

Application for Resource Plan Approval 2022-2036

PUBLIC DOCUMENT — NOT PUBLIC (OR PRIVILEGED)
Data has been excised

SUBMITTED TO

Minnesota Public Utilities Commission: Docket No. E017/RP-21-339

North Dakota Public Service Commission

South Dakota Public Utilities Commission

September 1, 2021



Table of Contents

1	Statement of Preferred Plan.....	1
2	Preface	1
3	The Factors Considered in our Planning Analysis.	12
3.1	Plan Synopsis	13
3.2	Load Forecast.....	15
3.3	Future Resource Needs.....	16
3.4	Resource Plan Development	18
3.5	New Resource Alternatives.....	19
3.6	Preferred Resource Plan	19
3.7	Multi-State Jurisdictional Complexity	27
3.7.1	Multiple ISOs (SPP & MISO)	28
3.8	Resilience	32
3.9	Coyote Station	40
3.10	Adding Dual Fuel Capabilities at Astoria Station	53
3.11	Preferred Plan is in the Public Interest	58
3.12	Preferred Plan Rate Impacts.....	59
3.13	Five-Year Action Plan.....	60
3.14	Conclusion.....	61
4	Current Outlook.....	62
4.1	Retirement of Hoot Lake Plant.....	62
4.2	Completion of Astoria Station, a 245 MW simple-cycle natural gas combustion turbine in South Dakota	62
4.3	Completion of the 150 MW Merricourt Wind generation facility in North Dakota	63
4.4	MISO Module E Resource Adequacy Obligation.....	63
4.5	Market Conditions in the MISO.....	64
4.6	MPUC Approval of the 49.9 MW Hoot Lake Solar generation facility	64
4.7	Renewable Energy Objectives (REO) and Standards (RES)	65
4.8	DSM and Conservation Requirements.....	66
4.9	Projected Load and Capability	69
5	Plan Development	73
5.1	Plan Objectives.....	73
5.2	Planning Tools	73
5.3	Planning Process	74
6	Preferred Resource Plan	75
6.1	Preferred Resource Plan Description	78
6.2	REO/RES/SES Compliance	78
6.3	Load Growth Scenarios.....	79
6.4	Environmental Externalities.....	80
6.5	Emissions and Greenhouse Gas Reduction Goal	80
6.6	Oil Peaker Evaluation Sensitivities	83
6.7	Additional Sensitivity Scenarios	84

ii. Table of Contents

7	Conclusion.....	86
7.1	Preferred Plan is in the Public Interest.....	86
7.2	Socio-Economic Impacts of the Preferred Plan	87
7.3	Five-Year Action Plan.....	88

iii. List of Appendices

- Appendix A: Plan Cross Reference and Checklist
- Appendix B: Electric Utility Report
- Appendix C: Existing Resources
- Appendix D: Potential Resources
- Appendix E: Assessment of Federal and State Environmental Regulation
- Appendix F: Assumptions for EnCompass Modeling Scenarios
- Appendix G: REO/RES Compliance Strategy
- Appendix H: Brattle Group Study on Demand Response
- Appendix I: Integrated Resource Plan Sensitivity Summary
- Appendix J: Distributed Renewable Generation Evaluation

iv. List of Tables

Table 2-1: Execution of 2016 IRP Order	4
Table 2-2: Comparison of 2017-2020 Forecasted to Actual Market Prices.....	5
Table 2-3: Coyote Withdrawal NPVRR Comparison*	8
Table 2-4: Otter Tail 2022-2028 Detailed Action Plan.....	10
Table 3-1: Otter Tail Total System Average Cost of Energy Paid by Otter Tail Customers since 2010..	12
Table 3-2: Summer 2022-2036 Base Case Projected Load and Capability Prior to Preferred Resource Plan	17
Table 3-3: List of Resource Alternatives Included in EnCompass Model.....	19
Table 3-4: Preferred Resource Plan Summary.....	20
Table 3-5: Base Case with and without Externalities	25
Table 3-6: NPV Revenue Requirement Base Case and Preferred Plan	26
Table 3-7: Percentage of Otter Tail operations in each of its three states.....	27
Table 3-8: Generation Resources and Resiliency Factors.....	34
Table 3-9: Resilient Generation	36
Table 3-10: Coyote Station Ownership Percentage	41
Table 3-11: Coyote Station Estimated Foreseeable Withdrawal Costs.....	46
Table 3-12: February 2021 LMP Pricing Scenario	57
Table 3-13: Five-Year Action Preferred Plan Activities.....	61
Table 4-1: Summer 2022-2036 Base Case Projected Load and Capability Prior to Preferred Resource Plan	71
Table 6-1: Preferred Plan Resource Summary.....	75
Table 7-1: Five-Year Action Preferred Plan Activities.....	89

v. List of Figures

Figure 3-1: Current Capacity Resources and Reserve Obligation 2022-2036 (MW)	18
Figure 3-2: Preferred Plan Capacity Resources and Reserve Obligation 2022-2036 (MW)	21
Figure 3-3: Preferred Plan Energy Resources and Requirements with Externalities Applied 2022-2036 (GWh)	22
Figure 3-4: Preferred Plan Energy Resources and Requirements without Externalities Applied 2022-2036 (GWh)	22
Figure 3-5: 2025 Energy by Fuel Source No Externalities	23
Figure 3-6: 2025 Energy by Fuel Source with Externalities	23
Figure 3-7: Preferred plan 2036 Energy by Fuel Source No Externalities	24
Figure 3-8: Preferred plan 2036 Energy by Fuel Source with Externalities	24
Figure 3-9: 2022 Forecasted Load Relationship with Resilient Generation	38
Figure 3-10: 2030 Forecasted Load Relationship with Resilient Generation (Preferred Plan)	39
Figure 3-11: Historic Ventura Hub Natural Gas Prices	55
Figure 3-12: Preferred Resource Plan Estimated Rate Impacts	59
Figure 3-13: Preferred Resource Plan Estimated Rate Impacts by Class	60
Figure 4-1: Historic and Forecast Unmanaged 50/50 Non-coincident Summer Peak Demand	69
Figure 4-2: Historic and Forecast Annual Retail Sales Before EE (Losses are not included)	70
Figure 4-3: Summer 2022-2036 Capacity Needs Prior to Preferred Plan Information	72
Figure 6-1: 2022-2036 Capacity Resources and Reserve Obligation for Preferred Plan (MW)	76
Figure 6-2: 2022-2036 Energy Resources and Energy Requirements for Preferred Plan with Externalities (GWh)	77
Figure 6-3: 2022-2036 Energy Resources and Energy Requirements for Preferred Plan without Externalities (GWh)	78
Figure 6-4: Compliance with REO/RES Regulation in All Jurisdictions	79
Figure 6-5: SO ₂ and NO _x Emissions	81
Figure 6-6: CO ₂ Emissions	81
Figure 6-7: Mercury Emissions	81
Figure 6-8: Preferred Plan CO ₂ Emissions and the CO ₂ reduction Goal	82
Figure 6-9: Sensitivity Comparison (PVSC/PVUC)	85

1 Statement of Preferred Plan

Otter Tail Power Company (Otter Tail or Company) has developed a Preferred Plan that will allow us to reduce costs while maintaining and enhancing resiliency and giving the Company greater control over whether or not to dispatch resources based on market conditions.

Accordingly, we are requesting authority to carry out the following key aspects of the plan within the next five years:

- the addition of dual fuel capability at Astoria Station;
- the addition of 150 MW of solar generation in 2025; and
- the commencement of the process of withdrawal from our 35 percent ownership interest in Coyote Station.

This plan, the analysis supporting it, and its various components are discussed in greater detail throughout this filing.¹

2 Preface

Otter Tail has prepared this resource plan for concurrent filings with the Minnesota Public Utilities Commission (MPUC), the North Dakota Public Service Commission (ND PSC), and the South Dakota Public Utilities Commission (SD PUC).

Resource Plan Requirements and Policy Considerations

In Minnesota, this plan is filed to satisfy the requirements of Minnesota Statute § 216B.2422 and Minnesota Rules, Part 7843. In North Dakota, the plan is filed pursuant to North Dakota Century Code §§ 49-05-04.4 and 49-05-17. In South Dakota, the plan is filed to keep the SD PUC apprised of the Company's plans; however, there is not any statute or rule requiring the SD PUC to review or approve resource plans.

¹ In addition to the foregoing, Otter Tail's five-year plan also includes taking the initial steps to necessary to bring 100 MW of additional wind resources into service in 2027.

The legal and regulatory requirements regarding resource plan approval thus differ from state to state, as does the significance of approval (where required). However, regardless of the specific differing statutory and regulatory provisions, integrated resource plan analysis plays an important role in all three Otter Tail states when the necessity and prudence of resource additions are considered, including certificate of need matters, certificate of public convenience and necessity cases, and rate recovery matters.

Otter Tail is quite small for a vertically integrated utility. Despite that small size, we have succeeded over the years in keeping our rates low. Customers have benefitted from our efficiency and economies of scale we have been able to achieve in spite of our limited customer base. If, however, the requirements of our regulators in Minnesota, North Dakota, and South Dakota were to diverge to the point that we had to operate state-specific systems in each jurisdiction, the increase in administrative expenses and the loss of economies of scale would increase our costs and, necessarily, our retail rates. It is important, therefore, that the Company be able to maintain a single integrated system pursuant to an integrated resource plan acceptable to all three jurisdictions. Obviously, there can be (and are) some differences in the regulatory treatment of certain resources, but there is also, just as obviously, a point at which Otter Tail could not reasonably accommodate such differences. Fortunately, we are confident that the Commissions in all three states will support the integrated resource plan presented in this filing, as was the case with our most recent resource plan.

Execution of the 2016 Plan

Resource planning is a continuous and iterative process. Accordingly, the resource plan submitted with this filing is based on the Company's most recent resource plan, which was submitted in 2016 (2016 Plan),² with appropriate adjustments for changing conditions in the market and our industry. In the 2016 Plan, various actions were scheduled for the 2017 to 2022 planning period. For the most part, the Company has completed its planned actions. In

² *In the Matter of Otter Tail Power Company's 2017-2031 Integrated Resource Plan*, in Minnesota Docket No E-017/RP-16-386 and North Dakota Case No. PU-16-308.

particular, two major resource additions authorized as part of the 2016 Plan³ are now in service: the 150 MW Merricourt Wind Energy Center, located near Merricourt, North Dakota, went into service in late 2020, and the 245 MW Astoria Station simple-cycle natural gas generator, located near Astoria, South Dakota, went into service in early 2021. The Company added those two generation resources in response to the May 2021 retirement of the Hoot Lake Plant⁴ and the expiration of certain capacity contracts.

In addition to the new generation resources now in service, the Company is also working to develop the MPUC-approved Hoot Lake Solar project, a 49.9 MW solar installation using the Hoot Lake Plant interconnection.⁵ The facility is currently anticipated to be in service in 2023. The Hoot Lake Solar opportunity emerged quickly, and Otter Tail responded effectively to secure interconnection rights, investment tax credits, and the necessary permits. The Hoot Lake Solar project matched a need identified in Minnesota for solar generation with a unique opportunity at the site of the retiring Hoot Lake Plant. Once in service it will provide significant ratepayer benefits, including reductions to market purchases during the most expensive hours of the year.⁶ Table 2-1 summarizes Otter Tail's execution of the 2016 Plan.

³ *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, April 26, 2017, MPUC Docket No E-017/RP-16-386.

⁴ The Hoot Lake Plant was a 140 MW coal-fired facility originally constructed in the 1950s that used coal from the Powder River Basin. It was retired from service on May 31, 2021.

⁵ *In the Matter of Otter Tail Power Company's Petition for Approval of the Hoot Lake Solar Project*, Order Approving Petition, Authorizing Allocation of Output and Costs, Authorizing Cost Recovery, And Requiring Compliance Filings, April 29, 2021, MPUC Docket No. E-017/M-20-844. The Company is currently undergoing vendor requests for proposals and negotiations.

⁶ *Id.* at 7.

Table 2-1: Execution of 2016 IRP Order

2016 Resource Plan Order	Execution of 2016 IRP
The addition of 200 MW of wind in the 2018-2020 timeframe	The 150 MW Merricourt Wind Farm became commercially operational in December 2020. ⁷
The addition of 30 MW of solar in about 2020	Received MPUC approval to construct the 49.9 MW Hoot Lake Solar Project beginning in 2021.
The addition of up to 250 MW of peaking capacity in 2021	The 245 MW Astoria Station was completed and became operational during Q1 2021
Average annual energy savings of 46.8 GWh (1.6 percent of sales).	Average annual energy savings of 1.86%, which exceeds the newly established 1.75% goal in Minnesota’s ECO Act. ⁸

The Company has performed well in carrying out the 2016 Plan. The Astoria and Merricourt projects were completed on time and under budget despite substantial labor availability challenges and supply chain disruptions caused by the COVID-19 pandemic. In fact, final Merricourt costs were nearly 20 percent⁹ lower than the estimated costs presented in the 2016 Plan, and the final Astoria costs are expected to be about seven percent¹⁰ lower than the estimated costs presented in the 2016 Plan. The Hoot Lake Plant was retired on-schedule, on May 31, 2021. The Company mitigated the community and worker impacts that are inherent in any facility retirement through thoughtful planning, communication, and coordination.

⁷ The 150 MW Merricourt Project with its approximately 50 percent net capacity factor is basically equivalent to the 200 MW addition of wind resource with an approximately 40 percent capacity factor assumed in the 2016 Resource Plan Order.

⁸ On May 25, 2021, Minnesota Governor Tim Walz signed the Energy Conservation and Optimization (ECO) Act of 2021. This legislation modernized Minnesota conservation policy by adding new opportunities and setting higher conservation goals. The ECO Act increased the annual energy savings goal for public electric utilities, from 1.5 percent of retail sales to 1.75 percent of retail sales, based on a rolling three-year average of weather normalized sales.

⁹ The 2016 Resource Plan wind resource selected was \$30/MW. Otter Tail expects the levelized cost of the Merricourt project to be less than \$24/MWh.

¹⁰ The 2016 Resource Plan new thermal alternative selected was \$599/kW (2017\$), escalated to \$674/kW (2021\$) / \$167.2 million and the current estimate at completion is \$628/kW / \$153.8 million.

The Company has also been successful with its demand-response initiatives, including Minnesota’s approved Conservation Incentive Program (CIP), South Dakota’s Energy Efficiency Program (EEP), and other conservation and demand-response initiatives. These programs benefit customers in all three states served by Otter Tail. Since the MPUC approved the 2016 Plan in 2017, Otter Tail has achieved energy savings of 78,583 MWh in 2018, 82,466 MWh in 2019, and 81,559 MWh in 2020. Combined, these achievements have significantly reduced our energy needs by 242,609 MWh, which has resulted in a substantial reduction in the cost of providing service to our customers.

As a result of both the Company’s successful management of the costs of the generation resource additions and favorable market conditions for purchased power, the Company has been able to keep its costs lower than contemplated in the 2016 Plan. Table 2-2 provides a comparison between the prices forecasted in the 2016 Plan and the actual market prices for 2017 to 2020.

Table 2-2: Comparison of 2017-2020 Forecasted to Actual Market Prices

\$/MWh	2016 Resource Plan	Actual LMPs	\$ Change	% Change
2017	29.99	23.00	-6.99	-23.3%
2018	27.94	27.28	-0.66	-2.4%
2019	27.81	22.99	-4.82	-17.3%
2020	28.10	16.60	-11.50	-40.9%
2017 -2020 Average	28.46	22.47	-5.99	-21.0%

Otter Tail’s all-in rates (including base rates, riders, and fuel charges) continue to be among the very lowest of all electric utilities in each of our states. We are proud of that, and we recognize that collaboration with our state Commissions and other stakeholders has been an important part of our success in keeping rates low. Our new resource plan is designed to keep our rates low, while maintaining reliability and responding to the realities of current and projected market conditions.

The Preferred Plan

Our preferred 2022-2036 resource plan (Preferred Plan) takes account of the anticipated demand and energy needs of the Company's customers. Based on those forecasted needs, we have set forth both specific actions that Otter Tail plans to complete during the first five years of the planning period and potential actions that Otter Tail may take during the subsequent ten years. In our plan, Otter Tail presents actions that: (a) will ensure that Otter Tail has the resources necessary to continue to provide reliable, low-cost electricity to meet customers' needs, while avoiding adverse impacts; (b) comply with the requirements of applicable statutes and rules; and (c) take account of the sometimes-differing goals of the commissions in all three states.

The Company has determined that it can best satisfy those goals by: (1) beginning the process of withdrawal from our ownership interest in Coyote Station; (2) modifying the Astoria Station so that it can use fuel oil in addition to natural gas (dual fuel capability); and (3) adding solar and wind resources, including a 150 MW solar facility and a 100 MW wind facility. Our analysis indicates that this combination of actions will maintain and enhance the resiliency of our system and reduce costs.

In fact, the economic analyses supporting the Preferred Plan is compelling. In almost every scenario and permutation analyzed, the results are clear: It is no longer in customers' best interest for Otter Tail to continue to participate as an owner in Coyote Station. This outcome is true regardless of any future compliance obligation¹¹ or potential change in law. Should significant investments need to be made at Coyote Station for environmental compliance purposes, the economic analysis is even more compelling. Consequently, Otter Tail is proposing to commence the process of withdrawing from its ownership interest in Coyote Station upon approval of this Preferred Plan with the consummation of that process expected by the end of

¹¹ This possibility arises from the EPA's Regional Haze Rule. In its planning, the Company is treating the need for capital investments to comply with that rule as a possibility; however, to be clear, Otter Tail is not taking the position that such capital investments should be required, nor are we providing an estimate of the likelihood of such an outcome.

2028.

Withdrawing from Otter Tail's ownership interest in Coyote Station will not be without challenges, however. Coyote Station is a key baseload resource for the plant's co-owners.¹² Additionally, Otter Tail is the current operator of the plant and is relied upon by the co-owners for the plant's safe and efficient operation. Further, Coyote Station is a mine-mouth lignite plant, which is fully integrated with the mine adjacent to the plant. The mine is owned by Coyote Creek Mining Company, LLC, a subsidiary of the North American Coal Corporation, which is not affiliated with any of the Coyote Station co-owners. Finally, Coyote Station is a key source of union jobs and tax base in Mercer County and North Dakota. Consequently, in addition to considering customer impact we must also consider the impacts to our Coyote Station co-owners and these other stakeholders. While these challenges are not insurmountable, they will require thoughtful consideration and management. We have sought to be measured and deliberate in our approach to withdrawing from Coyote Station. Through this resource planning process, we are seeking Commission acknowledgement and understanding of these challenges and risks, recognizing that Otter Tail's withdrawal from Coyote Station is demonstrated as the most reasonable course of action from a resource planning and customer perspective.

Otter Tail's withdrawal from Coyote Station is justified by our modeling and will also help to shift the Company's generation portfolio into a more flexible one, allowing Otter Tail to better match its operations with the ongoing trends in the MISO market. Shifting the generation fleet's focus to dispatchable gas resources and away from coal will help to improve operational flexibility while hedging market risk. That said, it is also necessary to ensure fuel-secure generation is available for those times when self-generation is necessary to maintain reliability of the system. Obtaining gains in reliability is a necessary component of prudent resource planning

¹² Ownership shares in Coyote are: 35% Otter Tail; 30% Northern Municipal Power Agency; 25% Montana-Dakota Utilities Co.; and 10% NorthWestern Energy. Minnkota Power Cooperative, Inc., serves as the agent for Northern Municipal Power Agency. NorthWestern's share of the plant is dispatched into the SPP Market with the remainder of Coyote Station dispatched into MISO.

and, to that end, we intend to make key system investments to enable Astoria Station to run on fuel oil in addition to natural gas. By making an investment in on-site fuel oil storage, Otter Tail will actually have more generation capacity than we currently have, while providing greater flexibility to decide whether to dispatch the resource depending on fuel costs and market conditions. Our analysis supports dual fuel at Astoria Station regardless of the course of action on Coyote Station.

Otter Tail's Preferred Plan will make the Otter Tail system more flexible in its ability to respond to market signals. Flexibility in this context includes the ability to start and stop generation quickly and less reliance on long term fuel supply commitments. The Preferred Plan provides sufficient resources to meet our customers' needs and hedges overall exposure while enhancing the Company's ability to take advantage of favorable market dynamics that accrue to our customers' short-and long-term benefit. In light of current market dynamics and as a hedge against the future, Otter Tail's Preferred Plan also includes the addition of 150 MW of solar and 100 MW of wind as economic resources for the system.

Table 2-3 demonstrates the economic benefits of the Company's Preferred Plan.

Table 2-3: Coyote Withdrawal NPVRR Comparison*

	No Externalities		With Externalities	
	Base Case	Preferred Plan	Base Case	Preferred Plan
Continued Operation (\$000)	\$2,515,096	\$2,530,668	\$2,971,847	\$2,991,608
2028 Withdrawal (\$000)	\$2,466,554	\$2,479,385	\$2,864,875	\$2,909,334
Difference (\$000)	-\$48,542	-\$51,283	-\$106,972	-\$82,274

* Tables 3-5 and 3-6 detail the resource additions included for the plans in Table 2-3.

The figures presented above are the result of EnCompass modeling that forms the foundation for this resource plan. To prepare for this modeling, the Company conducted numerous virtual stakeholder group meetings in the states we serve. Otter Tail considered input from those stakeholders in developing this resource plan. Details of the underlying assumptions and descriptions of significant components, activities and issues associated with this resource plan

are documented within the appendices to this filing.

Historically, the Company has advocated for what we describe as a “least cost” resource plan. However, the selection of such a plan has always involved more than just selecting the lowest cost option under a single forecasted scenario. Instead, Otter Tail analyzes numerous potential scenarios in a range of possible “futures.” By considering a variety of scenarios, the Company’s goal has always been to go beyond a single “least cost” consideration to also consider the various *risks* that are inherent in any plan so that we can arrive at a plan that has the greatest likelihood of being “least cost” under the broadest range of possible futures. It might therefore be more accurate to say that Otter Tail’s resource planning has been focused on finding the “least cost/least risk” plan. The Preferred Plan is such a plan.

As with any planning based on forecasts, considerable unknowns and variables outside of any stakeholder’s control will impact the actual resulting costs. Any long-range plan is subject to change because it is based on forecasts and assumptions from a specific point in time. As we continue into this rapidly evolving period influenced by technological advances, efficiency gains, fuel economics and, not least of all, regulatory influences, speculating on what the “least-cost plan” looks like using current assumptions carries significant opportunities and risk. These opportunities and risks relate mostly to actual fuel and market prices, capital costs for construction, and the future volatility of prices and costs. In this resource plan we have attempted to present information that our Commissions and other stakeholders can use to give careful consideration of how best to balance least-cost principles and the cost-related risks and opportunities inherent in planning.

