

# Otter Tail Integrated Resource Plan (2021) and Supplemental Integrated Resource Plan (2023) Review and Analysis

*Prepared for:*

NORTH DAKOTA PUBLIC SERVICE  
COMMISSION  
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**TABLE OF CONTENTS**

EXECUTIVE SUMMARY ..... 1

INTRODUCTION/BACKGROUND..... 3

APPLICABLE STATUTES AND RULES..... 4

    Compliance with ND PSC Resource Plans..... 4

LOAD FORECASTING..... 5

    Load Forecast Accuracy Values..... 5

    Planning Reserve Margin..... 6

RESOURCE AND PROJECT REVIEW ..... 8

    Load Following Generation ..... 8

    Surplus/Replacement Transmission Availability ..... 8

    Renewable Options.....10

    Updated Renewable Pricing .....11

    Accreditation for Existing and New Resources .....11

MODELING AND EXPANSION PLANS .....13

    Planning Reserve Margin Update.....13

    Coyote Station Retirement Assumption.....13

    Production Cost Runs .....13

    Net Present Value of Revenue Requirements Period .....14

    Spot Market Interaction .....14

    Reliance on Market Purchases .....15

    Scenario Analysis .....16

PREFERRED PLAN.....19

    Extreme Weather Modeling/Reliability Modeling .....23

CONCLUSION/RECOMMENDATIONS .....26

APPENDIX A – SUPPLEMENTAL IRP PREFERRED PLAN

APPENDIX B – SCENARIO OUTPUT

APPENDIX C – OTTER TAIL SENSITIVITY SUMMARY

## EXECUTIVE SUMMARY

This report presents to the North Dakota Public Service Commission (ND PSC) the findings of CDG Engineers' (CDG) comprehensive review of Otter Tail Power Corporation's Integrated Resource Plans (IRPs) in response to the ND PSC's commitment to responsible energy management and regulation. The review encompasses both the 2021 IRP and the 2023 Supplemental IRP and makes several recommendations.

The analysis highlights several key findings and recommendations:

**Alternate Least-Cost Preferred Plan:** CDG does not recommend the Otter Tail Preferred Plan because it does not reflect the least cost plan and would be impacted by the other recommendations in this report. CDG recommends that the ND PSC request that Otter Tail modify its Preferred Plan to remove solar additions in the five-year action plan period (2024-2028), remove the plan to take the initial steps of adding 200 MW of wind generation in the 2029 timeframe, model the system with Coyote Station through 2040, and after 2029 modify its Preferred Plan to more closely align with the alternative least-cost plan referred to as the ND Alternate Preferred Plan. This plan does not add any new unplanned resources in the five-year action plan period. The plan also provides a lower NPVRR from 2023-2037 by \$57 Million and longer-term reliability compared with Otter Tail's Preferred Plan.

**Surplus Energy Restrictions:** Otter Tail models surplus transmission available to new resources by collocating with existing resources, but restricts this surplus to zero-capacity wind and solar, and solar with capacity. This approach overlooks MISO market risks, fails to effectively hedge prices or optimize the dispatch of the existing generation fleet and fails to consider other resources that could be less costly. The replacement generation for retiring resources similarly does not include a comprehensive portfolio of resources.

**Coyote Station Retirement:** During the 2023-2037 IRP period, keeping Coyote Station operational was the least-cost plan by more than \$10 Million compared with the base case of closing it in 2028. Additionally, CDG performed reliability modeling which also supports maintaining Coyote Station in operation. Continued participation in Coyote Station is recommended for resource planning. Otter Tail suggested retaining Coyote through 2040 in their Preferred Plan; however, in the modeling Otter Tail assumes that Coyote Station retires in 2028 and selects resources accordingly. For expansion planning Otter Tail should assume and select resources based on the continued operation of Coyote Station.

**Load Following Generation Options:** CDG noted that broadening the assessment of load following generation options, such as partnerships with other utilities in ownership of a combustion turbine and Power Purchase Agreements (PPAs), will improve resource planning.

**Modeling Extreme Weather Events:** Including modeling for the effects of extreme weather events on load forecasts, fuel availability, fuel prices, and purchase power price forecasts will provide insights into system reliability and cost. CDG did a stochastic analysis of Otter Tail's system as a potential method to quantify these risks. This analysis showed that operating Coyote through 2040 and the ND Alternate Preferred Plan reduced Loss of Load Hours (LOLH).

**Production Cost Model Dispatch:** Running a production cost model with a full dispatch will provide a more accurate representation of the value of dispatchable and storage resources, better optimize the resource mix, and develop more reliable cost estimates.

**NPVRR Reporting:** Otter Tail compares scenarios using the NPVRR (Net Present Value of Revenue Requirement) from 2023-2050 as the basis for determining the least cost plan. It is more appropriate to use the NPVRR for the IRP period 2023-2037 rather than 2023-2050 to compare scenarios. This comparison uses the most accurate and actionable forecast data.

**Market Purchase Assumptions:** Modifying market purchase assumptions and implementing a market price depth curve will provide a more accurate representation of market interactions and their impact on resource planning.

**Renewable Modeling Enhancement:** CDG provided recommendations for improving renewable modeling including using the renewable price updates presented by Otter Tail at the November 20, 2023, Informal Hearing, monitoring MISO Direct Loss of Load (DLLOL) accreditation, accounting for repowering costs or degradation, and properly addressing curtailments.

**PRMR Calculation:** Otter Tail acknowledged that their calculation for the MISO Planning Reserve Margin Requirement (PRMR) is not correctly implemented in the EnCompass model. This affects the expansion planning and NPVRR calculations.

## INTRODUCTION/BACKGROUND

On June 8, 2023, the North Dakota Public Service Commission (ND PSC), in its ongoing commitment to the regulation of public utilities, engaged the services of CDG Engineers (CDG) to undertake a comprehensive review of the Otter Tail Power Corporation (Otter Tail) Integrated Resource Plan (IRP) filed September 1, 2021, and the 2023 Supplemental Integrated Resource Plan filed on March 31, 2023. On November 20, 2023, the ND PSC held an Informal Hearing with Otter Tail to review Otter Tail's updated modeling. In the engagement with the ND PSC, CDG Engineers undertook a multifaceted project, focusing on key areas that are pivotal to the state's energy planning efforts. This initiative aimed to ensure the affordable build-out of resources with a focus on the reliability, resilience, and affordability of North Dakota's energy infrastructure.

The initial work focused on data requirements and model development. CDG worked closely with ND PSC staff to define the information to replicate and run additional scenarios of the Otter Tail system. CDG then proceeded to develop a model that accurately replicated the outcomes presented in the Otter Tail IRP.

Collaborating closely with PSC staff, CDG Engineers selected appropriate scenarios and sensitivities to assess the reliability and resilience of the Otter Tail portfolio. CDG also assessed the cost implications of the Otter Tail Preferred Plan under varying conditions. In addition to these scenarios, CDG modeled alternative scenarios and generation options to provide a comprehensive view of the base case and Preferred Plan. These scenarios and sensitivities were evaluated based on each scenario's NPVRR, while taking into consideration factors such as unserved energy, curtailments, and unserved capacity.

CDG Engineers rigorously assessed the Otter Tail IRP and Supplemental IRP in alignment with North Dakota's IRP rules as specified in North Dakota Administrative Code (NDAC) Chapter 69-09-12. This review involved a thorough comparison of these plans against the state's regulatory requirements. Any inconsistencies or omissions within the Otter Tail IRP were documented.

This report presents the findings of CDG's comprehensive review, offering a detailed analysis of Otter Tail's IRP and the accompanying 2023 Supplemental IRP. It assesses the plans' compatibility with state IRP rules and evaluates their adherence to established best practices in the industry. Furthermore, this report outlines several recommendations and insights from the analysis in development of a more cost-effective resource build-out.

## **APPLICABLE STATUTES AND RULES**

The ND PSC introduced updated Resource Plans and Cybersecurity rules, designated as NDAC Chapter 69-09-12, which became effective on January 1, 2023. These new regulations represent a significant step forward in ensuring the reliability and security of energy resources within the state.

### **Compliance with ND PSC Resource Plans**

CDG's review has revealed notable discrepancies between Otter Tail's IRP and the prevailing ND PSC rules. Otter Tail's IRP, published in 2021, references the previous rules under North Dakota Century Code Chapter 49-05-17, which are now obsolete based on the updated regulations. Otter Tail claims that this was discussed with commission staff and that it was acknowledged that they would not be meeting all the required criteria. Subsequent sections of this report will delve deeper into the specifics of Otter Tail's IRP and evaluate its compatibility with the ND PSC's Resource Plans, providing recommendations for corrective actions where necessary to ensure compliance with the ND PSC rules.

## LOAD FORECASTING

### Load Forecast Accuracy Values

NDAC Section **69-09-12-04(3)(h)** requires that resource plans include “the accuracy of the peak demand and energy forecasts compared to the previous integrated resource plan forecasts and an explanation for the causes of any deviation”. However, Otter Tail's IRP does not provide an analysis of historical load forecast accuracy.

Otter Tail provided CDG with its load forecast. The demand and load forecast and actuals are shown in Table 1 and Table 2. The energy load forecast is within 5% of the actual load in all years except 2022 where there was a new large load not included in the prior forecasts. The demand forecasts were within 3% of the actual demand in all years except 2020.

Table 1 - Load Forecasts and Actual Load (GWh)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
As Forecasted in Year 2018	4,773	4,953	4,790	4,748	4813					
As Forecasted in Year 2019		4,966	5,009	5,017	5,010	5,023				
As Forecasted in Year 2020			4,893	4,955	4,904	4,907	4,906			
As Forecasted in Year 2021				5,679	5,747	5,750	5,777	5,805		
As Forecasted in Year 2022					5,676	5,643	5,642	5,649	5,652	
As Forecasted in Year 2023						5,699	5,741	5,716	5,746	5,757
Actuals	4,999	4,785	4,793	5,547						

Table 2 - Demand Forecasts and Actual Demand (MW)

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
As Forecasted in Year 2018	820	822	824	826	828					
As Forecasted in Year 2019		798	801	803	806	808				
As Forecasted in Year 2020			804	807	811	814	818			
As Forecasted in Year 2021				739	743	747	751	754		
As Forecasted in Year 2022					768	771	774	778	781	
As Forecasted in Year 2023						770	781	784	787	789
Actuals	806	714	805	798						

### Planning Reserve Margin

NDAC Section **69-09-12-03(2)** requires that resource plans identify the resources needed to meet forecasted capacity and energy needs, including a reserve requirement. The Planning Reserve Margin Requirement (PRMR) as defined by MISO and Otter Tail plays a vital role in ensuring grid reliability. This review has identified that Otter Tail has misapplied the PRMR in Otter Tail's EnCompass model, which has a substantive effect on the expansion plan and NPVRR. This effect ranges from 13.4 MW in 2023 to over 20 MW in the final year of the Supplemental IRP. The PRMR as calculated by Otter Tail and the actual winter coincident peak as correctly modeled are shown in Figure 1.

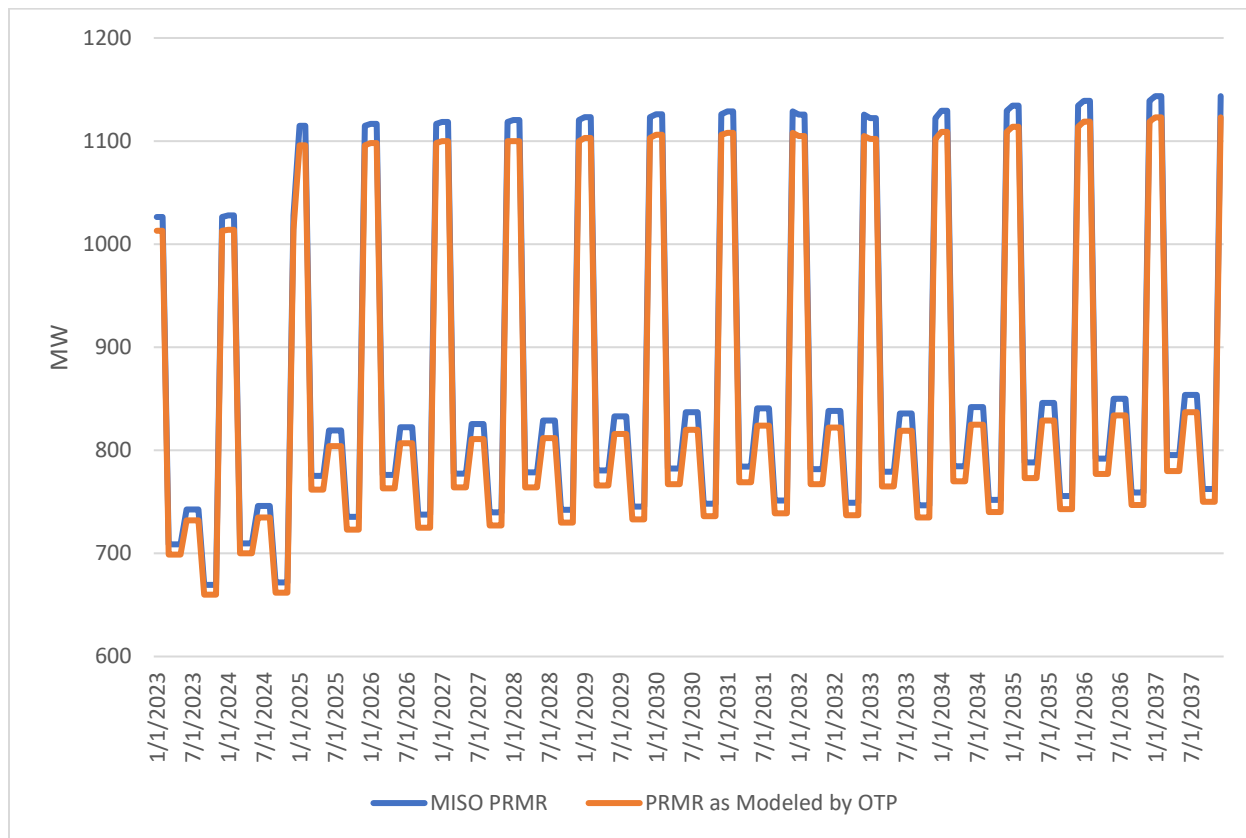


Figure 1 - Planning Reserve Margin

The effect of this discrepancy moves the year that Otter Tail's coincident peak is greater than its existing resources up from 2034 to 2029. This results in a different expansion plan and would likely affect Otter Tail's decision in selecting a Preferred Plan. CDG's modeling correctly applied the PRMR to all its resource expansions.

