

APPENDIX D – PRODUCTION COST MODELING



NTEC Production Cost Analysis

Dairyland Power Cooperative,
Nemadji River Generation, LLC, South Shore Energy
LLC

Dairyland Power Cooperative, Nemadji River Generation, LLC, South
Shore Energy LLC NTEC NEPA and State Siting Services
Project No. 101798

5/11/2022

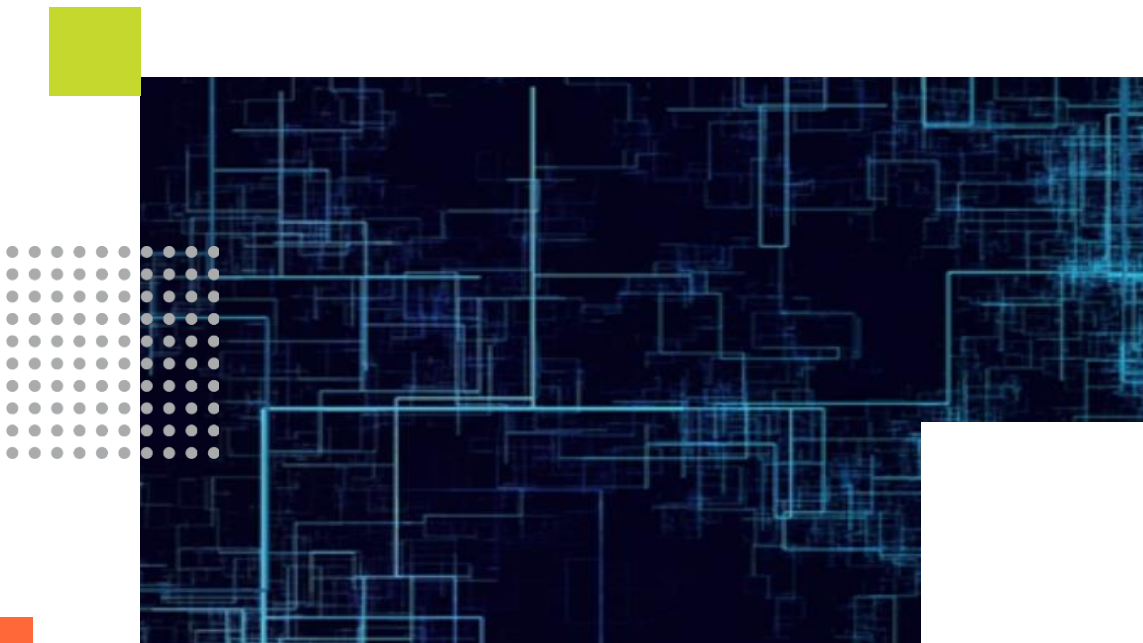


TABLE OF CONTENTS

	<u>Page No.</u>
1.0 EXECUTIVE SUMMARY.....	1
2.0 INTRODUCTION.....	3
2.1 About NTEC	3
2.2 Purpose	3
3.0 BACKGROUND.....	4
3.1 MISO	4
3.2 Basin Electric Power Cooperative	6
3.3 Dairyland.....	7
3.4 Minnesota Power	8
4.0 ANALYSIS APPROACH.....	9
4.1 PROMOD IV	9
4.2 MTEP Models.....	9
4.3 Model Updates	11
4.4 Production Cost Modeling Scenarios	12
5.0 RESULTS AND KEY FINDINGS	13
5.1 Generation Dispatch and Emissions	13
5.2 Curtailment and Congestion	17
5.3 Key Findings.....	19
 APPENDIX A - DETAILED GENERATION RESULTS	

LIST OF TABLES

	<u>Page No.</u>
Table 1: MISO 2005 and 2020 Energy Mix.....	5
Table 2: MTEP Model Retirement Updates.....	12
Table 3: 2025—2040 MISO West Dispatchable Resource Generation Summary (MWh Total over 16 Years)	14

LIST OF FIGURES

	<u>Page No.</u>
Figure 1: 2025–2040 MISO West Annual CO ₂ Emission Reductions with NTEC.....	2
Figure 2: MISO Territory Map.....	4
Figure 3: Basin Service Territory.....	6
Figure 4: Dairyland Service Territory.....	7
Figure 5: Minnesota Service Territory.....	8
Figure 6: MISO Future 1 Generation Build Out.....	10
Figure 7: MISO Future 1 Generation Build Out Siting.....	11
Figure 8: Generation Dispatch Stack.....	13
Figure 9: Annual Generation Comparison of Key Resource Types (MWh).....	15
Figure 10: 2025–2040 MISO West Coal Unit Generation.....	16
Figure 11: 2025–2040 MISO West Annual CO ₂ Emission Reductions with NTEC.....	17
Figure 12: MISO West Generation and Load Concentration.....	18
Figure 13: Flow Direction and Location of Wind Rich Areas in MISO West.....	19

LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Term/Phrase/Name</u>
1898 & Co.	1898 & Co., Part of Burns & McDonnell
Basin Electric	Nemadji River Generation, LLC
Client	Dairyland Power Cooperative, Nemadji River Generation, LLC, South Shore Energy LLC
CO ₂	Carbon Dioxide
Dairyland	Dairyland Power Cooperative
Dispatch	Security-Constrained Economic Dispatch
FTR	Financial Transmission Right
GI	Generation Interconnection
GIA	Generator Interconnection Agreement
LMP	Locational Marginal Price
MISO	Midcontinent Independent System Operator, Inc.
MTEP	Miso Transmission Expansion Plan
MWh	Megawatt Hour
NG	Natural Gas
NTEC	Nemadji Trail Energy Center
PROMOD	ABB PROMOD IV
SCED	Security-Constrained Economic Dispatch
SCUC	Security-Constrained Unit Commitment
South Shore	South Shore Energy, LLC

DISCLAIMERS

1898 & Co.SM is a division of Burns & McDonnell Engineering Company, Inc. which performs or provides business, technology, and consulting services. 1898 & Co. does not provide legal, accounting, or tax advice. The reader is responsible for obtaining independent advice concerning these matters. That advice should be considered by reader, as it may affect the content, opinions, advice, or guidance given by 1898 & Co. Further, 1898 & Co. has no obligation and has made no undertaking to update these materials after the date hereof, notwithstanding that such information may become outdated or inaccurate. These materials serve only as the focus for consideration or discussion; they are incomplete without the accompanying oral commentary or explanation and may not be relied on as a stand-alone document.

The information, analysis, and opinions contained in this material are based on publicly available sources, secondary market research, and financial or operational information, or otherwise information provided by or through 1898 & Co. clients whom have represented to 1898 & Co. they have received appropriate permissions to provide to 1898 & Co., and as directed by such clients, that 1898 & Co. is to rely on such client-provided information as current, accurate, and complete. 1898 & Co. has not conducted complete or exhaustive research, or independently verified any such information utilized herein, and makes no representation or warranty, express or implied, that such information is current, accurate, or complete. Projected data and conclusions contained herein are based (unless sourced otherwise) on the information described above and are the opinions of 1898 & Co. which should not be construed as definitive forecasts and are not guaranteed. Current and future conditions may vary greatly from those utilized or assumed by 1898 & Co.

1898 & Co. has no control over weather; cost and availability of labor, material, and equipment; labor productivity; energy or commodity pricing; demand or usage; population demographics; market conditions; changes in technology, and other economic or political factors affecting such estimates, analyses, and recommendations. To the fullest extent permitted by law, 1898 & Co. shall have no liability whatsoever to any reader or any other third party, and any third party hereby waives and releases any rights and claims it may have at any time against 1898 & Co., Burns & McDonnell Engineering Company, Inc., and any Burns & McDonnell affiliated company, with regard to this material, including but not limited to the accuracy or completeness thereof.

1.0 EXECUTIVE SUMMARY

1898 & Co., a division of Burns & McDonnell Engineering Company, Inc. (1898 & Co.), has been retained by Dairyland Power Cooperative (Dairyland), Nemadji River Generation, LLC, a Basin Electric Power Cooperative subsidiary (Basin Electric), and South Shore Energy, LLC (South Shore), an ALLETE subsidiary, to perform production cost modeling that evaluates impacts associated with the Nemadji Trail Energy Center (NTEC) related to regional carbon dioxide (CO₂) emissions.