There is no doubt there will be differences of opinion based upon stakeholders’ various perspectives. Otter Tail’s goal is to keep customers’ interests in the forefront of this analysis. We know we share this goal with each of our three Commissions. With this in mind, our Preferred Plan strikes a balance between several planning objectives - including arriving at a diversified mix of generation resources that assures reliability, rate stability, stewardship of

resources, and the flexibility to respond to risks and opportunities in this rapidly changing environment. Table 2-4 below summarizes the key actions in the Preferred Plan. Each of the items listed is discussed in greater detail in subsequent sections of this filing.

Table 2-4: Otter Tail 2022-2028 Detailed Action Plan

Year	Actions
2022	<u>Pursue Withdrawal from Coyote:</u> Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant <u>150 MW Solar (in-service 2025):</u> Development Activities: Secure land, MISO interconnection, Preliminary Design Permitting <u>Dual Fuel at Astoria:</u> Development Activities: Engage engineering firm for studies to refine cost estimates and the combustion turbine supplier to develop preliminary schedule including environmental study for permitting process
2023	<u>Pursue Withdrawal from Coyote:</u> Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant; assess other actions necessary to withdraw from plant ownership by end of 2028 <u>150 MW Solar (in-service 2025):</u> Secure necessary equipment and contracting for construction <u>Dual Fuel at Astoria:</u> Enter into agreements for equipment, begin detailed design, seek construction bids
2024	<u>Pursue Withdrawal from Coyote:</u> Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant; assess other actions necessary to withdraw from plant ownership by end of 2028 <u>150 MW Solar (in-service 2025):</u> Construction

	<p><u>Dual Fuel at Astoria:</u></p> <p>Manufacture equipment and start construction</p> <p><u>100 MW Wind (in-service 2027):</u></p> <p>Commencing development activities: secure land, MISO interconnection, preliminary design permitting</p>
2025	<p><u>Pursue Withdrawal from Coyote:</u></p> <p>Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant; assess other actions necessary to withdraw from plant ownership by end of 2028.</p> <p><u>150 MW Solar:</u></p> <p>2025 commercial operation</p> <p><u>Dual Fuel at Astoria:</u></p> <p>Construction and 2026 commercial operation.</p> <p><u>100 MW Wind (in-service 2027):</u></p> <p>Secure necessary equipment and contracting for construction</p>
2026	<p><u>Pursue Withdrawal from Coyote:</u></p> <p>Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant; assess other actions necessary to withdraw from plant ownership by end of 2028.</p> <p><u>Dual Fuel at Astoria:</u></p> <p>2026 Commercial operation</p> <p><u>100 MW Wind (in-service 2027):</u></p> <p>Construction</p>
2027	<p><u>Pursue Withdrawal from Coyote:</u></p> <p>Fulfill contractual and legal obligations; assess opportunity to sell ownership interest in plant; assess other actions necessary to withdraw from plant ownership by end of 2028</p> <p><u>100 MW Wind:</u></p> <p>2027 Commercial operation</p>
2028	<p><u>Pursue Withdrawal from Coyote:</u></p> <p>Otter Tail expected withdraw from Coyote Station end of 2028</p>

3 The Factors Considered in our Planning Analysis.

Otter Tail’s overall rates for electric service are among the lowest in the nation. The Table below reflects an Otter Tail Total System blended cost of energy paid by Otter Tail’s customers since 2010.¹³ It shows that our customers have benefitted from our consistent and cost-effective portfolio of resources over that period. It is important that we continue to be able to operate as one system, with a generation mix serving all our customers.

**Table 3-1: Otter Tail Total System Average Cost of Energy
Paid by Otter Tail Customers since 2010**

Calendar Year	Estimated Total System Cost of Energy (\$/MWh)
2010	21.64
2011	22.04
2012	23.43
2013	23.54
2014	26.46
2015	25.18
2016	22.45
2017	23.73
2018	24.68
2019	23.25
2020	18.54

The Preferred Plan identifies the anticipated electric service needs of our customers for the 2022-2036 planning period, and it includes aspects that are aimed at the emergence of new opportunities presented by low market prices, low market price forecasts, and low costs for generation alternatives. It details specific action items that we intend to complete within the first six years of the planning period.

¹³ Recovery of fuel costs vary by jurisdiction including the treatment of true-up amounts. For the purposes of this estimation Otter Tail utilized actual fuel costs per MWh by jurisdiction and weighted them: Minnesota – 50%, North Dakota 40%, and South Dakota 10% to arrive at an approximate average cost of energy across all our states.

In its Order concerning Otter Tail's initial resource plan filing in 1992, the MPUC stated that it considers the characteristics of the available resource options and the proposed plan as a whole.¹⁴ The MPUC has continued this approach in Otter Tail's subsequent resource plans. In Minnesota Administrative Rules, Chapter 7843.0500, Subp.3, it states that :

“Resource options and resource plans must be evaluated on their ability to:

- A. maintain or improve the adequacy and reliability of utility service.
- B. keep the customer's bills and the utility's rates as low as practicable, given regulatory and other constraints.
- C. minimize adverse socio-economic effects and adverse effects upon the environment.
- D. enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations.
- E. limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.”

While this list is taken from Minnesota Administrative Rules, it provides a useful set of factors from which to consider Otter Tail's plan in all states; the plan's success in any state will depend on how it will maintain and improve reliability, keep rates low, manage the potential for adverse effects, maintain flexibility, and mitigate risk. These factors could be a simple report card for any utility and for any resource plan. Therefore, we have incorporated these objectives into the evaluation of our Preferred Plan.

3.1 Plan Synopsis

Our Preferred Plan is consistent with our 2016 Plan, and it positions the Company well to manage customer costs, risks, and other negative impacts while maintaining reliable electric service. At the same time, the resulting diversified, balanced generation portfolio will give us the

¹⁴ *In the Matter of the Petition of Otter Tail Power Company for Approval of its 1992 Resource Plan*, Order Approving 1992 Resource Plan and Requiring Additions To 1994 Resource Plan, May 19, 1993, MPUC Docket No. E-017/RP-92-484.

flexibility to respond to industry changes and MISO market conditions. The Preferred Plan better manages risks than would the base case scenario or other scenarios, and it is therefore the most favorable of the plan scenarios considered.

Otter Tail's request regarding its interest in Coyote Station

The most notable aspect of the Preferred Plan is Otter Tail's request for authority to meet customers' generation needs through resources that are more flexible in their dispatch and less likely to require large capital expenditures at Coyote Station. Otter Tail owns a 35 percent interest in Coyote Station, and it was designed as a baseload generating resource. It therefore has limitations to its dispatch flexibility. Current and forecasted market conditions present opportunities to utilities that have greater flexibility in the dispatch of their resources and, therefore, as part of this filing, we are requesting authority to commence the process of withdrawing from Coyote Station so that we can increase the flexibility of our portfolio and reduce costs for our customers. Also, we anticipate Coyote Station may require significant capital investment to maintain compliance with the Environmental Protection Agency's (EPA) Regional Haze Rule and possibly other environmental regulatory requirements.

To be clear, Coyote Station has performed at least as well as it was expected to perform in previous resource plans, and the costs of Coyote Station have not materially increased from what was expected at the time of the 2016 Plan. Its costs have been stable, and the results of this analysis are, therefore, not due to unexpected increases to the costs of operating the plant (with the exception of the possible costs anticipated to comply with the Regional Haze Rule).

The results of our analysis, and our request, are instead due to market price forecasts and demand forecasts now being much lower than previous forecasts. Otter Tail has taken advantage of these low market conditions within the limits of its existing resource portfolio, but current forecasts reflect that we can lower costs further by increasing the flexibility of our generation portfolio. Commencing withdrawal from ownership will include monitoring changes to our capacity needs and other assumptions to ensure withdrawal from Coyote Station will remain prudent.

Again, the details of the factors affecting Coyote Station and the evolving market conditions are considered more fully throughout this filing, and they provide insight on the question of whether it is preferable to maintain or withdraw from our current interest in Coyote Station to pursue favorable market opportunities for our customers through more advantageous resources. This requested authority is not typical of resource plans, but it is also not unique. In Otter Tail's 2010 IRP,¹⁵ a thorough examination was made of the question whether Otter Tail should maintain its Hoot Lake Plant or retire it to pursue more advantageous alternatives. For purposes of this resource plan, we have conducted significant comparative scenario analysis in our modeling. Later in this filing, we also consider factors relating to this decision that go beyond the modeling.

The Preferred Plan

This filing provides an explanation of our analysis, the data and inputs into the analysis and its results. With this filing we request Commission authority within the legal framework of each particular state to commence the following key actions in furtherance of the Preferred Plan:

- To add of dual fuel capability at Astoria Station;
- To add of 150 MW of solar generation in 2025; and
- To commence of the process to withdraw from our ownership interest in Coyote Station.

3.2 Load Forecast

The process of developing this resource plan began with an econometric peak demand and energy requirements forecast, which was used as our Base forecast scenario.

The forecast peak demand and energy requirements are detailed in Appendix B. The energy requirements forecast represents an approximately 0.46 percent average annual growth rate, prior to new demand side management (DSM) programs, and it is the key component in determining

¹⁵ *In the Matter of Otter Tail Power Company's 2011-2025 Resource Plan*, Order Approving Baseload Diversification Study and Setting Requirements for Next Resource Plan, March 25, 2013, MPUC Docket No. E017/RP-10-623. The Baseload Diversification Study was a study required by the MPUC for the purpose of examining alternatives for decommissioning or replacing or repowering Otter Tail's Hoot Lake Power Plant. The March 25, 2013 Order authorized Otter Tail to decommission and replace Hoot Lake Plant.

the type of resources to be added, whether baseload, intermediate, or peaking. Peak demands are anticipated to average an annual growth rate of 0.57 percent in the summer, prior to new DSM programs. The peak demand will determine the size of capacity resources required for the system. As a participant in the Midcontinent Independent System Operator, Inc. (MISO), Otter Tail is currently required to maintain a 9.4 percent planning reserve margin on the forecasted summer peak demand coincident with the MISO's peak demand, after accounting for plant accreditation ratings as defined by the MISO.¹⁶

When comparing the load forecast from our 2016 IRP to the updated forecast used in this IRP there is a noticeable reduction in the current forecast. This reduction is a result of energy efficiency programs. Otter Tail has seen significant demand and energy savings, in excess of three percent in some years. Another factor contributing to our forecast reductions is a decrease to firm demand requirements from our large industrial customers.

3.3 Future Resource Needs

Table 3-2 and Figure 3-1 provide the Company's summer season resource needs showing the Company's projected load and capability according to the MISO Module E rules for resource adequacy. Section 4.4 provides discussion of the MISO Module E and further detail regarding the resource adequacy obligation calculation.¹⁷

The total accredited capacities, shown as Zonal Resource Credits (ZRCs), represent the MISO's capacity ratings for the Company's resources based on the 2021 planning year accreditation levels. Resource, forward purchase, and demand response accreditations are based on historical summer performance and do not vary monthly.

¹⁶ As noted below MISO is considering changes to its compacity construct.

¹⁷ The Module E resource adequacy obligation calculation is: Reserve Obligation = (Coincident Peak Demand Forecast-Demand Response) x (1+Load Based Reserve Margin) + Transmission Losses, where the reserve margin is currently 7.6 percent. Total Accredited Capacity is the sum of Aggregate ZRCs, Local ZRCs, External ZRC's and Net Transaction ZRCs, where ZRCs are MWs that have been converted to "Zonal Resource Credits." Under Module E, only ZRCs are eligible for designation toward the Reserve Obligation.

Table 3-2: Summer 2022-2036 Base Case Projected Load and Capability Prior to Preferred Resource Plan

Line No.		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
1	Forecasted Load	672.0	675.6	679.2	682.8	686.4	690.0	693.6	697.3	700.9	704.6	708.3	712.0	715.7	719.5	723.2
2	Transmission Losses	39.0	38.8	38.6	38.6	38.6	38.6	38.5	38.4	38.4	38.5	38.6	38.4	39.0	39.5	40.0
3	Net CIP Demand Reduction	12.3	23.1	32.8	38.7	44.7	51.4	58.2	64.9	70.9	74.2	77.4	89.2	80.1	72.6	66.2
4	Total Forecasted Load	698.8	691.4	685.1	682.7	680.3	677.1	674.0	670.8	668.4	668.9	669.5	661.2	674.6	686.3	697.1
5	MISO Coincident Factor	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%
6	Coincident Load	635.9	629.2	623.4	621.3	619.1	616.2	613.3	610.4	608.2	608.7	609.2	601.7	613.9	624.6	634.3
7	MISO Planning Reserve	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%
8	Total Obligation	695.6	688.3	682.0	679.6	677.3	674.1	671.0	667.8	665.4	666.0	666.5	658.2	671.6	683.3	694.0
9	Coal	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5
10	Natural Gas / Oil	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	286.7	286.7	286.7	286.7
11	Wind	82.3	82.3	82.3	82.3	82.3	82.3	82.3	78.7	78.7	78.7	78.7	74.0	74.0	74.0	74.0
	Solar	0.0	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
	Hydro	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Purchased*	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
12	Load Management	16.0	16.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0
14	Total ZRCs	819.1	831.4	831.4	832.4	833.4	834.4	835.4	832.8	833.8	834.8	835.8	774.4	775.4	776.4	777.4
<i>*Co-generation, Co-Op Shared, and WAPA</i>																
15	Net (Line 14 - Line 8)	123.5	143.0	149.3	152.7	156.1	160.2	164.4	164.9	168.3	168.8	169.3	116.2	103.9	93.2	83.5

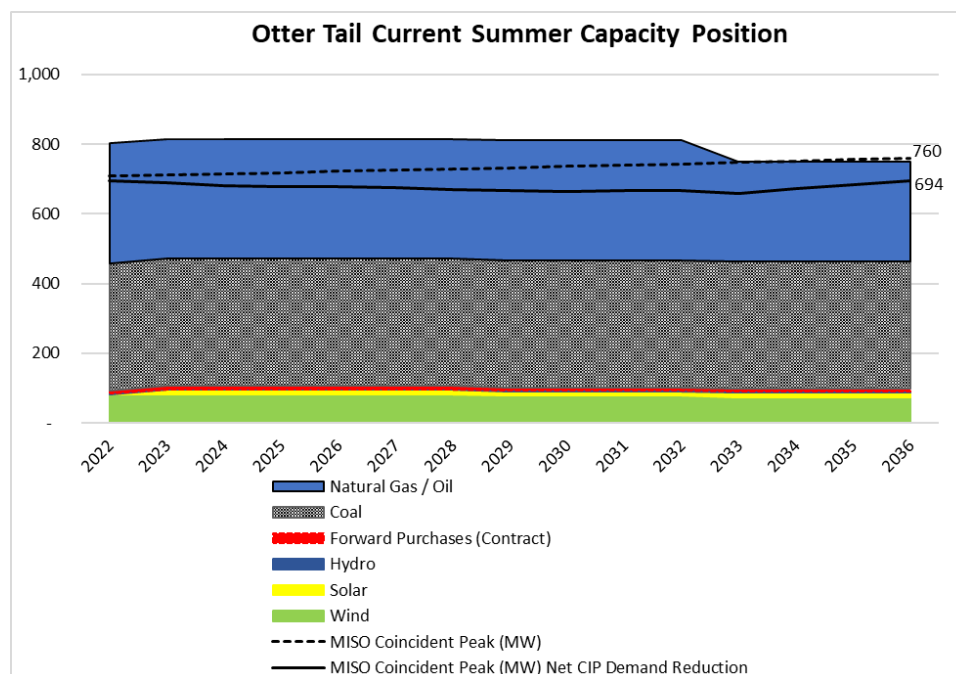
Implementation Information

The data in Table 3-2 above and Figure 3-1 below illustrate Otter Tail’s capacity position prior to plan development in 2021.¹⁸ The decrease in Total ZRCs in 2033 is due to the end of depreciable lives for a number of our peaking plants. The table shows that we have adequate capacity for the planning period.

Figure 3-1 depicts the Table 3-2 data and includes a solid black line representing Otter Tail’s current forecast obligation to customers, which incorporates energy efficiency savings. Figure 3-1 also includes a dotted black line that shows what Otter Tail’s forecast obligation would be if we recognized no new energy efficiency.

¹⁸ Based on the existing resources as of May 31, 2021.

Figure 3-1: Current Capacity Resources and Reserve Obligation 2022-2036 (MW)



As shown in Figure 3-1, for 2036, forecasted CIP Demand Reduction is expected to reduce Otter Tail’s 2036 summer capacity position from 760 MW to 694 MW, approximately nine percent.

3.4 Resource Plan Development

The software model we use for resource plan modeling is EnCompass, which replaced the Strategist model used for our 2016 Plan.¹⁹ Otter Tail’s long-range peak demand and energy forecasts were incorporated into the EnCompass database, along with the supply-side and demand-side resources available to the Company over the course of the study period.

EnCompass was then used to develop a series of least-cost resource plans. We defined the objective function as minimizing total utility costs (i.e., a zero externality scenario) and, for Minnesota, minimizing total societal costs (i.e., an externality value scenario).

¹⁹ Otter Tail first used the EnCompass software in previous Minnesota proceedings that were approved by the Commission including its forecasted 2021 Energy Adjustment Rider rates in Docket No. E017/AA-20-462.

The EnCompass software develops an optimized resource plan for each scenario for the time period 2022 through 2036. Scenarios were developed, including evaluation of sensitivities that varied load growth, altered natural gas and energy market prices, adjusted the MISO capacity requirement, and applied externalities.

3.5 New Resource Alternatives

Otter Tail considers both demand-side and supply-side resources in long-term planning analysis. Appendix D provides a more detailed discussion of the new resources we evaluated. Table 3-3 provides a list of the alternatives evaluated within the EnCompass model.

Table 3-3: List of Resource Alternatives Included in EnCompass Model

Resource Alternatives Modeled	Description
Natural Gas Simple Cycle - Small	Generic 49 MW nameplate capacity aeroderivative type simple cycle unit
Natural Gas Simple Cycle - Large	Generic 248 MW nameplate capacity frame type simple cycle unit
Wind	50 MW nameplate capacity utility-scale wind resource. Generic options as well as specific replacement and surplus interconnection options are available.
Solar	25 MW nameplate capacity utility-scale solar resource. Generic options as well as specific replacement and surplus interconnection options are available.
Stand Alone Battery Storage	Generic 25 MW lithium-ion battery storage resource
Paired Battery Storage	10 MW lithium-ion battery storage resource paired with a 25 MW solar installation

3.6 Preferred Resource Plan

Table 3-4 shows preferred 15-year resource plan which includes a request for authority to add dual fuel capability at Astoria by 2026, add 150 MW of solar in 2025, add 100 MW of wind in 2027, start the process of withdrawing from ownership in Coyote Station, and add 50 MW of solar in 2033. The Preferred Plan appropriately addresses customer needs and balances other objectives described in this filing, including, most importantly, low-cost and reliable service for our customers.

Table 3-4: Preferred Resource Plan Summary²⁰

Resource Plan (MW) - Based on Nameplate ratings	
2022	
2023	
2024	
2025	150 MW Surplus Interconnection Solar
2026	Dual Fuel at Astoria
2027	100 MW Surplus Interconnection Wind
2028	Anticipated Withdrawal from Coyote 149 MW
2029	
2030	
2031	
2032	
2033	50 MW Replacement Solar
2034	
2035	
2036	

Figure 3-2 below shows the capacity resource additions along with existing resources over the study period. Figures 3-3 (with externalities) and 3-4 (no externalities) below show the energy contributions by fuel category for 2022-2036 for the Preferred Plan under the two externality scenarios. The application of externality penalties to the unit dispatch results in significant differences in the energy mix between the two scenarios even though both scenarios have the same set of resources available. In Figures 3-3 and 3-4, the Purchases category (light blue) is primarily comprised of day-ahead market opportunity purchases (where we can take advantage of market prices that are lower than our generation costs), while the Forward Purchases (yellow) represents longer term bilateral contractual purchases.

²⁰ Otter Tail includes three categories for wind and solar projects: (1) generic wind resources require a new generation site, (2) surplus interconnection wind may be added alongside an existing generating facility where the generation of both resources does not exceed the existing interconnection amount of the original facility, and (3) replacement interconnection wind resources reuse the existing interconnection rights of an existing resource that is retiring.

Figures 3-2 through 3-8 below note the significant demand and energy contributions from Otter Tail's DSM and energy efficiency programs, which reduce our capacity requirements by 54 MW in 2025 and by 94 MW in 2036. These reductions have saved our customers significant costs. We have approved energy efficiency and DSM programs in Minnesota and South Dakota, and all customers in our three-state service area have benefitted from cost reductions driven by DSM energy efficiency efforts.

