) mortalities and

[180] Minn. R. 7843.0500, subp. 3(C).
[181] Minn. Stat. § 216B.2422, subd. 2(a).
[182] PSE Report, Executive Summary.

health impacts attributable to coal plant emissions in the broader region, and the equity implications of these regional costs.

B. Communities living near Coyote and Big Stone already face large and compounding environmental burdens

Because the populations living nearest to fossil fueled power plants face higher per capita health risks from pollution, PSE began its analysis by looking at the populations in the immediate vicinity of Otter Tail's coal plants. And because populations with high cumulative socioeconomic, health, or environmental burdens may be particularly vulnerable to pollutants from the coal plants, PSE analyzed the populations living within a three-mile radius of Coyote and Big Stone to identify potential risk factors in these populations.

PSE found that the community surrounding Coyote does not rank highly compared to the rest of the state on any of the demographic indicators (for example, low-income populations) that PSE examined. However, the area does rank highly for a variety of environmental pollutant exposures, suggesting this area has high cumulative environmental burdens. For example, the area ranks in the 89th percentile for air toxics cancer risk, and in the 75th percentile for air toxics respiratory risk.[183] Additionally, measurements of the groundwater monitoring wells at Coyote found that 24 out of 25 wells had exceeded federal levels for compounds including sulfate, manganese, lithium, cobalt, selenium, boron, arsenic, nitrate, and lead.[184] These chemical groundwater exceedances pose potential risks to the nearby communities through groundwater contamination.

As for Big Stone, the demographics of the three-mile radius surrounding the plant includes a larger share of elderly populations and a larger share of individuals without a high school

[183] PSE Report, Section 3.1.
[184] PSE Report, Section 3.2.5.

education than in the rest of the state.[185] Similar to the area around Coyote, this population also has a high cumulative environmental burden, ranking in the 95th percentile for $PM_{2.5}$ (particulate matter that is inhalable into the lungs and can cause adverse health effects), the 96th percentile for air toxics cancer risk, and in the 75th percentile for air toxics respiratory risk.[186] This is especially troubling for this demographic region, given that the larger share of elderly residents may be particularly vulnerable to air pollution. Additionally, measurements of groundwater monitoring wells near the coal ash impoundments at Big Stone showed the groundwater exceeded federal levels at all 15 wells for compounds including arsenic, boron, cobalt, lead, lithium, molybdenum, radium, and sulfate.[187] Similar to Coyote, these chemical groundwater exceedances pose potential risks to the nearby communities through groundwater contamination.

Thus, even though the communities around both coal plants do not have a large number of demographic risk indicators, these plants run the risk of adding to cumulative environmental burdens that area residents face, including not just air quality issues, but groundwater contamination as well.

C. Because Coyote is an especially large emitter of human health-damaging air pollutants, the operation of Coyote and Big Stone today will contribute to over 40 premature deaths in this year alone

Next, PSE looked at the emissions of various pollutants at both of the coal plants. Specifically, PSE looked at the health-damaging air pollutants of sulfur dioxide ("SO_2"), nitrogen oxides ("NOx"), particulate matter 2.5 ("$PM_{2.5}$"), and volatile organic compounds ("VOCs").[188] PSE looked at these particular air pollutants because exposure to these pollutants is associated

[185] PSE Report, Section 3.1.
[186] *Id.*
[187] PSE Report, Section 3.2.5.
[188] Some of these pollutants have direct health impacts—for example, $PM_{2.5}$ and NO_x. Others can react chemically in the atmosphere to form pollutants that have health impacts. For example, NO_x and SO_2 may react chemically in the atmosphere to form secondary $PM_{2.5}$, and NO_x may react with VOCs to produce ozone. PSE Report, Section 1.

with a wide range of cardiovascular and respiratory health impacts, including asthma attacks, heart attacks, and premature death.[189] Populations living near to and downwind of coal plants that emit these pollutants tend to have the highest risk of adverse health effects. Indeed, several studies have associated living near coal plants with adverse health outcomes such as asthma and premature births.[190]

PSE found that Coyote emitted significantly more NO_x, SO_2, and $PM_{2.5}$ than Big Stone. In fact, with regard to SO_2 and $PM_{2.5}$, Coyote emits nearly *twenty times* more than Big Stone.[191] This is because Coyote burns lignite coal, which is the lowest grade of coal, and requires more coal to be burned to generate the same amount of electricity as hard coal like bituminous or subbituminous (Big Stone utilizes subbituminous).[192] Lignite also tends to have higher amounts of sulfur and ash content than other types of coal, meaning it also leads to more pollution per MWh generated than harder coals.[193] Additionally, Coyote lacks modern pollution controls that could greatly reduce its emissions, as CEOs discussed in Section III.B.1.