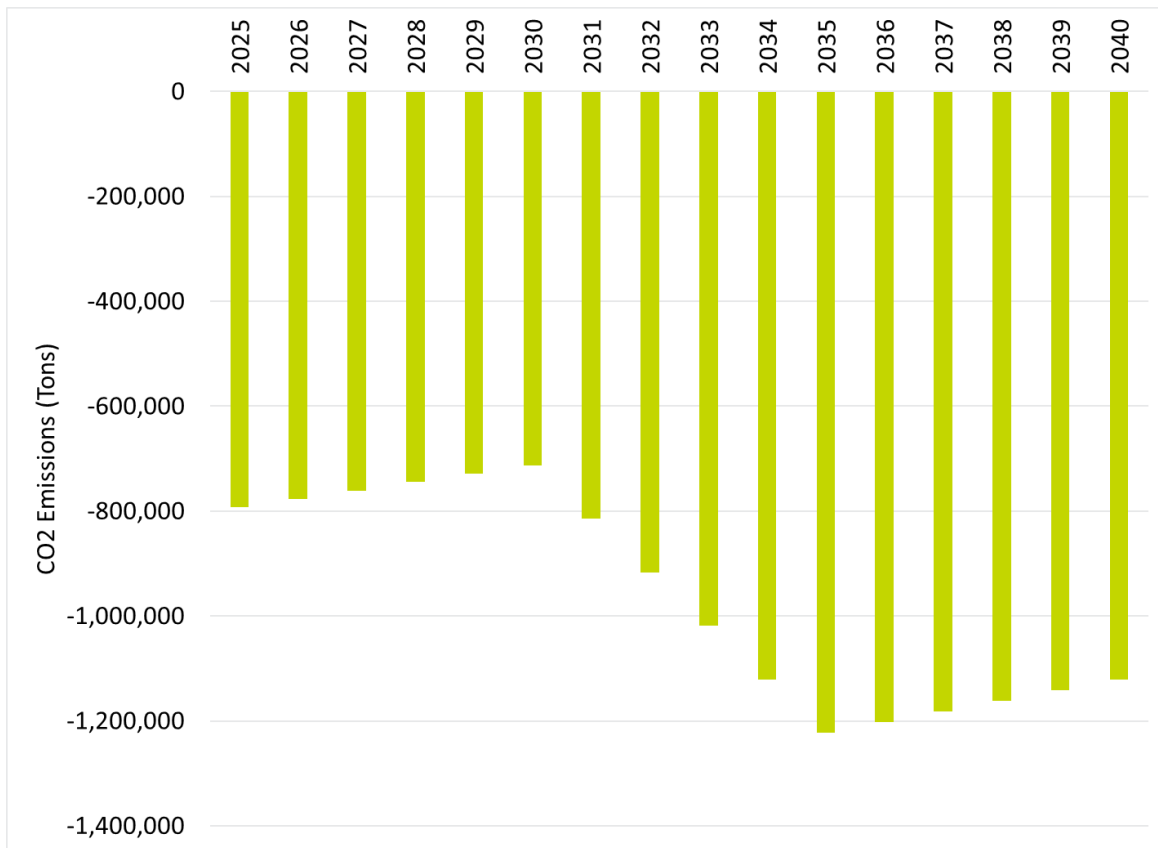
The production cost modeling was performed using ABB's PROMOD IV (PROMOD) production cost modeling software. PROMOD performs hourly chronological security-constrained unit commitment and economic dispatch (SCUC/SCED/Dispatch). This analysis utilized MISO's Transmission Expansion Plan (MTEP) models, which are developed by MISO annually and are used for economic analysis. Using PROMOD for production cost modeling, at a high level, forecasts the MISO day-ahead energy market dispatch of generators while adhering to multiple constraints to dispatch the most efficient, lowest variable cost generators. For purposes of this analysis, PROMOD simulations were performed to simulate and isolate the impact NTEC has on generation dispatch across the region. Two simulations were performed as part of this analysis to project the future dispatch of resources across MISO and the neighboring regions, one with NTEC and one without NTEC, to analyze the incremental impacts NTEC may have on the system.

The results between the with NTEC and without NTEC scenarios were compared over the study period, which is from 2025 through 2040. The following are the key findings of this report, which are further described in Section 5.0.

Since NTEC will be one of the most efficient dispatchable facilities in MISO, NTEC is expected to offset the energy produced otherwise by less efficient higher-emitting resources throughout the region. As demonstrated in the chart below, NTEC reduces CO₂ emissions in MISO West by an average of 964,000 tons per year, which equates to removing more than 190,000 internal combustion engine cars per year from the road¹.

¹ Assuming a typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year
<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

Figure 1: 2025–2040 MISO West Annual CO₂ Emission Reductions with NTEC



In addition to directly reducing emissions from less efficient generators, NTEC's location on the transmission system reduces transmission congestion across the region, which results in more generation from renewable resources. Comparing the two simulations, the With NTEC Scenario resulted in 2,302,807 MWh of additional renewable generation, which was not curtailed over the study period. This is due to a reduction in transmission congestion that currently exists between the renewables-heavy western portion of MISO West and the load centers in the eastern portion of MISO West. NTEC, being located closer to load centers in MISO West, relieves congestion between load centers and renewable generation, which leads to additional renewable generation on the system.

2.0 INTRODUCTION

1898 & Co., a division of Burns & McDonnell Engineering Company, Inc. (1898 & Co.), was retained by Dairyland Power Cooperative (Dairyland), Nemadji River Generation, LLC, a Basin Electric Power Cooperative subsidiary (Basin Electric) and, South Shore Energy, LLC (South Shore), an ALLETE subsidiary, (collectively the NTEC Owners) to perform production cost modeling that evaluates impacts associated with the Nemadji Trail Energy Center (NTEC) related to regional carbon dioxide (CO₂) emissions. The production cost modeling performed as part of this study is intended to be used as part of the Rural Utilities Service's Supplemental Environmental Assessment being prepared for the NTEC. 1898 & Co. performed the analysis independently with oversight from Dairyland Power Cooperative (Dairyland) and Minnesota Power, an ALLETE subsidiary, resource planning staff.

2.1 About NTEC

NTEC is a proposed 550–625 MW combined-cycle natural gas plant in Superior, Wisconsin. Natural gas combined-cycle generators efficiently produce power through combustion turbines, which utilize natural gas (NG), and a steam turbine which utilizes the hot exhaust gases from the combustion turbines to generate power. NTEC will be jointly owned by South Shore, Dairyland, and Basin Electric Power Cooperative² (collectively "NTEC Owners"). Jointly owning NTEC between the NTEC Owners allows each respective utility to own a portion of the natural gas combined cycle that otherwise may not have fit into one individual owner's resource plans. Energy associated with NTEC will be bid into the Midcontinent Independent System Operator, Inc. (MISO) market.

2.2 Purpose

This analysis aimed to use production cost modeling software to simulate the future dispatch of generation resources and analyze the incremental impacts associated with NTEC. The entire MISO market was simulated both with and without NTEC. Some of the metrics which were studied include:

- Generation output by fuel type
- CO₂ emissions
- Renewable generation curtailment
- Transmission congestion

The analysis uses models and software to simulate the economic dispatch across 8760 annual hours in future years. The production cost modeling software optimizes dispatch of resources to meet load while observing various constraints; more information about the modeling software is in Section 4.1. The dispatch results can then be used to compare the impact a specific resource, in this study NTEC, has across the study footprint and duration.

² <https://www.basinelectric.com/News-Center/news-releases/Basin-Electric-partners-with-Dairyland-Power-Cooperative-and-ALLETE-to-add-new-natural-gas-generation>

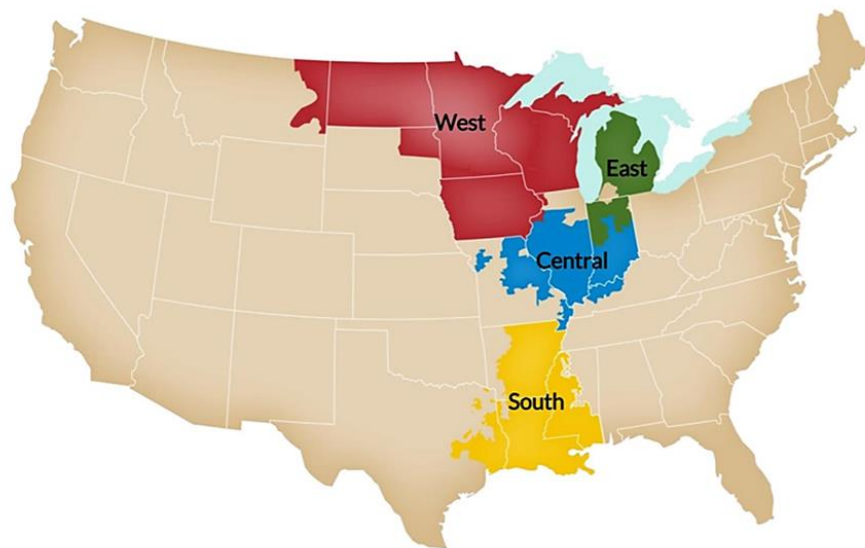
3.0 BACKGROUND

3.1 MISO

MISO is an independent, not-for-profit organization that delivers power across 15 U.S. states and the Canadian province of Manitoba³. By managing 72,000 miles of transmission operations, MISO delivers power to forty-two million people. MISO also manages the buying and selling of electricity throughout their footprint. Around the clock, MISO administers the generation and transmission of the right amount of electricity to serve their customer's energy needs. MISO also works in conjunction with its members and stakeholders to plan for the future of its electric grid.

MISO is often broken into four sub-regions, West, East, Central, and South, for sub-regional planning purposes, as shown in Figure 2. The MISO West planning region consists of 20 Transmission Owning members and includes Iowa, Minnesota, Wisconsin, and parts of Illinois, Michigan, Montana, North Dakota, and South Dakota. To capture the regional impacts being analyzed as part of this study, results in Section 5.0 are frequently summarized at the MISO West sub-region level. The MISO West footprint aligns with the NTEC Owners' service territories and the location of existing resources.

Figure 2: MISO Territory Map



MISO's resource mix has been evolving over recent decades as more renewable generation comes online and existing coal resources retire. From 2016 through 2020, roughly 19,000 MW of existing generation, primarily dispatchable resources, retired while there were 17,800 MW of additions, largely made up of wind and gas resources⁴. This trend of changing capacity mix has led to a dramatic shift in MISO's energy mix since 2005, as demonstrated in table 1.