As shown in Figure 1, the planning reserve margin is heavily influenced by the winter period. This makes the winter peak load and winter accreditation important for load serving purposes. Figure 2 and Table 3 show Otter Tail's winter firm capacity compared

with their winter coincident peak. As depicted, the first year that requires additional capacity is 2029.

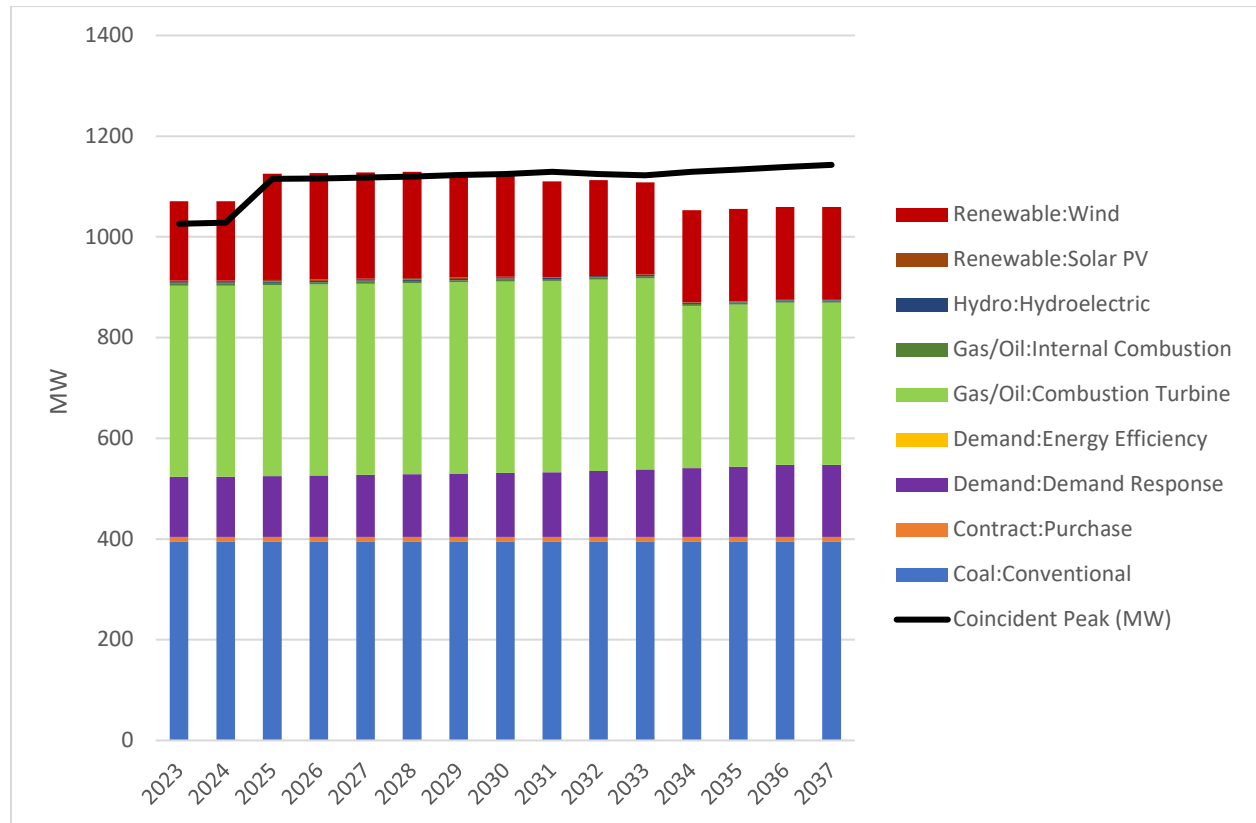


Figure 2 - Planning Reserve Margin Requirement and Existing Generation Firm Capacity

Table 3 - Coincident Peak and Existing Firm Capacity

	Coincident Peak (MW)	Existing Firm (MW)	Excess/Deficit
2023	1,026	1,070	44
2024	1,028	1,070	42
2025	1,115	1,125	10
2026	1,116	1,126	10
2027	1,118	1,128	10
2028	1,120	1,129	9
2029	1,123	1,122	-1
2030	1,125	1,123	-2
2031	1,129	1,112	-17
2032	1,125	1,115	-10
2033	1,122	1,111	-11
2034	1,129	1,056	-73
2035	1,134	1,058	-76
2036	1,139	1,062	-77
2037	1,143	1,062	-81

## RESOURCE AND PROJECT REVIEW

CDG reviewed Otter Tail's IRP modeling and noted opportunities for different modeling techniques and modeling instances that do not follow ND PSC IRP rules.

### Load Following Generation

The modeled natural gas resource options are limited to a single unit LM6000 aeroderivative combustion turbine and a 248 MW "Firm Dispatchable" resource which mimics Otter Tail's Astoria Station. These options are limited and could be supplemented by smaller dispatchable options like Reciprocating Internal Combustion Engines (RICE), sharing the output of a larger turbine, or purchasing load following capacity as a PPA. These partnering opportunities are required to be evaluated under the NDAC Sections **69-09-12-04(3)(b)** and **69-09-12-04(3)(c)**.

### Surplus/Replacement Transmission Availability

Otter Tail has identified 400 MW of surplus interconnection between 2025-2032, an additional 600 MW of surplus interconnection after 2032, and 150 MW of replacement interconnection after 2032. The initial 400 MW of surplus interconnection is limited to 150 MW of solar with capacity credit and 250 MW of solar with zero capacity credit.

The options shown in Table 4 were adapted from a table provided by Otter Tail.

*Table 4 - Assumed Surplus and Replacement Capacity in Otter Tail IRP*

Timeframe	Resource	Type	Maximum in Timeframe	Total MWs	Total MWs by Type
After 2032, Post IRA	25 MW Battery	Replacement	2	50	150
	25 MW Solar		2	50	
	50 MW Wind		1	50	
	50 MW Wind	Surplus	6	300	600
	25 MW Solar		12	300	
2025-2032 Only	25 MW Solar	Surplus	10	250	400
	25 MW Solar with Capacity Credit		6	150	

The initial 400 MW of surplus interconnection is assumed to be spread across all of Otter Tail's current points of interconnection solely owned by Otter Tail. These points and rights are shown in Table 5.

Table 5 - Assumed Interconnection Rights in Otter Tail IRP

Resource	Interconnection Rights (MW)
Merricourt	150
Ashtabula	48
Ashtabula III	62.4
Langdon I	40.5
Luverne	49.5
Astoria	284.5
Jamestown 1 & 2	29, 29
Lake Preston	29
Solway	50

The 600 MW of surplus interconnection assumes pairing resources with complementary existing generation. In this way the surplus generation additions are a mechanism for reducing fuel costs at existing stations rather than offering capacity. This capacity is limited to only generic solar and wind resources.

Finally, the 150 MW replacement interconnection comes from the retirement of the Jamestown 1/2, Lake Preston, and Solway CTs. This replacement interconnection is limited to wind, solar and battery generation despite the generation replacing existing CT resources.

It is unclear why the resources able to use this excess transmission capacity are limited to solar, wind, and battery. The value of the transmission is also unclear based on the relative pricing of generic generation. Generic wind is priced at \$48.5/MWh where replacement wind is priced at \$35/MWh implying a value of \$13.5/MWh. However, generic solar is priced at \$47/MWh, where replacement solar is priced at \$40/MWh implying a value of \$7/MWh. Finally, generic battery storage is priced at \$180/kW-yr, where replacement battery storage is priced at \$140/kW-yr, implying a value of \$40/kW-yr.

CDG compared the cost of the remodeled Otter Tail Base Case (corrected for PRMR) and assuming a 2040 Coyote exit to the same case with gas units added as resource options. CDG modeled generic CT options with a negative fixed cost of \$40/kW-yr to reflect the value of using replacement or surplus transmission interconnection. Along with the CT options that Otter Tail modeled, CDG also modeled a 1/4-size H-Class CT option (62 MW), a 1/2-size H-Class CT option (144 MW), and a RICE unit (21 MW). The expansion plan for this scenario includes 144 MW of new CT generation and is shown in Table 6. Therefore, restricting surplus and replacement to only solar, wind, and storage without considering other resources is more costly and is not be recommended.

Table 6 - Expansion Plan for Generation Agnostic Replacement Generation

		<b>Remodeled Base Case (Corrected for PRMR)</b>	<b>Same Case with Generation Agnostic Replacement/Surplus Generation</b>
<b>Withdraw from Coyote 12/31/2040</b>	<b>NPVRR (\$000)</b>	1,907,771	1,890,291
	<b>2023</b>	Hoot Lake Solar	Hoot Lake Solar
	<b>2024</b>		
	<b>2025</b>	Wind Repowers	Wind Repowers
	<b>2026</b>		
	<b>2027</b>		
	<b>2028</b>	25 MW Solar – Surplus+Cap ITC	
	<b>2029</b>		
	<b>2030</b>		
	<b>2031</b>	25 MW Solar - Surplus+Cap, ITC 50 MW Wind - Generic, PTC	50 MW Wind - Generic, PTC
	<b>2032</b>	125 MW Solar - Surplus, ITC 125 MW Solar - Surplus+Cap, ITC 150 MW Wind - Generic, PTC	250 MW Solar - Surplus, ITC 150 MW Solar - Surplus+Cap, ITC 50 MW Wind - Generic, PTC
	<b>2033</b>		144 MW Firm Dispatchable
	<b>2034</b>		
	<b>2035</b>		
	<b>2036</b>		
	<b>2037</b>		

### Renewable Options

Otter Tail modeled several wind and solar resources. They modeled different costs associated with transmission access and the availability of Inflation Reduction Act (IRA) tax credits.

The renewable projects are subject to curtailments and within the model, the curtailments reduce the PPA price, which is not commonly a feature of PPA contracts. Often because of contractual agreements and tax credit effects, the buyer must pay the PPA price for curtailed generation. When CDG modeled the Preferred Plan to assume Otter Tail paid for curtailed generation, the NPVRR is increased by \$4.5 Million. The way Otter Tail modeled curtailments encourages the selection of these renewable PPA resources, because allowing for free curtailments understates the true cost of a PPA.

Otter Tail has modeled the IRA with the PTC/ITC tax savings ending in 2032. However, the IRA allows for safe harboring projects under construction several years after the expiration of the ITC/PTC, which allows for projects to be deferred, yet still qualify for the benefit. Without this recognition, in many of Otter Tail's scenarios, significant wind and solar generation is added exactly when these benefits expire (i.e., 2032) in order capture these benefits. Therefore, to be consistent with the IRA, these tax credits should be extended through at least 2034 before phasing them out. When the IRA tax credits were extended

through 2034, the Preferred Plan defers 250 MW of solar and 150 MW of wind to the year 2034. This new expansion plan resulted in an NPVRR savings of \$5.7 Million.

The overall effect of the modeling choices by Otter Tail discussed in this section favored the addition of solar, wind, and storage resources earlier in the Otter Tail expansion planning.

### Updated Renewable Pricing

Otter Tail presented updated modeling at the Informal Hearing on November 20, 2023. At this hearing, Otter Tail presented the cost of renewable energy. The PPA price for solar energy and the fixed cost for battery projects were increased based on Otter Tail's discussions with developers. As shown in Table 7 the costs increased 30% on average compared to the base modeling assumptions.