PSE used epidemiological models to evaluate the health implications of both coal plants' emissions rates. Looking at $PM_{2.5}$-related health impacts alone, PSE found the emissions from Otter Tail's share of Coyote will contribute to 39 premature deaths in 2023 alone, and its share of Big Stone will contribute to 3 premature deaths in 2023 alone.[194] Note that this calculation is only for Otter Tail's share of these plants (35% at Coyote and 54% at Big Stone). Total deaths from operation of the plants are significantly larger. Thus, PSE's findings confirm that while both coal

[189] PSE Report, Section 1.
[190] *Id.*
[191] PSE Report, Section 3.2.1.
[192] *Id.*
[193] *Id.*
[194] PSE Report, Section 3.2.2

plants are polluting, Coyote is especially polluting and dangerous to human health, even compared to other coal plants.

D. Otter Tail's Preferred 2040 Plan would contribute to 710 premature deaths; CEOs preferred plan would reduce these deaths by nearly 70% and save $5.4 billion in health damages

After evaluating the impacts to humans of Otter Tail's operation of Coyote and Big Stone today, PSE looked at the human impact of Otter Tail's Preferred 2040 Plan (Operating Coyote until 2040, Big Stone until 2046). PSE found this plan would contribute to *710 premature deaths* between 2023-2046.[195] The majority of these deaths—675—are attributable to Otter Tail's share in Coyote.[196] However, if Otter Tail was to exit Coyote in 2028 as the CEOs' modeling shows is prudent, the number of deaths due to Otter Tail's share of Coyote would fall to 215.[197] This means a 2028 Coyote exit, even with continued operation of Big Stone until 2046, would still prevent 461 premature deaths. According to PSE's modeling, it would also save $5.2 *billion* in health damages.[198] CEOs Preferred Plan, which includes a 2028 exit of Coyote and a 2030 exit of Big Stone would further reduce human impacts by: preventing 478 premature deaths, reducing heart attacks, reducing respiratory hospital admissions, reducing upper respiratory impacts, and saving $5.4 billion in health damages between 2023-2046.[199] Table 12 below shows the human impacts of ongoing operation of Coyote and Big Stone.

[195] PSE Report, Section 3.2.3
[196] *Id.*
[197] *Id.*
[198] *Id.*
[199] *Id.*

Table 12. Cumulative Coal Power Plant $PM_{2.5}$-Related Health Impacts in Each Scenario[200]

Plant Name (Modeled Years)	Scenario	Mortality (high est.)	Upper Respiratory Symptoms	Respiratory Hospital Admits	Nonfatal Heart Attacks (high est.)	Total Health Impacts ($)
Coyote (2023-2028)	**2028 Plan (CEO Preferred Plan)**	215	2,299	24.3	100.6	2,417,448,600
Coyote (2023-2040)	**2040 Plan**	675	7,105	76.9	313.7	7,674,237,700
Big Stone (2023 - 2046)	**2028 Plan**	36	376	4.2	16.9	410,846,000
Big Stone (2023 - 2046)	**2040 Plan**	35	369	4.1	16.5	400,377,700
Big Stone (2023-2030)	**CEO Preferred Plan**	17	172	1.9	7.7	185,903,300