³ <https://www.misoenergy.org/about/>

⁴ MISO Annual State of the Market Reports - <https://www.potomaceconomics.com/document-library/>

Table 1: MISO 2005⁵ and 2020 Energy Mix

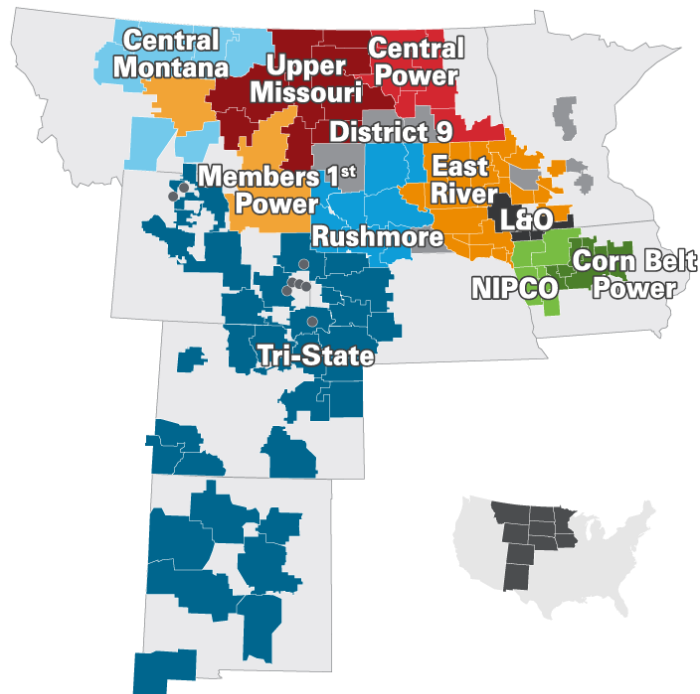
Fuel Type	2005	2020
Nuclear	13%	17%
Coal	76%	34%
Natural Gas	7%	34%
Oil	0%	0%
Hydro	2%	2%
Wind	0%	12%
Other	2%	1%

⁵ [https://ccaps.umn.edu/documents/CPE-Conferences/MIPSYCON-PowerPoints/2017/GenTheEvolutionoftheGridintheMidcontinentIndependentSystemOperator\(MISO\)Region.pdf](https://ccaps.umn.edu/documents/CPE-Conferences/MIPSYCON-PowerPoints/2017/GenTheEvolutionoftheGridintheMidcontinentIndependentSystemOperator(MISO)Region.pdf)

3.2 Basin Electric Power Cooperative

Basin Electric Power Cooperative is a regional wholesale electric generation and transmission cooperative owned and controlled by the member cooperatives, providing wholesale power to 3 million electric consumers across nine states⁶. From 2000 to 2020, Basin's winter capability has shifted from 85% coal to 40% coal generation. Renewable and green generation, such as wind, equaled 18.6% of Basin's total energy mix in 2020.

Figure 3: Basin Service Territory⁷



⁶ <https://www.basinelectric.com/about-us/organization/At-a-Glance/index>

⁷ <https://www.basinelectric.com/about-us/members/>

3.4 Minnesota Power

Minnesota Power serves about 145,000 retail electric customers and 15 municipal systems across a 26,000-square-mile service area shown in Figure 5⁹. Since 2005, through the *EnergyForward* resource strategy Minnesota Power has transitioned from an energy mix of 95% coal to more than 50% renewable energy. Minnesota Power's goal is to be 70 percent renewable in 2030, reduce carbon emissions by 80 percent by 2035, and have a generation mix that is coal-free by 2035 while helping to ensure reliable and affordable power for customers. The need for a natural gas combined cycle, such as NTEC, was identified as part of Minnesota Power's 2015 IRP. The Minnesota Public Utilities Commission approved NTEC in 2019.¹⁰ Minnesota Power currently has limited natural gas peaking resources and no combined-cycle generators. As part of their IRP, Minnesota Power identified that a combined cycle unit could bridge the energy transition away from coal resources towards renewables and provide dispatchable generation to complement the variable generation of their renewable resources.

Figure 5: Minnesota Service Territory



⁹<https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7b70795F77-0000-C41E-A71C-FD089119967C%7d&documentTitle=20212-170583-01>

¹⁰ NTEC is partially owned by Minnesota Power's affiliate, South Shore Energy, LLC. Minnesota Power is purchasing a share of NTEC energy and capacity from South Shore Energy, LLC through a Capacity Dedication Agreement. NTEC is owned by South Shore, LLC (rather than directly by Minnesota Power) because of a specific Wisconsin statute that restricts power plant ownership only to Wisconsin entities.

4.0 ANALYSIS APPROACH

4.1 PROMOD IV

The production cost modeling was performed using ABB's PROMOD IV (PROMOD) production cost modeling software which simulates hourly chronological security-constrained unit commitment and economic dispatch (SCUC/SCED/Dispatch). MISO's Transmission Expansion Plan (MTEP) models were utilized for this analysis and are further described in section 4.2. The PROMOD simulations performed evaluated unit dispatch across all of MISO and the other regions within the eastern interconnect. The objective of the production cost simulations within PROMOD is to minimize cost while adhering to constraints, such as generating unit operational characteristics, transmission topology, and balancing energy supply with customer demand. Using PROMOD for production cost modeling, at a high level, forecasts the MISO day-ahead energy market dispatch of generators while adhering to multiple constraints to dispatch the most efficient, lowest variable cost generators. For purposes of this analysis, PROMOD simulations were performed to simulate and isolate the impact NTEC has on generation dispatch across the region.

PROMOD has been used for a variety of system economic and transmission planning activities over the past 40-years including applications such as locational marginal price (LMP) forecasting, financial transmission right (FTR) valuation, environmental analysis, generation asset valuations, transmission asset valuations, transmission congestion analysis, and other related energy market studies. The detailed hourly nodal dispatch results from PROMOD can be used to forecast specific generator fuel usage, emissions, and energy output.

4.2 MTEP Models

MISO develops MTEP models annually for use with PROMOD production cost modeling. Each planning cycle begins by collaboratively building regional models with various stakeholders. MISO uses the models to evaluate and recommend transmission investments. Since 2003 over \$42 billion¹¹ of assets have been approved as part of the MTEP process. MISO develops PROMOD MTEP models for the fifth, tenth, fifteenth, and twentieth years into the future.

MISO models existing generation in its MTEP models along with projected future generation fleet changes during the model time periods. These project changes, referred to by MISO as MISO Futures, incorporate utility IRPs, state and utility emissions goals, and industry trends to project the continued fleet transition currently underway throughout MISO. As part of the 2021 MTEP process, three different futures were developed. However, as of the time this study was performed, only the base future, Future 1, PROMOD model had been developed.

As part of Future 1, 77 GW of unit retirements and 121 GW of new resources were added across the MISO footprint; the breakdown by resource type is in Figure 6. A majority of the retirements are coal units, while the 121 GW of new additions is a combination of solar, gas, wind, and storage. Planned generation with signed generator interconnection agreements (GIA), such as NTEC are included in the model. In addition to resources that have signed

¹¹<https://cdn.misoenergy.org/MTEP21%20Full%20Report%20including%20Executive%20Summary611674.pdf>

GIAs, new generic units included as part of the Future's generation build-out process were sited across MISO's footprint with insights derived from examining the MISO generation interconnection (GI) queue and from analyses performed by consultants Vibrant Clean Energy¹². More details about the MISO Futures can be found in the MISO Futures Report¹³.

Figure 6: MISO Future 1 Generation Build Out

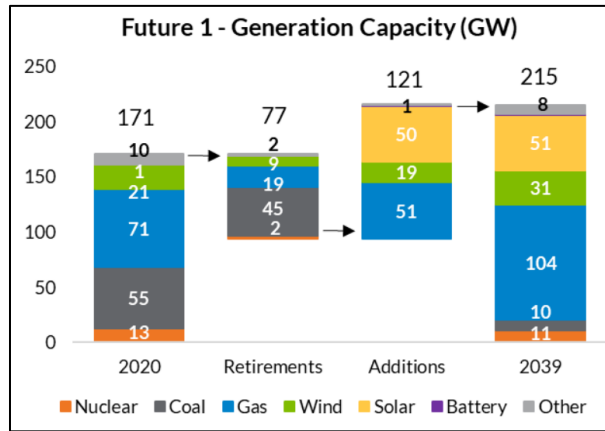
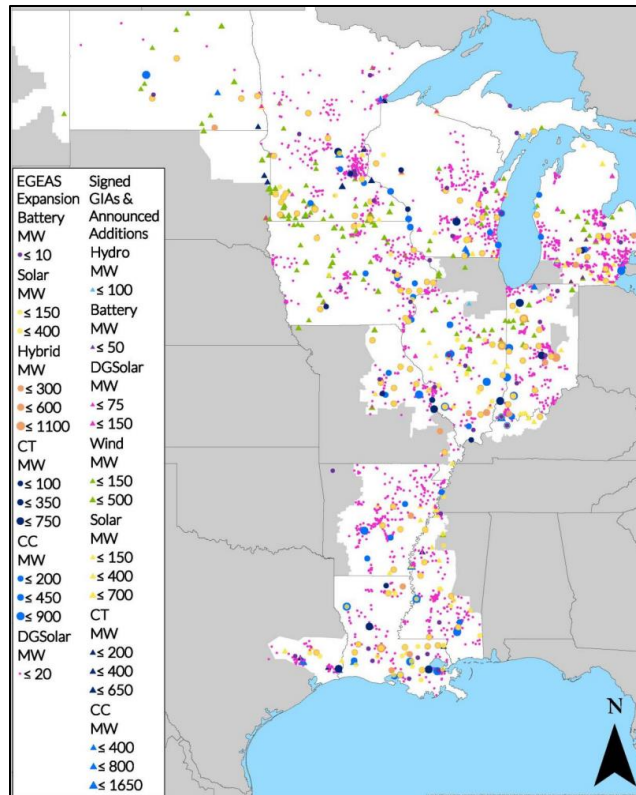


Figure 7 displays the new generation siting associated with the build-out included in Future 1.