Table 7 - Fixed and PPA Cost Changes for Storage and Solar

Resource	Input	New Cost	Existing Cost	Difference
25 MW Battery	Fixed Costs (\$000/yr)	\$5,375	\$4,300	25%
25 MW Battery, ITC	Fixed Costs (\$000/yr)	\$4,125	\$3,300	25%
25 MW Replacement Battery	Fixed Costs (\$000/yr)	\$4,125	\$3,300	25%
25 MW Surplus Battery, ITC	Fixed Costs (\$000/yr)	\$3,750	\$3,000	25%
25 MW Solar - Generic	Energy Costs (\$/MWh)	\$65	\$47	38%
25 MW Solar - Generic, ITC	Energy Costs (\$/MWh)	\$45	\$39	15%
25 MW Solar - Replacement	Energy Costs (\$/MWh)	\$60	\$40	50%
25 MW Solar - Surplus	Energy Costs (\$/MWh)	\$60	\$40	50%
25 MW Solar - Surplus, ITC	Energy Costs (\$/MWh)	\$40	\$32	25%
25 MW Solar - Surplus+Cap, ITC	Energy Costs (\$/MWh)	\$40	\$32	25%

When CDG tested the effect of this updated pricing on the ND Alternate Preferred Plan, discussed later, it found that the model added 25 MW less solar generation in 2034. This was in a plan that already significantly reduced the number of renewable units and added a portion of a conventional combustion turbine.

### Accreditation for Existing and New Resources

Otter Tail used MISO's 2023/2024 Loss of Load Expectation (LOLE) study as the basis for its renewable accreditation for 2023-2030 and MISO's Regional Resource Assessment (RRA) for the years after 2030. The values in Table 8 are reproduced from Table 4-3 from Otter Tail's Supplemental IRP filing.

Table 8 - PY23-24 UCAP MISO Accreditation (%)

	Summer	Fall	Winter	Spring
<b>Wind (current)</b>	18	23	40	23
<b>Solar (current)</b>	45	25	6	15
<b>Battery (current)</b>	82	68	82	76
<b>Wind (2031)</b>	18	21	37	12
<b>Solar (2031)</b>	23	18	1	17
<b>Battery (2031)</b>	82	68	82	76
<b>Wind (2041)</b>	16	21	26	12
<b>Solar (2041)</b>	18	20	11	11
<b>Battery (2041)</b>	100	100	97	64

After the Supplemental IRP was filed, MISO produced a preliminary view of accreditation under a Direct Loss of Load (DLOL) methodology. Figure 3 depicts a MISO presentation showing DLOL accreditation results for the resource expansion plan that meets its members decarbonization and resource goals. As shown in Figure 3, solar is much lower in both the summer and winter periods when compared with the current accreditation methodology (i.e., PY23-24 on the figure), and the accreditation largely declines through time as additional solar is added to the system. The changes to the DLOL and the uncertainty of accreditation demonstrate a risk of relying on solar to fulfill capacity requirements.

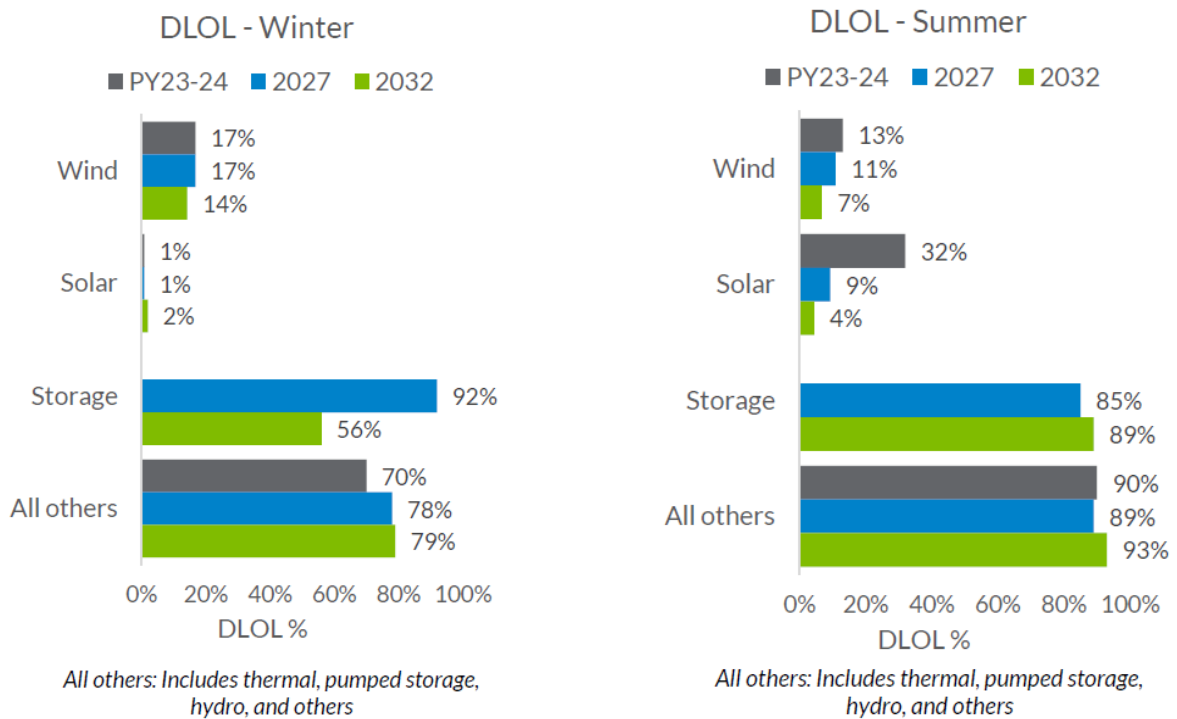


Figure 3 – MISO DLOL Preliminary Accreditation

## MODELING AND EXPANSION PLANS

CDG developed an EnCompass model to verify Otter Tail's results and evaluate alternative scenarios and input assumptions. CDG received Otter Tail's EnCompass model files and developed a new database using the same version of EnCompass. CDG replicated Otter Tail's expansion plan model and scenarios and proceeded to develop an alternative model based on North Dakota policy preferences and integrated resource plan rules.

### Planning Reserve Margin Update

The first major change CDG made was to correct the PRMR as discussed in the Load Forecasting section. CDG applied this correction to all modeling runs and scenarios, unless otherwise stated.

Otter Tail's Base Case (corrected for the PRMR) is also referenced as the remodeled Otter Tail Base Case scenario. This scenario does not assume any regional haze upgrades to the Coyote Station, assumes a 2040 exit date, introduces zero-capacity renewable resources and resource restrictions as discussed.

### Coyote Station Retirement Assumption

Otter Tail provides modeling for a 2040 Coyote exit and a 2028 Coyote exit, and that modeling is replicated where shown to show the effects of an early retirement of the plant. However, despite Otter Tail's narrative discussing retaining Coyote Station the base case and preferred plan modeling in the filing assumes a 2028 retirement. In the remodeled Otter Tail Base Case (corrected for the PRMR) and the remodeled Otter Tail Preferred Plan, CDG uses a 2040 retirement for Coyote Station as a base assumption.

### Production Cost Runs

When modeling its system, Otter Tail simulated its generation dispatch using a typical week without using the "No Commitment" option (i.e., not optimized over 8760 hours per year) with a full capacity expansion optimization. This is appropriate for determining the capacity expansion, but it does not provide a full hourly view of the system dispatch. In other words, Otter Tail did not optimize their resource expansion across all 8760 hours.

"No Commitment", according to the Encompass software literature, ignores the minimum capacity constraint and estimates the number of units online for a resource by dividing the total generation by the maximum capacity and outputs a continuous dispatch. This means that rather than performing a unit commitment for each available unit, the model will add a fraction of a unit based on the relative economics of the plant, while ignoring some of the commitment rules for the plant. By contrast, CDG used the "Full Commitment" option across all 8760 hours of the year and selected its plans based on all the resource dispatch characteristics. Therefore, CDG's modeling better accounts

for the value of dispatchable and storage resources and this, in turn, provides a more accurate NPVRR. Table 9 shows the impact of performing a production cost run on the NPVRR for the remodeled Otter Tail Base Case (corrected for the PRMR). Both runs use the same expansion plan which assumed a 2040 Coyote exit.

Table 9 – NPVRR Difference for Expansion Plan and Production Cost Run

	(\$000s)
<b>No Commitment Run 2023-2050</b>	\$2,771,929
<b>Full Commitment Run 2023-2050</b>	\$2,737,429
<b>Difference</b>	\$34,500

### Net Present Value of Revenue Requirements Period

Otter Tail compared each scenario's NPVRR with one another using the full expansion planning simulation period from 2023-2050 rather than the IRP period from 2023-2037. Choosing a longer period for economic comparisons exacerbates the effects of generic growth of prices, loads, and generation costs and can affect the resources added to serve load for up to 37 years in the future. Relying on these estimates in the later years increases the uncertainty of the estimates and the cost of the resource mix.

For example, all generic and existing thermal generation resources' fixed and variable costs increase by 2% per year each year. Additionally, generic thermal resources' capital costs increase by 1% per year each year, while the cost of wind, solar, and storage resources stay flat throughout the expansion plan period. This skews the costs and NPVRR in the later years as the uncertainty of the costs are compounded through time.

Unless Otter Tail has a rationale for using this longer-term view, it is more appropriate and consistent with standard practice to calculate the NPVRR over the same period as the period over which the resources were selected (i.e., 2023-2037). CDG calculated the NPVRR using this period (2023-2037) to more accurately reflect the operating and capital costs of the system during the period for which the IRP was filed. This method better reflects the ND PSC rules to evaluate scenarios and sensitivities on a consistent and comparable basis.

### Spot Market Interaction

Otter Tail does not allow market sales in its resource plans, which is appropriate for a long-term expansion planning model. Otter Tail models up to 1000 MW of firm market energy purchases and 250 MW of market capacity purchases. Otter Tail is part of the MISO market and has access to significant amounts of energy through that market; however, modeling 1000 MW of potential purchases against a peak demand that ranges from

1026-1143 MW is risky. While Otter Tail modeled market capacity purchases, no capacity purchases are purchased in any scenario.

Otter Tail could account for this risk by modeling an increase in market prices with an increase in the demand for such purchases. CDG modeled the first 300 MW of energy purchases at 100% of market price, the next 300 MW at 110% of market price, and the last 400 MW at 120% of market price. CDG did not develop a market price curve based on actual generation and market purchase data, so this should be considered an example of one. When CDG introduced this market price curve to the remodeled Otter Tail Base Case (corrected for the PRMR), CDG discovered that an upward market price curve reduced market purchases by an average of 6.5% and increased the NPVRR by \$7.2 Million during the IRP period, as shown in Table 10. It is recommended that Otter Tail quantify the risks of increasing market purchase costs as the demand increases. Reliance on market purchases without appropriately valuing the cost can skew the resource selection to intermittent resources.

Table 10 – NPVRR and Annual Purchases with and without Purchase Price Curves

	NPVRR (\$000s)	Average Annual Purchases (GWh)
<b>Otter Tail Base Case (corrected for the PRMR)</b>	1,907,771	1,651
<b>Otter Tail Base Case (corrected for the PRMR) w/Purchase Price Curve</b>	1,915,011	1,543
<b>Difference</b>	7,241	108

### Reliance on Market Purchases

While Otter Tail maintains sufficient capacity to serve its PRMR, a significant portion of the energy within its IRP scenarios is provided by market purchases. For example, the percent of load served by purchases from the remodeled Otter Tail Base Case (corrected for the PRMR) simulation are shown in Figure 4. In this case, Otter Tail purchases an average of 23.8% of its load from the market, even when Coyote is extended through 2040. The amount of market purchases decline in 2032 after additional resources are brought online. This compares with 24.8% of market purchases over the same period in Otter Tail's base case that retires Coyote in 2028. Retiring Coyote in 2028 would therefore only exacerbate Otter Tail's exposure to market purchases. This effect is most clear both plans add resources in 2032, where there are 22% higher market purchases when Coyote retires in 2040.