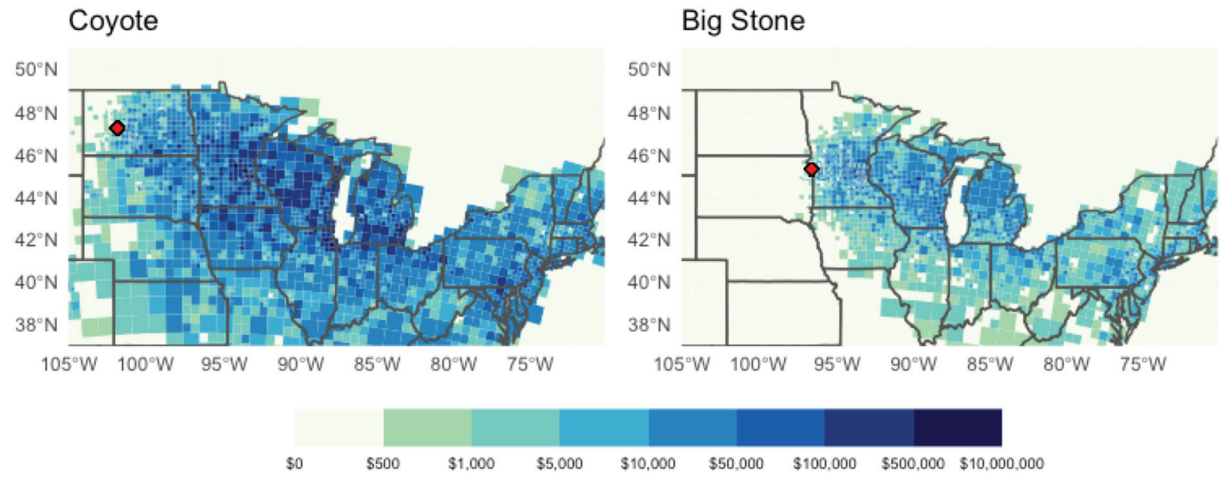
The cost and mortality figures in the previous paragraph and in Table 12 look at the human health impacts of Otter Tail's shares of Coyote and Big Stone without considering whether the generation is serving Minnesotans or customers in North or South Dakota. Since 50% of Otter Tail's energy serves Minnesota,[201] the costs of these health impacts related to Minnesota consumption alone would be exactly half of the system-wide values. For example, just exiting Coyote in 2028 rather than 2040 would save $2.6 billion in health damages attributable to Minnesota consumption. Exiting both plants, in 2028 and 2030 under the CEOs Preferred Plan, would save $2.7 billion in health damages and prevent 239 premature deaths attributable to generation serving Minnesota.

[200] PSE Report, Section 3.2.3.
[201] OTP Supplemental IRP, at 33.

E. The health impacts from Coyote and Big Stone disproportionately affect Native Populations

PSE went on to look at the *distribution* of the health impacts associated with the operation of Big Stone and Coyote to see geographically where these health impacts are occurring. PSE's findings revealed the impacts from both plants extend across multiple states, particularly downwind and east of the facilities.[202] As shown in Figure 10 below, it is clear that although neither coal plant is located in Minnesota, Minnesotans are unquestionably bearing the adverse health consequences of the continued operation of these plants.

Figure 10. Annual Total $PM_{2.5}$ Public Health Impacts of Each of Otter Tail's Coal Plants[203]



PSE also looked at how the health impacts varied by race and ethnicity, and found that the plants disproportionately affect Native populations. Coyote's emissions specifically lead to 2.6 times more deaths ($PM_{2.5}$-related) for Native populations than for the overall population. Table 13 below shows the coal plant impacts by race and ethnicity:

[202] PSE Report, Section 3.2.4.
[203] *Id.*

Table 13. Annual Per Capita Coal Plant Health Impacts by Race and Ethnicity[204]

Plant Name	Black *$/100 people*	Latino *$/100 people*	Native *$/100 people*	Asian *$/100 people*	White *$/100 people*	Overall *$/100 people*
Coyote	17.5	12.4	93.7	20.1	47	36
Big Stone	5.8	3.9	12.4	8.5	15	11.5

In sum, the PSE analysis revealed that the areas immediately surrounding Otter Tail's two operating coal plants are already bearing high environmental burdens due to existing air and water pollution. These immediate communities, and communities significantly downwind of the coal plants, including Minnesotans, will continue to be adversely affected by ongoing operation of both coal plants. However, the continued operation of Coyote poses the greatest threat, as its pollution impacts are orders of magnitude larger than many other coal plants, and it disproportionately impacts Native people who experience 2.6x the mortalities from Coyote as compared to the overall population.

Thus, while Otter Tail proposes to continue to operate Coyote until 2040, an early exit would save many lives per year and billions of dollars in healthcare costs. Indeed, if the Commission requires Otter Tail to exit Coyote by 2028, this will prevent 461 premature deaths that would otherwise be attributable to Otter Tail's share of Coyote (230 of which are attributable to serving Minnesota customers). And Commission approval of the CEOs Preferred Plan, with early exits from both of the coal plants, would prevent an estimated 478 premature deaths and avoid $5.4 billion dollars in health impacts as compared to approval of Otter Tail's Preferred 2040 Plan (with 239 of those deaths and $2.7 billion of the costs attributable to serving Minnesota customers).

[204] PSE Report, Section 3.2.4.

VIII. Given the Continued Operation of Coyote and Big Stone, the Commission Should Defer a Decision on the Astoria LNG Proposal Until the Next IRP

In this IRP, Otter Tail also requests to add liquified natural gas ("LNG") storage to its two-year-old Astoria Station gas plant. CEOs recommend the Commission defer a decision on this proposal until Otter Tail's next IRP given that there is no imminent need for this addition while Otter Tail is still operating two large dispatchable resources—Coyote and Big Stone. CEOs recognize that as the energy transition continues, there will be a need for additional dispatchable capacity and a need for resource attributes such as fuel assurance, which MISO, NERC, and other entities are in the process of defining and developing standards around. It is conceivable that Otter Tail's system may need or benefit from additional on-site fuel storage in the future once it no longer includes multiple large dispatchable generators. However, an assessment of the need for this "insurance policy" is premature while Otter Tail still has multiple large dispatchable resources on its system—and plans to have these resources well into the 2040s.