Figure 3-2: Preferred Plan Capacity Resources and Reserve Obligation 2022-2036 (MW)

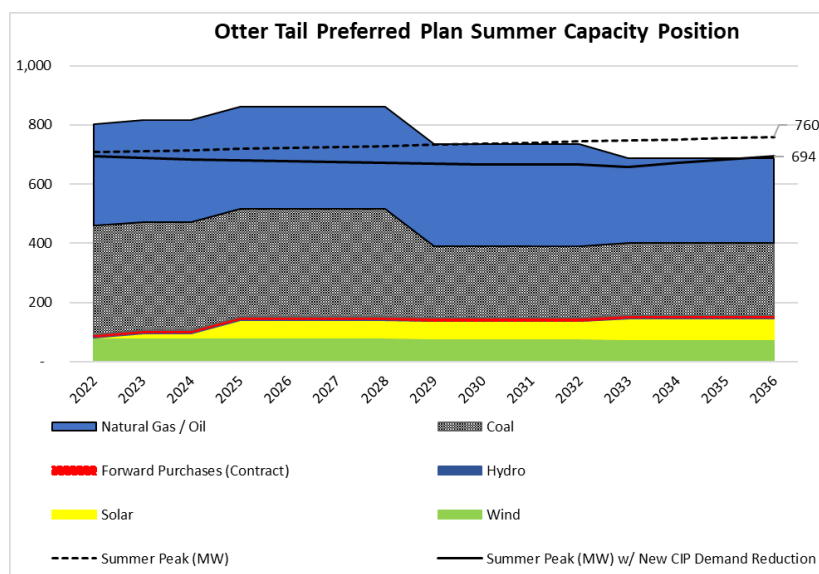


Figure 3-3: Preferred Plan Energy Resources and Requirements with Externalities Applied 2022-2036 (GWh)

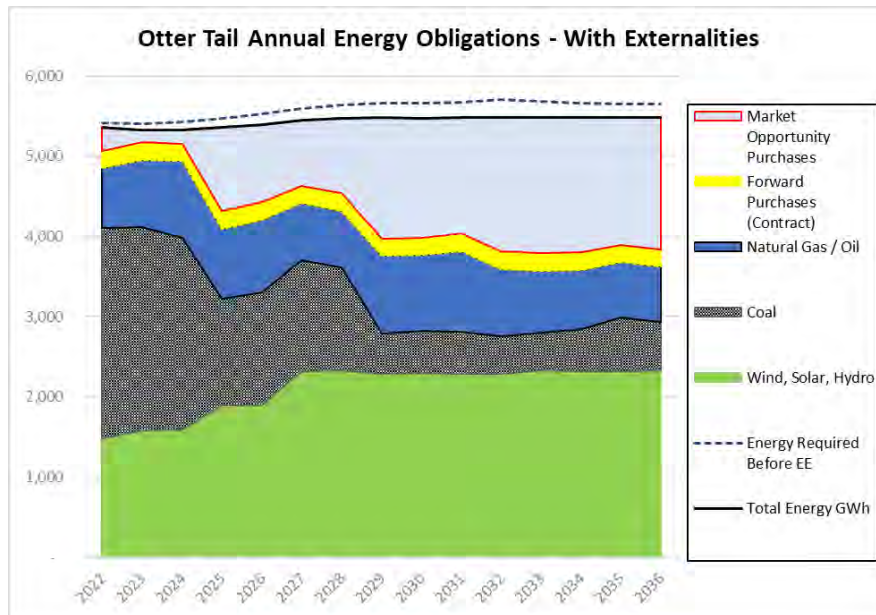
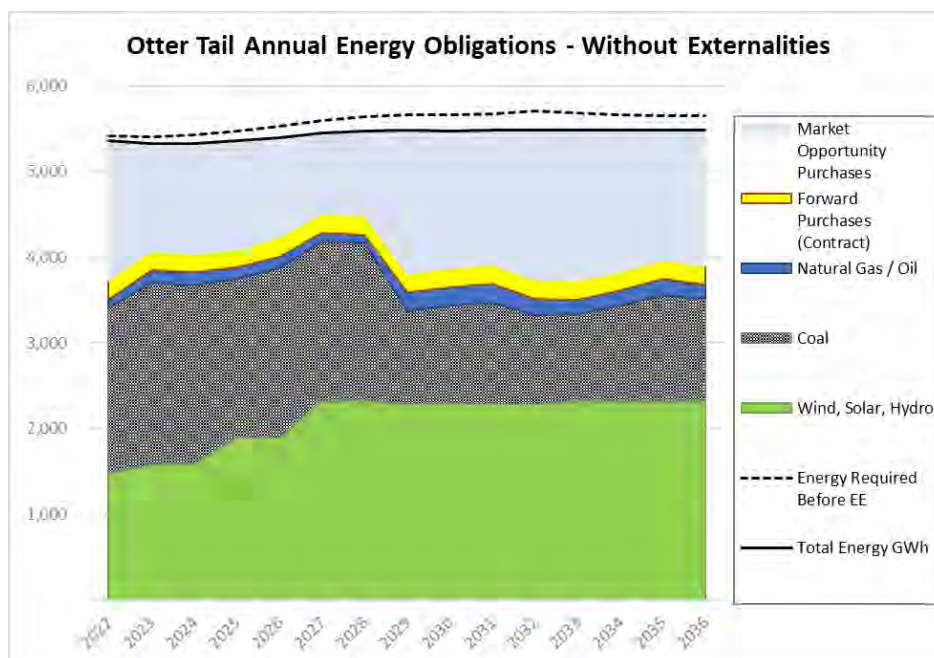


Figure 3-4: Preferred Plan Energy Resources and Requirements without Externalities Applied 2022-2036 (GWh)



Figures 3-5 and 3-6 shows the projected energy contribution by fuel category for the year 2025.

Figure 3-5: 2025 Energy by Fuel Source No Externalities

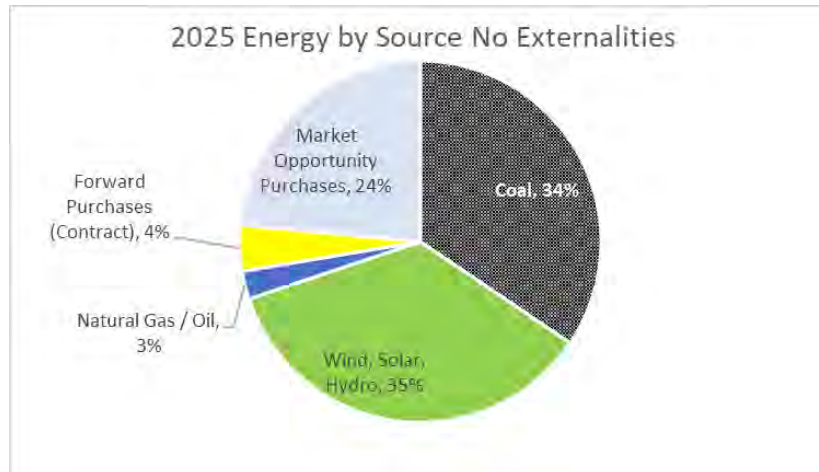
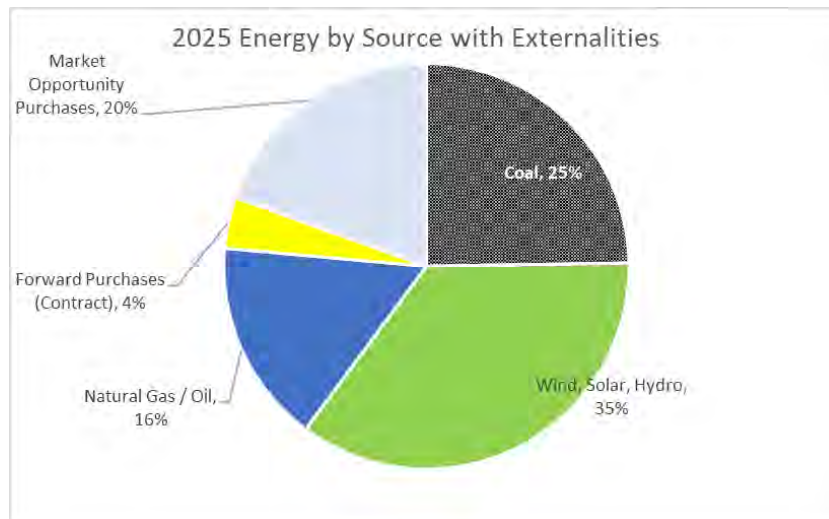


Figure 3-6: 2025 Energy by Fuel Source with Externalities



Figures 3-7 and 3-8 provide the forecasted energy contribution by fuel category for the Preferred Plan for the year 2036 with and without externalities.

Figure 3-7: Preferred plan 2036 Energy by Fuel Source No Externalities

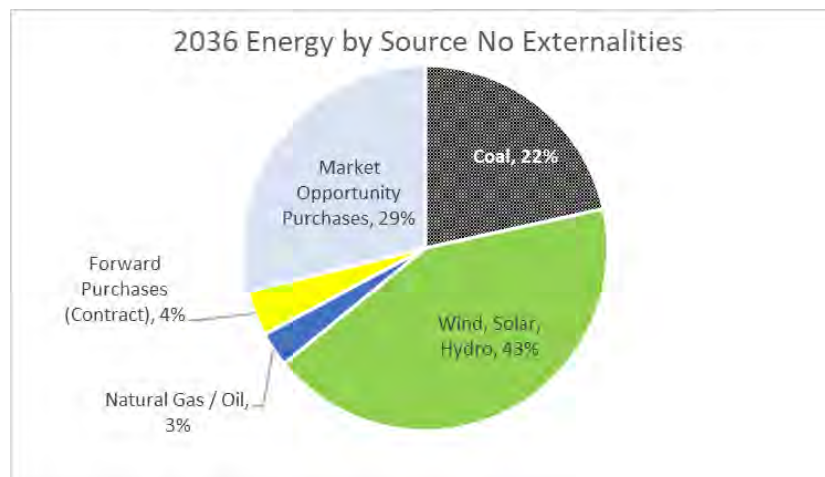
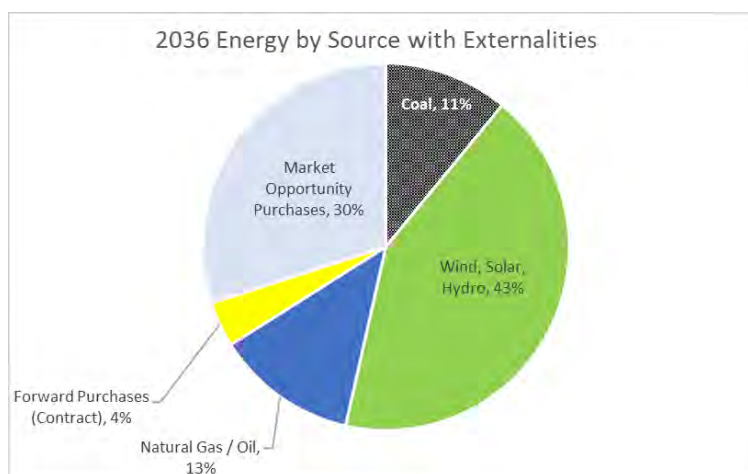


Figure 3-8: Preferred plan 2036 Energy by Fuel Source with Externalities



For each sensitivity, this filing includes six EnCompass modeling runs to provide insight into the impacts of Otter Tail continuing with its interest in Coyote Station and the impacts of Otter Tail pursuing alternatives to Coyote Station:

- 1) Withdraw from Coyote Station December 31, 2040: Otter Tail maintaining its interest in Coyote Station until 2041 (the plant's assumed retirement date based on its remaining depreciable life):

- 2) Withdraw from Coyote Station December 31, 2028: Otter Tail withdrawing from Coyote at the end of 2028 (the end date for the second Regional Haze planning period): and
- 3) Withdraw from Coyote Station December 31, 2026: Otter Tail withdrawing from Coyote at the end of 2026 (for analysis purposes only -- this date assumes the earliest possible date the Company could conceivably withdraw under the plant ownership agreement among the Coyote Station co-owners – a decision that would need to be made prior to the issuance of any Commission order).

Each of these sensitivities were modeled both with and without environmental externalities. In all but two²¹ of 82 of the withdrawal sensitivities, the least cost strategy is withdrawal from Coyote Station before the end of the plant's current depreciable life in 2041.

Table 3-5: Base Case with and without Externalities

	Base Case - no externalities		
	Withdraw 2040	Withdraw 2028	Withdraw 2026
2022			
2023			
2024			
2025			
2026	25 MW Sur Solar	100 MW Sur Solar	100 MW Sur Solar
2027			
2028			
2029			
2030			
2031			
2032			
2033			
2034			
2035		50 MW Rep Wind 50 MW Sur Wind	50 MW Rep Wind 50 MW Sur Wind
2036			
NPVRR	\$ 2,515,096	\$ 2,466,554	\$ 2,460,904

Base Case - with externalities		
Withdraw 2040	Withdraw 2028	Withdraw 2026
125 MW Sur Solar	125 MW Sur Solar	125 MW Sur Solar
100 MW Sur Solar	100 MW Sur Solar	100 MW Sur Solar
50 MW Gen Wind	50 MW Gen Wind	50 MW Gen Wind
50 MW Gen Wind	50 MW Gen Wind	50 MW Gen Wind
50 MW Sur Wind		100 MW Sur Wind
50 MW Sur Wind	50 MW Sur Wind	
	100 MW Sur Wind	50 MW Sur Wind
50 MW Rep Wind	25 MW Rep Solar	50 MW Rep Solar
	25 MW Rep Solar	
25 MW Rep Solar	100 MW Rep Wind	50 MW Rep Wind
\$ 2,971,847	\$ 2,864,875	\$ 2,855,293

²¹ In the 2028 and 2026 withdrawal from Coyote sensitivity with natural gas and market energy prices 100 percent above forecast, the model calculates a net present value revenue requirement that are approximately \$2.4 million and \$1.1 million respectively more expensive than Otter Tail maintaining its interest in Coyote until its assumed retirement date.

Table 3-6: NPV Revenue Requirement Base Case and Preferred Plan

	Withdrawal from Coyote in 2028			
	No Externalities		With Externalities	
	Base Case	Preferred Plan	Preferred Plan	Base Case
2022				
2023				125 MW Sur Solar
2024				
2025		150 MW Sur Solar	150 MW Sur Solar	100 MW Sur Solar 50 MW Gen Wind
2026	100 MW Sur Solar			50 MW Gen Wind
2027		100 MW Sur Wind	100 MW Sur Wind	
2028				50 MW Sur Wind
2029				100 MW Sur Wind
2030				
2031				
2032				
2033		50 MW Rep Solar	50 MW Rep Solar	25 MW Rep Solar
2034				25 MW Rep Solar 100 MW Rep
2035	50 MW Rep Wind 50 MW Sur Wind			
2036				
NPVRR	\$ 2,466,554	\$ 2,479,385	\$ 2,909,334	\$ 2,864,875

Based on this analysis, the Preferred Plan is for Otter Tail to withdraw from its ownership interest in Coyote Station by the end of 2028. The only resource addition entering service during the Five-Year Action Plan is 150 MW of solar in 2025 (assuming use of a surplus interconnection at existing generating facility, further described in Section 6 below). This amount of solar is *less* than the sensitivities including environmental externality costs would indicate and *more* than the sensitivities not including environmental externality costs would indicate.

The Preferred Plan represents a balanced and reasonable approach to the challenging task of addressing the concerns of our regulators and varied stakeholders. The Preferred Plan meets all legal requirements and allows the Company to continue providing reliable, low-cost electricity to meet our customers' requirements.²²

²² This includes satisfaction of Minnesota's Greenhouse Gas Reduction Goals. *See* Appendix A.

3.7 Multi-State Jurisdictional Complexity

Otter Tail is very small, serving just 137,000 customers in its three states. The percentage of Otter Tail’s utility service delivered to each state varies depending on whether demand, energy or the number of customers is measured. Overall our service is approximately 50 percent Minnesota, 40 percent North Dakota and 10 percent South Dakota. Table 3-7 provides approximate 2021 figures for of demand, energy and customer count in each state.

Table 3-7: Percentage of Otter Tail operations in each of its three states

	Minnesota	North Dakota	South Dakota
Demand	50%	39%	11%
Energy	54%	36%	10%
Customer count	47%	44%	9%

In all three states Otter Tail serves very small rural towns—the average population of our communities in the three-state region is approximately 400 people.

Continuing to operate as a single, cost-effective multi-state utility is important for our customers and these small communities. Otter Tail is already one of the smallest vertically integrated utilities in the country. To give some perspective, Xcel Energy’s NSP Minnesota subsidiary, through which Xcel serves Minnesota, North Dakota, and South Dakota, is approximately 10 times the size of Otter Tail. Because of this already very small size, splitting Otter Tail into separate and even smaller utility systems would result in harmful inefficiencies and an increased cost of service. The Preferred Plan presented in this filing meets resource planning objectives in each of our jurisdictions, and we feel strongly that it can be supported in all the states we serve, and it has the additional benefit of providing a path for Otter Tail to continue operating with a single integrated system. This current resource plan reflects the execution of the projects approved in our most recent plan and continues the Company down the path of reliable, affordable, and environmentally responsible electric service.

3.7.1 Multiple ISOs (SPP & MISO)

Otter Tail has a partial interest in each of Big Stone Plant and Coyote Station. Each of these baseload plants are co-owned and they each operate in two Independent System Operators (ISOs): Southwest Power Pool (SPP) and MISO.

Each of these units was constructed before the time of Regional Transmission Organizations (RTOs), ISOs and centrally dispatched energy markets. They were constructed as “baseload units,” which means that they were conceived, designed, and constructed with the expectation that they would form the “base” of the owners’ generation portfolios and run consistently for long periods of time without frequent or material variation in output. At that time, each utility expected to operate its generation portfolio as a single unit and only vary the portfolio’s output generally with variation in its customers’ energy usage. There were occasional utility-to-utility sales, and there were also planning pools within regions, but there were no coordinated energy markets and there were no moment-by-moment energy market prices upon which a utility could base its unit dispatch decisions. Most importantly, customers’ usage levels did not vary unpredictably or dramatically and, therefore, managing a portfolio that could match customers’ collective “load shape” was the goal. Baseload units ran most of the time between “minimum” and full output (following customers’ usage from high to low) and peaking units filled in as needed during periods of particularly high usage.

Now, however, with the advent of coordinated region-wide energy markets, there are times when units with greater flexibility can take advantage of changes to regional energy market prices. For example, if a generating unit has the ability to turn on and off, and ramp up and down quickly, the owner can take advantage of rapidly evolving pricing variations—when prices are high, it can dispatch the unit and use it to prevent high market prices from being passed to its customers, or it can sell the off-take into the market for the benefit of its customers; when prices are low, the owner can ramp down the plant and buy low cost energy from the market for its customers’ use. In the markets, the dispatch of units occurs through the coordinated “commitment” and “dispatch” constructs. The unit commitment determines whether the unit is

on or off-line—and can be driven by a market-based signal or determined by the owner. The unit dispatch determines the amount of generation from a unit at a given time in response to whether the unit’s offered cost is above or below the market price. If the market price is above unit cost, the unit is dispatched higher. If the market price is below unit cost, the unit is dispatched lower.

As indicated, baseload units like Big Stone Plant and Coyote Station were not conceived or designed with the intent of flexibly dispatching into rapidly variable energy markets. Their design requires that when they run, they run at a minimum level, which historically was often something close to half of their full output. Since original operation, plant staff has worked to safely reduce the minimum load levels to approximately 25-35 percent of full load level. From their minimum level of output up to their full output potential, they are relatively flexible, but starting and stopping such units takes substantial lead time and therefore owners have generally “committed” these generators in times when they perceive exposure to energy market prices. These design limitations have not historically been a concern (again, due to there not being a coordinated energy market and due to energy prices being higher than the price of operating these units), but, with the advent of energy markets, and periods of low prices, increased flexibility would give the owners of such units greater market opportunities to lower costs for their customers. With this in mind, Otter Tail, other owners of baseload plants, and other stakeholders have been considering ways to increase the flexibility of baseload units.²³

Because baseload units require long lead times to “turn on” and to recover when they “turn off,” they have generally been “self-committed” to their minimum load levels. This means that they would run at their minimum levels even when market prices were below their cost of running. This strategy has been intended to prevent their unavailability if market prices were to increase faster than they could be dispatched to respond. By running at minimum, they could serve as a

²³ For example Otter Tail has discussed this issue and associated challenges in MPUC Docket No. E-999/CI-19-704, *In the Matter of an Investigation into Self-Commitment and Self-Scheduling of Large Baseload Generation Facilities*.

hedge against price volatility. In recent years, however, the owners of some baseload units have been able to remove any “self-commitments” and allow the units to “economically dispatch,” that is, be called upon to run if and when prices exceed their operating costs. This can pose some risk of their unavailability should prices rise unexpectedly, but when markets and loads are relatively low and expected to stay low, this can be a reasonable strategy that may lower overall costs for customers. These strategies for baseload units are relatively new, and Otter Tail and the owners of Big Stone and Coyote have recently moved the units to economic dispatch in many hours. It is an example of how strategies for increasing baseload flexibility are considered in response to new market opportunities.

In addition to the technical and mechanical limitations that affect the flexibility of baseload units, Otter Tail’s partial interests in Coyote Station and Big Stone Plant are also subject to additional coordination-related limitations because the plants are jointly owned. Those limitations are described below. While this section focuses on operational limitations due to co-ownership, it is also important to keep in mind that Otter Tail’s customers have benefitted substantially from co-ownership of these two baseload plants. For example, the co-ownership has allowed Otter Tail and the other owners to achieve significant economies of scale that would not have been possible if they had each built their own separate stand-alone generating units.

Coyote Station

Coyote Station is co-owned by Otter Tail (35 percent), Northern Minnesota Municipal Power Agency (represented by Minnkota Power Cooperative) (30 percent), Montana-Dakota Utilities Co. (MDU) (25 percent), and Northwestern Energy (10 percent). Coyote Station was constructed between the years 1980 and 1983, and it had a depreciable life that assumed retirement in 2016.²⁴ The depreciable life was extended at various times during the life of the plant, the last time being in 2013, when the depreciable life was extended by nine years, from

²⁴ See MPUC MN Docket E017/D-83-2.

2032 to 2041.²⁵

Otter Tail, Minnkota, and MDU operate within the MISO market; Northwestern Energy operates within the SPP market. The SPP and MISO markets do not have mechanisms for inter-ISO coordination of commitment status of jointly owned units that partially operate in each ISO. Furthermore, both markets model partial shares of jointly owned units as individual, separate, and distinct generators. If each partner share of the unit were to be offered on an economic commitment basis, in many hours only a portion of the entire unit would be dispatched. From a practical standpoint, however, since the plant is one physical generator, dispatch of a single owner's share of the plant will result in the dispatch of all owners' shares of the plant. Furthermore, from a co-owner contractual standpoint, if one owner calls on its share of the plant, all owners are required to take their share of the total minimum output.

Big Stone Plant

Big Stone is co-owned by Otter Tail (53.9 percent), Montana Dakota Utilities Co. (22.7 percent), and Northwestern Energy (23.4 percent). Big Stone Plant, located near Milbank, South Dakota, is a 475 MW coal plant burning sub-bituminous coal from the Powder River Basin. It was retrofitted with an Air Quality Control System (AQCS) in 2015. The AQCS is comprised of state-of-the-art controls for SO₂, NO_x, and mercury. Big Stone has similar market operating complexities as Coyote. Big Stone straddles both the MISO and SPP wholesale energy markets and can be dispatched by either ISO. Big Stone contractual obligations require partners to take their minimum share of the plant whenever another owner calls for dispatch.

Both Big Stone and Coyote Station are currently capable of being placed on economic commitment. The Big Stone co-owners meet periodically to determine if Big Stone should be placed into economic commitment or must-run status based on market conditions. Our intention

²⁵ *In the Matter of Otter Tail Power Company's Request for Approval of its Five Year Depreciation Study*, MPUC Docket No. E017/D-13-795, Order (Apr. 7, 2014).

is to keep it on economic commitment in the future. The EnCompass sensitivities included in this IRP generally have the Big Stone capacity factor from around 20 percent to 60 percent depending on the sensitivity. This range is far below the 85-90 percent capacity factor of traditional baseload coal plants.

There are several differences between Coyote Station and Big Stone Plant. Big Stone is a delivered fuel plant where we only pay for coal that we take—as contrasted with Coyote where we have a fixed component in the fuel cost. Big Stone’s AQCS, with capital intensive state-of-the-art SO₂ and NO_x controls, is already in place. While the Company would have sufficient capacity resources after withdrawal from Coyote Station, replacing Otter Tail’s interest in Big Stone would require the addition of another large dispatchable resource (likely a gas CT). Also, Big Stone has recently been operated more frequently on economic dispatch, which reduces the hours it operates in a market below its production costs.

3.8 Resilience

Historically, resource plans have been focused on energy and capacity metrics to assess a utility’s ability to produce electricity cost-effectively and reliably for its customers. With changes in the marketplace, however, concepts of resilience have grown in significance. These concepts were highlighted during events such as the 2014 Polar Vortex and the 2021 Winter Storm Uri, where renewable generation was at times not available, natural gas availability was at times limited, and electricity market prices and natural gas prices were at times extremely high. While Otter Tail had limited exposure during these events, some other utilities experienced very concerning service interruptions and high fuel and electricity bills.