¹² https://cdn.misoenergy.org/2018%20VCE%20Study_Results536959.pdf

¹³ <https://cdn.misoenergy.org/MISO%20Futures%20Report538224.pdf>

Figure 7: MISO Future 1 Generation Build Out Siting



4.3 Model Updates

For this NTEC production costing study, minor adjustments were made to the underlying MTEP models based on Minnesota Power and Dairyland input¹⁴. These changes were made to reflect more recent information regarding existing unit retirements, such as retirement dates determined during Minnesota Power or Dairyland’s integrated resource planning process or other analysis performed after the MTEP models were developed. These unit retirement updates which were made are outlined below in Table 2.

¹⁴ Basin did not provide input on the MTEP assumptions due to the timing of this analysis in relation to Basin’s joining of the partnership on NTEC

Table 2: MTEP Model Retirement Updates

Generator	MTEP Retirement Year	Updated Retirement Year ¹⁵
Boswell 1	2029	Retired before first model year
Boswell 3	2026	2030
Boswell 4	2026	2050
Cannon Falls Energy 1	2024	2050
Cannon Falls Energy 2	2024	2050
Coal Creek 1	2022	2050
Coal Creek 2	2022	2050
Duane Arnold	2026	Retired before first model year
John P Madgett 1	2026	2050
Sherburne 3	2031	2029
Silver Bay PC:2	2026	Retired before first model year
Taconite Harbor EC:1	2026	Retired before first model year
Taconite Harbor EC:2	2026	Retired before first model year

In addition to generator retirement date updates, the Great River Energy Coal Creek high-voltage direct current transmission line, which was recently sold, was updated in the modeling to stay online throughout the study period. Before Coal Creek's sale¹⁶, when the MTEP models were being developed, there was uncertainty around the high-voltage direct-current line's future. With the recent sale of the Coal Creek line it is not expected to retire in 2022 as was originally included in the MTEP models.

4.4 Production Cost Modeling Scenarios

Two sets of production cost simulations were performed using the MISO MTEP models in PROMOD. Because NTEC is included in the MISO's base MTEP models, the first scenario modeled is the "With NTEC Scenario." For the second scenario, the "Without NTEC Scenario," NTEC was removed from the model. The only variable that was changed between the two scenarios is the removal of NTEC. Therefore, the differences between the results from these two Scenarios are used to show the impacts of NTEC on the system.

¹⁵ Retirement year of 2050 is representative of a date later than 2040 which is the last year of the model simulations

¹⁶ <https://greatriverenergy.com/rainbow-energy-center-to-purchase-coal-creek-station/>

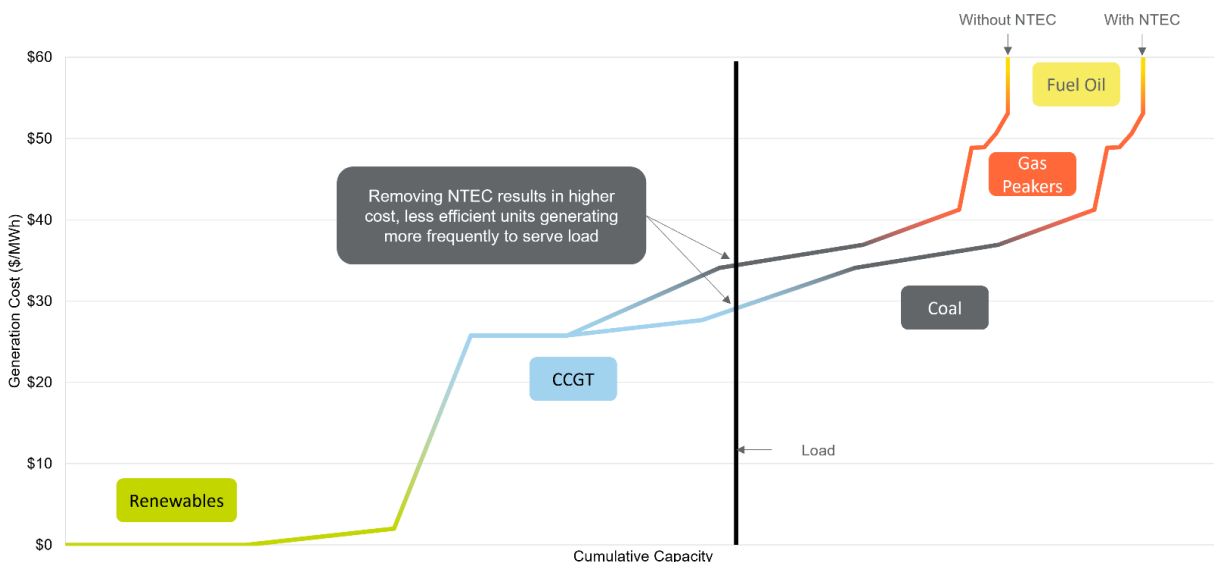
5.0 RESULTS AND KEY FINDINGS

Results from the simulation of the With NTEC Scenario and the Without NTEC Scenario were compared across multiple metrics. The results shown in this section are summaries of the detailed hourly production cost simulations. Results for years between the available MTEP model years was interpolated to determine the total impact over the 15-year study time frame.

5.1 Generation Dispatch and Emissions

Removing NTEC from the model results in less efficient (i.e., uses more fossil fuel to produce energy), higher production cost resources, generating more frequently. This shift results in more reliance on coal, natural gas peaking, and fuel oil generators – these generation technologies typically emit more carbon per MWh than NTEC. Figure 8 reflects a generation dispatch stack created by taking resources in MISO West and stacking them in order of least generation cost. The Y-axis reflects generation costs, including delivered fuel and variable operating and maintenance costs. The X-axis reflects the cumulative capacity of the stacked generators. Because similar assets have similar generation costs, asset classes are grouped together and are reflected in the figure by different colors. NTEC, included in the lower supply curve, falls to the lower cost portion of the CCGT grouping. Comparing the intersection of the load (vertical line) and the two supply curves highlights the effect of removing NTEC on the relative dispatch cost between the two scenarios. Since NTEC will be one of the most efficient facilities located in MISO, NTEC will offset energy produced otherwise by less efficient higher carbon-emitting resources throughout the region.

Figure 8: Generation Dispatch Stack



The dispatchable generation by resource type in MISO West from 2025 through 2040 for the two NTEC cases is shown in Table 3 below. NTEC generation is displayed on a separate line item from other natural gas combined cycles in Table 3 to isolate the differences between NTEC and other generators between the two scenarios. With NTEC's generation going to