Additionally, by the time of Otter Tail's next IRP, there will likely be better information from MISO regarding reliability attributes and where those attributes are needed. Although Otter Tail argues that the LNG proposal will provide the MISO-identified reliability attribute of "fuel assurance," and points to that as a core justification for this proposal, it is well known that MISO's reliability attributes discussion is still in early stages of development, and there is significant work to be done before any requirements, guidelines, or market products are established. Additionally, many of MISO's reliability attributes are meant to be looked at on a larger, system-wide scale, not utility by utility, in recognition of the regional nature of the wholesale power market and many reliability functions. Waiting until there is better information from MISO will allow the Commission to consider the attributes discussion holistically and avoid proposals like this one that treat Otter Tail's system as if it is an island.

Otter Tail also argues that their LNG proposal is necessary to avoid excessive exposure to market risk. However, Otter Tail previously used this same justification when asking the Commission to approve the Astoria gas plant in the first place in its last IRP. CEOs are concerned that Otter Tail's proposed solution to market risk is a moving target, leading to new (and costly) fossil fuel investment proposals with each of Otter Tail's last two IRPs. Rather than making another *substantial* investment in this only 2-year-old gas plant, again in the name of avoiding market risk, CEOs ask the Commission to consider this proposal, and the risks it seeks to address, in the next IRP.

CEOs also encourage the Commission to order Otter Tail to explore greater energy efficiency, demand flexibility, and energy storage options before approving a significant investment in on-site LNG storage. A new report from Lawrence Berkeley National Laboratory and the Brattle Group reveals just how much these tools can reduce the cost of achieving carbon-free electricity. The study demonstrates that investing in efficient and grid-responsive commercial and residential buildings would reduce the need for utilities to build infrastructure to meet rare moments of extremely high demand (such as Otter Tail's LNG proposal) and would result in shaving more than one-third off the cost of decarbonizing the country's power supply.[205] In recognition of this opportunity, the Department of Energy has a goal of tripling the energy efficiency and demand flexibility of the buildings sector by 2030 compared to 2020 levels.[206]

---

[205] *Demand-side solutions in the US building sector could achieve deep emissions reductions and avoid over $100 billion in power sector costs*, One Earth volume 6 at 1005 (August 18, 2023); see also, *Why efficient buildings are key to decarbonizing the power grid*, Canary Media (August 22, 2023) available at https://www.canarymedia.com/articles/energy-efficiency/why-efficient-buildings-are-key-to-decarbonizing-the-power-grid?utm_campaign=canary&utm_medium=email&_hsmi=271196820&_hsenc=p2ANqtz-_u56F5mfnjZulH-SFWMyvBzmN6K2WPlvP2VGi09BKptL4hCw8LKuSR0XV8lKgtLspfC1mZKD1sVXr_kb-ZltZflh21Aw&utm_source=newsletter.

[206] Office of Energy Efficiency and Renewable Energy, *DOE's National Roadmap for Grid-interactive Efficient Buildings* (May 18, 2021).

However, in order to have cost-saving benefits, these tools must be utilized in advance of new investments in peaking facilities. CEOs recognize that Otter Tail has regularly exceeded the state's annual energy conservation requirements and already has a relatively large winter demand response resource. We applaud the Company's work in these areas—it is a leader in the demand management space in Minnesota. However, this does not mean that all potential has been tapped. Otter Tail did not evaluate potential expansions to this portfolio when considering alternatives to its LNG proposal. Given the price tag involved, it is imperative to perform a robust alternatives analysis and reasonable to include these cost-effective resources in such an evaluation. The energy transition requires that we allow for future ambitions to be higher than past performance.

CEOs therefore recommend the Commission reject the Astoria on-site fuel storage proposal without prejudice. Otter Tail should continue to evaluate alternatives to onsite LNG storage at Astoria Station, including whether a portfolio of energy efficiency, demand response, energy storage, and/or renewable energy resources could fulfill the same *system* need.