While resiliency is not a defined term as applied to generation resources, in the context of cold or hot weather events (mentioned above) we identify three characteristics of a resilient resource:

1. Dispatchability – A generation resource is dispatchable if it can reasonably be expected to generate when called upon.

2. **Reliable Fuel Supply** – A generation resource has a more reliable fuel supply when fuel is available onsite, when onsite fuel storage is possible or there is more than one reasonable means for fuel delivery.
3. **Energy Price Protection** – A generation resource has more energy price protection if the availability and cost of fuel for generation can be managed during volatile market conditions.

Table 3-8 below provides a high-level summary of what resiliency factors Otter Tail's current and potential future generation resources possess. The resources are also listed in order of most resilient to least resilient.

Table 3-8: Generation Resources and Resiliency Factors

Generation Resource	Dispatchable	Reliable Fuel Supply	Energy Price Protection	Ranking Factors
1. Coal Generation	Yes	Yes	Yes	Fuel storage capability and low volatility in fuel price
2. Dual Fuel Simple Cycle	Yes	Yes	Yes	Fuel oil storage capabilities, multiple fuel sources, fuel oil storage protects from volatility in natural gas market
3. Fuel Oil Simple Cycle	Yes	Yes	Yes	Fuel oil storage capability protects from volatility in natural gas market
4. Natural Gas Simple Cycle	Yes	No	No	Without dual fuel capabilities, no storage capability, dependence on single natural gas supply pipeline, no protection from volatile natural gas markets and relatively close correlation in gas and electricity markets
5. Solar	No	No	No	Ranked higher than wind due to generation occurring during peak loads, and while not dispatchable, no significant correlation to energy and natural gas markets
6. Wind	No	No	No	No fuel storage and relatively close inverse correlation between wind generation operating and energy and gas market prices

In addition to considering individual resource resiliency, Otter Tail also considers the resiliency of its entire generation portfolio. This includes the diversity of its portfolio and the portfolio's ability to withstand significant unforeseen events. One question at the heart of resiliency is the extent to which wind and solar generation may be relied upon during a significant event. As shown in Table 3-8 above, from an individual generation resource level, wind and solar are not dispatchable and have other features considered less resilient than dispatchable resources.

Therefore, the analysis of market exposure detailed below conservatively assumes no contribution from wind and solar resources. From an overall generation portfolio perspective, however, it is reasonable to expect solar and wind resources to provide some generation in many of the hours of high loads. In terms of our expectations for actual operation, some portion, if not all, of the "market exposure" identified below is expected to be covered by Otter Tail's variable resources. The addition of new resources and the removal of other resources, namely Coyote Station in the Preferred Plan, requires Otter Tail to look at what opportunities it is taking advantage of and whether it is creating potential resiliency problems for the portfolio.

While our portfolio has performed exceptionally well, even during significant events, maintaining and enhancing the overall resiliency of the portfolio is an important consideration. One cost effective option to maintain and enhance resiliency is adding dual fuel capability at Astoria Station, which would allow Otter Tail to use natural gas supplied by the current pipeline as the main source of fuel and use stored fuel oil during rare instances of pipeline unavailability or volatile natural gas markets. Otter Tail currently operates its Solway combustion turbine in similar fashion.

The capital cost for the addition of dual fuel capability at Astoria is preliminarily estimated at [PROTECTED DATA BEGINS... ..PROTECTED DATA ENDS] with a corresponding annual O&M cost of [PROTECTED DATA BEGINS... ..PROTECTED DATA ENDS]

A reasonable schedule would be to add dual fuel capability in conjunction with Astoria’s first inspection in 2026. This would allow for replacement of any combustion turbine components necessary for potential use of fuel oil in parallel with the inspection. Other necessary equipment could be installed independent of plant operations either before or after the scheduled 2026 minor inspection. Otter Tail is moving forward with engaging an engineering firm and initiating dialogue with the combustion turbine supplier to develop a more refined cost estimate and preliminary schedule. This information will be used to support any decisions on moving forward with the addition of dual fuel capability.

Given the three criteria listed above for assessing resiliency, Table 3-9 compares Otter Tail’s total current resilient generation resources to what the Preferred Plan resilient generation would be in 2030, assuming dual fuel capability is added at Astoria. Controllable load is also included in the list of resilient resources because the net result of a reliable load control system and a resilient generator is similar in terms of reducing market exposure during peak load situations. Two separate values have been given for summer and winter generation capabilities since Otter Tail’s combustion turbines and load control resource have varying output capabilities depending on the season.

Table 3-9: Resilient Generation

	Current Winter	Current Summer	Preferred Plan Winter	Preferred Plan Summer
Big Stone	256	256	256	256
Coyote	149	149	0	0
Astoria	0	0	285	245
Solway	46	43	46	43
Oil Peakers	74	69	74	69
Controllable Load	115	20	115	20
Total (MW)	640	537	776	633

Figures 3-9 and 3-10 compare the resilient generation levels listed in Table 3-9 to the forecasted hourly load in 2022 and 2030. The hourly load has been sorted by season and then sorted from

high to low to show the quantity of hours during which load would be expected to exceed dispatchable/fuel secure/price-protected generation capabilities.

In 2022 the forecasted market exposure is roughly 130,000 MWh, or 10.6 percent of Otter Tail's total load. Looking ahead to 2030, Otter Tail anticipates total market exposure to decrease to just 29,500 MWh, or 2.4 percent. As noted above it is reasonable to expect solar and wind resources to provide some generation in many of the times total load exceeds resilient generation. In terms of our expectations for actual operation, some portion, if not all, of the forecasted market exposure is expected to be covered by Otter Tail's variable resources.

The forecasted market exposure is not a ceiling for Otter Tail's market purchases. Actual market purchases will likely be higher due to Otter Tail's ability to take advantage of low market prices as those opportunities arise.

Taking advantage of market opportunity is an important tool that has allowed Otter Tail to keep rates low. The distinction between market exposure and market opportunity is an important point that must be understood. *Market exposure* can be thought of as the times when total load exceeds total resilient generation potential. *Market opportunity* is the times when market energy prices are lower than the variable energy costs of our dispatchable resources. In times of market opportunity most of our dispatchable resources can be ramped down or completely curtailed, which reduces customer cost. The important factor to remember is that just because the dispatchable units are ramped down to minimums or offline completely does not mean they are unavailable to cover Otter Tail's load, should market conditions change.

Figure 3-9 (below) compares Otter Tail's 2022 forecasted hourly load to existing resilient generation capabilities. The blue line in Figure 3-9 depicts OTP's winter and summer load duration curves. A load duration curve illustrates the total amount of load in each hour of the season arranged in order of magnitude. From it, we can consider the maximum amount of load we need to be prepared to serve over the course of a year. The grey line in Figure 3-9 is drawn

to show the level of our resilient generation resources. The purpose of this figure is to show the relationship between resilient generation capabilities and forecasted hourly load and potential market exposure if variable resources were not generating at the time load exceeded the resilient generation capabilities. As shown in the figure, Otter Tail projects that 10.6 percent of its overall load will be exposed to market energy prices assuming no variable resource generation in 2022.

Figure 3-9: 2022 Forecasted Load Relationship with Resilient Generation

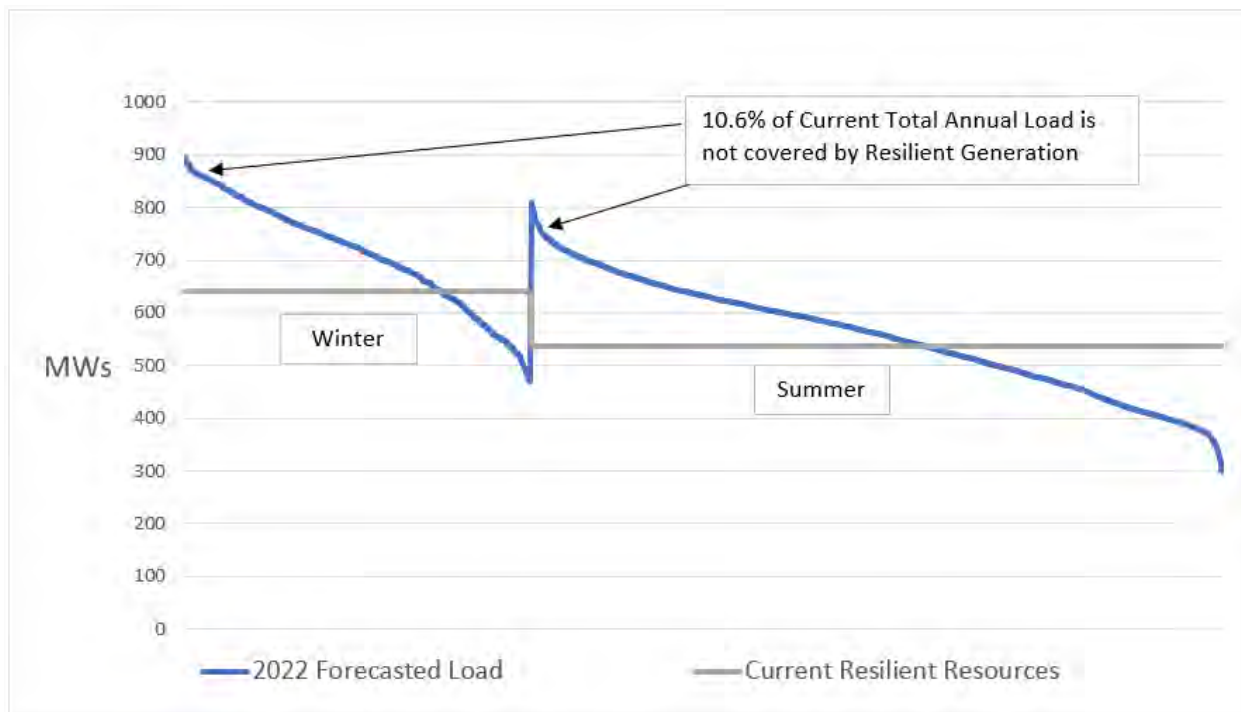
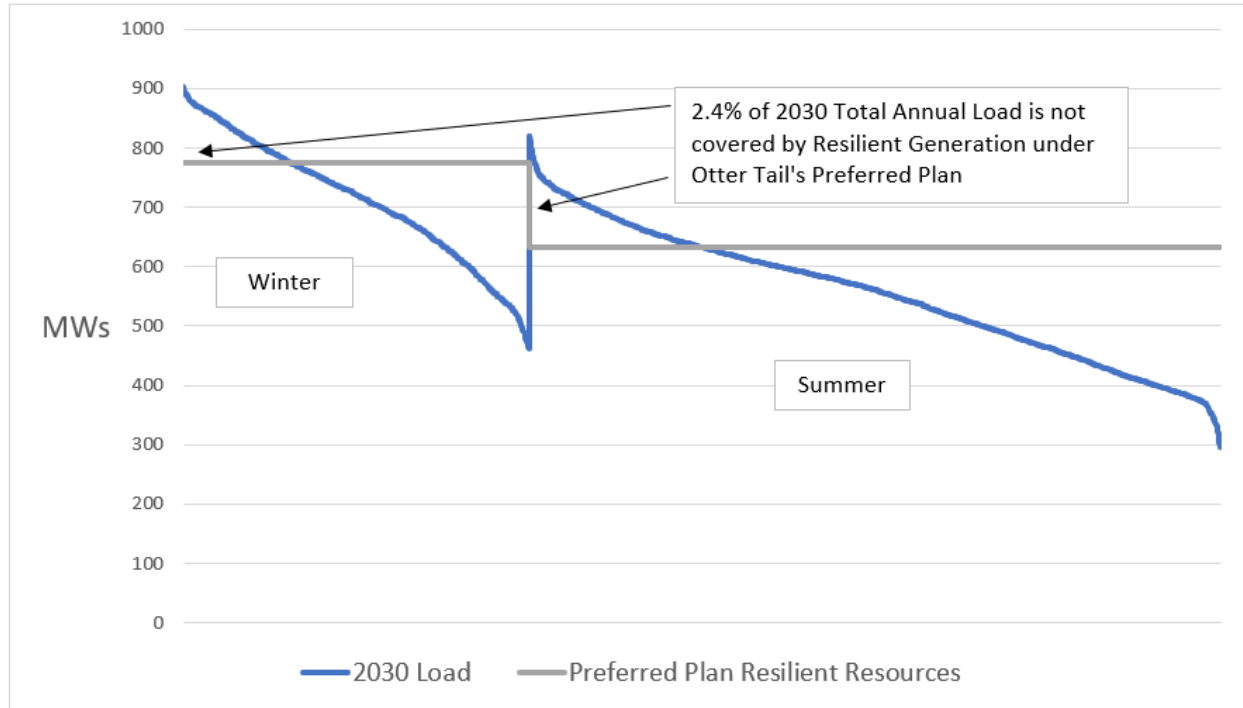


Figure 3-10 similarly compares Otter Tail's 2030 forecasted hourly load with the resilient generation available under the Preferred Plan. As noted by Figure 3-10 the Preferred Plan reduces the amount of load not backed by resilient generation from 10.6 percent to only 2.4 percent.

Figure 3-10: 2030 Forecasted Load Relationship with Resilient Generation (Preferred Plan)



Assuming for analysis that Otter Tail did not add dual fuel at Astoria Station then Figure 3-10 does not fully capture the total market risk associated with the Preferred Plan. The reason for this is because natural gas units tend to be the marginal units in the MISO energy market. This means that they set the price based on their variable energy cost. High market price situations are usually accompanied (or caused) by high natural gas prices. Relying on natural gas units to serve load during volatile market situations will not provide adequate price protection for customers unless those units have the ability and fuel on hand to switch to an alternate fuel source when natural gas prices are elevated. There is also the potential in extreme situations that natural gas might not be available, in which case the unit would be forced offline and unable to generate when it is needed most. This makes the addition of dual fuel capability at Astoria a particularly attractive resiliency enhancement.

If Astoria Station is removed from the list of Preferred Plan resilient resources in Table 3-9, total market risk exposure increases from 2.4 percent to 30.4 percent in 2030. To reduce the risk associated with natural gas generation, Otter Tail currently uses forward energy purchases to hedge against the potential for high natural gas prices in the winter months. Recently the forward energy purchase price points have been competitive due to the low market prices seen in the last handful of years. This is an adequate solution for the time being but adding dual fuel capability at Astoria would mitigate the need for forward energy hedge which Otter Tail finds desirable to reduce exposure to the forward energy purchase market.

3.9 Coyote Station

Withdrawing From Coyote Station: Process and Key Considerations

Otter Tail is requesting approval to commence the process of withdrawing from its ownership interest in Coyote Station with the intent to complete withdrawal by 2028. By withdrawal, the Company means that it is seeking to end its ownership and role in operating the facility in a manner that is both least-cost to Otter Tail's customers and least-impactful to other plant stakeholders, including the co-owners. Withdrawing from Coyote Station will be complex. The Company must address the concerns of other stakeholders, including its co-owners, the owner of the adjacent lignite coal mine, our employees, and the community in and around Beulah, North Dakota for whom the power plant is such an important source of good jobs and tax revenue.²⁶ There are also uncertainties. Nevertheless, it is Otter Tail's commitment to plan for and pursue courses of action that benefit our customers through low-cost reliable electricity. Our analysis shows that the customer benefits of Otter Tail's withdrawal are compelling. For this reason, the Company is seeking permission to begin the withdrawal process with the intent of ending its involvement in Coyote Station by 2028. Our proposal provides us with sufficient lead time to obtain clarity on many issues necessary to prudently withdraw from Coyote Station.

²⁶ The Company notes that decisions involving the future of other jointly-owned coal plants around the country have been difficult. Notable examples include Public Service Company of New Mexico's proposed departure from the Four Corners facility in New Mexico and litigation between co-owners of the Colstrip plant in Montana.

Coyote Station Overview

Coyote Station is a 428 MW, lignite fueled, mine-mouth generating facility located near Beulah, North Dakota.²⁷ Since entering service in 1981, Coyote Station has been a co-owned generation plant with each co-owner owning an undivided interest in the entire plant as provided in Table 3-10 below:

Table 3-10: Coyote Station Ownership Percentage

Coyote Owners	Ownership Percentage	ISO Membership ²⁸
Otter Tail Power Company	35%	MISO
Northern Municipal Power Agency (Minnkota Power Cooperative)	30%	MISO
Montana Dakota Utilities Co.	25%	MISO
Northwestern Energy	10%	SPP

The joint ownership of Coyote Station is governed by the Agreement for Sharing Ownership of Generating Unit No. 1 (Plant Ownership Agreement) and subsequent amendments, which define the co-owners' rights and responsibilities and the processes by which decisions are made. Otter Tail is the operating agent for the Plant and our employees operate the plant for Otter Tail and the other co-owners.²⁹ Generally, the Plant Ownership Agreement provides that decisions concerning the plant require the concurrence of (a) owners having ownership shares of more than 50 percent of the plant *and* (b) at least three owners, although some major decisions require concurrence of all the owners. Necessarily, this structure has promoted collaborative decision-making. Importantly, as of January 1, 2022, the Plant Ownership Agreement also permits an owner to terminate the agreement upon five years written notice.

²⁷ There are six mine mouth generation facilities operating in North Dakota. Coyote Station is the only mine-mouth generating facility that falls under MPUC's regulation.

²⁸ As noted above the SPP and MISO markets do not coordinate the commitment nor the dispatch of jointly owned units.

²⁹ Otter Tail has been the operating agent for Coyote Station since July 1, 1998. In that capacity it provides all the personnel necessary to operate the plant. There are currently 80 Otter Tail employees working at Coyote Station.

Coyote Station is a mine mouth generating facility, meaning that it was conceived, sited, designed, and constructed to have a long-term, integrated relationship with an immediately adjacent mine serving the plant. In that regard, Coyote Station obtains all of its fuel requirements under a Lignite Sales Agreement (LSA) with Coyote Creek Mining Company, L.L.C, a subsidiary of The North American Coal Corporation.³⁰ The LSA recognizes that Coyote Station and the mine are integrated, with the mine existing to serve Coyote Station. Importantly, because of this structure the LSA is designed to ensure an equitable relationship between buyer and seller. The term of the agreement extends to the end of 2040, unless terminated earlier, and therefore, for rate making purposes, the depreciable life of Coyote Station has been extended as well.³¹

Coyote Station has served Otter Tail well. Although market conditions have changed and there are now significant advantages to having greater control over when a generation resource is dispatched, the development of jointly owned coal generation plants was once common in the electric utility industry (particularly in this region) and co-ownership of Coyote Station provided Otter Tail with many advantages over the years. Through co-ownership, Otter Tail and its co-owners have achieved better economies of scale than if each utility had built its own separate, smaller generation plant. Otter Tail has also benefited from knowledge sharing and collaboration with its co-owners, and from its successful operation of Coyote Station. Otter Tail's balanced portfolio of rail-delivered coal (Big Stone Plant and the recently retired Hoot Lake Plant) and mine-mouth lignite coal (Coyote Station) have provided fuel diversity important to reliable and affordable electric service. Otter Tail is now seeking to obtain fuel security and system resiliency consistent with the changing marketplace. To that end, Otter Tail is seeking Commission approval to commence the withdrawal from its ownership interest in Coyote Station.

³⁰ North American Coal employs approximately 110 personnel at the mine.

³¹ *In the Matter of Otter Tail Power Company's Request for Approval of its Five Year Depreciation Study*, MPUC Docket No. E017/D-13-795, Order (Apr. 7, 2014).

Withdrawal from Coyote Station

By withdrawing from its ownership interest in Coyote Station, Otter Tail is ultimately seeking to end its obligations³² to the co-owners of the plant and the owners of the mine. This includes financial and contractual obligations to these counterparties as well as ending Otter Tail's role as operator of the plant. To accomplish this, Otter Tail must either (1) divest its ownership shares in the plant to another co-owner or third-party who will take on Otter Tail's current obligations, and secure releases from those obligations as necessary in favor of the acquiring party; or (2) terminate the co-tenancy in the plant under the ownership agreement and any contractual obligations that survive the termination of that co-tenancy. Neither option is without risk or potential cost to Otter Tail and its customers. In this section, Otter Tail discusses the overall process and identifies some of the complexities of withdrawal from its 35 percent ownership interest in Coyote Station. Our goal is to withdraw from Coyote Station in a manner that minimizes the impact on stakeholders (including the other co-owners, the community that has hosted the plant for decades and our employees) to the extent reasonably possible. Otter Tail believes that divesting its shares would be the preferred path to take, if a willing and qualified acquirer can be found. That said, Otter Tail will explore termination of the Plant Ownership Agreement if necessary. Otter Tail is seeking the authority to commence its withdrawal from Coyote Station because the two paths of withdrawal present several challenges that will take time to address.

As noted, Otter Tail's preference is to divest its ownership in Coyote to a co-owner or third party, with the acquiring party participating in the plant in conjunction with the existing co-owners and as a counterparty to the LSA, provided that certain necessary consents were secured and conditions met.³³ In this way, all the stakeholders in Coyote Station will have an opportunity to continue operations of the plant and/or plan for an orderly wind down sometime after 2028.

³² As noted above Otter Tail serves as the operating agent of the plant. Until and unless Otter Tail withdraws as operating agent, or the owners agree otherwise, this obligation remains.

³³ If the other owners were also interested in selling their interests such that the entire plant could be sold to a third-party, Otter Tail would be open to such a possibility.

However, the market for ownership interests in coal plants is not robust. Consequently, Otter Tail will need time to identify potential acquirers for its ownership share in Coyote Station. In light of market conditions, any divestiture may be at pricing below its undepreciated net book value. If a buyer is found, Otter Tail intends to be creative in structuring a divestiture transaction; Otter Tail, however, would need regulatory support and assurance that it would be able to recover the costs and liabilities that such a divestiture transaction would require Otter Tail to undertake. Having until 2028 to withdraw will provide Otter Tail with the time it needs to seek out buyers or pursue alternative paths to withdrawal.

Absent a willing and qualified buyer, and withdrawal from Coyote Station continuing to be the most prudent course of action, Otter Tail could give notice by the end of 2023 to terminate the Plant Ownership Agreement in late 2028. Termination of the Plant Ownership Agreement is permitted by (a) agreement among *all* the co-owners, with a mutually agreed-upon termination date, or (b) by Otter Tail (or any co-owner) upon not less than five years advance written notice. Otter Tail notes, however, that co-ownership agreements of this type and vintage never truly contemplated the details of cessation of operation of these large baseload plants since at the time they were some of the most economic sources of generation available. Consequently, the Plant Ownership Agreement provides relatively few details on how to wind down operations to cease operating by the end of 2028 should the agreement be terminated.