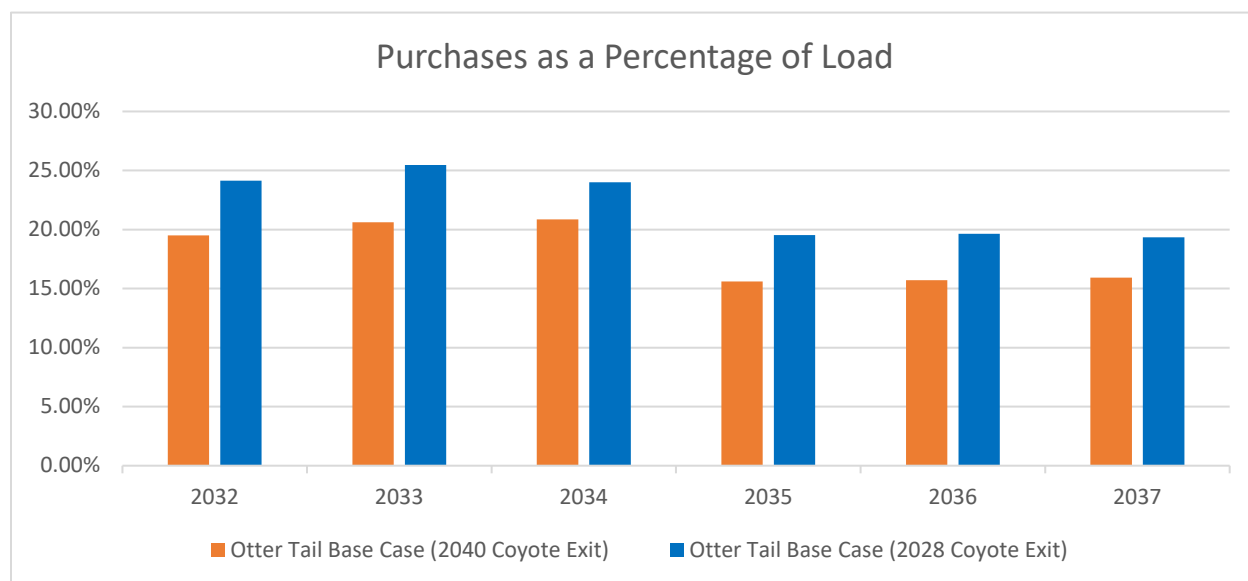


Figure 4 - Purchases as a Percentage of Load for the remodeled Otter Tail Base Case (corrected for the PRMR)

### Scenario Analysis

With these changes CDG reran all the scenarios that Otter Tail ran in their Supplemental IRP as described in Appendices F and I of the Supplemental IRP. These simulations used the same inputs as were used by Otter Tail in their modeling. The only changes in this update are that the PRMR is corrected as described in the Load Forecasting section and that CDG used production cost models for the years of the IRP (2023-2037) as the basis for the NPVRR.

Otter Tail's sensitivity runs modified specific inputs as described below to show their effects on the base case.

- **NGEM -50%/50%/100%** - modifies the natural gas and electricity market prices by -50%, 50%, and 100%.
- **Regional Haze Mid** - additional cost for compliance of the Coyote station under increased regional haze regulations. Assumes the addition of an SNCR (selective non-catalytic reduction system).
- **Regional Haze High** - additional cost for compliance of the Coyote station under increased regional haze regulations. Assumes the addition of an SCR (selective catalytic reduction system).
- **Load +10%/25%** - increased load by 10%/25% in all years.
- **Renewable High** – increased capital costs for wind, solar and storage resources.
- **Renewable Low** – assumes a 40% investment tax credit.
- **High/Low Accred** – changes the firm capacity assumed for solar, storage, and wind resources to 25 % higher in the high case and 50% lower in the low case.
- **Carbon Tax** – assumes a carbon tax increasing from 7 to 54 \$/ton from 2026-2050.

None of the scenarios modeled include externalities. Otter Tail's modeling also specifically excludes externalities associated with carbon costs, emissions reductions, and renewable energy standards. The NPVRR associated with the scenarios that were reran are shown in Table 11. The associated expansion plans generated by CDG in its modeling are shown in Appendix B. The expansion plans generated in the Otter Tail modeling are included in Appendix C. It should be noted that Otter Tail did not specifically assess the risks of each scenario and sensitivity as required by the NDAC Section **69-09-12-03(8)**, so they equally weighted them in their comparisons.

Table 11 also includes some scenarios that CDG ran that were not included in the Supplemental IRP. These scenarios reflect a combination of sensitivities.

As shown in Table 11, the 2040 Coyote retirement option has a lower NPVRR in 10 of 22 of Otter Tail's scenarios and 10 of 15 Otter Tail scenarios that do not include regional haze regulations. The scenarios that retire Coyote in 2028 that have a lower NPVRR than a retirement in 2040 assume higher natural gas, higher renewable resource pricing, or do not assume regional haze regulations. Scenarios where the NPVRR for the 2028 Coyote exit are greater than the 2040 exit are shaded in blue. Additional scenarios were run that include regional haze costs and assume high load growth, lower renewable accreditation, and higher natural gas pricing. In these scenarios, continued participation in the Coyote station through 2040 has a lower cost than retiring the station in 2028 even when regional haze regulations are assumed. Based on these scenarios, continued participation in the Coyote Station is recommended.

Table 11 - NPVRR Calculation for 2040 and 2028 Coyote Exit Scenarios

	Withdraw from Coyote 12/31/2040	Withdraw from Coyote 12/31/2028	2028 Difference from 2040 Exit NPVRR
	NPVRR (\$000)	NPVRR (\$000)	(\$000)
Otter Tail Base Case (corrected for the PRMR)	1,907,771	1,917,916	10,145
Preferred Plan	1,925,485	1,920,005	-5,480
NGEM+50%	2,103,861	2,109,633	5,772
NGEM+100%	2,245,469	2,256,895	11,425
NGEM-50%	1,490,135	1,475,260	-14,875
Regional Haze Mid Cost	1,950,927	1,913,369	-37,558
Regional Haze Mid Cost - NGEM+100%	2,289,316	2,256,895	-32,421
Regional Haze High Cost	1,971,482	1,913,369	-58,113
Regional Haze High Cost - NGEM+100%	2,304,855	2,256,895	-47,960
Load+10%	2,118,651	2,128,822	10,171
Load+10% - NGEM+100%	2,493,555	2,512,347	18,792
Load+25%	2,472,261	2,524,103	51,843
Load+25% - NGEM+100%	2,905,885	2,944,866	38,981
High Accred	1,903,472	1,879,835	-23,637
Low Accred	1,981,366	2,025,697	44,331
Carbon Tax	2,135,058	2,057,495	-77,563
Renew High Cost	1,916,322	1,948,735	32,413
Renew High Cost - NGEM+100%	2,350,153	2,408,349	58,196
Renew Low Cost (40% ITC)	1,903,311	1,901,701	-1,610
Regional Haze High Cost – Low Accred	2,045,301	2,025,697	-19,604
Regional Haze High Cost - Load+25%	2,534,782	2,524,103	-10,679
Regional Haze High Cost - Renew High Cost	1,980,901	1,948,735	-32,167
<b>ADDITIONAL SCENARIOS RAN</b>			
Regional Haze High, Low Accred, Load +25, NGEM +100%	3,345,702	3,374,424	28,721
Regional Haze Mid, Low Accred, Load +25, NGEM +100%	3,336,576	3,374,424	37,847
Regional Haze High, Low Accred, Load +10, NGEM +100%	2,831,705	2,885,939	54,234
Regional Haze Mid, Low Accred, Load +10, NGEM +100%	2,805,124	2,885,939	80,815

## PREFERRED PLAN

NDAC Section **69-09-12-03 (1)** requires, Otter Tail to define a “Preferred Plan”. As stated in the Supplemental IRP Otter Tail’s Preferred Plan:

*“replaces our Initial Preferred Plan in its entirety, 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, including the Minnesota Clean Energy Law; (c) preserve flexibility to respond to risks in a fluid and uncertain planning environment; and (d) account for differing policies in each of the three states we serve while preserving the customer benefits of system-wide planning and networked assets for a small utility.*

*(a) modifying Astoria Station to add LNG fuel storage capability; (b) adding solar and wind resources, including approximately 200 MW of solar generation and approximately 200 MW of wind generation (in addition to repowering our existing wind facilities—excluding Merricourt) and (c) retaining Coyote Station in our generation portfolio pending the need for any significant, non-routine capital investment that may be required to continue operating the plant.”*

The full section of the Supplemental Integrated Resource Plan related to the Otter Tail Preferred Plan is included in this report as Appendix A.

Part of the Otter Tail Preferred Plan includes adding LNG to the Astoria Station. This change is not modeled and the addition of it is not a capacity addition; therefore, CDG does not discuss it in this report. This proposed addition is discussed in case number PU-23-066.

Otter Tail mentions in their preferred plan that they recommend “retaining Coyote Station in our generation portfolio pending the need for any significant, non-routine capital investment that may be required to continue operating the plant.” However, Otter Tail assumed a 2028 Coyote retirement date when it selected resources for both its as-filed base case and its as-filed Preferred Plan. CDG then re-modeled these “as-filed” plans assuming a 2040 Coyote Station exit while matching Otter Tail’s as-filed resource expansions to obtain accurate NPVRRs of keeping Coyote operational through 2040. Table 12 depicts Otter Tail’s as-filed Base Case (scenario 1) and the as-filed Preferred Plan (scenario 2). The filed Base Case and Preferred Plans are modeled as an hourly production cost simulation with a 2040 Coyote exit and assume Otter Tail’s other resource constraints.

CDG then re-ran Otter Tail's base case using the same inputs per the supplemental IRP, but also introduced additional thermal generation options for replacement resources and partial gas CTs for the model to select, removed zero-capacity surplus resources, assumed a 2040 Coyote exit, and extended ITC/PTC tax credits. This case is labeled the ND Alternate Preferred Plan (scenario 3).

Each scenario in Table 12 assumes a corrected PRMR, calculates NPVRR over the period 2023-2037, and assumes a 2040 Coyote retirement.

Table 12 – Expansion Plans for Base Case and Preferred Plans

Scenario #		1	2	3
Scenario Name		<i>Otter Tail Base Case (As Filed)</i>	<i>Otter Tail Preferred Plan (As Filed)</i>	<i>ND Alternate Preferred Plan</i>
	NPVRR (\$000)	1,966,608	1,949,704	1,892,485
	Delta From Scenario 2 (\$000)	16,904	-	-57,219
	2023	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar
	2024			
	2025	Wind Repowers	Wind Repowers	Wind Repowers
	2026			
	2027		100 MW Solar – Surplus+Cap, ITC	
	2028		50 MW Solar – Surplus, ITC 50 MW Solar – Surplus+Cap, ITC	
	2029	50 MW Solar – Surplus+Cap, ITC 300 MW Wind – Generic, PTC	200 MW Wind – Generic, PTC	
	2030		100 MW Solar – Surplus, ITC	
	2031	25 MW Surplus Battery, ITC	150 MW Wind – Generic, PTC	50 MW Wind – Generic, PTC
	2032	150 MW Solar – Surplus, ITC 100 MW Solar – Surplus+Cap, ITC 25 MW Surplus Battery, ITC 100 MW Wind – Generic, PTC	100 MW Solar – Surplus, ITC 25 MW Surplus Battery, ITC	
	2033			144 MW Firm Dispatchable
	2034			150 MW Solar Surplus+Cap, ITC 250 MW Wind – Generic, PTC
	2035			
	2036			
	2037			

As a result of Otter Tail optimizing its base case and preferred plan around the assumption of a 2028 Coyote Station exit rather than keeping it operational through 2040, both the as-filed Base Case and the as-filed Preferred Plan have a higher NPVRR than the ND Alternate Preferred Plan.

The ND Alternate Preferred Plan's (scenario 3) NPVRR is \$57 Million less than the Otter Tail Preferred Plan (scenario 2). Over the 5-year action plan through 2028, the ND Alternate Preferred Plan selects no resources, while Otter Tail includes in its Preferred Plan 200 MW of solar and then prepares to add 200 MW of wind the following year. These resources were not selected to serve needs consistent with North Dakota policy or to fulfill a capacity or energy need. The ND Alternate Preferred Plan selects none of these resources and results in a lower NPVRR.

Furthermore, the ND Alternate Preferred Plan was allowed to select higher capacity credit CTs as replacement resources instead of forcing the model to select either wind, solar, or storage resources after 2032. By allowing the model to select higher capacity credit CTs after 2032, the model will not select any of the uneconomic solar resources earlier in the model in anticipation that the capacity deficit can be cured with a later dispatchable resource addition. Furthermore, because the ITC and PTC are extended through 2034, the final generation addition is deferred from 2032 to 2034 as the model can defer investment and not build as much generation early on to secure the tax credits.