CONCLUSION

In light of the foregoing, the CEOs respectfully request that the Commission take the following actions in this IRP:

1. Find that it is not prudent and not in the public interest for Otter Tail to retain its share of Coyote beyond 2028 and that Otter Tail should therefore withdraw from Coyote as soon as reasonably possible, but by no later than 2028. The Commission should also authorize Otter Tail to give contractual notice of its intent to withdraw to co-owners while declining to explicitly find at this time that Otter Tail required Commission authorization to give this notice or that it was prudent not to give notice of withdrawal earlier.

2. Modify Otter Tail's Preferred 2040 Plan to:
   a. Include withdrawing from Coyote by no later than 2028.
   b. Find that Otter Tail has demonstrated a need for: planned wind repowers in 2025, 200 MW of surplus solar in the 2027-2028 timeframe, 350 MW of wind resources in the 2029-2031 timeframe, an additional 200 MW of surplus solar in the 2030-2032 timeframe, and 50 MW of surplus battery resources by no later than 2032.

c. Require Otter Tail to request an Attachment Y-2 study with MISO, and perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Coyote retirement and any potential mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
d. Conduct an assessment of the value of reusing the Company's interconnection rights at Coyote, and submit that assessment in this docket within 12 months of this order.

3. Find that it is not prudent and not in the public interest for Otter Tail to retain its interest in Big Stone beyond 2030 and that Otter Tail should therefore withdraw from Big Stone as soon as reasonably possible, but by no later than 2030.

4. Find that it is prudent and in the public interest for Otter Tail to accelerate its acquisition of wind power and battery storage at a scale and pace consistent with the resources listed in this order.

5. Further modify Otter Tail's Preferred 2040 Plan to include:
   a. Withdrawing from Big Stone by no later than 2030;
   b. Finding there is a need for and approving the following resources, *additional to those in Recommendation 2.b*: 550 MW of wind resources in the 2029-2031 timeframe and 125 MW of battery resources by 2031.
   c. Requiring Otter Tail to request an Attachment Y-2 Study from MISO for the Big Stone Plant and to perform any transmission and reliability analysis that may be needed to evaluate the impacts of a potential Big Stone retirement and identify any mitigations that may be needed. The Y-2 study should be filed in this docket and with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   d. Requiring Otter Tail to conduct an assessment of the transmission congestion present in the Big Stone area, the impact of LRTP lines and other transmission infrastructure, and the future local transmission outlook. The results of this evaluation should be filed with the Company's next Minnesota IRP.
   e. Requiring Otter Tail to conduct an assessment of the value of reusing the Company's interconnection rights at Big Stone, and to submit that assessment in this docket with the Company's next Minnesota IRP, or by March 1, 2026 at the latest.
   f. Requiring Otter Tail to issue a Request for Information 6-12 months prior to filing its next IRP, seeking information from developers on projects under development in proximity to Big Stone or in proximity to potential paths for a generation-tie line. The results of the RFI should be filed with Otter Tail's next IRP.

6. In the alternative to Recommendation 5, require Otter Tail to begin planning now for a Big Stone withdrawal by no later than 2030 and to present a plan in its next Minnesota IRP that withdraws from Big Stone by no later than the end of 2030. The plan should demonstrate that Otter Tail is taking proactive steps to keep a 2030 exit on the table and is exploring the economic value of retiring the plant, including consulting with co-owners on the issue.

7. Find that it may be economic for Otter Tail to add the wind, solar and/or battery storage resources listed above before the dates specified, and therefore the company should

actively assess market conditions and project availability to bring forward economic resources when feasible, and by no later than the dates listed above.

8. Defer a decision on Otter Tail's Astoria LNG proposal until the Company's next IRP.

9. Direct Otter Tail in its next IRP to:
   a. Include an analysis of the costs of its preferred plan and its comparative plans under the full range of regulatory and externality costs specified by the Commission in its forthcoming order in docket 22-236. This analysis should include emissions both inside and outside Minnesota to the extent they are associated with generation used to serve Minnesota customers.
   b. Present modeling runs that allow a reasonable amount of both market purchases and sales.
   c. Conduct production cost modeling to obtain more detailed information to develop the portfolio PVRRs and to evaluate the dispatch of resources during specific periods of time, including during periods of challenging system conditions.
   d. Include an analysis of the health and equity impacts of its preferred plan.
   e. Include an assessment of energy efficiency, demand flexibility, and energy storage options, especially in comparison with the addition of on-site fuel storage at its Astoria facility.

10. Order Otter Tail to submit its next IRP by two years from the date of this order.

Respectfully submitted,

/s/Amelia Vohs

Amelia Vohs
Minnesota Center for Environmental Advocacy
1919 University Avenue West, Ste. 515
St. Paul, MN 55104
(651) 223-5969
avohs@mncenter.org

Attorney for Clean Energy Organizations.