As discussed further below, there may be additional clarity on Regional Haze Rule compliance obligations that could impact the plans of each of the co-owners. If material capital investments are required to comply with the Regional Haze Rule by 2028, it is conceivable that the co-owners could mutually agree to terminate the Plant Ownership Agreement and provide for an orderly wind-down of plant operations and disposition of plant assets. A withdrawal date in 2028 helps provide sufficient time to gain clarity on this approach. This time frame also recognizes that the other Coyote Station owners each have their own resource needs and planning cycles, and that there may be other regulatory compliance issues to consider.

If there is no co-owner consensus on termination of plant operations, Otter Tail could unilaterally initiate termination of the Plant Ownership Agreement upon five years advance notice. To be clear, Otter Tail's termination of the Plant Ownership Agreement would depend on several factors discussed in this resource plan, the status of which is subject to future developments. Such unilateral termination could impact the other co-owners, given post closure obligations of the parties to each other, the community, and the state of North Dakota along with the potential that the co-owners may choose to continue to rely on the plant for their own load serving needs. Without an orderly process for implementing termination of Otter Tail's participation in the plant, there is some potential for disputes amongst the co-owners to arise. Otter Tail is hopeful that a mutually agreeable path can be found, but if it is not, Otter Tail would need sufficient assurances that it could recover any prudently incurred costs of terminating the Plant Ownership Agreement that could occur.

Last, termination of the Plant Ownership Agreement does not cause the automatic termination of the LSA. The LSA and applicable law contain provisions allowing for early termination under certain conditions. If the LSA is terminated early, the agreement provides for the co-owners to buy the membership interests in the mine entity (Coyote Creek Mining Company, L.L.C.) and thereby assume certain of its obligations. Otter Tail currently projects that in the event of a 2028 buy-out, it would be obligated to pay approximately \$21.7 million. That figure was used in the Company's modeling, and is a conservative forecast based on current assumptions. Any actual buy-out amount would be calculated in the future based on the actual termination date of the LSA and would depend on conditions at the time. As with any contractual termination, there is always the potential for disputes.³⁴ These costs would need to be recoverable should Otter Tail move forward with a withdrawal.

³⁴ As is the case in any situation involving the early termination of a contract there is a risk of litigation. Otter Tail has not included the costs of potential litigation in its modeling.

Cost Impacts of Withdrawal from Coyote Station

For its economic analysis, Otter Tail developed a conservative estimate of the reasonably foreseeable costs of withdrawing from Coyote Station at the end of 2028 of \$68.5 million, estimated as follows:

Table 3-11: Coyote Station Estimated Foreseeable Withdrawal Costs

OTP Share	Forecast (in millions)		
Coyote Station	YE 2040	YE 2028	YE 2026
Book Value (non-land accts 311-316)	(13.4)	\$33.4	\$41.2
2041 Decommissioning/Salvage*	\$13.4	\$13.4	\$13.4
LSA Early Termination Costs	\$0	\$21.7	\$33.3
Total For Withdrawal	\$0.0	\$68.5	\$87.9
*This is the Coyote End of Life book value collected and accumulated in our current depreciation rates for the decommissioning of the plant.			
Note: Does not include any: (1) ancillary costs of withdrawal such as loss of plant related transmission rights or other operational matters; (2) any potential costs of disputes; (3) any unforeseen liabilities.			
Project Book Balances in 2021: August 31, 2021: \$62.1M YE 2021: \$60.7M			

The \$68.5 million potential cost of withdrawal assumes as a modeling baseline the termination of the Plant Ownership Agreement (whether by the co-owners or by Otter Tail) and subsequent retirement of Coyote Station at the end of 2028. This amount does not consider: (1) ancillary impacts to Otter Tail's costs due to withdrawal; (2) any costs related to disputes between the co-owners and Otter Tail or between North American Coal or Otter Tail; and (3) any unforeseen or retained liabilities other than undepreciated net book value of the Plant. As Otter Tail commences the process of withdrawing from Coyote Station, we expect to obtain more clarity on these costs and refine our economic assessment as part of the process of withdrawal. That said, our modeling suggests that even if Otter Tail should prudently incur additional costs or liabilities from its withdrawal from Coyote Station that withdrawal would still be the most prudent course of action. Consequently, the \$68.5 million is a reasonable baseline of known and quantifiable

costs from which to assess the prudence of Otter Tail's commencement of the process of withdrawal from its ownership interest in Coyote Station.

There are two general cost categories to Otter Tail's withdrawal: (1) undepreciated net book value, and (2) early termination costs under the LSA. The undepreciated net book value is based on Coyote Station's remaining depreciable life which currently extends to 2041.³⁵

As noted above, Otter Tail's remaining net plant balance of approximately \$62.0 million is being depreciated over the current remaining life of the plant. Otter Tail's planned withdrawal, if approved, requires consideration of how (and when) to recover the undepreciated balance. In addition to the undepreciated plant balance there are LSA early termination costs to consider. Otter Tail proposes that LSA termination costs and the undepreciated plant balance be placed within a regulatory asset account, which can serve as a vehicle for recovery. The cost impact to customers would then depend on the amortization schedule by which these expenses are recovered over time. One option is a schedule that aligns with Coyote Station's current retirement date of 2041 notwithstanding the Company's exit from the plant by 2028. This option would have the least impact on ratepayers and would be the Company's preferred option. A similar mechanism was used by the MPUC for the abandonment of Xcel Energy's Prairie Island nuclear facility EPU project. The second option would be to accelerate recovery of the regulatory asset account balance to match the early exit date, which would have greater customer impacts. Additional options would fall on a date between these bookends. However, as Otter Tail considers options for its withdrawal (sale or notice, etc.), reducing the depreciable life of the plant may be premature. It is not Otter Tail's intent to reduce the plant's remaining life if, for example, there is another potential owner. The paramount issue is that the Commissions authorize recovery, including a return on the undepreciated regulatory asset.

³⁵ As noted earlier, the original depreciable life of Coyote Station assumed retirement in 2016. The depreciable life was extended at various times during the life of the plant, the last time being in 2013, when the depreciable life was extended by nine years, from 2032 to 2041.

Other Factors that Could Impact Withdrawal

In addition to the contractual issues discussed above, there are additional factors that could influence the ultimate process and form of any withdrawal from Coyote Station. These variables are dynamic and difficult to predict, especially in combination, and they may affect the prospects for a sale of Otter Tail's ownership interest in Coyote Station or the willingness of the co-owners to agree on Coyote Station's future. Regulatory approvals will be a precondition to Otter Tail's withdrawal from Coyote Station. Further, Otter Tail's capacity needs and capacity position will also impact our ability to withdraw. Additionally, the ancillary impacts of withdrawal on Otter Tail's transmission rights will need to be further studied.³⁶ Last, use of the Coyote Plant site and impacts to the community stemming from withdrawal will all have to be considered.

Environmental compliance requirements such as the Regional Haze Rule will have to be assessed and could impact the overall approach to a withdrawal. Together, these factors could impact the timing, costs, and method of withdrawing from ownership in Coyote Station. The Company's modeling forecasts benefits from withdrawal under the scenarios and sensitivities it has considered; however, we cannot rule out the possibility that some combination of factors, including developments that are not currently contemplated, could produce different results in the future. If that were to occur, the Company and its Commissions might need to revisit the issue.

Regulatory Approvals

Otter Tail's plan to withdraw from Coyote Station is premised and conditioned on the support of the Company's regulators, particularly the state commissions regulating Otter Tail's rates. Regardless of whether a formal framework for review and approval of an IRP exists, it is essential that the Commissions in Minnesota, North Dakota, and South Dakota each support withdrawal and allow Otter Tail to recover the resulting costs in rates. Each state has a different regulatory construct and Otter Tail will work to obtain appropriate guidance from each

³⁶ Upon withdrawal, Otter Tail may need to have alternative transmission arrangements in place, the cost of which are difficult to predict. Our resource planning model does not account for these costs.

Commission at the appropriate time. The Company also anticipates that it may need to seek further approval from one or more Commissions once it has a clearer plan for its method of withdrawal.

Environmental Compliance

In 1999, the U.S. Environmental Protection Agency (EPA) published regulations implementing Section 169A of the Clean Air Act (CCA) establishing the Regional Haze Rule as the comprehensive visibility protection program for Federal Class I areas.³⁷ States are required to submit Regional Haze Rule state implementation plans (SIPs) that evaluate reasonable progress in approximately 10-year increments. The first Regional Haze planning period covered the years 2008-2018, while the second planning period covers the timeframe ending in 2028. The EPA has designated five Regional Planning Organizations (RPOs) to assist with the coordination and cooperation needed to address visibility. North Dakota is a member of the Western Regional Air Partnership, which serves as the RPO in 15 western states.³⁸

SIPs for the second planning period were originally due to EPA on July 31, 2018; however, in early 2017 EPA provided an extension until July 31, 2021.³⁹ In view of this schedule change the MPUC granted Otter Tail's request to extend the filing date of this IRP to September 1, 2021, in part to allow for additional time to conduct modeling needed to comply with the SIP being prepared by the North Dakota Department of Environmental Quality (North Dakota DEQ).⁴⁰ The North Dakota SIP is delayed (as are all the SIPs within the Western Air Partnership).⁴¹ At

³⁷ These areas include national parks, memorial parks, and wilderness areas over a certain size. The Regional Haze Rule did not mandate specific milestones or rates of progress, but instead called for states to establish goals that provide for reasonable progress towards achieving natural visibility conditions by the year 2064.

³⁸ Minnesota is a member of the Central Regional Air Planning Association.

³⁹ 82 Federal Register 3078.

⁴⁰ *In the Matter of Otter Tail Power Company's 2017-2031 Resource Plan*, Order Extending Deadline for Filing Resource Plan, Requiring Supplemental Filing, And Completing Competitive Bidding Process, December 30, 2019, MPUC Docket No. E-017/RP-16-386.

⁴¹ The change in timing relates to delays in the efforts by the Western Regional Air Partnership to develop build out a Technical Support System (TSS) website modeling tool.

this time, Otter Tail anticipates that the North Dakota DEQ will provide a draft SIP for public review in late 2021 or early 2022.

The base assumption in Otter Tail’s IRP modeling analysis is that the North Dakota DEQ will not propose a SIP requiring additional controls on Coyote Station. However, Otter Tail recognizes there is a risk that the EPA may not accept that approach;⁴² therefore, Otter Tail also included sensitivities in its modeling for the possibility that the Coyote Station owners will be required to make significant upgrades. If significant upgrades are required, they will likely need to be made before 2028 so that they can be operational by the time of the compliance deadline of December 2028. Otter Tail’s analysis shows that even at a “no controls” SIP, where no capital investments are required at Coyote Station, withdrawing from Coyote Station would be a financial benefit for Otter Tail customers. Not surprisingly, this is particularly true when including externality costs required by Minnesota. Even in the no externality analysis, in all cases except when natural gas and market energy prices double, the analysis shows that Otter Tail’s withdrawal from Coyote Station would benefit customers. However, the Coyote Station owners each have their own cost structures, generation fleets, and modeling, and Otter Tail anticipates that more clarity will be available prior to a final determination on environmental compliance costs.

Otter Tail Capacity Needs

As noted, the prudence of Otter Tail’s withdrawal from Coyote Station is premised on the load forecasting that forms the basis of this IRP. However, as the future is uncertain, changes to Otter Tail’s capacity needs could impact the prudence of a withdrawal from Coyote Station. As part of commencing the process of withdrawing from Coyote Station, Otter Tail will continue to monitor its needs to ensure it has sufficient generation to meet its obligation of reliable service to its customers.

⁴² Otter Tail is not quantifying that risk, nor is it taking a position in this filing with regard to what action the EPA should or should not take.

Load growth is certainly a possibility. Otter Tail’s low prices can be attractive for new forms of high load customers. For example in August 2021, we filed for the ND PSC’s approval an electric service agreement with a new, “super-large load” customer.⁴³ Should additional customers such as this one emerge on our system, we will need to evaluate the least cost way to serve this new load. That said, our current analysis indicates that (1) we have sufficient capacity to meet our current needs with sufficient margin; and (2) that Coyote Station may not be the least cost or most beneficial resource to serve emerging load.

An additional emerging issue that has the potential to impact Otter Tail’s withdrawal from Coyote is the possibility of MISO changing its capacity construct. The issue has been under consideration, and it is possible that MISO will change its capacity requirements so that Load Serving Entities (LSEs) must account capacity needs using something different than the current annual requirement method. Otter Tail is a winter peaking utility and MISO is a summer peaking organization which provides material benefits to Otter Tail since Otter Tail must have enough capacity to meet its load obligation during MISO’s summer peak, when the Otter Tail system is not at peak. A shift to a seasonal construct to meet both a summer and winter peak could increase Otter Tail’s capacity needs without any changes to its actual load profile. Otter Tail understands that MISO may make a filing with FERC in the near future to implement a new seasonal capacity construct. Until that filing is made, the actual details of MISO’s proposal will not be known with certainty. Our Preferred Plan is based on a resource planning analysis that assumes no change to the MISO capacity construct. However, an initial assessment of what our current understanding of what MISO could potentially propose for a changed capacity construct indicates that even with a possible change to the MISO capacity construct, withdrawal from Coyote Station would still be financially beneficial. Otter Tail is monitoring this issue and notes that it could be a material factor in the future.

⁴³ *In the Matter of Otter Tail Power Company’s Application for Super Large General Service Rate & Electric Service Agreement Approval*, August 9, 2021, ND PSC Case No. PU-21-366.

Operational Matters

While the resource planning analysis in this IRP indicates that withdrawal from Coyote Station is a prudent path, during the time from commencement of withdrawal to actual withdrawal, Otter Tail will need to consider the operational matters involved. Different withdrawal paths will impose different operational outcomes and needs. As Otter Tail seeks to implement withdrawal, additional operational considerations are likely to arise.

Further, if Coyote Station is closed, there are other potential uses for the site. Solar or natural gas generation (two natural gas pipelines are in the vicinity) are two possibilities given the existing transmission interconnection. However, while Otter Tail is open to the concept, there is no agreement among the Coyote Station owners regarding re-use of the site, and such consensus would be necessary for any such development. In addition, state and local preferences and policies would need to be considered. Accordingly, our Preferred Plan does not incorporate any predictions or assumptions regarding re-development, and the Company is simply noting the possibility here as it may be relevant to stakeholders and Commissions.

Mitigation of Impacts on the Community

The Company understands the importance of Coyote Station and the adjacent mine to the local community and will endeavor to mitigate the impacts of any withdrawal. However, the magnitude of impacts will depend on factors discussed above, including whether the Company is able to sell its ownership share in Coyote Station, and, if not, whether other uses for the site are developed. As the future of the plant becomes clearer, we anticipate that any plans for mitigation will be determined through consultation with community members and elected officials. Included in these impacts will be Otter Tail's need to appropriately transition our workforce currently operating the plant. The transition will depend on the path for withdrawal that will ultimately be chosen. Consequently, we are not able to present any concrete plans in this regard at this time.

Otter Tail's Proposed Plan to Withdraw from Coyote

Should the Commission approve Otter Tail's Preferred Plan – with such approval recognizing the complexities of Otter Tail's potential paths to withdrawal from Coyote Station – we intend to promptly: (1) offer the Company's ownership interest to the other co-owners and qualified third parties, and (2) continue working with the Coyote Station co-owners regarding a possible consensus decision on Coyote Station's future. If no buyer for Otter Tail's ownership interest is found, and the co-owners are not able to reach a consensus, Otter Tail would then propose to exercise its right to terminate the Plant Ownership Agreement on five years advance notice, provided other factors noted in this resource plan did not call for reassessment.

Assuming no intervening issues create circumstances in which withdrawal is no longer prudent, Otter Tail's intent is to withdraw from Coyote Station by the end of 2028. We understand that different stakeholders will have different views on this timing. Some stakeholders may focus on the cost of Coyote Station operations in a low MISO market and the continued routine capital spending pending withdrawal. Other stakeholders may focus on exhausting options that might keep Coyote Station viable before retiring a baseload generation facility. While the timing is unlikely to satisfy all of the involved stakeholders, Otter Tail believes this proposal is reasonable and appropriately balances competing concerns.

Summary

Otter Tail's Preferred Plan requests authority to begin the process of withdrawal from Coyote Station with a goal of withdrawing by 2028 as described above.

3.10 Adding Dual Fuel Capabilities at Astoria Station

Plant Description

Astoria Station, located near Astoria, South Dakota, is a wholly owned 245 MW natural gas peaking unit that was an approved resource addition as part of our 2016 Plan and came online in early 2021.

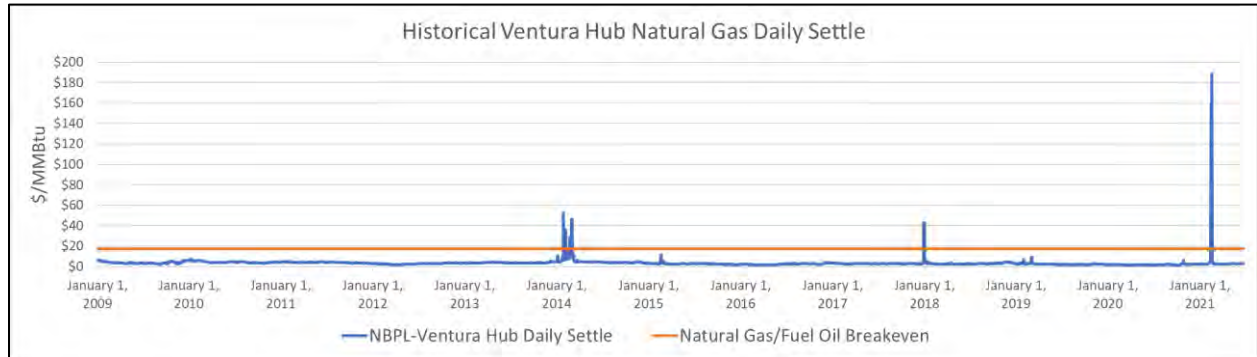
Dual Fuel Capabilities

Astoria Station was designed, permitted, and constructed with natural gas as the sole source of fuel. Prior to selecting a combustion turbine, Otter Tail confirmed that any one of the potential combustion turbines selected could be converted to dual fuel. To be clear, MISO does not currently require dual fuel capabilities for capacity accreditation. Prior to MISO, it is our understanding that MAPP (the Midwest Area Power Pool) required fuel oil backup for natural gas fired units which is why we have fuel oil backup at our Solway Power plant. The natural gas transmission lines are very reliable. In fact, even during Winter Storm Uri in February 2021, natural gas would have been available for Astoria Station if it would have needed to operate. What Winter Storm Uri highlighted more so than any time before is natural gas volatility and intra-day price risk; risk that dual fuel capabilities at a peaker would protect against. The volatility seen during Winter Storm Uri demonstrates that installation of dual fuel capability at Astoria would be justified and would have inherent reliability benefits, as discussed below.

Natural Gas Price Volatility

The natural gas transmission lines, where the Otter Tail natural gas peakers are located, are very reliable. The extraordinary pricing variability during the 2021 Winter Storm Uri event generated our internal review of the intra-day pricing variability exposure of a natural gas generator without a secondary fuel source backup. Over the past decade, there have been three events that caused high gas prices, the most recent of which was Winter Storm Uri. Figure 3-11 below depicts the gas market prices since January 2009.

Figure 3-11: Historic Ventura Hub Natural Gas Prices



With increased reliance on variable renewable resources and natural gas generation to fill short term electrical demand needs, history has shown that natural gas prices can be volatile, and we expect that to continue. But the advent of fracking has made the long-term price of gas more stable.

When analyzing the economic benefits of dual fuel (or on-site backup fuel oil) at Astoria when considering the intra-day pricing risk has focused on three primary factors:

- *Protection against intraday natural gas pricing deltas* – During extreme and volatile pricing conditions, like what was seen in February 2021, the natural gas market can vary dramatically between the time a generation offer is given to MISO and when MISO clears the offer. If the quantity of MWs cleared varies from expectations, and the price to procure or liquidate additional natural gas fuel supply varies from expectations, the generator can be exposed to significant pricing risk. Dual fuel capability mitigates if not eliminates this risk by providing a known and stable fuel supply during extreme natural gas pricing events.

- *Energy hedge value* – Without the ability to call on Astoria Station for dual fuel capability (and therefore run the facility at a pre-determined energy price), Otter Tail has utilized energy purchases at the Otter Tail load zone to hedge against high priced, natural gas-driven markets during the winter months of December, January, and February. This winter energy hedge purchase could likely be significantly reduced or eliminated with installation of dual fuel. While not directly related to intraday pricing risk, this value can be considered in the analysis.
- *Possibility of a changing MISO capacity construct* – It is not yet certain if a change to the capacity construct within MISO will occur, but the issue is being seriously considered.

Using Winter Storm Uri as an example, Otter Tail has been able to back cast the value of having dual fuel available at Astoria Station.⁴⁴ The data below provides insight on the likely financial implications. The following analysis assumes the value of avoiding intraday natural gas forecasting uncertainty. This includes intraday pricing deltas, and timing challenges associated with procurement of natural gas, offering generation, and commitment/dispatch by the MISO market.

The analysis is based on historical energy and natural gas pricing data during Winter Storm Uri. Despite the historical data, numerous assumptions were required, complicating the analysis, including timely gas nominations, intraday purchase pricing and liquidation pricing, and changing market conditions. Sensitivity analysis was completed based on varied natural gas timely nominations and energy market pricing.

⁴⁴ During Winter Storm Uri Otter Tail had not yet retired Hoot Lake and Astoria Station was still in the testing phase. As such, these costs were not incurred by Otter Tail or its customers.

Table 3-12: February 2021 LMP Pricing Scenario

LMP Pricing Scenario	Timely Gas Purchase: % of Daily Capacity	Timely MMBtu Purchase (MMBTu)	Intraday Purchase (MMBTu)	Gas Only		Duel Fuel Integration			Net Benefit Delta	
				Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	Fuel Oil Dispatch (MWh)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case
Historical Astoria LMPs	0%	0	43,696	(\$545,053)	(\$2,388,478)	20,825	\$2,736,879	\$2,736,879	\$3,281,932	\$5,125,357
	10%	72,098	(28,402)	(\$2,158,476)	(\$5,394,416)	20,825	\$2,801,247	\$2,710,305	\$4,959,723	\$8,104,721
	15%	108,148	(64,452)	(\$3,016,393)	(\$7,449,380)	20,825	\$2,833,431	\$2,697,018	\$5,849,825	\$10,146,398
	25%	180,246	(136,550)	(\$4,834,641)	(\$12,663,298)	20,825	\$2,897,799	\$2,670,444	\$7,732,440	\$15,333,742
	50%	360,492	(316,796)	(\$9,391,184)	(\$25,720,761)	20,825	\$3,047,796	\$2,581,341	\$12,438,980	\$28,302,102
	100%	720,984	(677,288)	(\$18,547,966)	(\$51,926,357)	20,825	\$3,304,092	\$2,312,466	\$21,852,058	\$54,238,823
Historical Astoria LMPs X2	0%	0	281,293	(\$3,059,285)	(\$16,700,630)	35,525	\$8,991,457	\$8,868,562	\$12,050,742	\$25,569,192
	25%	180,246	101,047	(\$6,509,090)	(\$18,603,269)	35,525	\$9,326,478	\$9,244,548	\$15,835,568	\$27,847,817
MISO LMP Price Cap \$3,500/MWh	0%	0	720,984	\$173,912,028	\$95,423,088	64,680	\$216,278,628	\$216,114,768	\$42,366,600	\$120,691,680
	25%	180,246	540,738	\$172,612,885	\$113,746,180	64,680	\$216,613,650	\$216,490,755	\$44,000,764	\$102,744,574
Historical SPP Big Stone LMPs	0%	0	494,311	\$35,155,620	(\$13,818,038)	38,710	\$66,852,204	\$66,708,827	\$31,696,585	\$80,526,865
	25%	180,246	314,065	\$33,105,452	(\$4,972,881)	38,710	\$67,187,226	\$67,084,813	\$34,081,774	\$72,057,694

The possible benefits of having dual fuel at Astoria Station varied significantly based on the given sensitivity. In the cases where February 2021 historical Astoria LMP data was utilized, the net benefit of dual fuel capability ranged from \$3.2 million to \$21.8 million, depending on the amount of timely gas nominations. The net benefit nearly doubles under a “worst” natural gas scenario where natural gas is either purchased at the high trading mark of the day or liquidated at the low trading mark of the day.