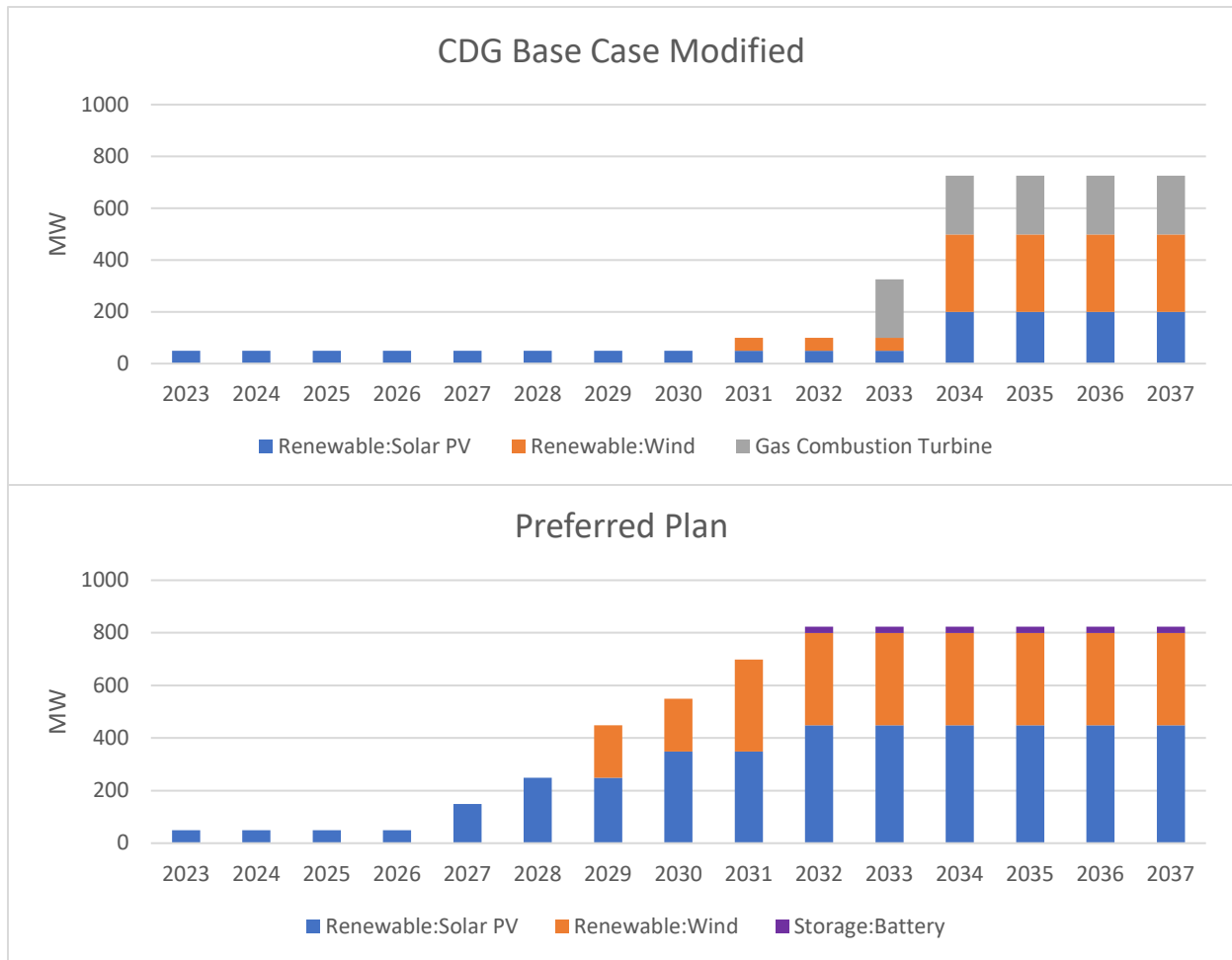


Figure 5 & 4 - Nameplate Capacity Generation Additions (MW) by Scenario

Overall, CDG has found that the Otter Tail Preferred Plan adds more generation earlier and is more expensive on an NPVRR basis than the ND Alternate Preferred Plan. The changes between the Otter Tail Preferred Plan and ND Alternate Preferred Plan are due to decisions made by Otter Tail to not optimize the resource expansion based on least cost, to restrict the selection of replacement resources, to not consider a full suite of resource options, and to not build resources when they are not needed for capacity or energy needs due to modeling under the assumption that Coyote Station will retire in 2028 instead of 2040. This is inconsistent with the NDAC Section **69-09-12-03(3)** that requires that utilities select resources “representing the least-cost plan”.

Because the Otter Tail Preferred Plan does not represent the least cost plan and builds more generation than is required to meet the PRMR, this strongly indicates that the additional solar and wind resources were added to satisfy requirements outside of the objectives of the ND PSC IRP rules. The NDAC Section **69-09-12-03(6)** requires that “the North Dakota Preferred Plan may not select resources based on a carbon cost, greenhouse gas reduction goals, renewable energy standards, emissions goal, or other

externalities.” The Otter Tail Supplemental IRP describes four risks and uncertainties that affected its Preferred Plan:

- Modeling Changes
- Capacity Accreditation Questions
- Otter Tail's Capacity Position Relative to Load Growth
- Recent Volatility in MISO Energy Markets and Natural Gas Markets

Otter Tail describes the potential risks but did not quantify or model the risks. For instance, Otter Tail's models introduced restrictions on the type of resources the model was able to select while ignoring analysis that would be consistent with North Dakota's energy preferences and the impact the preferred portfolio could have on reliability during extreme weather events as demonstrated in the next section. Otter Tail also did not assess its exposure to the market purchases.

Furthermore, adding solar resources only increases cost through the planning period and largely increases cost beyond the planning period. This adds not only cost to the plan, but also potentially additional risk to the portfolio because MISO is in the process of developing new accreditation around the proposed DLOL approach. Additional risk is also added given the significant number of solar resources in MISO's interconnection queue, and the potential impact from a decline in on-peak energy prices. Currently, solar resources make up 52% of the MISO queue.

Finally, by using an assumed 2028 Coyote exit to create the capacity expansion Otter Tail is inconsistent with the language referring to retaining Coyote Station in its generation portfolio and as a result contributes to the overbuild of generation within the action plan period and beyond 2029.

### Extreme Weather Modeling/Reliability Modeling

NDAC Section **69-09-12-04(3)(i)** requires that utilities assess the reliability and resource adequacy of resource plans during extreme weather events. This assessment should include quantitative metrics for the size, frequency, duration, and timing of capacity shortfalls during extreme weather conditions. Otter Tail's IRP performed no such modeling. Without this modeling, Otter Tail cannot judge the adequacy of their planning for such scenarios. Attention in this area is crucial to ensure that its energy infrastructure can withstand extreme weather conditions.

CDG developed a stochastic model of Otter Tail's system parameterized on historical data from 2020-2023 for prices, loads, and outages. This period was inclusive of two of the more impactful extreme weather events. For this analysis, market energy purchases were limited to 500 MW, which is roughly half of Otter Tail's peak load. This limit helps to

reflect the effects of extreme weather, outages, and generation variability on the system. CDG ran this model for 300 iterations for the load year 2035 using the generation additions from the ND Alternate Preferred Plan scenario and two Otter Tail Preferred Plans: one with a 2040 Coyote exit (Otter Tail Preferred Plan) and another with a 2028 exit (Otter Tail Preferred Plan (2028 Coyote Exit)).

This method is a framework that can be used to show the reliability risk associated with the variability in prices, loads, and generation on Otter Tail's ability to serve load. Figure 6 shows the distribution of Loss of Load Hours (LOLH) for the three scenarios. The Otter Tail Preferred Plan with a 2028 Coyote withdrawal had the most hours of LOLH observed, while the ND Alternate Preferred Plan had the fewest.

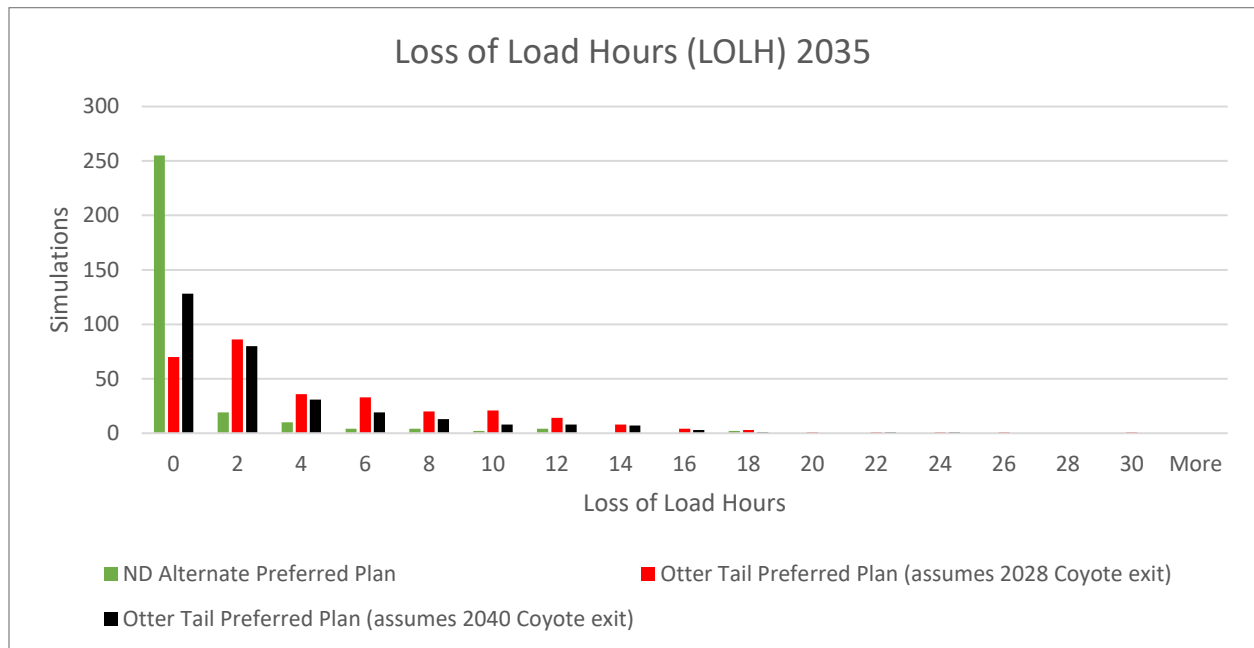


Figure 6 - Distribution of Loss of Load Hours with Stochastic Simulation

The analysis also shows the effect of prices, loads, and outage distributions on system cost. Figure 7 shows the distribution of revenue requirements for the three scenarios. Revenue requirements include fuel, operations and maintenance expense, purchases, contract costs, fixed costs, carrying costs, depreciation, and allowed return. The ND Alternate Preferred Plan's 2035 expected revenue requirement is \$4 Million less than Otter Tail's Preferred Plan assuming Coyote is retired in 2040 and \$6 Million less assuming it retires in 2028. Similarly, the ND Alternate Preferred Plan's expected 2034 revenue requirement has a 95% chance of not exceeding \$216 Million, which is \$5 Million less than the Preferred Plan assuming Coyote is retired in 2040 and \$7 Million less assuming it retires in 2028. This demonstrates that the ND Alternate Preferred Plan has lower cost along with less risk of exceeding that cost across multiple scenarios of prices, loads, and outages.

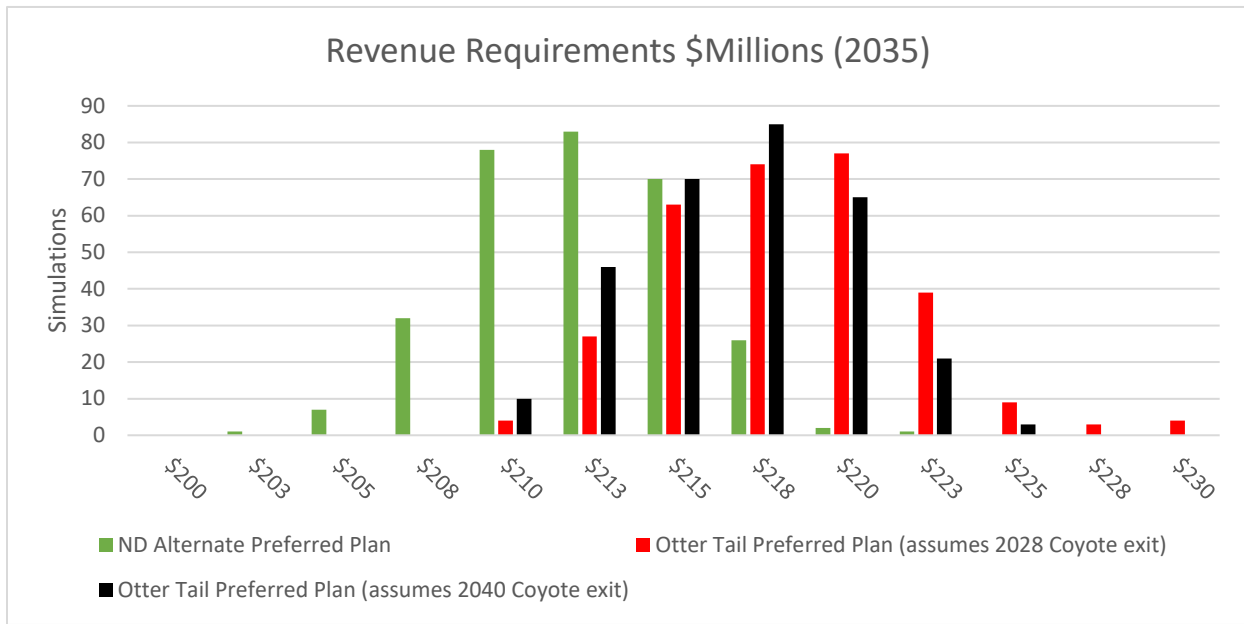


Figure 7 - Distribution of Revenue Requirements with Stochastic Simulation

## CONCLUSION/RECOMMENDATIONS

CDG Engineers reviewed Otter Tail's IRP, Supplemental IRP, and associated modeling to determine whether the IRP complies with ND PSC rules, follows best industry practices, and selected the least-cost portfolio for ratepayers. The analysis has revealed both strengths and areas for improvement within the IRPs. Through replicating Otter Tail's modeling and performing its own modeling, CDG determined that the Otter Tail Preferred Plan adds more generation than is necessary to meet its PRMR and is more costly than the ND Alternate Preferred Plan. The Otter Tail Preferred Plan relies heavily on solar resources (earlier than even its base case), which provide little or no capacity towards its PRMR. These additions as well as the preparation of adding 200 MW of wind the year after its 5-year action plan is not economic. The ND Alternate Preferred Plan adds none of these resources and at a lower cost and with fewer LOLH in a reliability analysis.