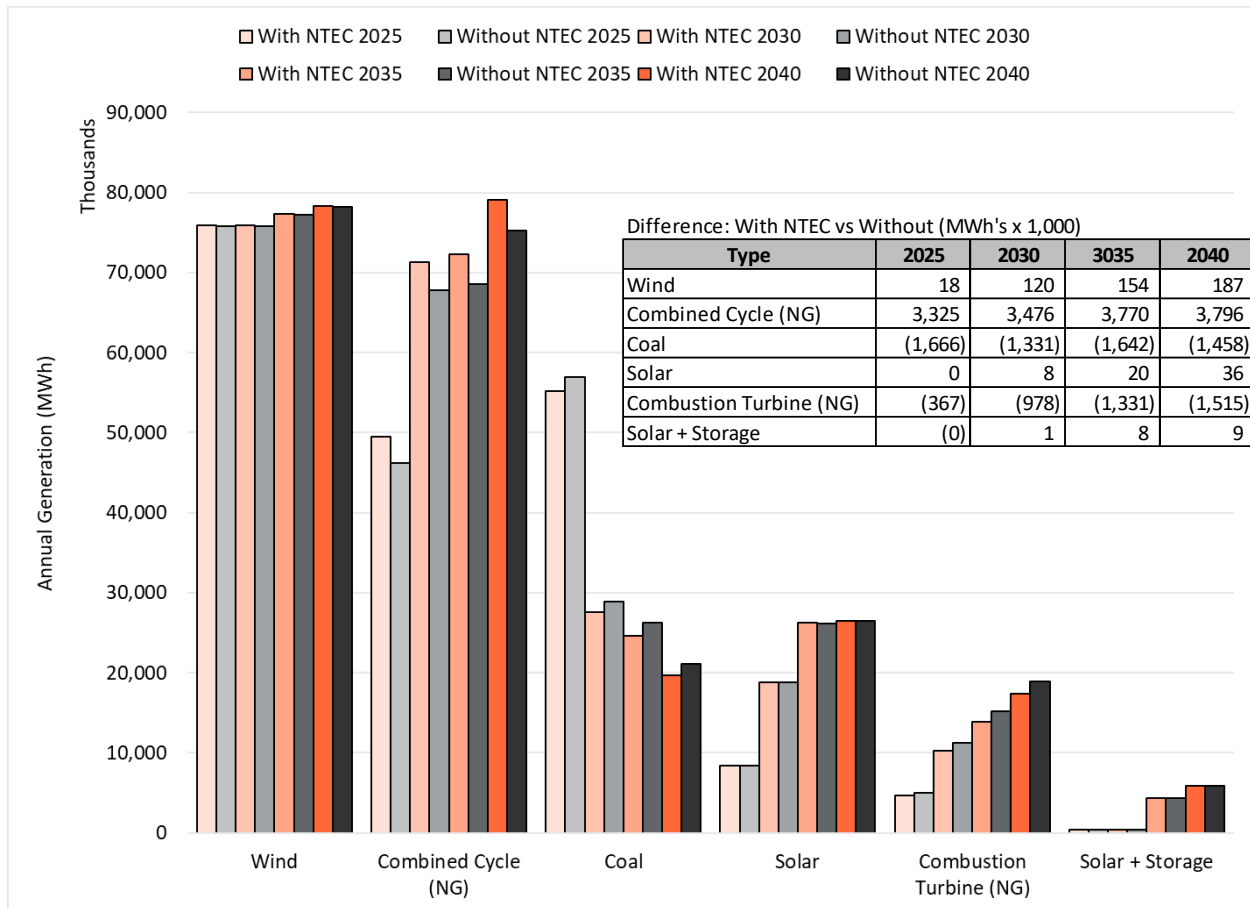
zero once removed from the model, the generation of coal and natural gas combustion turbines saw dramatic increases in their utilization.

Table 3: 2025–2040 MISO West Dispatchable Resource Generation Summary (MWh Total over 16 Years)

Generation Type	With NTEC	Without NTEC	Percent Difference
Coal	486,251,143	510,486,609	5%
Combined Cycle (NG) ¹⁷	1,037,156,110	1,046,058,347	1%
NTEC (NG)	66,491,555	0	-100%
Combustion Turbine (NG)	186,816,810	204,008,311	9%
Internal Combustion (NG)	21,070,823	21,891,105	4%
Steam Turbine (NG)	24,487,278	25,305,931	3%
Internal Combustion (Oil)	146,677	163,868	12%
Steam Turbine (Other)	735,790	742,787	1%
Combustion Turbine (Oil)	476,382	490,400	3%

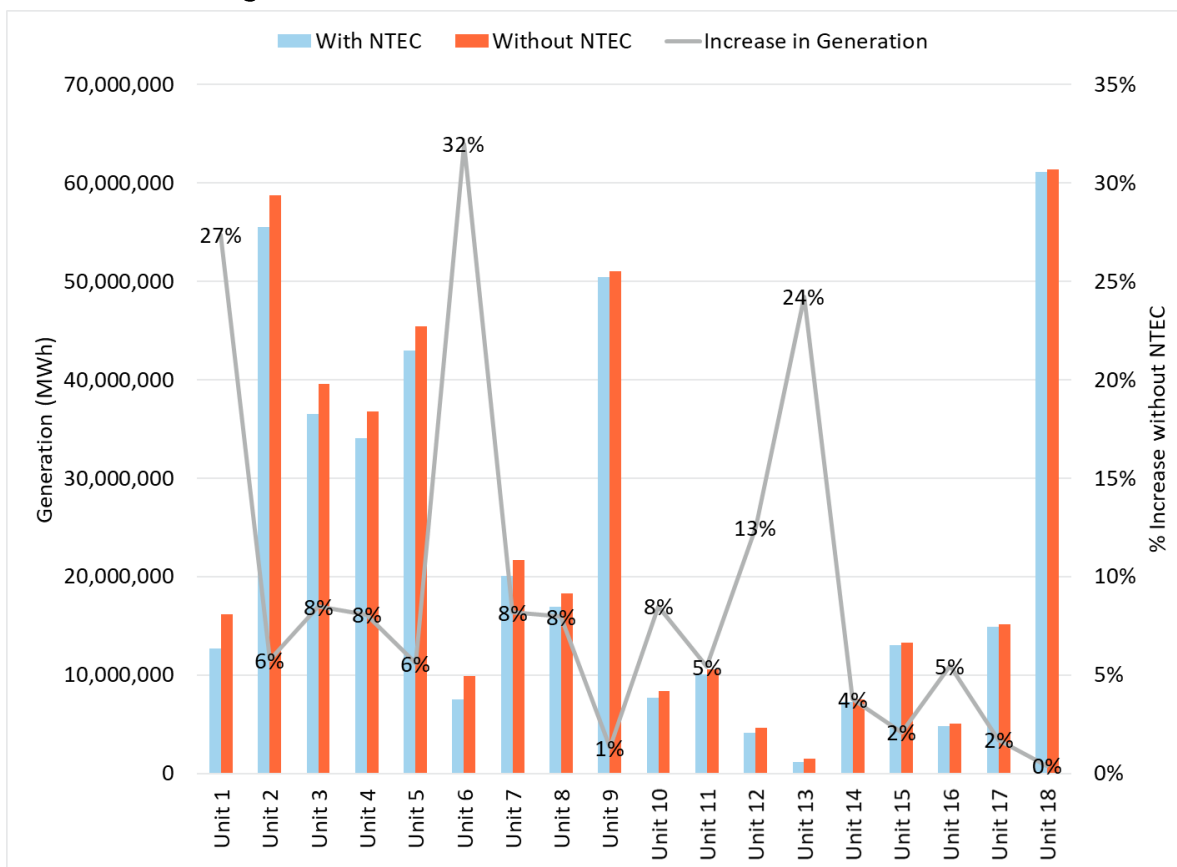
¹⁷ NTEC generation is not included in the Combined Cycle (NG) total.

Figure 9: Annual Generation Comparison of Select Resource Types (MWh)



The increase in coal generation in the Without NTEC Scenario was spread across 28 of the 30-coal units which were online in the MTEP model for at least a portion of the study period. Figure 10 shows the generation for the 18 individual coal units which contributed most to the 24,235,465 MWh of increased coal generation with NTEC removed from the simulation.

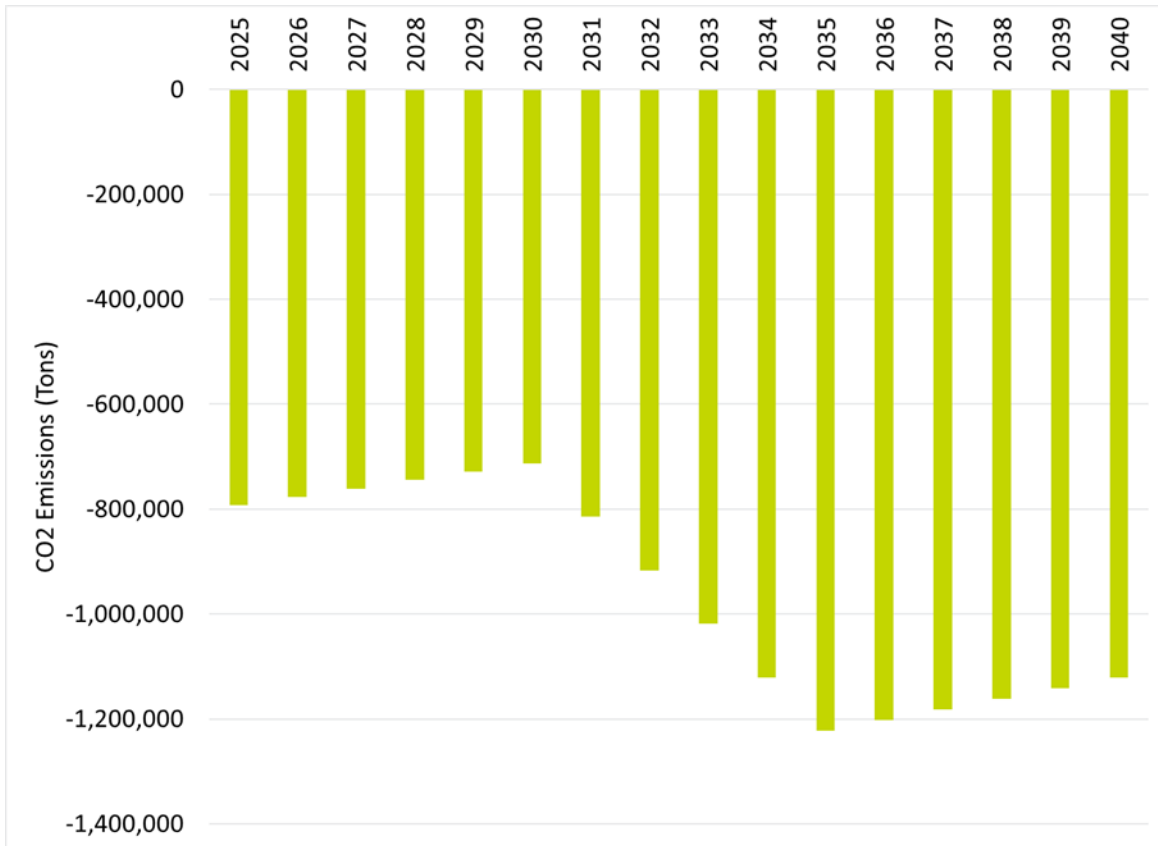
Figure 10: 2025–2040 MISO West Coal Unit Generation



Along with the increase in generation from coal units under the Without NTEC Case, more CO₂ emissions are produced in MISO West without NTEC. Figure 11 shows the annual decrease in CO₂ emissions in MISO West with NTEC operating. This reduction in emissions with NTEC reflects the difference in emissions under the two scenarios across all generating units. Over the study period, NTEC reduces CO₂ emissions in MISO West by an average of 964,000 tons per year; this equates to removing more than 190,000 internal combustion engine cars per year from the road¹⁸. In summary, while NTEC may produce emissions, its effect on the system as a whole results in a reduction in CO₂ emissions.