Additional scenarios considered the possibility of increased LMP prices above and beyond what was historically experienced during Winter Storm Uri. Under these scenarios, the net benefit ranged from \$12.1 million - \$44.0 million. While some of these scenarios have a very remote possibility of occurrence, it is prudent to mitigate these risks and increase our fleet resiliency by adding dual fuel capability at Astoria Station.

Astoria Station’s location on the Norther Border Pipeline is advantageous. It is located between the Canadian and North Dakota supplier injection points and the higher load centers to the southeast. It is important to note that natural gas was always available for Astoria Station during Winter Storm Uri in February 2021. However, while the deliverability risk of gas was low, the

price risk for the delivered gas was high. Dual fuel capability at Astoria Station would mitigate the risk of intraday pricing volatility and overall energy pricing risks that were experienced by some other utilities during the February 2021 event.

It is important to note that dual fuel capability at Astoria Station is justified regardless of any decision on Coyote Station. Dual fuel at Astoria Station addresses the risk of intra-day pricing volatility and overall energy pricing risks. The benefit of addressing these risks is apparent regardless of when or how (or even whether) Otter Tail withdraws from ownership in Coyote Station.

Otter Tail is asking for Commission approval to advance with the project with the understanding the preliminary estimated cost is [PROTECTED DATA BEGINS...
...PROTECTED DATA ENDS].

3.11 Preferred Plan is in the Public Interest

The Preferred Plan aligns with and supports Otter Tail's commitment to operate its generation facilities as efficiently as practicable while minimizing adverse effects on the environment. The Preferred Plan identifies new resources that will meet our customers' needs while maintaining flexibility and minimizing the risk of exposure to changes in financial, social, and technological factors beyond our control.

The Preferred Plan is cost-effective. It was developed with a model that integrates demand-side and supply-side resource analysis. The Preferred Plan allows our customers to realize the benefits of Otter Tail operating as a single system, which is essential to securing operating efficiencies.

The Preferred Plan satisfies the legal and regulatory requirements in our multi-state service territory. Complying with the standards and expectations administered by three Commissions can be challenging at times. Otter Tail believes that the Preferred Plan meets that challenge,

satisfying the requirements and prerogatives of each jurisdiction we serve.

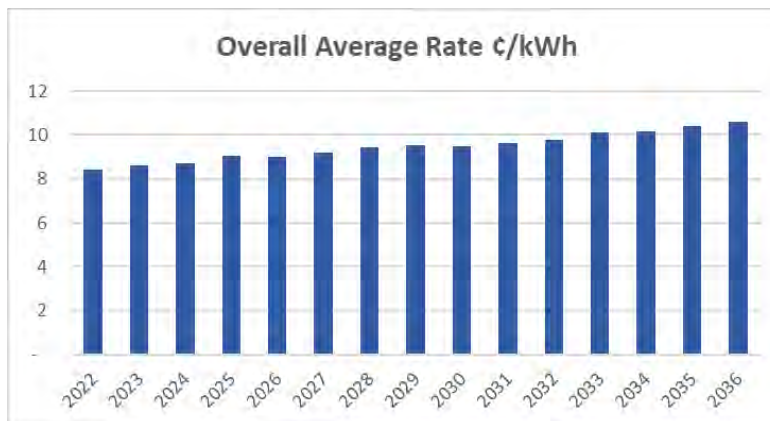
In response to discussions with stakeholders and in compliance with rules detailed in Appendix A, the Company evaluated numerous sensitivities for this resource plan and provides the resulting net present value revenue requirement and annual resource addition in Appendix I.

The Company plans for the most likely forecast, recognizing that this plan can adapt as time progresses to accommodate variations in actual load growth from the present long-range forecast. The Preferred Plan considers resilience of the system and includes renewable resources for new energy additions and energy efficiency and conservation.

3.12 Preferred Plan Rate Impacts

Figure 3-12 shows the potential estimated overall rate impact of the Preferred Plan.

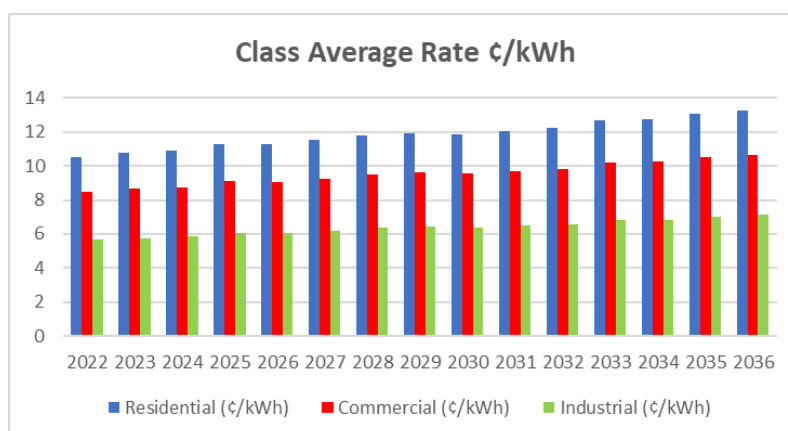
Figure 3-12: Preferred Resource Plan Estimated Rate Impacts



The data shown is the average annual rate based on the EnCompass model for the total system and represents total revenue divided by total sales. Figure 3-13 shows the potential estimated rate impacts of the Preferred Plan by customer class. A number of parameters in the operation of the model will impact rates. The EnCompass model assumes automatic rate increases each year to

meet the targeted rate of return; but in reality, recovery proceedings take place as needed and have an inherent amount of regulatory and administrative lag. The EnCompass model rate impact calculation takes into account the generation additions in the Preferred Plan but it does not include all projected capital expenditures, asset-based sales, or projected CO₂ costs.

Figure 3-13: Preferred Resource Plan Estimated Rate Impacts by Class



3.13 Five-Year Action Plan

Table 3-13 identifies specific major items that require action in the first five years of the planning period. The five-year action plan is for the years 2022-2036; however, the action items in 2021 also are provided. As shown, the major activities during the five-year period are construction of the 49.9 MW Hoot Lake Solar, addition of 150 MW of surplus interconnected solar in 2025, completion of dual fuel at Astoria in 2026, and activities related to the addition of 100 MW of surplus interconnected wind in 2027 and withdrawal from Coyote in 2028.

Table 3-13: Five-Year Action Preferred Plan Activities

Year	Activity
2021	Engineering and procurement for 49.9 MW Hoot Lake Solar. Purchase SRECs for compliance with MN Solar Energy Standard.
2022	June 1 Triennial CIP filing for 2023, 2024, 2025. Anticipated construction of Hoot Lake Solar.
2023	MISO interconnection process for 150 MW surplus solar projects. Anticipated Commercial Operation Hoot Lake Solar.
2024	Engineering and procurement for 150MW surplus solar projects. Depending on developments provide five year advance notice of termination of Coyote Station Plant Ownership Agreement by January 1, 2024.
2025	June 1 Triennial CIP filing for 2026, 2027, 2028. Construction and commercial operation of 150 MW solar projects. MISO interconnection process for 100 MW surplus wind project.
2026	Construction and commercial operation of Dual Fuel Astoria project. Engineering and procurement for 100 MW surplus wind project.

3.14 Conclusion

Otter Tail has continued to optimize existing resources to meet both customer needs and resource adequacy requirements. This strategy will continue while balancing risk and economics. Cost-effective energy efficiency and demand response is used throughout the study period. The least-cost, least-risk preferred resource plan presented here accomplishes the goal of meeting customer needs and regulatory requirements in the three jurisdictions that Otter Tail serves.

4 Current Outlook

The following list provides a brief overview of the most prevalent changes that have occurred since the 2016 Plan. These changes include the tangible effects of both regulatory and economic factors on the Company's current outlook.

4.1 Retirement of Hoot Lake Plant

As approved in the course of the 2010 IRP proceeding and related Baseload Diversification Study,⁴⁵ Otter Tail's Hoot Lake Plant retirement and decommissioning of the facility began in May 2021. Hoot Lake's capacity is not included in the current MISO Module E for Planning Year 2021-2022. As discussed in other sections of this Petition, Otter Tail will use the transmission interconnection from the retired Hoot Lake Plant for its Hoot Lake Solar facility.

4.2 Completion of Astoria Station, a 245 MW simple-cycle natural gas combustion turbine in South Dakota

The 2016 IRP indicated that Otter Tail had taken significant actions to proceed with installation of a new, 245 MW⁴⁶ simple cycle natural gas combustion turbine. Astoria Station was one of two projects, the other being the Merricourt Wind Facility, to replace the retiring Hoot Lake Plant.

Otter Tail successfully executed the Astoria Station project at costs below budget and on schedule. The generating facility became operational in February 2021. MISO has dispatched Astoria regularly since April 30, 2021, one month prior to retirement of Hoot Lake Plant, and the unit has operated well.

⁴⁵ MPUC Docket No. E017/RP-10-623.

⁴⁶ The 245 MW is a summer rating, the winter rating is 285 MW.

4.3 Completion of the 150 MW Merricourt Wind generation facility in North Dakota

Otter Tail successfully executed the Merricourt Wind Energy Facility project which became commercially operational in December 2020. This project, along with Astoria Station, serve to replace the now retired Hoot Lake Plant.

4.4 MISO Module E Resource Adequacy Obligation

Beginning in June 2013 the MISO revised its resource adequacy construct. The revisions included changing from a monthly construct based on non-coincident peak demand to an annual construct based on the MISO's coincident peak demand. In addition, the MISO created ten capacity pricing zones to ensure capacity and transmission investments are made in the right places. The change from a non-coincident construct to a summer coincident construct reduced the Company's reserve obligation since Otter Tail's summer peak is less than its winter peak. Otter Tail's summer coincident peak demand diversity factor is approximately nine percent of its summer peak demand. This means that Otter Tail's capacity requirement is equal to 91 percent of its summer peak plus transmission losses and a required reserve margin which was set at 9.4 percent for planning year 2021-2022.

MISO is currently in the design phase of a new capacity construct that seeks to set capacity requirements on a seasonal basis rather than the current annual construct. At the current time there are still many unknowns that make it difficult to model the future seasonal construct. For this reason, Otter Tail has decided to continue with the annual construct in its modeling. Also, Otter Tail includes a sensitivity with an additional 10 percent MISO capacity requirement as a reference point to consider if Otter Tail's capacity requirements were to increase due to the seasonal construct. This is an estimate of a possible impact from such a change to the construct, as it is currently in development and Otter Tail doesn't have sufficient information to precisely estimate its possible impact.

4.5 Market Conditions in the MISO

Wholesale energy prices remain low due to the increasing penetration of wind generation and continuing low natural gas prices. Annual average Locational Marginal Prices (LMP) at the OTP.OTP load zone in the day-ahead market remain low:

2018: \$27.28/MWh
2019: \$22.99/MWh
2020: \$16.60/MWh
2021 (YTD May 13): \$30.81/MWh⁴⁷

Capacity values in the MISO centralized market have remained low due to excess reserves. However, pending coal plant retirements may tighten reserve margins.

4.6 MPUC Approval of the 49.9 MW Hoot Lake Solar generation facility

Otter Tail's Hoot Lake Solar project is a solar generating facility that will be located at the site of Otter Tail's recently retired coal-fueled Hoot Lake Plant, on approximately 450 acres of Company-owned property in Fergus Falls, Minnesota. The project consists of approximately 110,000 solar panels with total capacity of 49.9 MW and expected energy output of 105,000 megawatt hours, at a projected net capacity factor of 24 percent. This project will utilize several components of the Hoot Lake Plant, including the land, existing infrastructure, and existing interconnection rights associated with the Hoot Lake Plant.

The MPUC recently approved Otter Tail's petition made pursuant to Minn. Stat. § 216B.1691 (Renewable Energy Standard Statute) and § 216B.1645 (Renewables Cost Recovery Statute).⁴⁸ In its Order, the MPUC authorized future cost recovery of 100 percent of Hoot Lake Solar's

⁴⁷ The large increase seen in 2021 was caused in large part by Winter Storm Uri.

⁴⁸ *In the Matter of Otter Tail Power Company's Petition for Approval of the Hoot Lake Solar Project*, Order Approving Petition, Authorizing Allocation of Output and Costs, Authorizing Cost Recovery, and Requiring Compliance Filings, April 29, 2021, MPUC Docket No. E-017/M-20-844.

output and costs to Otter Tail's Minnesota jurisdiction through its Renewable Resource Cost Recovery Rider.⁴⁹

4.7 Renewable Energy Objectives (REO) and Standards (RES)

Otter Tail includes a discussion on REO and RES in Appendix G. The Preferred Plan includes the addition of 100 MW of surplus interconnected wind in 2027. Otter Tail has joined the Midwest Renewable Energy Tracking System (M-RETS) and uses this system to track and report compliance with REO and RES targets. The Company fulfills its obligation to meet renewable energy objectives in both North Dakota and South Dakota to generate or procure 10 percent of annual retail sales from renewable or recycled energy.

Otter Tail assessed the appropriate resources to include in this resource plan including incremental levels of new wind that could be reasonably procured and worked into the system while maintaining reliability of service. Further, Otter Tail relied on the MISO developed Renewable Integration Impact Assessment (RIIA) study⁵⁰ to help identify inflection points associated with increasing levels of renewable generation. The RIIA study identified five risks to address as more renewables are integrated into the generation portfolio: (1) stability risk, (2) shifting periods of grid stress, (3) shifting periods of energy shortage risk, (4) shifting flexibility risk, and (5) insufficient transmission. Otter Tail sees these risks in its own resource planning and in particular views the transmission queue for new interconnection of wind as a significant hurdle to introducing new wind resources outside of utilizing surplus interconnection at existing plants. In addition to the MISO transmission queue, the EnCompass modeling does lean towards selecting solar resources.

⁴⁹ *Id.* Order point 8.

⁵⁰ MISO Renewable Integration Impact Assessment: <https://www.misoenergy.org/planning/policy-studies/Renewable-integration-impact-assessment>.

4.8 DSM and Conservation Requirements

Demand Side Management

Otter Tail contracted with Brattle in 2020 to perform a Demand Response (DR) Potential Study for Otter Tail's system. This study is included as Appendix H. To perform the study, Brattle used its LoadFlex model which was also used in Brattle's 2019 load flexibility potential study prepared for Xcel Energy. Brattle studied the potential to increase Otter Tail's existing DR portfolio along with adding new DR products to its portfolio. Brattle evaluated each DR measure dispatched against an hourly forecast of marginal costs to determine value.

At a high-level Brattle found Otter Tail to have a large existing demand response portfolio which is actively utilized. Brattle states, "OTP's existing DR capability is in the top 10 percent of U.S. IOUs." Based on 2019 EIA-861 data Brattle found Otter Tail to be ranked at the 90th percentile in Peak Reduction Capability, 95th percentile in Residential Customer Enrolled in a DR program, and 90th percentile in Non-Residential Customers enrolled in a DR program.

Technical Potential

Page 17 of Brattle's study describes Incremental Technical Potential by 2036. Brattle defines Technical Potential as, "the maximum achievable potential irrespective of cost-effectiveness. It is incremental to OTP's existing DR portfolio." Brattle identified incremental technical potential for both summer and winter seasons. Most technical potential identified was by expanding Otter Tail's existing direct load control for Commercial and Industrial (C&I) customers. Other areas of large technical potential included offering more dynamic pricing to all classes of customers. These areas include, adding critical peak pricing rates (CPP) for residential, increasing C&I customer participation in the Company's existing CPP rate, and also increasing C&I participation in Otter Tail Time of Use (TOU) rates. As a reminder, Technical Potential does not take cost-effectiveness into account.

Economic Potential

Brattle’s modeling used for the “Base Case” assumes current Otter Tail resources and a 2020 forecast of MISO energy and capacity values. For evaluation of economic potential, Brattle set incentive levels at maximum cost-effective levels. The Base Case modeling found that system conditions do not appear to support the cost-effective addition of new DR programs. Avoided generation capacity investments are the primary DR value proposition but based on current resources Otter Tail does not forecast a need for new capacity until 2033.⁵¹ Regarding Economic Potential, the Brattle study concludes:

- Generation capacity avoidance is the key driver of DR value, and it is not currently an opportunity for Otter Tail
- There may be isolated opportunities for geo-targeted distribution deferral; requires detailed analysis of distribution plan
- Time-varying rates may be desirable as an option regardless, as they provide other benefits beyond avoided costs (e.g., equity, fairness, facilitating electrification).

Brattle also modeled a “High Value Sensitivity Case.” The High Value Sensitivity Case assumes a need for capacity on the Otter Tail system and assumes higher capacity prices. This scenario was not based on any Otter Tail forecast, but instead an analysis to what strategies Otter Tail would target if there was a capacity need and if capacity prices were higher. Based on these assumptions the analysis did identify several cost-effective new DR opportunities. The opportunities identified mostly consisted of Otter Tail utilizing its CPP and TOU rate offerings to enroll a greater number of large and medium C&I customers. Lesser opportunities identified included expansion of its large C&I interruptible program and CPP for residential customers. While the Brattle study did not identify any cost-effective DR opportunities, the Company continues to have a strong commitment to DR. The Company understands its existing and robust DR portfolio is important to system planning and providing low-cost energy and capacity to its

⁵¹ See Table 2-2, Line 9.

customers. Otter Tail continues to actively market its DR programs to its customers to recruit new customers, and to also maintain the existing customers' controllable loads.

Otter Tail is excited about the future possibilities of DR. The Company's ongoing multi-year Automated Metering Infrastructure project combined with its plan to update its aging load management system will prepare the Company for the future when it will better equipped to strategically control DR loads and thoroughly evaluate and offer additional dynamic pricing plans.

Conservation

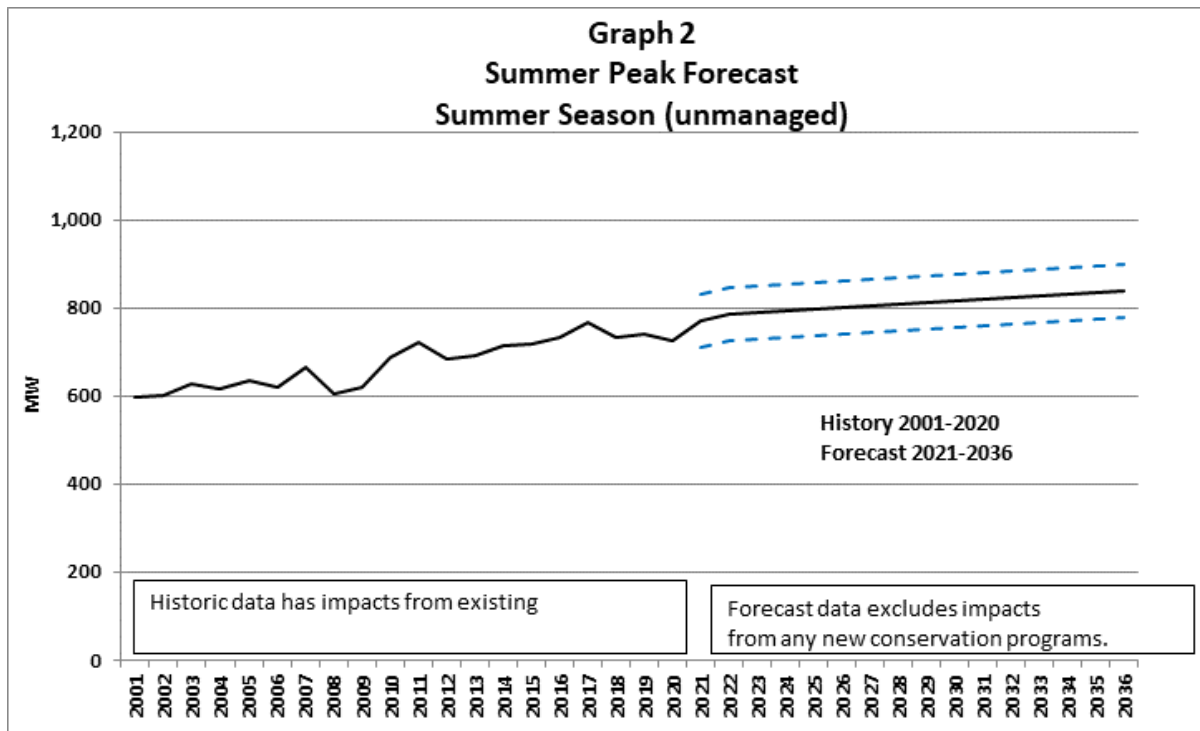
The Minnesota Next Generation Energy Act of 2007 established a goal for all Minnesota electric and natural gas utilities of achieving energy savings equal to one percent of retail energy sales. In 2013, the energy savings goal was modified to an annual goal of 1.5 percent of retail energy sales. The goal is based on a rolling three-year average of weather normalized historical retail sales.⁵² On July 1, 2019, the Company made its 2021-2023 Minnesota CIP Triennial filing with the Minnesota Department of Commerce's Division of Energy Resources. The CIP plan as filed complied with all regulatory requirements, including annual energy savings goals at or above 2.4 percent. This resource plan reflects an average annual energy savings of 1.86 percent, which exceeds the newly established 1.75 percent goal in the Minnesota Energy Conservation and Optimization Act of 2021. In November 2020, the SD PUC approved the Company's 2021-2023 Energy Efficiency Partnership Triennial Plan (EEP). The EEP set forth a number of conservation projects with an estimated 4.6 million kWh in annual savings. As noted above the programs benefit customers in all three states served by Otter Tail by reducing our energy needs and reducing the costs of providing service to our customers.

⁵² On May 25, 2021, Minnesota Governor Tim Walz signed the Energy Conservation and Optimization (ECO) Act of 2021. This legislation modernized Minnesota conservation policy by adding new opportunities and setting higher conservation goals. The ECO Act increased the annual energy savings goal for public electric utilities, from 1.5 percent of retail sales, to 1.75 percent of retail sales, based on a rolling three year average of weather normalized sales.