CDG determined that Otter Tail's resource planning can benefit from adjustments and enhancements to better align with ND PSC rules and industry standards. The following recommendations aim to address the identified issues and enhance the reliability, transparency, and compliance of Otter Tail's IRPs, ultimately contributing to the sustainable and affordable development of North Dakota's energy infrastructure.

1. **Least-Cost Preferred Plan:** CDG's analysis, integrating the suggested measures, resulted in the ND Alternate Preferred Plan, a genuine least-cost expansion plan. It is recommended that the ND PSC request that Otter Tail modify its Preferred Plan to remove the solar additions in the five-year action plan period, not take the initial steps to add 200 MW of wind in 2029 and modify its plan after 2029 to more closely align with the ND Alternate Preferred Plan. This plan avoids introducing new unplanned resources within the five-year action plan period, a \$57 million lower NPVRR from 2023-2037 and enhanced long-term reliability. The ND Alternate Preferred Plan and the analysis contained within this report support these recommendations.
2. **Solar Resources in the Action Plan:** The ND Alternate Preferred Plan does not include any new solar resources before 2034. Based on this outcome it is recommended that North Dakota reject the new solar resources included in the five-year action plan period of the Otter Tail preferred plan and reject taking the initial steps to add 200 MW of wind in the 2029 timeframe.
3. **Coyote Station Retirement Option:** The analysis conducted reveals that in 10 out of 22 scenarios, and particularly in 10 of 15 scenarios excluding regional haze regulations, the option of retaining Coyote Station results in a lower NPVRR. In the least cost simulation, continuing to utilize Coyote Station has a lower NPVRR by over \$10 Million compared to the equivalent simulation with a 2028 exit. Based on these findings, it is recommended that Otter Tail continues participation in Coyote Station as a prudent choice in its resource planning. The continued operation of Coyote Station should be the base assumption for expansion plan modeling used in Otter

Tail's preferred plan in keeping with their objective of retaining Coyote Station in their generation portfolio pending any significant capital expense.

4. **Surplus and Replacement Resource Restrictions:** Otter Tail models surplus transmission available from collocating complementary new resources and/or using unused transmission allocations from existing resources or replacements for retiring resources. Otter Tail restricts the surplus generation to zero-capacity wind and solar and solar with capacity. Restricting resource options, either as replacement or surplus, does not represent an attempt to effectively hedge market prices, optimize the dispatch of the existing generation fleet, or to select a least-cost resource plan. The replacement generation available from retiring resources only adds one dispatchable option (up to 50 MW of batteries). Otter Tail should consider surplus and replacement transmission available for all types of resources rather than restricting the options to wind, solar, and storage. The ND Alternate Preferred Plan is agnostic toward the technology for surplus and replacement resources and furthermore adds natural gas resources as replacement options.
5. **Load Following Generation Options:** Otter Tail should develop a resource plan that better reflects ND energy policy by considering a broader range of load following generation options. This could include partial natural gas projects representing partnerships with other utilities and Power Purchase Agreements (PPAs). A more comprehensive assessment of load following options will improve resource planning. In the ND Alternate Preferred Plan, partial units were considered, and a partial combustion turbine was selected as a resource in the least-cost plan.
6. **Modeling of Extreme Weather Events:** Otter Tail should model the effects of extreme weather events on load forecasts, fuel availability, fuel prices, and purchase power price forecasts. This will ensure that its energy infrastructure is adequately prepared for extreme conditions, enhancing grid resilience. When CDG modeled the effects of an energy purchase limited system, the ND Alternate Preferred Plan had a lower number of LOLHs than the Otter Tail Preferred Plan assuming a 2040 Coyote exit and the Otter Tail Preferred Plan assuming a 2028 exit. This analysis supports the finding that keeping Coyote operational through 2040 contributes to the reliability of the resource plan.
7. **Production Cost Model Dispatch:** Otter Tail should run a production cost model with a full dispatch for each expansion plan. A full dispatch will more accurately represent and capture the value of dispatchable and storage resources, leading to a more reliable NPVRR upon which to select a resource plan. This type of analysis is essential to fully evaluate the reliability and operations of the system.
8. **Market Purchase Assumptions:** Otter Tail should modify its market purchase assumptions to lower the number of purchases available and/or implement a market price depth curve to reflect the effect on prices as more purchases are made each

hour. This will provide a more accurate representation of market interactions and their impact on resource planning.

9. PRMR Calculation: CDG recommends that Otter Tail correct its PRMR calculation in the EnCompass model. The PRMR impacts the expansion plan and the NPVRR of all scenarios. Otter Tail should rerun the scenario expansion plans with an accurate PRMR to ensure reliability in resource planning.
10. NPVRR Reporting: CDG recommends that Otter Tail use an NPVRR period of 2023-2037 rather than 2023-2050. This better aligns with the planning horizon of the IRP and would use the most reliable data in the study for price and load forecasts.
11. Historical Load Forecast Accuracy: To better quantify the risks associated with load forecast errors, Otter Tail should provide an assessment of the accuracy of historical load and demand in its future IRPs. This will enhance transparency and ensure stakeholders can assess the reliability of its load forecasts.
12. Renewable Modeling Enhancement: Otter Tail should enhance its modeling of renewables by:
  - a. Monitoring MISO DLOL accreditation and incorporating forecasts into future IRPs.
  - b. Properly accounting for curtailments within the production cost model for renewables.
  - c. Monitoring the timing and amount of Investment Tax Credits and Production Tax Credits for renewable projects for better planning.
  - d. Using renewable prices presented at the November 20, 2023, Informal Hearing.

These recommendations aim to enhance the accuracy, transparency, and compliance of Otter Tail's Integrated Resource Plans with ND PSC rules and industry best practices. By implementing these suggestions, Otter Tail can make more informed decisions regarding its energy infrastructure, ensuring reliability and sustainability in North Dakota's energy landscape, while selecting the least-cost resource plan consistent with North Dakota's energy policy.

**APPENDIX A**

**Supplemental IRP Preferred Plan**

### 3 Supplemental Preferred Plan

#### The Supplemental Preferred Plan

Our Supplemental Preferred Plan, which replaces our Initial Preferred Plan in its entirety, 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, including the Minnesota Clean Energy Law; (c) preserve flexibility to respond to risks in a fluid and uncertain planning environment; and (d) account for differing policies in each

<sup>7</sup> ND PSC Case No. PU-21-380. In North Dakota, the plan is filed pursuant to North Dakota Century Code §§ 49-05-04.4 and 49-05-17.

<sup>8</sup> In addition to addressing MISO's seasonal capacity construct and the Inflation Reduction Act we also noted our intent to address changes in MISO Planning Resource Auction (PRA) prices and capacity projections and Otter Tail load forecast changes that have occurred since our Initial Filing.

<sup>9</sup> *In the Matter of Otter Tail Power Company Advance Prudence Application – Astoria Station Onsite Fuel Inventory System*, ND PSC Case No. PU-23-066.

of the three states we serve while preserving the customer benefits of system-wide planning and networked assets for a small utility.

The Company has determined that it can best satisfy those goals by: (a) modifying Astoria Station to add LNG fuel storage capability; (b) adding solar and wind resources, including approximately 200 MW of solar generation and approximately 200 MW of wind generation (in addition to repowering our existing wind facilities—excluding Merricourt) and (c) retaining Coyote Station in our generation portfolio pending the need for any significant, non-routine capital investment that may be required to continue operating the plant. Our analysis indicates that this combination of actions will provide flexibility, reduce costs, and maintain and enhance the resiliency of our system.

Table 3-1 provides the preferred 15-year resource plan for both the Base Case and our Supplemental Preferred Plan. The Table includes the resource selection and net present value of revenue requirements (NPVRR) both with and without externalities.

Our five-year action plan to add 200 MWs of solar in the 2027/2028 timeframe and to begin activities to add 200 MW of wind in the 2029 timeframe is not altered by any actions we may take concerning Coyote Station. As shown below, if Otter Tail were to withdraw from Coyote Station, in a future resource planning proceeding we would likely request authority to add 100 MW of solar and 150 MW of wind in the 2030/2031 timeframe.

**Supplemental Table 3-1 – Supplemental Preferred Plan Summary**

	No Externalities		with Externalities	
	Base Case	Preferred Plan*	Base Case	Preferred Plan*
2023	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar
2024				
2025	Wind Repowers	Wind Repowers	Wind Repowers 400 MW Sur Solar 100 MW Gen Wind	Wind Repowers
2026	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel 50 MW Gen W	Astoria Onsite Fuel
2027		100 MW Sur Solar		100 MW Sur Solar
2028		100 MW Sur Solar		100 MW Sur Solar
2029	50 MW Sur Solar 250 MW Gen Wind	200 MW Gen Wind	150 MW Gen Wind	200 MW Gen Wind
2030		100 MW Sur Solar		100 MW Sur Solar
2031	25 MW Sur Battery	150 MW Gen Wind	25 MW Sur Battery	150 MW Gen Wind
2032	25 MW Sur Battery 250 MW Sur Solar 100 MW Gen Wind	100 MW Sur Solar 25 MW Sur Battery	25 MW Sur Battery 150 MW Gen Wind	100 MW Sur Solar 25 MW Sur Battery
2033				
2034				
2035				
2036				
2037				
NPVRR	\$2,714,497	\$2,724,103	\$3,152,731	\$3,199,210

\*Resource additions in 2030 and 2031 are to be determined. 100MW Surplus Solar and 150 MW Generic Wind are needed if Otter Tail withdraws from Coyote at year end 2028.

As provided in the table above, the NPVRR for the Supplemental Preferred Plan is slightly higher than the optimal EnCompass solved Base Case. Our Supplemental Preferred Plan represents a balanced and reasonable approach to addressing the concerns of our regulators and varied stakeholders, which complies with all legal requirements and allows the Company to continue providing reliable, low-cost electricity to meet our customers' needs.

Graphs 3-1 to 3-4 show Otter Tail's position within MISO's current capacity construct for all seasons through 2037 – considering scenarios with Coyote Station included and removed from the resource stack.

**Graph 3-1: Supplemental Preferred Plan Accredited Winter Capacity and -  
PRMR**

**[PROTECTED DATA BEGINS...**

**...PROTECTED DATA ENDS]**

**Graph 3-2: Supplemental Preferred Plan Accredited Spring Capacity and  
PRMR**

**[PROTECTED DATA BEGINS...**

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**Graph 3-3: Supplemental Preferred Plan Accredited Summer Capacity and  
PRMR**

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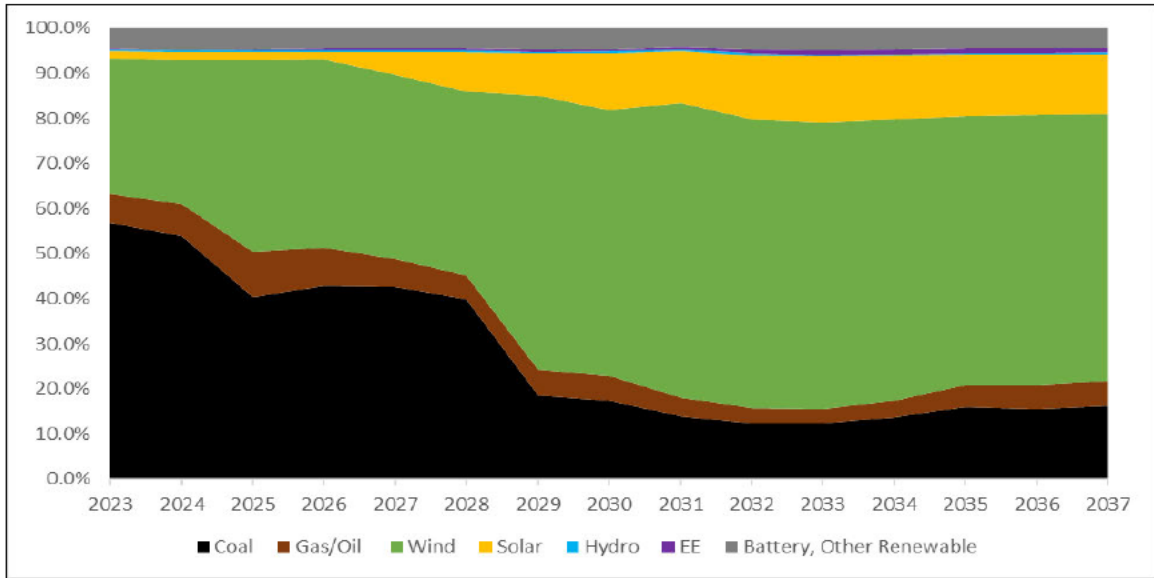
**Graph 3-4: Supplemental Preferred Plan Accredited Fall Capacity and  
PRMR**