¹⁸ Assuming a typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

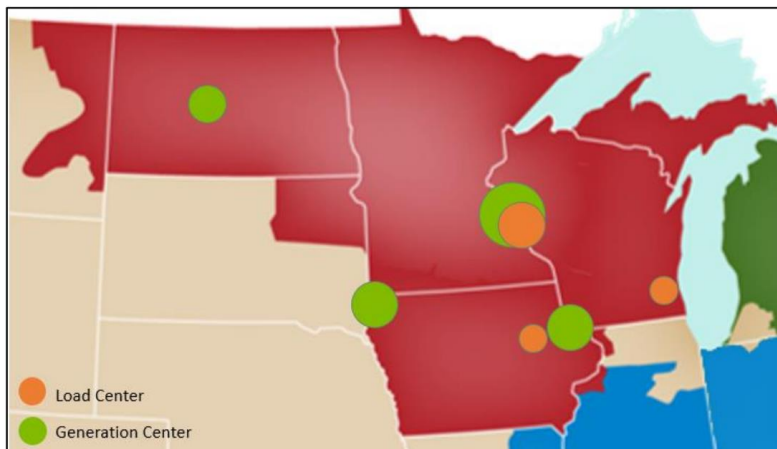
Figure 11: 2025–2040 MISO West Annual CO₂ Emission Reductions with NTEC



5.2 Curtailment and Congestion

As part of this analysis, the production cost modeling included the transmission topology throughout MISO as was included in the MTEP models, previously described in Section 4.0. One metric which can be analyzed as part of SCED modeling is the congestion on the transmission system. PROMOD calculates the three pricing components of LMPs, which are energy, congestion, and losses. The transmission system throughout MISO West generally flows from generation-rich areas in the West towards larger cities to the East, including Minneapolis/Saint Paul, Milwaukee, and Des Moines. Figure 12 below generally shows where generation and load are concentrated in the MISO West region.

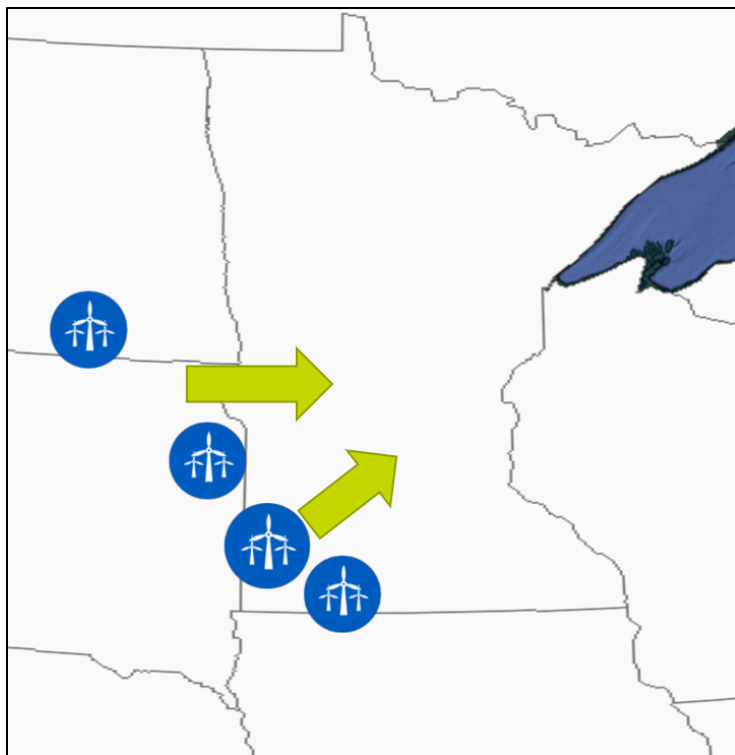
Figure 12: MISO West Generation and Load Concentration¹⁹



This energy flow from the West to the East can lead to transmission congestion. Transmission congestion can also affect the price of energy, or LMPs, across the system. Generally, when there is congestion between a generation-rich area and a load center, the LMP at the generation side of the constraint will decrease, and non-dispatchable resources (i.e., wind and solar) may be forced to curtail due to these price signals. If there is generation located on the side of the constraint closer to load, this can help to reduce congestion across a transmission corridor and result in less total congestion and less curtailment of wind or solar generation.

The production cost simulation results show that NTEC being online leads to less transmission congestion across constraints flowing from the West to the East in MISO West. This reduction in congestion results in additional renewable generation on the system, primarily due to wind located on the Western side of MISO West being curtailed less frequently. Figure 13 below shows where the additional flow of wind generation occurs because of NTEC being online. Comparing the two simulations, the With NTEC Scenario resulted in 2,302,807 MWh of additional renewable generation, which was not curtailed over the study period. This curtailed energy equals roughly an additional 35 MW wind resources enabled by NTEC being on the system. In addition to allowing more renewable energy to serve load, the decrease in transmission congestion also lowers energy prices on the system since congestion pricing is a component of LMPs.

¹⁹<https://cdn.misoenergy.org/MTEP21%20Full%20Report%20including%20Executive%20Summary611674.pdf>

Figure 13: Flow Direction and Location of Wind Rich Areas in MISO West

5.3 Key Findings

NTEC being an efficient natural gas combined cycle, when included in the model, results in less generation being produced by less efficient, higher carbon-emitting resources in MISO West. The generation that NTEC offsets consists largely of generation from coal facilities and less efficient NG peaking combustion turbines. Therefore, including NTEC in the model results in a decrease of CO₂ emissions at an average rate of 964,000 tons annually over the study period.

Due to NTEC's location on the transmission system also reduces transmission congestion across the MISO West region. Specifically, within MISO's West region, less wind is ultimately curtailed with the presence of NTEC. This decrease in curtailment is due to a reduction in transmission congestion between the renewables-heavy western portion of MISO West and the load centers in the eastern part of MISO West. NTEC, being located closer to load centers in MISO West, relieves congestion between load centers and renewable generation, which leads to additional renewable generation on the system.