4.9 Projected Load and Capability

Otter Tail's submits its energy and demand forecasts and forecast documentation used in its 2022-2036 Plan as part of this filing.⁵³ Otter Tail's forecast documentation consists of a detailed summary of the processes used to create its energy and peak demand forecasts. Figure 4-1 below shows the historical and projected non-coincident summer peak demand by season through the study period to 2036.

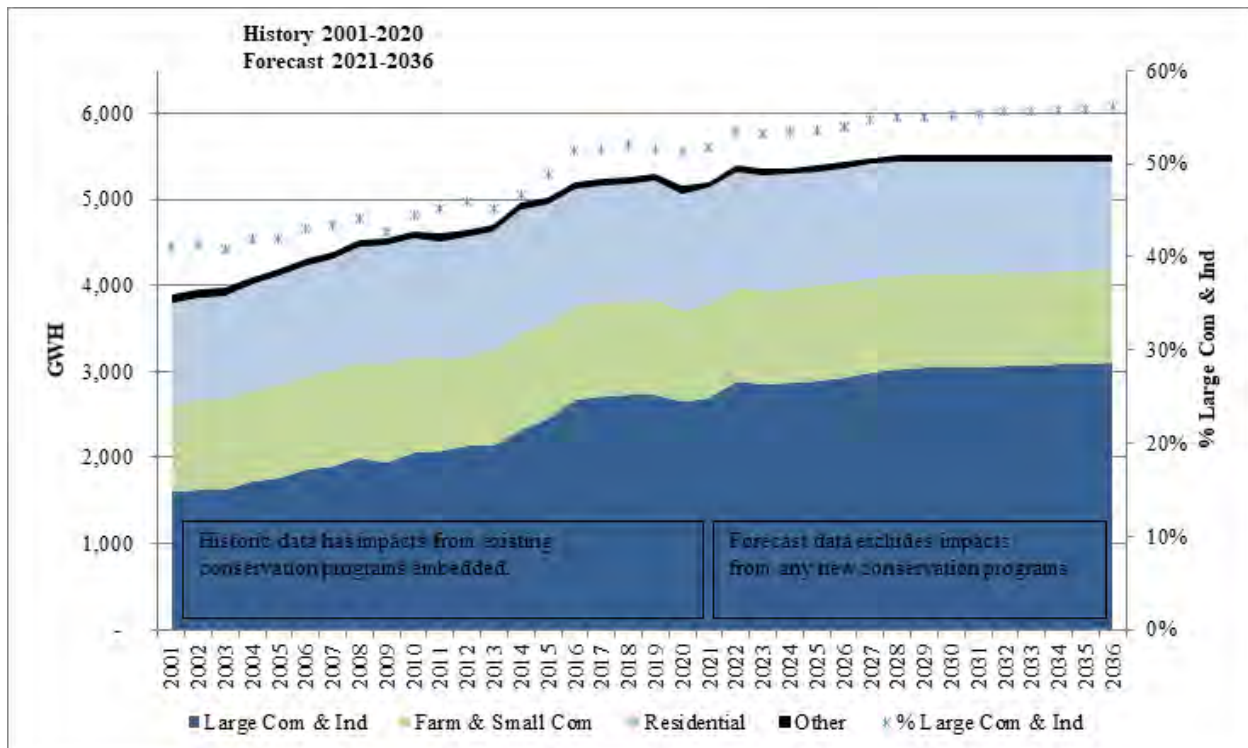
Figure 4-1: Historic and Forecast Unmanaged 50/50 Non-coincident Summer Peak Demand



⁵³ The energy and demand forecast is included in our September 1, 2021 IRP filings for the ND PSC and SD PUC. We previously provided the MPUC the energy and demand forecast on August 2, 2021 as part a pre-filing obligation. See, *In the Matter of Otter Tail Power Company's 2022-2036 Resource Plan*, Energy and Demand Forecast Models Information Filing, August 2, 2021, MPUC Docket No. E017/RP-21-339.

Figure 4-2 shows historic and forecast annual energy requirements by customer class. The historic and forecast values have existing conservation programs embedded, whereas the forecasted values exclude new conservation programs. Otter Tail’s energy requirements are driven equally by residential and commercial customers, creating an annual load factor of approximately 70 percent. Otter Tail projects that by the end of the study period, large commercial and industrial loads will increase to nearly 60 percent of the Company’s retail sales.

Figure 4-2: Historic and Forecast Annual Retail Sales Before EE (Losses are not included)



Otter Tail assesses capacity need through evaluation of the Company’s load and capability under Module E of the MISO Resource Adequacy Construct. Capacity need is calculated by taking the difference between the planning reserve obligation, which is the coincident peak demand forecast plus the planning reserve margin and transmission losses, and the sum of accredited generating capability, net transaction capacity, and demand side resources.

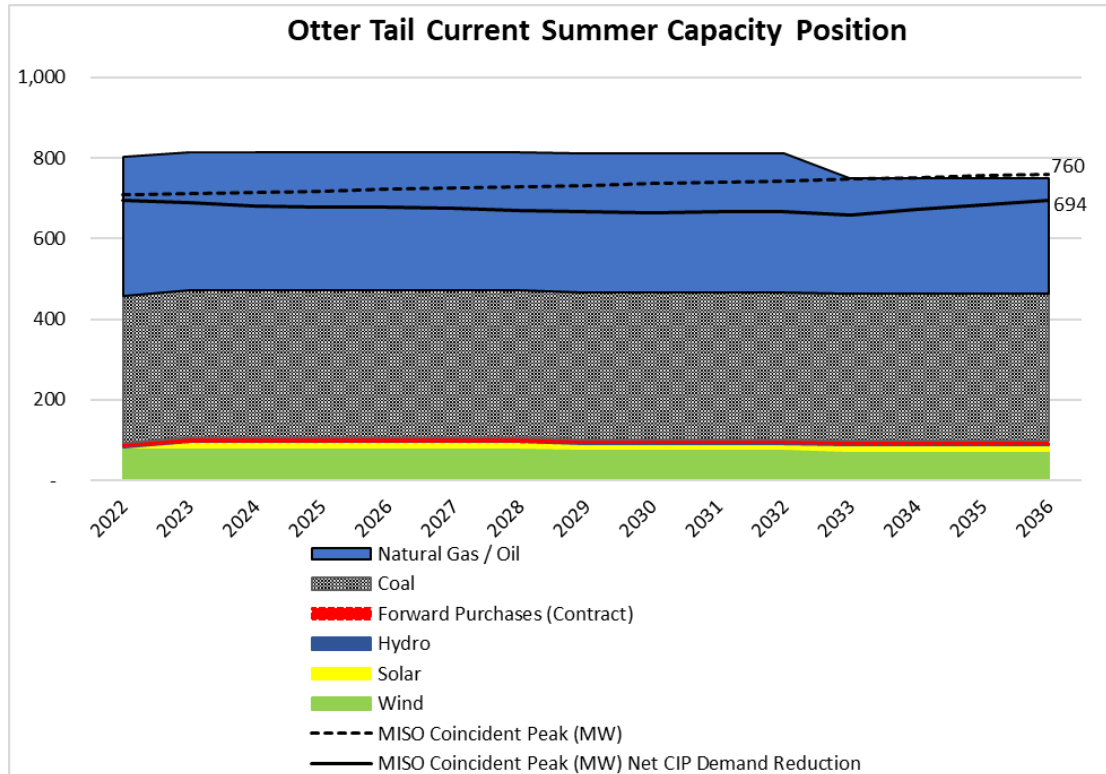
PUBLIC DOCUMENT – NOT PUBLIC (OR PRIVILEGED) DATA HAS BEEN EXCISED
Resource Plan 71

The Company's projected summer capacity needs under Module E requirements are shown in Tables 4-1 and represented graphically in Figure 4-3. The MISO requires the Company to designate capacity to meet the 50th percentile peak demand forecast plus reserves. The supply-side resource stack is composed of capacity that is converted to zonal resource credits (ZRCs) for resources that are universally deliverable within the MISO footprint (or aggregate), as well as for resources that are locally deliverable to Otter Tail's load, and any bilateral transactions of ZRCs.

Table 4-1: Summer 2022-2036 Base Case Projected Load and Capability Prior to Preferred Resource Plan

Line No.		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
1	Forecasted Load	672.0	675.6	679.2	682.8	686.4	690.0	693.6	697.3	700.9	704.6	708.3	712.0	715.7	719.5	723.2
2	Transmission Losses	39.0	38.8	38.6	38.6	38.6	38.6	38.5	38.4	38.4	38.5	38.6	38.4	39.0	39.5	40.0
3	Net CIP Demand Reduction	12.3	23.1	32.8	38.7	44.7	51.4	58.2	64.9	70.9	74.2	77.4	89.2	80.1	72.6	66.2
4	Total Forecasted Load	698.8	691.4	685.1	682.7	680.3	677.1	674.0	670.8	668.4	668.9	669.5	661.2	674.6	686.3	697.1
5	MISO Coincident Factor	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%	91%
6	Coincident Load	635.9	629.2	623.4	621.3	619.1	616.2	613.3	610.4	608.2	608.7	609.2	601.7	613.9	624.6	634.3
7	MISO Planning Reserve	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%
8	Total Obligation	695.6	688.3	682.0	679.6	677.3	674.1	671.0	667.8	665.4	666.0	666.5	658.2	671.6	683.3	694.0
9	Coal	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5	365.5
10	Natural Gas / Oil	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	344.3	286.7	286.7	286.7	286.7
11	Wind	82.3	82.3	82.3	82.3	82.3	82.3	82.3	78.7	78.7	78.7	78.7	74.0	74.0	74.0	74.0
	Solar	0.0	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3	12.3
	Hydro	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
12	Purchased*	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
13	Load Management	16.0	16.0	16.0	17.0	18.0	19.0	20.0	21.0	22.0	23.0	24.0	25.0	26.0	27.0	28.0
14	Total ZRCs	819.1	831.4	831.4	832.4	833.4	834.4	835.4	832.8	833.8	834.8	835.8	774.4	775.4	776.4	777.4
<i>*Co-generation, Co-Op Shared, and WAPA</i>																
15	Net (Line 14 - Line 8)	123.5	143.0	149.3	152.7	156.1	160.2	164.4	164.9	168.3	168.8	169.3	116.2	103.9	93.2	83.5

Figure 4-3: Summer 2022-2036 Capacity Needs Prior to Preferred Plan Information



Otter Tail is a winter peaking utility but for modeling purposes bases its capacity resource need on the summer season as required by the MISO resource adequacy rules. Although the summer season drives capacity needs, the entire year is evaluated for the Company's energy needs. As shown, the Company has a small capacity deficit beginning in the summer of 2033 corresponding to the current end of life for certain peaking plant facilities.

5 Plan Development

5.1 Plan Objectives

In its Order concerning Otter Tail’s initial resource plan filing in 1992, the MPUC stated that it considers the characteristics of the available resource options and the proposed plan as a whole. In addition, the MPUC provided evaluation considerations that Otter Tail has used to guide its total system resource plans. This framework evaluates resource plans on their ability to: (1) maintain or improve the adequacy and reliability of utility service, (2) keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints, (3) minimize adverse socio-economic effects and adverse effects upon the environment, (4) enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations, and (5) limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control. Otter Tail keeps these objectives in mind while selecting resource options that will provide adequate, reliable, and reasonably priced electric power for its customers.

5.2 Planning Tools

Otter Tail uses EnCompass to perform capacity expansion planning. The EnCompass model optimizes future resource selections while ensuring capacity and energy needs are met within the bounds set. The model selects a least-cost resource plan based on the net present value of revenue requirements (NPVRR) of all possible alternatives.

This will be the first complete IRP that Otter Tail has filed using the EnCompass modeling software. Prior to EnCompass, Otter Tail used Strategist for all capacity expansion modeling. The decision to begin the transition from Strategist to the newly developed EnCompass software occurred in 2018. EnCompass was selected based on a multitude of factors including functionality, ease of use, and cost.

5.3 Planning Process

Otter Tail's planning process is an iterative progression that includes the following primary steps:

- 1) Modeling the Company's system using EnCompass – This step requires representing all components of the Company's existing fleet of generation, transactions, DSM programs, and financial structure. This is an ongoing process, and many inputs are updated either annually or as changes occur.
- 2) Performing capacity expansion runs – This step requires executing the capacity expansion model to rank plans of feasible combinations of alternatives under specified constraints. The capacity expansion tool ranks the plans according to least cost. Careful review of model results for verification and validation and reasonability is essential.
- 3) Developing a preferred resource plan – As noted above, the Company aims to select a least cost/least risk preferred plan that complies with all relevant statutes and rules, resource adequacy obligations, renewable energy objectives and standards, and established environmental regulations. Additionally, the plan is weighed against scenarios that evaluate regulatory and market uncertainties in the planning horizon. The Preferred Plan protects the customer and the Company from unnecessary exposure to risk, while maintaining flexibility and commitment to providing electricity in an economical, reliable, and environmentally responsible manner.

6 Preferred Resource Plan

The Preferred Plan identifies resources that could be used to serve customer loads over the entire 2022 – 2036 resource planning period. It also details Otter Tail’s expected activities during the first five years of the planning period. This section first discusses details associated with the Preferred Plan. The Company’s Preferred Plan, presented in Table 6-1, shows the resource additions anticipated for the planning period.

Table 6-1: Preferred Plan Resource Summary

Resource Plan (MW) - Based on Nameplate ratings	
2022	
2023	
2024	
2025	150 MW Surplus Interconnection Solar
2026	Dual Fuel at Astoria
2027	100 MW Surplus Interconnection Wind
2028	Anticipated Withdrawal from Coyote 149 MW
2029	
2030	
2031	
2032	
2033	50 MW Replacement Solar
2034	
2035	
2036	

Table 6-1 shows the addition of 150 MW of surplus interconnection solar in 2025 followed by the completion of dual fuel capability at Astoria Station in 2026, 100 MW of surplus interconnection wind in 2027, withdrawal from our ownership interest in Coyote Station in 2028, and the addition of 50 MW of replacement interconnection solar in 2033. The solar resource selected in 2025 qualifies for a 26 percent investment tax credit (ITC.) The additional wind and solar resources selected in 2027 and 2033 are not expected to qualify for any tax incentives according to the rules as they are written today.

Due to the current congestion in the MISO interconnection queue, transmission interconnection costs for new resources are very high and impact the economic feasibility of adding new generation units of all types. Recently the MISO has provided two alternative methods for

interconnecting new resources without having to go through the traditional queue process. These two new interconnection methods are replacement interconnection and surplus interconnection. Replacement interconnection resources reuse the existing interconnection rights of a resource that is retiring. Existing interconnection rights for an existing resource that is retiring have a shelf-life of three years. If not used within that time frame the interconnection rights expire. This is the approach that Otter Tail used for the Hoot Lake Solar project. Surplus interconnection resources are built alongside an existing resource and share the interconnection rights. The total output of both resources cannot exceed the existing interconnection amount of the original unit.

Figure 6-1 shows the reserve obligations and the capacity resources of the Preferred Plan.

Figure 6-1: 2022-2036 Capacity Resources and Reserve Obligation for Preferred Plan (MW)

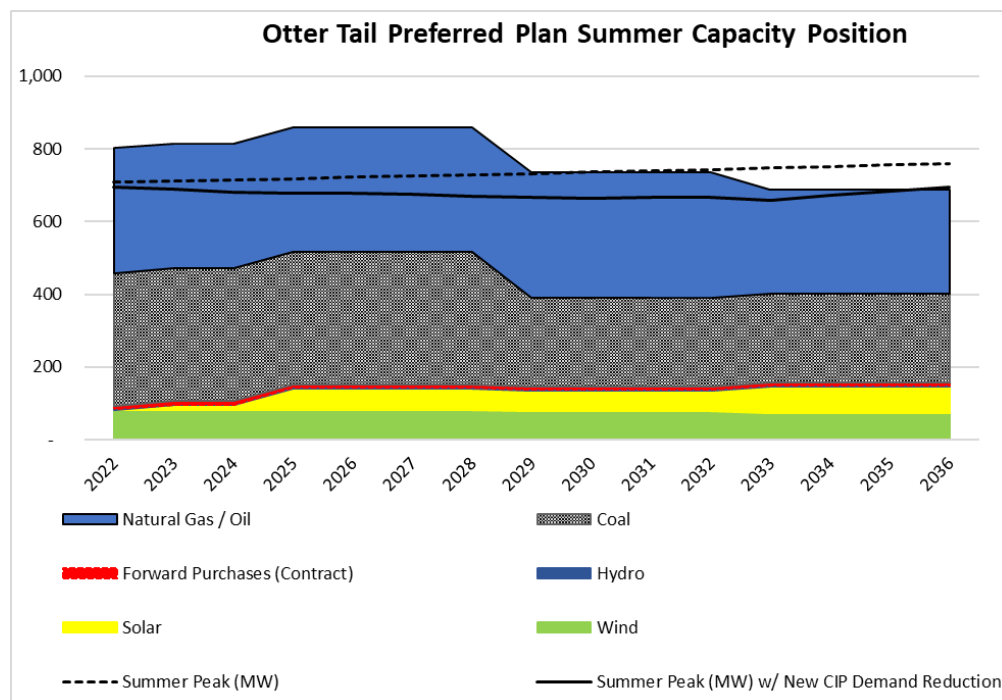


Figure 6-2 shows the energy sources in the Preferred Plan by fuel type with externalities applied, and Figure 6-3 shows the energy sources without externalities applied. Conservation contributes a significant reduction to the Company's future energy needs (as depicted in the difference between the solid and dotted black lines), as do wind generation, continued market opportunity purchases, and natural gas generation.

Figure 6-2: 2022-2036 Energy Resources and Energy Requirements for Preferred Plan with Externalities (GWh)

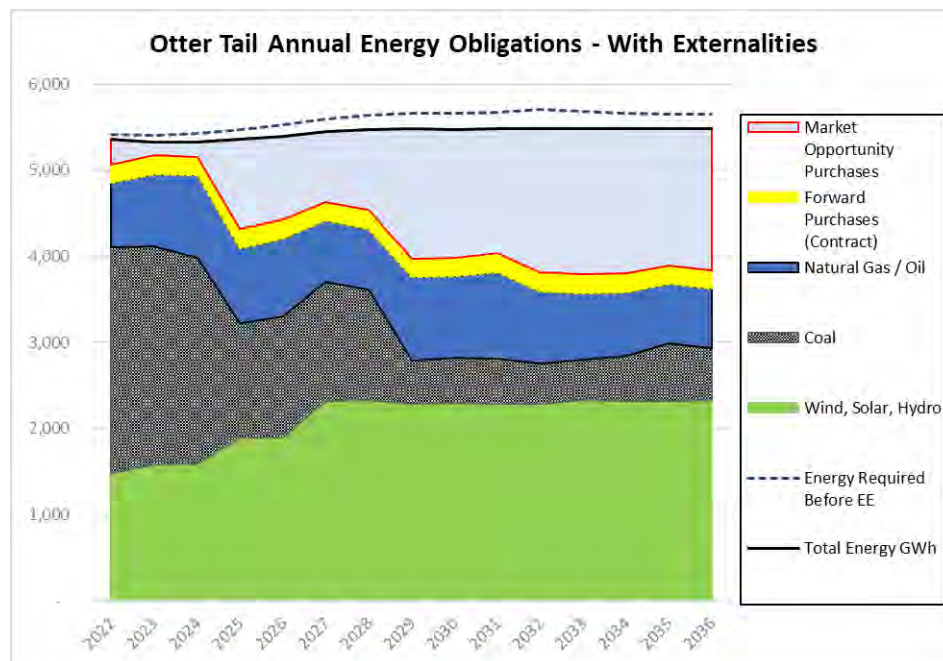
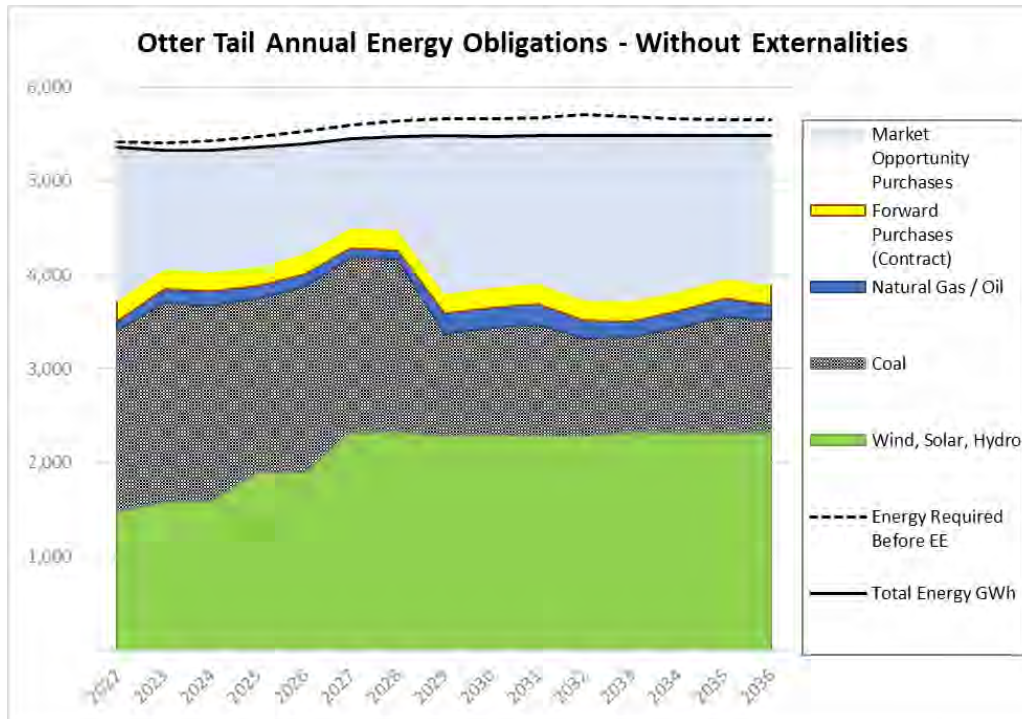


Figure 6-3: 2022-2036 Energy Resources and Energy Requirements for Preferred Plan without Externalities (GWh)



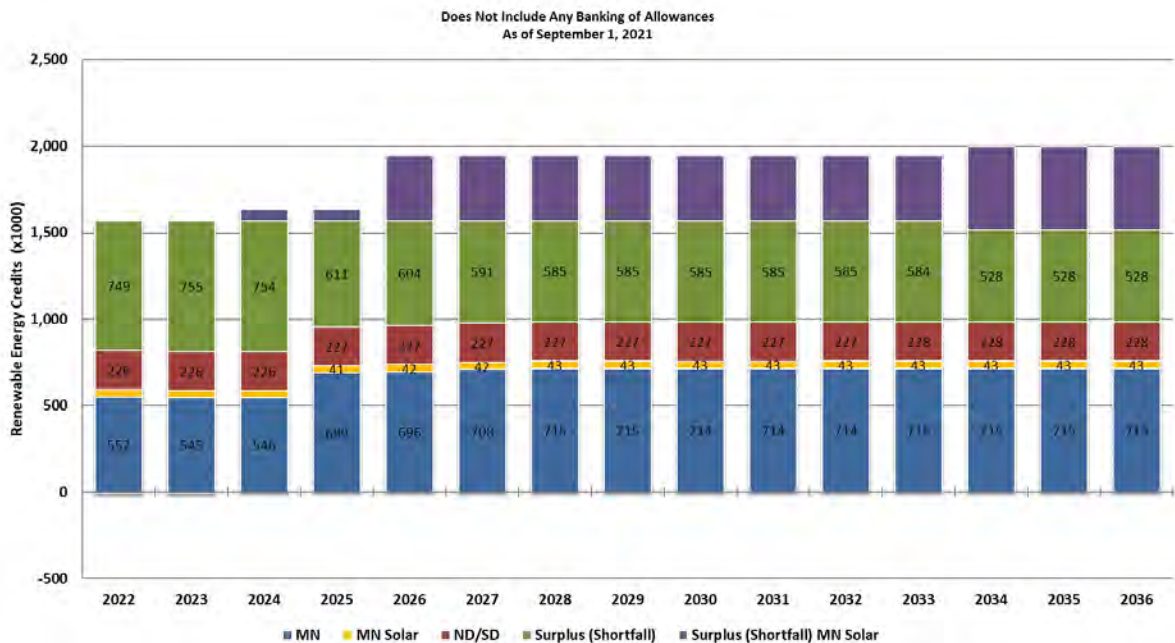
6.1 Preferred Resource Plan Description

Otter Tail's Preferred Plan in the externality scenario has a present value of societal cost (PVSC) of \$2.91B in 2022\$. The Otter Tail Preferred Plan in the zero-externality scenario has a present value of utility cost (PVUC) of \$2.48B in 2022. Otter Tail believes that this plan reduces risk for customers in all three of its jurisdictions. The plan takes advantage of available federal tax credits that incentivize carbon free generation while also maintaining a level of dispatchable generation comparable with the Company's historic levels.