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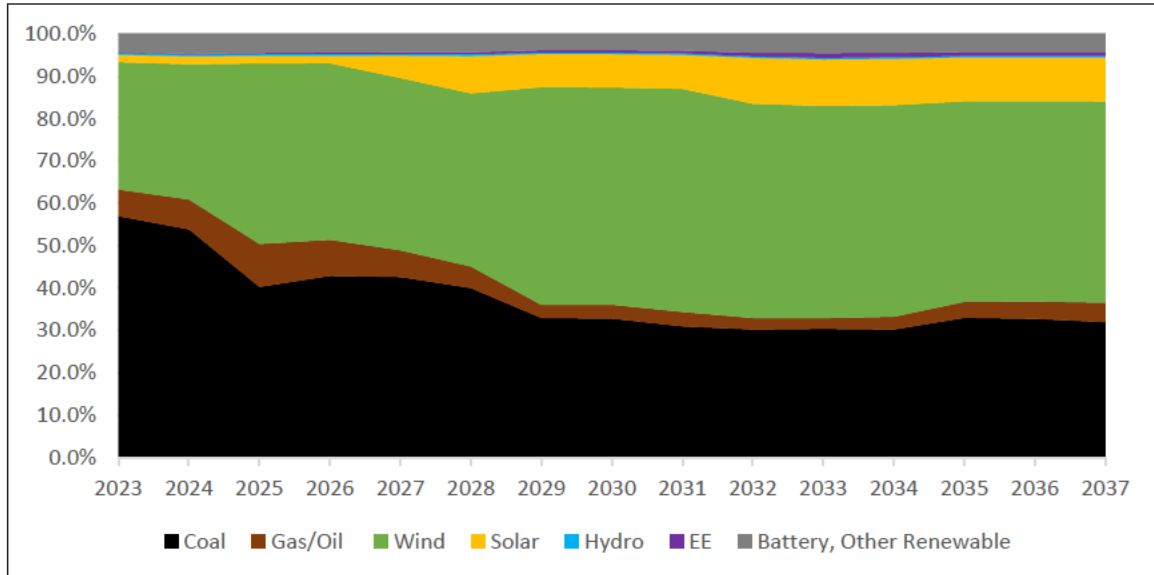
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Graph 3-5 shows the expected energy mix through 2037 for Otter Tail’s Supplemental Preferred Plan, considering scenarios with Coyote Station included through 2040 and not included beginning in 2029 (this data is based on Encompass generator output in runs not considering externalities).

**Graph 3-5: Supplemental Preferred Plan (Coyote 2028) Energy Generation Percentage**



**Graph 3-6: Supplemental Preferred Plan (Coyote 2040) Energy Generation Percentage**



Otter Tail’s approach to planning recognizes that modeling and a corresponding NPVRR analysis, while important, is not the end of the analysis. As noted in our Initial Filing, the Company has historically 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 Supplemental Preferred Plan is such a plan.

Our Supplemental Preferred Plan closely tracks our Initial Preferred Plan. The primary difference concerns Coyote Station. In our Initial Preferred Plan we stated the following:

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 obligation 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.<sup>10</sup>

Based on material changes that have occurred since our Initial Filing we believe our customers are better served by the Company remaining an owner in Coyote Station pending a need for significant investments in the plant, which would most likely be necessary for environmental compliance purposes.<sup>11</sup> Should we determine it necessary to withdraw from Coyote Station, our goal is to do so expeditiously while minimizing potential adverse impacts. Consequently, Otter Tail is seeking authority in its Supplemental Preferred Plan to withdraw from its ownership interest in Coyote Station in the event Otter Tail is required to make a significant, non-routine capital investment in the facility. Pending such a development, Otter Tail believes it prudent not to

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<sup>10</sup> Initial Filing at p. 6.

<sup>11</sup> 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 outcome.

prematurely withdraw from its ownership in Coyote Station, recognizing that our ownership in Coyote Station will be reevaluated in our next resource plan filings.

The risks and uncertainties that inform our view of Coyote Station (discussed in more detail later in this Supplemental Filing) include the following:

- **Modeling Changes** - In our Initial Filing, there were few scenarios where it was economic to remain in Coyote Station beyond 2028. In nearly every case, even when externalities were not included, the modeling supported withdrawing from Coyote Station. In our updated modeling there are now additional scenarios that support remaining in Coyote Station. These scenarios include a high renewable energy cost scenario and a low renewable accreditation scenario.
- **Capacity Accreditation Questions** - There remain significant questions about MISO's capacity accreditation for generation resources. MISO is considering several proposals for capacity accreditation and as of the date of this Supplemental Filing it is unclear which standard MISO will adopt.<sup>12</sup>
- **Otter Tail's Capacity Position Relative to Load Growth** – Otter Tail's updated modeling includes the addition and projected addition of large loads. Some of these loads are agricultural processing facilities similar to what we have seen historically, albeit with different methods, intended to produce carbon neutral products; others are atypical in nature for Otter Tail, such as data processing customers. We expect continued interest from customers in these industries, which could affect our overall capacity position.
- **Recent Volatility in MISO Energy Markets and Natural Gas Markets** - While we expect these markets to return to more normal conditions in our forecasts, the extreme volatility in these markets that occurred after our Initial Filing demonstrates that forecasting will always have an inherent amount of uncertainty and risk.

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<sup>12</sup> Also note that on March 21, 2023, MISO received an order from the Federal Energy Regulatory Commission (FERC) establishing a show cause proceeding in FERC Docket EL23-46-000 regarding Seasonal Accredited Capacity (SAC) ratios for Schedule 53 resources. FERC's order dated March 17, 2023 states that MISO "appears to be violating its Open Access Transmission, Energy and Operating Reserve Markets Tariff (Tariff) by failing to update its system-wide Unforced Capacity (UCAP)/Intermediate Seasonal Accredited Capacity (ISAC) ratio (Ratio) for the 2023/24 Planning Resource Auction despite having updated ISAC values for certain resources." In response to FERC's order, MISO will be recalculating the SAC ratios, which is expected to result in reduced SAC values for individual market participants on an aggregate basis. We do not anticipate this development having a material impact on our Supplemental Filing.

- MISO Capacity Position & Regional Resource Assessment –Since our Initial Filing MISO has shifted from capacity surplus to capacity shortfall, and MISO modeling indicates near term capacity risk. MISO’s Local Resource Zone 1 of which Otter Tail has 99 percent of its customers, is not isolated from this risk.

In the current planning environment, having Coyote Station part of the Company’s portfolio provides a cost-effective hedge against market volatility, unresolved accreditation questions, forecasting uncertainties and related risk of errors, and unforeseen developments. This is a cautious and measured approach that preserves flexibility and limits risk pending more clarity on several fronts.

There is no doubt there will be differences of opinions among our stakeholders, some of whom may view our Supplemental Preferred Plan as a significant departure from our Initial Preferred Plan on the issue of Coyote Station. We do not think that is the case. Our position with respect to Coyote Station tracks closely to that detailed in our Initial Filing; our Supplemental Preferred Plan should be viewed as a cautious pause pending further developments.

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. Our Supplemental Preferred Plan strikes a balance between several planning objectives - including arriving at a diversified mix of generation resources that assures reliability, rate stability, environmental responsibility, and the flexibility to respond to risks and opportunities in this rapidly changing environment.

As we noted in our Initial Filing any withdrawal from Coyote Station is complex and challenging. Coyote Station is a key baseload resource for the plant’s co-owners. 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, with the adjacent mine serving the plant. There are significant differences between mine mouth plants such a Coyote Station and delivered fuel plants that affect any withdrawal analysis. Appendix K provides a summary of these differences.

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 jobs and tax base in Mercer County and North Dakota. These challenges will require thoughtful consideration and management should circumstance make it necessary to withdraw from Coyote Station.

Table 3-2 below summarizes the key actions in the Supplemental Preferred Plan. Each of the items listed is discussed in greater detail in subsequent sections of this filing.

**Table 3-2: Otter Tail 2023-2029 Detailed Action Plan**

Year	Actions
2023	<p><u>Monitor Possible Withdrawal from Coyote Station:</u></p> <p>Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed.</p> <p><u>Wind Equipment Upgrades (in service 2024 &amp; 2025)<sup>13</sup>:</u></p> <p>Secure necessary siting amendments, equipment and contracting for construction.</p> <p><u>Onsite Fuel at Astoria Station:</u></p> <p>Development Activities: Engage engineering firm to complete sufficient design to support permitting, regulatory approvals, and Engineering, Procurement, and Construct (EPC) bid packages. Enter into EPC and fuel supply agreements.</p>
2024	<p><u>Monitor Possible Withdrawal from Coyote Station:</u></p> <p>Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed.</p> <p><u>100 MW Solar (in-service 2027):</u></p> <p>Development Activities: Secure land, MISO interconnection, Preliminary Design Permitting</p> <p><u>Onsite Fuel at Astoria Station:</u></p> <p>EPC contractor completes detailed design, manufacturing and</p>

<sup>13</sup> We reference the repowering of our wind facilities in the Supplemental Preferred Plan to provide a full picture of our efforts to develop cost effective generation and the impact of the IRA. Repowering of these facilities is subject to separate regulatory proceedings outside of this Supplemental Preferred Plan.

Year	Actions
	construction begins.
2025	<p><u>Monitor Possible Withdrawal from Coyote Station:</u> Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed.</p> <p><u>100 MW Solar (in-service 2028):</u> Development Activities: Secure land, MISO interconnection, Preliminary Design Permitting</p> <p><u>Onsite Fuel at Astoria Station:</u> Construction</p>
2026	<p><u>Monitor Possible Withdrawal from Coyote Station:</u> Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed.</p> <p><u>100 MW Solar (in-service 2027):</u> Final design and contracting</p> <p><u>200 MW Wind (in-service 2029):</u> Development Activities: Secure land, MISO interconnection, Preliminary Design, Permitting</p>
2027	<p><u>Monitor Possible Withdrawal from Coyote Station:</u> Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed.</p> <p><u>100 MW Solar</u> 2027 Commercial operation</p> <p><u>100 MW Solar (in-service 2028):</u> Final design and contracting</p> <p><u>200 MW Wind (in-service 2029):</u> Secure necessary equipment and contracting for construction</p>
2028	<p><u>Monitor Possible Withdrawal from Coyote Station:</u> Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital</p>

Year	Actions
	investment; withdraw if a large non-routine capital investment is needed. <u>100 MW Solar</u> 2028 Commercial operation <u>200 MW Wind (in-service 2029):</u> Construction
2029	<u>Monitor Possible Withdrawal from Coyote Station:</u> Fulfill contractual and legal obligations. Prepare for possible withdrawal from plant pending need for a large, non-routine capital investment; withdraw if a large non-routine capital investment is needed. <u>200 MW Wind:</u> 2029 commercial operation

**APPENDIX B**

**Scenario Output**

CDG Modeled Scenario 2023 Base Case  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	25	-	-	25	250	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>75</b>	<b>400</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Preferred Plan  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	200	-	-	-	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	100	100	-	-	-	100	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>-</b>	<b>-</b>	<b>125</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario NGEM+50%

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	50	50	-	-	50	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>400</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario NGEM+100%

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	150	50	-	50	-	-	-	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>550</b>	<b>50</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>75</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>

CDG Modeled Scenario NGEM-50%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario RH Mid Cost  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	25	-	-	-	325	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>475</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>

CDG Modeled Scenario RH Mid Cost - NGEM+100%

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-
Gen Wind	-	-	150	50	-	50	-	-	-	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>550</b>	<b>50</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario RH High Cost

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	200	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	25	-	-	275	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>50</b>	<b>475</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario RH High Cost - NGEM+100%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	150	-	-	50	-	-	-	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>550</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>125</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Load+10%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	150	-	-	50	-	50	50	-	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	150	-	-	-	-	-	-	200	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>300</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>50</b>	<b>250</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Load+10% - NGEM+100%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
Gen Wind	-	-	200	-	-	50	-	-	50	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>600</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>175</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Load+25%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-
Sur Battery	-	-	25	25	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	300	-	50	-	50	-	50	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	125	-	25	-	-	-	-	175	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>450</b>	<b>25</b>	<b>75</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>50</b>	<b>225</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Load+25% - NGEM+100%

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	25	50	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	400	-	-	-	-	-	100	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	25	-	-	-	75	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>850</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>125</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario High Accred

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	-	200	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	50	-	-	-	25	300	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>500</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Low Accred  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	350	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>500</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>

CDG Modeled Scenario Carbon Tax  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	300	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	150	225	25	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>150</b>	<b>225</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>300</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Renew High Cost  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Renew High Cost - NGEM+100%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	50	-	-	50	-	-	-	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	150	-	50	-	-	-	-	100	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>200</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>275</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Renew Low Cost (40% ITC)

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	75	75	75	25	-	-	-	150	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>75</b>	<b>75</b>	<b>75</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>300</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario RH High Cost - LowAccred

Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	350	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>500</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>

CDG Modeled Scenario RH High Cost - Load+25%  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	300	-	50	-	100	-	-	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	125	-	25	-	-	-	-	175	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>475</b>	<b>-</b>	<b>75</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>225</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>