APPENDIX A - DETAILED GENERATION RESULTS

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
NTEC	2	3,969,067	4,083,437	4,269,955	4,272,465	-	-	-	-
Battery Storage - 1	1	-	-	-	3,465	-	-	-	3,433
Battery Storage - 2	1	-	-	-	2,981	-	-	-	2,994
Battery Storage - 3	1	-	-	-	3,006	-	-	-	3,031
Battery Storage - 4	1	-	-	-	2,927	-	-	-	2,975
Battery Storage - 5	1	-	-	-	3,586	-	-	-	3,636
Battery Storage - 6	1	-	-	-	3,208	-	-	-	3,217
Battery Storage - 7	1	-	-	-	3,001	-	-	-	2,973
CC - 1	1	1,133,694	1,319,692	-	-	1,191,867	1,373,444	-	-
CC - 2	1	-	5,295,030	5,396,282	5,421,886	-	5,291,472	5,355,552	5,384,719
CC - 3	1	-	5,351,310	5,595,989	5,691,885	-	5,258,807	5,562,433	5,614,491
CC - 4	1	-	661,667	666,592	668,382	-	662,676	667,854	668,834
CC - 5	1	-	-	-	670,260	-	-	-	670,759
CC - 6	1	1,596,402	-	-	-	1,630,839	-	-	-
CC - 7	1	1,176,754	1,215,989	1,315,458	1,308,567	1,201,133	1,239,268	1,342,290	1,320,089
CC - 8	1	2,993,074	3,140,541	3,509,433	3,506,912	3,086,285	3,234,643	3,589,331	3,592,420
CC - 9	1	4,213	-	-	-	4,825	-	-	-
CC - 10	1	182,808	218,839	262,477	258,938	188,038	227,000	268,487	264,238
CC - 11	1	2,002,712	-	-	-	2,041,519	-	-	-
CC - 12	1	2,390,600	2,657,421	2,989,986	3,000,227	2,479,133	2,761,229	3,085,122	3,101,073
CC - 13	1	1,202,865	1,284,635	1,348,274	1,403,046	1,221,026	1,307,611	1,372,260	1,420,737
CC - 14	1	1,199,402	1,272,073	1,331,584	1,394,815	1,211,828	1,296,205	1,353,893	1,417,002
CC - 15	1	1,118,187	1,163,431	1,220,440	1,253,646	1,128,829	1,175,614	1,231,545	1,260,724
CC - 16	1	1,161,453	1,215,930	1,283,352	1,302,535	1,176,066	1,229,584	1,296,271	1,311,624
CC - 17	1	-	-	-	-	-	-	-	-
CC - 18	1	-	-	-	-	-	-	-	-
CC - 19	1	-	-	-	-	-	-	-	-
CC - 20	1	-	495,360	516,809	529,405	-	501,163	520,522	531,359
CC - 21	1	-	-	-	2,076,388	-	-	-	2,096,298
Conventional Hydro - 1	1	33,614	33,610	33,607	33,595	33,615	33,610	33,607	33,595
Conventional Hydro - 2	1	95,187	95,217	95,216	95,182	95,188	95,219	95,223	95,179
Conventional Hydro - 3	1	26,543	26,538	26,535	26,595	26,543	26,538	26,535	26,595
Conventional Hydro - 4	1	51,215	51,201	51,203	51,200	51,215	51,200	51,203	51,200
Conventional Hydro - 5	1	78,412	78,426	78,394	78,383	78,403	78,411	78,394	78,383
Conventional Hydro - 6	1	63,115	63,115	63,115	63,116	63,115	63,115	63,115	63,116
Conventional Hydro - 7	1	41,850	41,850	41,850	41,850	41,850	41,850	41,850	41,850
Conventional Hydro - 8	1	35,065	35,066	35,066	35,066	35,065	35,066	35,066	35,066
Conventional Hydro - 9	1	52,187	52,170	52,123	52,055	52,199	52,164	52,131	52,067
Conventional Hydro - 10	1	57,004	57,018	57,005	56,991	57,003	57,012	56,996	56,991
Conventional Hydro - 11	1	49,802	49,812	49,805	49,785	49,800	49,814	49,805	49,787
Conventional Hydro - 12	1	25,565	25,565	25,565	25,565	25,565	25,565	25,565	25,565
Conventional Hydro - 13	1	65,718	65,714	65,704	65,688	65,722	65,713	65,702	65,691
Conventional Hydro - 14	1	88,911	88,925	88,895	88,889	88,906	88,919	88,895	88,889
Conventional Hydro - 15	1	121,846	121,839	121,791	121,770	121,818	121,826	121,791	121,770
Conventional Hydro - 16	1	2,342	2,315	2,284	2,288	2,352	2,317	2,291	2,287
Conventional Hydro - 17	1	19,700	19,700	19,700	19,700	19,700	19,700	19,700	19,700
Conventional Hydro - 18	1	22,605	22,603	22,601	22,597	22,603	22,602	22,601	22,597
Conventional Hydro - 19	1	15,982	15,982	15,982	15,982	15,982	15,982	15,982	15,982
Conventional Hydro - 20	1	-	-	-	-	-	-	-	-
Conventional Hydro - 21	1	111,420	111,426	111,409	111,381	111,420	111,429	111,415	111,381
Conventional Hydro - 22	1	287,630	287,706	287,606	287,478	287,607	287,712	287,600	287,483
Conventional Hydro - 23	1	124,435	124,426	124,398	124,383	124,438	124,418	124,396	124,383
CT Gas - 1	1	18,983	8,753	-	-	19,677	8,092	-	-
CT Gas - 2	1	11,661	4,597	-	-	11,348	3,591	-	-
CT Gas - 3	1	49,400	33,927	-	-	53,358	39,163	-	-
CT Gas - 4	1	74,799	178,965	130,856	140,028	79,874	190,387	143,842	157,174
CT Gas - 5	1	-	-	-	-	-	-	-	-
CT Gas - 6	1	-	-	-	-	-	-	-	-
CT Gas - 7	1	280,364	533,184	685,173	649,333	361,029	597,974	755,211	697,894
CT Gas - 8	1	348	597	299	1,071	348	1,294	448	945
CT Gas - 9	1	8,866	8,222	11,441	10,709	10,949	10,388	14,240	13,337
CT Gas - 10	1	2,493	-	-	-	3,046	-	-	-
CT Gas - 11	1	18,947	12,081	21,311	16,844	21,257	14,200	23,403	18,680
CT Gas - 12	1	734	411	189	635	802	428	185	747
CT Gas - 13	1	163,299	344,156	290,636	409,342	178,208	359,820	302,659	421,757
CT Gas - 14	1	-	-	-	-	-	-	-	-
CT Gas - 15	1	670,363	869,308	844,484	963,335	705,823	908,807	888,501	999,442
CT Gas - 16	1	-	1,279,337	1,416,906	2,305,486	-	1,489,903	1,679,345	2,616,240
CT Gas - 17	1	-	-	260,742	549,727	-	-	268,309	553,176
CT Gas - 18	1	-	-	649,391	1,213,964	-	-	729,530	1,276,356
CT Gas - 19	1	-	-	233,874	448,376	-	-	252,780	479,746

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
CT Oil - 20	1	-	-	-	-	-	-	-	-
Geothermal - 1	1	43,137	43,399	43,713	43,895	43,365	43,508	43,723	43,900
Geothermal - 2	1	43,139	43,401	43,713	43,808	43,365	43,506	43,727	43,816
Geothermal - 3	1	43,156	44,006	43,735	43,896	43,385	44,109	43,747	43,900
Geothermal - 4	1	43,167	43,996	43,731	43,908	43,392	44,107	43,749	43,918
Geothermal - 5	1	43,304	43,572	43,856	44,056	43,531	43,670	43,878	44,053
Geothermal - 6	1	43,330	44,176	43,872	44,055	43,550	44,274	43,897	44,052
Geothermal - 7	1	43,190	44,029	43,731	43,912	43,415	44,131	43,756	43,916
Geothermal - 8	1	43,165	43,435	43,728	43,917	43,398	43,531	43,753	43,917
Geothermal - 9	1	37,714	37,328	36,599	37,921	37,661	37,270	36,367	37,702
IC Gas - 1	1	137	-	-	24	47	-	-	24
IC Gas - 2	1	7,139	7,499	11,701	7,476	7,528	7,546	12,032	7,810
IC Gas - 3	1	7,286	7,955	11,537	7,544	7,603	8,031	11,856	7,922
IC Gas - 4	1	7,133	7,676	11,241	7,419	7,510	7,729	11,544	7,710
IC Gas - 5	1	7,264	7,666	11,821	7,519	7,618	7,715	12,114	7,822
IC Gas - 6	1	15,236	-	-	-	20,377	-	-	-
IC Oil - 1	1	2,247	9,886	10,050	10,237	2,411	10,204	10,456	10,642
IC Oil - 2	1	-	-	-	-	-	-	-	-
IC Oil - 3	1	-	-	-	-	-	-	-	-
IC Oil - 4	1	-	-	-	-	-	-	-	-
IC Oil - 5	1	-	-	-	-	-	-	-	-
IC Oil - 6	1	-	-	-	-	-	-	-	-
IC Oil - 7	1	13	84	69	6	13	411	302	198
IC Oil - 8	1	-	-	-	-	-	-	-	-
IC Oil - 9	1	-	-	-	-	-	-	-	-
IC Oil - 10	1	108	826	648	21	111	1,353	1,239	953
IC Oil - 11	1	-	-	-	-	-	-	-	-
IC Oil - 12	1	-	-	-	-	-	-	-	-
IC Oil - 13	1	-	-	-	-	-	-	-	-
IC Oil - 14	1	-	-	-	-	-	-	-	-
IC Renewable - 1	1	9,613	7,189	7,508	7,114	9,836	7,481	7,913	7,552
Interruptible Loads - 1	1	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0
Interruptible Loads - 2	1	-	-	-	-	-	-	-	-
Interruptible Loads - 3	1	60	120	83	155	60	120	83	159
Interruptible Loads - 4	1	64	50	63	288	54	50	63	453
Interruptible Loads - 5	1	512	469	446	1,186	487	487	426	1,215
Interruptible Loads - 6	1	0	(0)	(0)	(0)	0	(0)	(0)	2
Interruptible Loads - 7	1	-	-	-	-	-	-	-	-
Interruptible Loads - 8	1	13	28	22	38	13	28	22	39
Interruptible Loads - 9	1	-	-	-	-	-	-	-	-
Interruptible Loads - 10	1	51	37	72	367	48	37	72	529
Interruptible Loads - 11	1	96	103	121	254	96	108	119	255
Nuclear - 1	1	4,348,806	4,752,603	4,368,561	4,766,547	4,348,806	4,752,603	4,368,561	4,766,547
Nuclear - 2	1	4,080,866	4,501,074	-	-	4,080,866	4,501,074	-	-
Nuclear - 3	1	4,484,324	4,036,888	-	-	4,484,324	4,036,888	-	-
PV + BATT - 1	1	436,080	386,608	1,119,654	991,848	436,569	385,817	1,117,879	989,151
PV + BATT - 2	1	13,482	14,691	41,386	36,097	13,403	14,594	40,974	35,745
PV + BATT - 3	1	-	-	153,442	271,954	-	-	153,442	271,954
PV + BATT - 4	1	-	-	131,292	117,937	-	-	130,002	117,043
PV + BATT - 5	1	-	-	12,662	11,173	-	-	12,633	11,144
PV + BATT - 6	1	-	-	33,055	27,579	-	-	32,839	27,465
PV + BATT - 7	1	-	-	56,535	50,095	-	-	56,535	50,095
PV + BATT - 8	1	-	-	12,474	11,100	-	-	12,441	11,141
PV + BATT - 9	1	-	-	131,482	223,268	-	-	129,873	222,174
PV + BATT - 10	1	-	-	14,556	27,063	-	-	14,403	26,303
PV + BATT - 11	1	-	-	76,034	120,361	-	-	75,258	120,404
PV + BATT - 12	1	-	-	127,862	217,362	-	-	126,890	216,928
PV + BATT - 13	1	-	-	131,537	227,097	-	-	131,114	226,781
PV + BATT - 14	1	-	-	141,835	192,915	-	-	142,382	192,357
PV + BATT - 15	1	-	-	41,247	72,781	-	-	41,261	72,781
PV + BATT - 16	1	-	-	67,861	114,169	-	-	67,700	113,173
PV + BATT - 17	1	-	-	63,490	93,508	-	-	63,490	93,508
PV + BATT - 18	1	-	-	34,524	30,390	-	-	34,541	30,373
PV + BATT - 19	1	-	-	69,498	91,977	-	-	69,486	91,964
PV + BATT - 20	1	-	-	54,203	47,840	-	-	54,203	47,840
Solar PV - 1	1	244,439	244,314	244,859	245,124	244,439	244,314	244,859	245,124
Solar PV - 2	1	29,308	24,018	21,340	20,290	29,265	23,894	21,097	20,208
Solar PV - 3	1	6,210	6,221	6,235	6,235	6,204	6,219	6,232	6,236
Solar PV - 4	1	5,763	6,184	6,269	6,224	5,769	6,186	6,267	6,222
Solar PV - 5	1	6,415	6,410	6,423	6,431	6,415	6,410	6,418	6,426
Solar PV - 6	1	6,330	6,326	6,337	6,340	6,330	6,326	6,337	6,340