6.2 REO/RES/SES Compliance

Figure 6-4 represents the planned compliance with REO/RES regulation in all jurisdictions under the Preferred Plan. Otter Tail expects to have surplus renewable energy credits throughout the study period. The estimate of the cost/benefit of RES compliance is contained in Appendix G.

Figure 6-4: Compliance with REO/RES Regulation in All Jurisdictions



6.3 Load Growth Scenarios

The Company included two load growth sensitivities to capture the potential impact of significant load growth across its system. The first sensitivity increased total system sales and demand by 10 percent and the second sensitivity used an increase of 25 percent. These two sensitivities are included as Sensitivities *Q* and *R* in Appendix I. This was done in the EnCompass model by applying a multiplying factor to the base case sales and demand forecast time series inputs. The Company is aware of potential new large loads that are not included in the base forecast due to uncertainty of the loads at this time. One of these loads is the new, “super-large load” customer referenced above.⁵⁴ We model sensitivities with large amounts of load growth to address load growth uncertainty.

⁵⁴ Otter Tail’s request for approval of an electric service agreement for this load is pending before the ND PSC in Case No. PU-21-366.

6.4 Environmental Externalities

Otter Tail includes all modeling runs with and without externalities in Appendix I and compliance with specific dockets is provided in Appendix A.

6.5 Emissions and Greenhouse Gas Reduction Goal

The Preferred Plan (with externality values applied) shows a reduction in emissions from Otter Tail's historical levels. Figure 6-5 shows the estimated emissions for SO₂ and NO_x. Figure 6-6 shows the estimated emissions for CO₂. Figure 6-7 shows the estimated emissions for mercury. The values to the left of the solid black line indicate historical levels of emissions (2005 to 2020) for Otter Tail-owned units. The values to right of the solid black line (2022 to 2036) indicate the estimated emissions of the Preferred Plan for Otter Tail-owned units.

Figure 6-5: SO₂ and NO_x Emissions

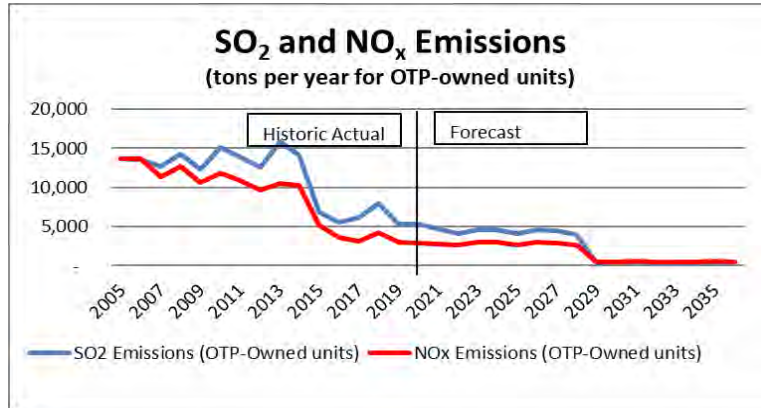


Figure 6-6: CO₂ Emissions

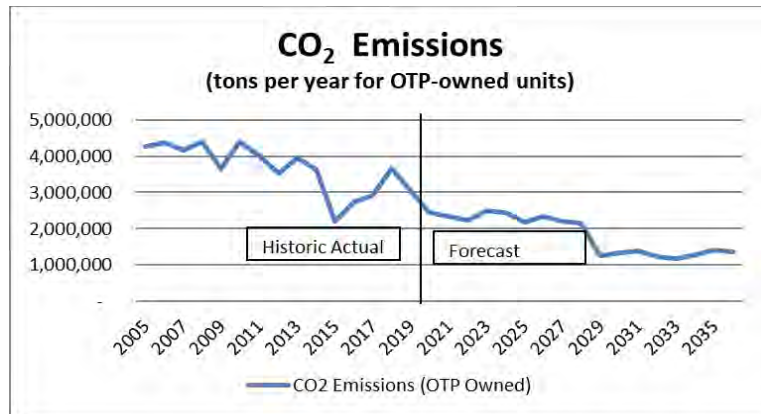
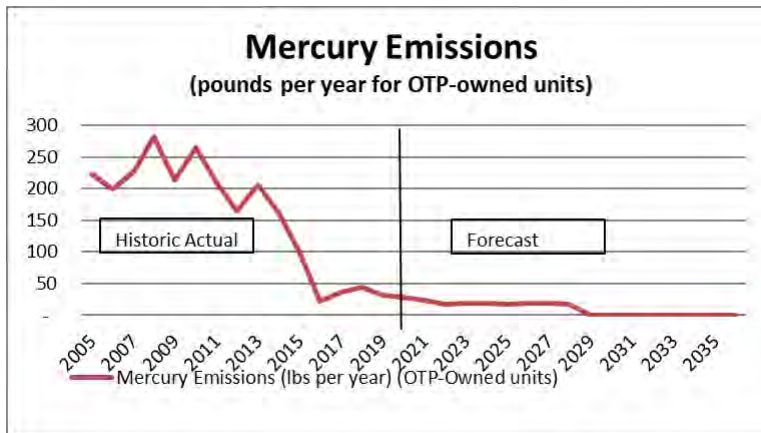


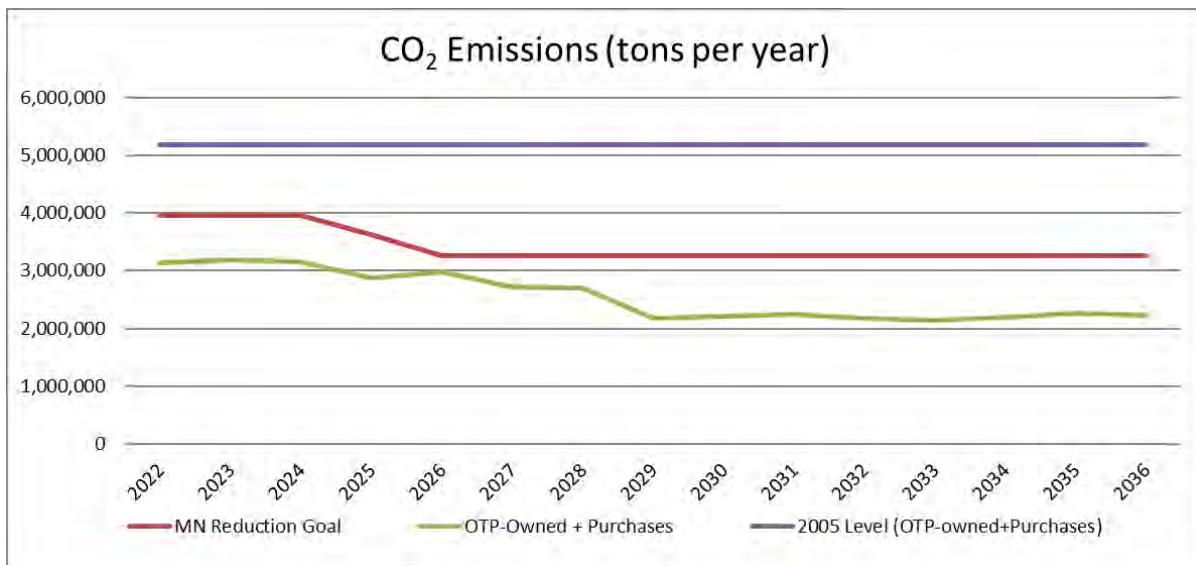
Figure 6-7: Mercury Emissions



Minnesota Statutes §216H.02 states that “It is the goal of the state to reduce greenhouse gas emissions to a level of at least 15 percent below 2005 levels by 2015, to a level at least 30 percent below 2005 levels by 2025, and to a level at least 80 percent below 2005 levels by 2050.” Otter Tail’s Preferred Plan meets the CO₂ reduction goal for Otter Tail’s system.

Figure 6-8 shows the Preferred Plan CO₂ emissions and how it compares with the CO₂ reduction goal and the 2005 level of CO₂ emissions. The 2005 level is estimated at 5,179,034 tons of CO₂ (4,270,780 tons from Otter Tail-owned units and 908,254 tons assumed for purchased energy based on the 2005 MRO west regional average CO₂ /MWh of 1,821.64 lbs). For market purchases in this resource plan, 1,098.40 lbs. of CO₂ are applied to each MWh of energy purchased (based on the eGRID2019⁵⁵ MRO west sub regional emissions rate).

Figure 6-8: Preferred Plan CO₂ Emissions and the CO₂ reduction Goal



⁵⁵ Available at: https://www.epa.gov/sites/production/files/2021-02/documents/egrid2019_summary_tables.pdf.

6.6 Oil Peaker Evaluation Sensitivities

Otter Tail includes three oil peaker plants in its resource plan: (1) at Jamestown, North Dakota, Units 1 and 2; and (2) Lake Preston, South Dakota. The peaking units are currently scheduled to be retired in 2033, as approved in Otter Tail's 2020 Annual Depreciation Filing,⁵⁶ in all modeling runs.

When Otter Tail made the decision to install the Lake Preston unit in 1978 and Jamestown Units in 1976 and 1978, the primary reason was not for additional generation; these units were installed in lieu of building a second high voltage transmission line (backup/supplemental source) into each of these areas. The Lake Preston unit is located in the Hetland Junction – Toronto load pocket (15 MWs), which, until recently, had a single transmission source, a 115 kV line from Big Stone, South Dakota to Canby, Minnesota. The Jamestown units are both located in the Jamestown load pocket (70 MWs), which currently has a single high voltage source, a 345 kV line from Center through Jamestown to the Bison station near Mapleton, all in North Dakota. Today, the Jamestown Units continue to serve the purpose for which they were originally installed, to provide backup local load serving capability to the respective load pockets in the event there is a loss of the high voltage transmission source currently serving the load. The Lake Preston Unit continues to provide similar backup source for its area; however, due to an increase of load in the area, Otter Tail recently installed a second transmission source that can also serve as a backup source, providing critical local transmission reliability for this load pocket.

If Otter Tail decides to retire the Jamestown Units, a high voltage transmission line will need to be built prior to retirement of the unit in order to continue to provide reliable service to its load pocket. Otter Tail has evaluated two different build-out options for this load pocket. The costs of building new transmission into the Jamestown load pocket range from \$11.25 - \$14.7 million.

⁵⁶ *In the Matter of the Petition of Otter Tail Power Company for Approval of its 2020 Annual Review of Depreciation Certification*, Order Approving Petition with Modifications, April 21, 2021, MPUC Docket No. E-017/D-20-703.

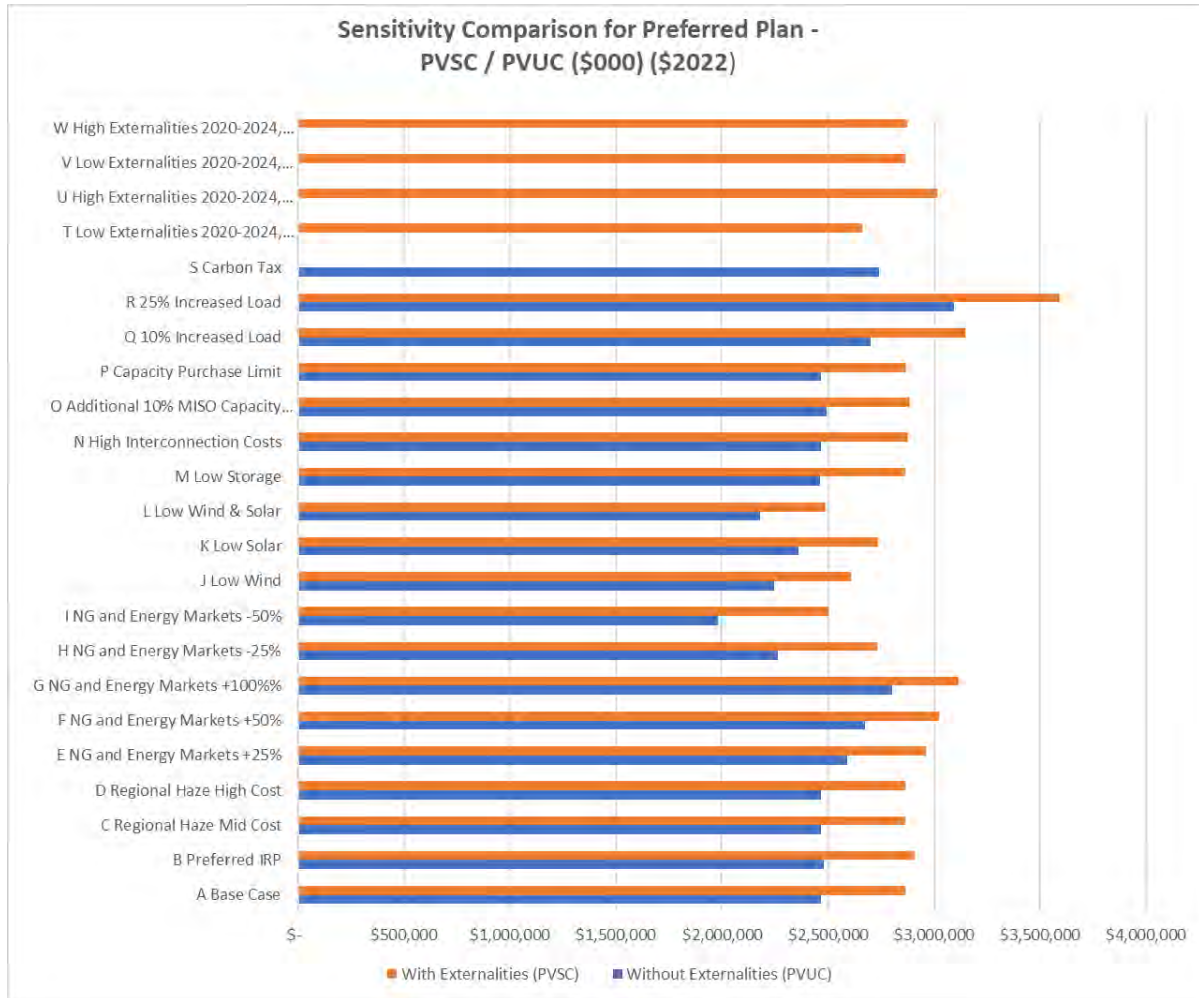
Otter Tail will be assessing the retirement of the Lake Preston unit now that a secondary transmission source has been installed in the area. The process of retiring the Lake Preston Unit will require a study and approval by MISO to determine if any additional equipment will be needed to support the area in the event the Lake Preston Unit is retired. At the same time Otter Tail will also assess the resiliency value Lake Preston continues to provide as a dispatchable generation resource with onsite fuel storage.

Generally, these units are viewed as low-cost to maintain in the fleet of resources: they are not capital or expense intensive, they rarely operate, and they are available for service if needed. However, as these units age, even though they are rarely called into service, at some point it will be prudent to plan for their retirement.

6.7 Additional Sensitivity Scenarios

Otter Tail evaluated additional sensitivities. They included variations in wind prices, solar prices, natural gas prices, energy market prices, and CO₂ reductions. A comparison of the PVSC/PVUC for all sensitivities we evaluated based on Otter Tail's Preferred Plan, which includes withdrawal from Coyote Station in 2028, is provided in Figure 6-9. Each sensitivity is shown in orange (the PVSC) and blue (PVUC). Numeric detail of the NPVRR results of these sensitivities, as well as resources selected, are provided in Appendix I.

Figure 6-9: Sensitivity Comparison (PVSC/PVUC)



7 Conclusion

Otter Tail Power Company's mission is to produce and deliver electricity as reliably, economically, and environmentally responsibly as possible to the balanced benefit of customers, shareholders, and employees and to improve the quality of life in the areas in which we do business. The Preferred Plan provides the best course of action for the Company to achieve these objectives. The Preferred Plan also provides flexibility to react to legislative, regulatory, and market changes that will occur during the next several years.

Specifically, we request authority for the following:

- the addition of dual fuel capability at Astoria Station;
- the addition of 150 MW of solar generation in 2025; and
- the commencement of the process of withdrawal from our 35 percent ownership interest in Coyote Station, with an anticipated completion date by the end of 2028.

The Preferred Plan improves environmental performance through implementation of DSM, renewable resources as well as keeping customer rates low. The resource plan satisfies the regulatory and statutory requirements of all three jurisdictions that it serves.

7.1 Preferred Plan is in the Public Interest

The Company is committed to operating its generation facilities as efficiently as practicable while minimizing adverse effects on the environment. New resources have been selected that will meet the Company's needs while maintaining flexibility and limiting the risk of exposure to changes in financial, social and technological factors beyond its control. The plan maintains flexibility during a period of much uncertainty in the future of the electric industry. In addition, customers will be provided with increased opportunities to improve their energy efficiency.

The Preferred Plan maintains and enhances system resiliency, the importance of which has been demonstrated by events such as the recent Winter Storm Uri. Specifically adding dual fuel

capability at Astoria Station substantially increases the level resilient generation provided by Otter Tail's generation portfolio during all seasons.

This resource plan satisfies the legal and regulatory requirements in the multi-state service territory and allows Otter Tail and its customers to realize the benefits of operating as a single system while recognizing the differing state requirements.

Our preferred resource plan will result in Otter Tail generating approximately 35 percent of our energy from renewables by 2022. The Preferred Plan, which includes average annual energy savings of 1.86 percent, authority to pursue withdrawal from Otter Tail's ownership in Coyote effective at the end of 2028, 150 MW of surplus interconnection solar in 2025, the addition of dual fuel capabilities at Astoria Station in 2026, 100 MW of surplus interconnection wind in 2027, and 50 MW of replacement interconnection solar in 2033, satisfies all rules and requirements of each jurisdictions statutes and provides a clear concise report to interested parties of what Otter Tail intends to do to satisfy customer needs in the near term, and identifies the resources the Company is considering for viable options for the long term.

7.2 Socio-Economic Impacts of the Preferred Plan

The Preferred Plan is a least cost/least-risk plan that meets all statutory and regulatory requirements while providing reliable and affordable electricity to customers. The Preferred Plan supports economic development in the states we do business by keeping costs low and reliability high for commercial and industrial customers so that those customers can invest in greater productivity and growth. Likewise, Otter Tail keeps costs low and reliability high for the residential consumer, recognizing that electricity is a fundamental input to the overall health, welfare, and productivity of society.

The resource additions in the Preferred Plan will create construction jobs to develop Hoot Lake Solar and other generation resources. We acknowledge that our withdrawal from ownership in Coyote Station under the Preferred Plan has the potential for adverse socio-economic impacts for

employees working at Coyote Station, the adjacent mine, and the community in and around Beulah, North Dakota. The Preferred Plan provides opportunities to mitigate those potential impacts.

The Preferred Plan will foster greater awareness and participation in energy efficiency in the homes and businesses the Company serves, helping to meet future energy needs, and avoiding the addition of more expensive generation alternatives. Under this plan the Company will continue to develop an effective demand-side management portfolio, a successful collaboration among Otter Tail and residential, commercial, and industrial customers. These programs provide customers with economic rates that allow them to be more productive and invest in the regional economy while providing load shifting or shedding capability in times of emergency.

In summary, in terms of socio-economic impact the Preferred Plan provides cost-effective, reliable electricity to all classes of customers, preserves and creates jobs in the utility industry, and reduces emissions, all while being responsive to the varied concerns of our stakeholders. Greater detail regarding impacts of specific projects within the plan will be addressed as those projects are developed.

7.3 Five-Year Action Plan

The Preferred Plan will require considerable activity within the next five years to bring about the resources previously approved and those selected in the plan; these significant activities are provided in greater detail in Section 2 above and throughout the Petition. Table 7-1 identifies some of the more major activities and the approximate timelines for those activities. Some of these activities are already underway. There are many other related activities that will be taking place to support the major items identified in the table that will involve many stakeholders, regulatory agencies, and interested parties.

Table 7-1: Five-Year Action Preferred Plan Activities

Year	Activity
2021	Commence engineering and procurement for 49.9 MW Hoot Lake Solar Purchase SRECs for compliance with MN Solar Energy Standard
2022	June 1 Triennial CIP filing for 2023, 2024, 2025. Anticipated construction of Hoot Lake Solar. Seek sale of Coyote Station ownership interest.
2023	MISO interconnection process for 150 MW surplus interconnection solar. Anticipated commercial operation of Hoot Lake Solar.
2024	Engineering and procurement for 150MW surplus interconnection solar projects. Depending on developments provide five year advance notice of termination of Coyote Station Plant Ownership Agreement by January 1, 2024.
2025	June 1 Triennial CIP filing for 2026, 2027, 2028, Construction and commercial operation of 150 MW surplus interconnection solar projects. MISO interconnection process for 100 MW surplus interconnection wind project.
2026	Construction and commercial operation of Dual Fuel Astoria project. Engineering and procurement for 100 MW surplus interconnection wind project.