CDG Modeled Scenario RH High Cost - Renew High Cost  
 Coyote Retirement Date 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	50	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

2023 Base Case  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	25	-	-	25	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	300	-	50	-	-	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	75	-	25	225	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>75</b>	<b>325</b>	<b>-</b>	<b>75</b>	<b>250</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

Preferred Plan  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	-	-	-	200	-	150	-	-	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	100	100	-	100	-	100	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	49	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>100</b>	<b>200</b>	<b>100</b>	<b>150</b>	<b>125</b>	<b>-</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

NGEM+50%		2028														
Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	
Gen Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sur Battery	-	-	-	-	-	-	-	-	25	25	-	-	-	-	-	
Gen Wind	-	-	-	-	50	50	250	-	-	100	-	-	-	-	-	
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-	
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Total</b>	<b>49</b>	<b>-</b>	<b>400</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>250</b>	<b>-</b>	<b>25</b>	<b>125</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	

CDG Modeled Scenario  
Coyote Retirement Date

NGEM+100%		2028														
Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	
Sur Battery	-	-	-	-	-	-	-	-	25	25	-	-	-	-	-	
Gen Wind	-	-	150	-	-	50	150	-	50	50	-	-	-	-	-	
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gen Solar	49	-	-	-	-	-	-	-	-	50	-	-	-	-	-	
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-	
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Total</b>	<b>49</b>	<b>-</b>	<b>550</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>150</b>	<b>-</b>	<b>75</b>	<b>125</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>-</b>	

CDG Modeled Scenario  
Coyote Retirement Date

NGEM-50% 2028		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Nameplate (MW)																
Gen Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar		49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GASCT		-	-	-	-	-	-	-	-	-	-	-	289	-	-	-
DR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		49	-	-	-	-	-	-	-	-	-	-	289	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Load+10% 2028		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Nameplate (MW)																
Gen Battery		-	-	-	-	-	-	-	50	-	-	-	-	-	-	-
Rep Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery		-	-	-	-	-	-	50	-	-	-	-	-	-	-	-
Gen Wind		-	-	150	-	-	-	200	-	-	150	-	-	-	-	-
Rep Wind		-	-	-	-	-	-	-	-	-	-	-	-	50	-	-
Sur Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar		49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar		-	-	125	-	25	-	-	-	-	175	-	-	-	-	-
GASCT		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		49	-	275	-	25	-	250	-	-	325	-	-	50	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Load+10% - NGEM+100%  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	25	50	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-
Gen Wind	-	-	200	-	-	50	200	-	50	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	100	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>600</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>250</b>	<b>-</b>	<b>50</b>	<b>150</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

Load+25%  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	200	-	-	-	-	-	100	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	150	-	-	-	-	-	-	250	-	-	-	-	-
GASCT	-	-	-	-	-	-	289	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>350</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>289</b>	<b>-</b>	<b>100</b>	<b>400</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

Load+25% - NGEM+100%  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	75	-	50	50	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	400	-	-	-	200	-	-	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	25	-	-	-	150	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>850</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>200</b>	<b>-</b>	<b>-</b>	<b>250</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

High Accred  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	200	-	100	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	25	-	25	25	-	200	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>225</b>	<b>25</b>	<b>100</b>	<b>300</b>	<b>-</b>	<b>25</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

Low Accred 2028		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Nameplate (MW)																
Gen Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind		-	-	-	-	-	-	-	-	-	150	-	-	-	-	-
Rep Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar		49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar		-	-	-	-	-	-	-	-	-	400	-	-	-	-	-
GASCT		-	-	-	-	-	-	289	-	-	-	-	-	-	-	-
DR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		49	-	-	-	-	-	289	-	-	550	-	-	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Carbon Tax 2028		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Nameplate (MW)																
Gen Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery		-	-	-	-	-	-	-	-	25	25	-	-	-	-	-
Gen Wind		-	-	-	-	-	-	300	50	50	50	-	-	-	-	-
Rep Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
Sur Wind		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar		49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar		-	-	-	150	175	-	-	-	-	75	-	-	-	-	-
GASCT		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		49	-	-	150	175	-	300	50	75	150	-	-	-	-	50

CDG Modeled Scenario  
Coyote Retirement Date

Renew High Cost  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	-	-	-	400	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>400</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario  
Coyote Retirement Date

Renew High Cost - NGEM+100%  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	50	50	-	-	-	-	-
Gen Wind	-	-	100	-	-	-	500	-	100	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	300	50	100	-	-	-	-	300	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>400</b>	<b>50</b>	<b>100</b>	<b>-</b>	<b>500</b>	<b>-</b>	<b>150</b>	<b>450</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

CDG Modeled Scenario Renew Low Cost (40% ITC)  
 Coyote Retirement Date 2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	25	-	25	-	-	-	-	-	-
Gen Wind	-	-	-	-	-	-	200	100	50	50	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	75	75	50	-	-	-	-	200	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	75	75	50	-	225	100	75	250	-	-	-	-	-

CDG Modeled Scenario Low Accred, Load +25,  
 Coyote Retirement Date 2028 NGEM +100%

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-
Gen Wind	-	-	200	-	-	-	250	-	-	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	200	25	75	-	-	-	-	100	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	400	25	75	-	300	-	-	200	-	-	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Regional Haze High, Low  
Accred, Load +25, NGEM  
+100%  
2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-
Gen Wind	-	-	200	-	-	-	50	-	-	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	200	125	-	-	-	-	25	50	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	400	125	-	-	50	-	25	225	-	-	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Regional Haze Mid, Low  
Accred, Load +25, NGEM  
+100%  
2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
Gen Wind	-	-	200	-	-	50	-	-	50	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	225	25	50	-	-	-	-	100	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	425	25	50	50	-	-	50	300	-	-	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Low Accred, Load +10, NGEM  
+100%  
2028

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
Gen Wind	-	-	200	-	50	-	50	-	-	150	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	150	150	25	25	100	-	-	150	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	350	150	75	25	150	-	-	350	-	-	-	-	-

CDG Modeled Scenario  
Coyote Retirement Date

Regional Haze High, Low  
Accred, Load +10, NGEM  
+100%  
2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	25	25	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	250	-	-	50	-	-	-	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	150	-	-	-	-	-	-	200	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	49	-	425	25	-	50	-	-	-	300	-	-	-	-	-

CDG Modeled Scenario  
 Coyote Retirement Date  
 Regional Haze Mid, Low  
 Accred, Load +10, NGEM  
 +100%  
 2040

Nameplate (MW)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Gen Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Battery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Battery	-	-	25	25	-	-	-	-	-	-	-	-	-	-	-
Gen Wind	-	-	200	50	-	-	50	-	-	100	-	-	-	-	-
Rep Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Wind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gen Solar	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rep Solar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sur Solar	-	-	125	25	-	-	-	-	-	200	-	-	-	-	-
GASCT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>49</b>	<b>-</b>	<b>350</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>300</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

**APPENDIX C**

**Otter Tail Sensitivity Summary**

NPVRR Comparison		A	A.1	B	C	D	E	F	G	H	I	J	
<b>IRP Refresh</b> <b>No Externalities Included</b>		2023 Base Case	Preferred Plan	Natural Gas & Energy Markets (NGEM) +50%	NGEM +100%	NGEM -50%	Regional Haze (RH) Mid Cost	RH Mid Cost NGEM +100%	RH High Cost	RH High Cost NGEM +100%	10% Increased Load	10% Increased Load NGEM +100%	
1	Withdraw from Coyote 12/31/2040	NPVRR (\$000)	\$2,742,670	\$2,764,110	\$2,999,270	\$3,163,944	\$2,173,232	\$2,798,479	\$3,218,073	\$2,818,342	\$3,236,851	\$3,025,644	\$3,495,792
2	Withdraw from Coyote 12/31/2028	NPVRR (\$000)	\$2,714,497	\$2,724,103	\$2,972,047	\$3,164,174	\$2,131,738	\$2,714,497	\$3,164,174	\$2,714,497	\$3,164,174	\$3,011,694	\$3,502,295
	2028 Difference from 2040 Exit NPVRR	(\$000)	-\$28,173	-\$40,007	-\$27,223	\$230	-\$41,494	-\$83,982	-\$53,899	-\$103,845	-\$72,677	-\$13,950	\$6,503

Annual Resource Additions - Exit Coyote 12/31/2040		A	A.1	B	C	D	E	F	G	H	I	J
		2023 Base Case	Preferred Plan	Natural Gas & Energy Markets (NGEM) +50%	NGEM +100%	NGEM -50%	Regional Haze (RH) Mid Cost	RH Mid Cost NGEM +100%	RH High Cost	RH High Cost NGEM +100%	10% Increased Load	10% Increased Load NGEM +100%
3	2023	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar
4	2024											
5	2025	Wind Repowers	Wind Repowers	Wind Repower 400 MW Sur Solar	Wind Repower 400 MW Sur Solar 150 MW Gen Wind	Wind Repowers	Wind Repowers	Wind Repowers 400 MW Sur Solar 150 MW Gen Wind	Wind Repowers	Wind Repowers 400 MW Sur Solar 150 MW Gen Wind	Wind Repowers 75 MW Sur Solar 100 MW Gen Wind	Wind Repowers 400 MW Sur Solar 200 MW Gen Wind
	2026	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel 75 MW Sur Solar	Astoria Onsite Fuel
6	2027		100 MW Sur Solar	50 MW Gen Wind								
7	2028		100 MW Sur Solar							50 MW Gen Wind		
8	2029		200 MW Gen Wind		50 MW Gen Wind			50 MW Gen Wind			50 MW Gen Wind	50 MW Gen Wind
9	2030											
10	2031			50 MW Gen Wind							50 MW Gen Wind	
12	2032	325 MW Sur Solar 200 MW Gen Wind	100 MW Sur Solar 25 MW Sur Battery	150 MW Gen Wind	100 MW Gen Wind		350 MW Sur Solar 200 MW Gen Wind	100 MW Gen Wind	325 MW Sur Solar 200 MW Gen Wind	100 MW Gen Wind	150 MW Sur Solar 150 MW Gen Wind	50 MW Sur Battery 25 MW Gen Solar 150 MW Gen Wind
	2033											
13	2034											
14	2035											
15	2036											
16	2037										50 MW Rep Wind	

Annual Resource Additions - Exit Coyote 12/31/2028		A	A.1	B	C	D	E	F	G	H	I	J
		2023 Base Case	Preferred Plan	Natural Gas & Energy Markets (NGEM) +50%	NGEM +100%	NGEM -50%	Regional Haze (RH) Mid Cost	RH Mid Cost NGEM +100%	RH High Cost	RH High Cost NGEM +100%	10% Increased Load	10% Increased Load NGEM +100%
18	2023	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar	Hoot Lake Solar
19	2024											
20	2025	Wind Repowers	Wind Repowers	Wind Repowers 400 MW Sur Solar	Wind Repowers 400 MW Sur Solar 150 MW Gen Wind	Wind Repowers	Wind Repowers	Wind Repowers	Wind Repowers	Wind Repowers	Wind Repowers 75 MW Sur Solar 100 MW Gen Wind	Wind Repowers 400 MW Sur Solar 200 MW Gen Wind
	2026	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel	Astoria Onsite Fuel 75 MW Sur Solar	Astoria Onsite Fuel
21	2027		100 MW Sur Solar	50 MW Gen Wind								
22	2028		100 MW Sur Solar									50 MW Gen Wind
24	2029	50 MW Sur Solar 300 MW Gen Wind	200 MW Gen Wind	250 MW Gen Wind	150 MW Gen Wind		50 MW Sur Solar 300 MW Gen Wind	150 MW Gen Wind	50 MW Sur Solar 300 MW Gen Wind	150 MW Gen Wind	50 MW Sur Battery 250 MW Gen Wind	25 MW Sur Battery 200 MW Gen Wind
	2030		100 MW Sur Solar									
25	2031	25 MW Sur Battery	150 MW Gen Wind	50 MW Gen Wind	100 MW Gen Wind		25 MW Sur Battery	100 MW Gen Wind	25 MW Sur Battery	100 MW Gen Wind	50 MW Gen Wind	25 MW Sur Battery 50 MW Gen Wind
27	2032	25 MW Sur Battery 250 MW Sur Solar 100 MW Gen Wind	100 MW Sur Solar 25 MW Sur Battery	50 MW Sur Battery 50 MW Gen Wind	50 MW Sur Battery 50 MW Gen Solar 50 MW Gen Wind		25 MW Sur Battery 250 MW Sur Solar 100 MW Gen Wind	50 MW Sur Battery 50 MW Gen Solar 50 MW Gen Wind	25 MW Sur Battery 250 MW Sur Solar 100 MW Gen Wind	50 MW Sur Battery 50 MW Gen Solar 50 MW Gen Wind	50 MW Gen Battery 175 MW Sur Solar 100 MW Gen Wind	50 MW Gen Battery 75 MW Gen Solar 50 MW Gen Wind
	2033											
28	2034											
29	2035					248 MW Firm Dispatchable						
30	2036										25 MW Rep Battery	
31	2037			50 MW Rep Wind								25 MW Rep Solar