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Solar PV - 7	1	5,779	5,790	5,796	5,796	5,779	5,790	5,796	5,796
Solar PV - 8	1	6,213	6,221	6,235	6,235	6,205	6,221	6,232	6,235
Solar PV - 9	1	5,763	6,184	6,272	6,224	5,771	6,182	6,267	6,221
Solar PV - 10	1	6,415	6,410	6,421	6,431	6,415	6,410	6,418	6,426
Solar PV - 11	1	6,330	6,326	6,337	6,340	6,330	6,326	6,337	6,340
Solar PV - 12	1	5,779	5,790	5,796	5,796	5,779	5,790	5,796	5,796
Solar PV - 13	1	6,211	6,221	6,235	6,235	6,205	6,221	6,232	6,236
Solar PV - 14	1	5,763	6,184	6,266	6,230	5,769	6,179	6,264	6,222
Solar PV - 15	1	6,415	6,410	6,423	6,431	6,415	6,410	6,415	6,426
Solar PV - 16	1	6,330	6,326	6,337	6,340	6,330	6,326	6,337	6,340
Solar PV - 17	1	5,779	5,790	5,796	5,796	5,779	5,790	5,796	5,796
Solar PV - 18	1	-	6,218	6,235	6,235	-	6,215	6,232	6,236
Solar PV - 19	1	-	6,200	6,269	6,230	-	6,190	6,264	6,218
Solar PV - 20	1	-	6,414	6,423	6,431	-	6,414	6,415	6,426
Solar PV - 21	1	-	6,328	6,337	6,340	-	6,328	6,337	6,340
Solar PV - 22	1	-	5,785	5,796	5,796	-	5,785	5,796	5,796
Solar PV - 23	1	-	6,218	6,235	6,235	-	6,215	6,232	6,236
Solar PV - 24	1	-	6,200	6,269	6,231	-	6,192	6,267	6,222
Solar PV - 25	1	-	6,414	6,423	6,431	-	6,414	6,418	6,426
Solar PV - 26	1	-	6,328	6,337	6,340	-	6,328	6,337	6,340
Solar PV - 27	1	-	5,785	5,796	5,796	-	5,785	5,796	5,796
Solar PV - 28	1	-	6,218	6,235	6,235	-	6,217	6,232	6,236
Solar PV - 29	1	-	6,200	6,269	6,228	-	6,195	6,267	6,219
Solar PV - 30	1	-	6,414	6,423	6,431	-	6,414	6,418	6,426
Solar PV - 31	1	-	6,328	6,337	6,340	-	6,328	6,337	6,340
Solar PV - 32	1	-	5,785	5,796	5,796	-	5,785	5,796	5,796
Solar PV - 33	1	-	6,218	6,235	6,235	-	6,218	6,232	6,234
Solar PV - 34	1	-	6,200	6,272	6,230	-	6,191	6,267	6,220
Solar PV - 35	1	-	6,414	6,423	6,431	-	6,414	6,418	6,426
Solar PV - 36	1	-	6,328	6,337	6,340	-	6,328	6,337	6,340
Solar PV - 37	1	-	5,785	5,796	5,796	-	5,785	5,796	5,796
Solar PV - 38	1	-	6,218	6,235	6,235	-	6,218	6,232	6,233
Solar PV - 39	1	-	6,200	6,272	6,228	-	6,193	6,267	6,221
Solar PV - 40	1	-	6,414	6,423	6,431	-	6,414	6,418	6,426
Solar PV - 41	1	-	6,328	6,337	6,340	-	6,328	6,337	6,340
Solar PV - 42	1	-	5,785	5,796	5,796	-	5,785	5,796	5,796
Solar PV - 43	1	-	-	6,234	6,235	-	-	6,231	6,234
Solar PV - 44	1	-	-	6,264	6,228	-	-	6,258	6,222
Solar PV - 45	1	-	-	6,413	6,431	-	-	6,410	6,426
Solar PV - 46	1	-	-	6,328	6,340	-	-	6,328	6,340
Solar PV - 47	1	-	-	5,788	5,796	-	-	5,788	5,796
Solar PV - 48	1	-	-	6,234	6,235	-	-	6,231	6,234
Solar PV - 49	1	-	-	6,264	6,224	-	-	6,257	6,220
Solar PV - 50	1	-	-	6,411	6,431	-	-	6,410	6,426
Solar PV - 51	1	-	-	6,328	6,340	-	-	6,328	6,340
Solar PV - 52	1	-	-	5,788	5,796	-	-	5,788	5,796
Solar PV - 53	1	-	-	6,234	6,235	-	-	6,231	6,234
Solar PV - 54	1	-	-	6,264	6,223	-	-	6,257	6,217
Solar PV - 55	1	-	-	6,413	6,431	-	-	6,408	6,423
Solar PV - 56	1	-	-	6,328	6,340	-	-	6,328	6,340
Solar PV - 57	1	-	-	5,788	5,796	-	-	5,788	5,796
Solar PV - 58	1	-	-	6,234	6,235	-	-	6,231	6,236
Solar PV - 59	1	-	-	6,258	6,225	-	-	6,255	6,222
Solar PV - 60	1	-	-	6,413	6,431	-	-	6,408	6,423
Solar PV - 61	1	-	-	6,328	6,340	-	-	6,328	6,340
Solar PV - 62	1	-	-	5,788	5,796	-	-	5,788	5,796
Solar PV - 63	1	-	-	6,234	6,235	-	-	6,231	6,235
Solar PV - 64	1	-	-	6,260	6,226	-	-	6,255	6,222
Solar PV - 65	1	-	-	6,413	6,431	-	-	6,408	6,423
Solar PV - 66	1	-	-	6,328	6,340	-	-	6,328	6,340
Solar PV - 67	1	-	-	5,788	5,796	-	-	5,788	5,796
Solar PV - 68	1	-	-	-	6,230	-	-	-	6,227
Solar PV - 69	1	-	-	-	6,223	-	-	-	6,201
Solar PV - 70	1	-	-	-	6,425	-	-	-	6,417
Solar PV - 71	1	-	-	-	6,340	-	-	-	6,340
Solar PV - 72	1	-	-	-	5,796	-	-	-	5,796
Solar PV - 73	1	-	-	-	6,230	-	-	-	6,229
Solar PV - 74	1	-	-	-	6,222	-	-	-	6,199
Solar PV - 75	1	-	-	-	6,425	-	-	-	6,419
Solar PV - 76	1	-	-	-	6,340	-	-	-	6,340
Solar PV - 77	1	-	-	-	5,796	-	-	-	5,796

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Solar PV - 78	1	-	-	-	6,230	-	-	-	6,229
Solar PV - 79	1	-	-	-	6,219	-	-	-	6,200
Solar PV - 80	1	-	-	-	6,425	-	-	-	6,420
Solar PV - 81	1	-	-	-	6,340	-	-	-	6,340
Solar PV - 82	1	-	-	-	5,796	-	-	-	5,796
Solar PV - 83	1	-	-	-	6,230	-	-	-	6,229
Solar PV - 84	1	-	-	-	6,219	-	-	-	6,199
Solar PV - 85	1	-	-	-	6,425	-	-	-	6,420
Solar PV - 86	1	-	-	-	6,340	-	-	-	6,340
Solar PV - 87	1	-	-	-	5,796	-	-	-	5,796
Solar PV - 88	1	1,848	1,802	1,838	1,848	1,843	1,805	1,835	1,844
Solar PV - 89	1	116,959	117,101	117,398	117,513	116,959	117,101	117,398	117,513
Solar PV - 90	1	230,339	230,548	230,878	231,530	230,339	230,548	230,878	231,530
Solar PV - 91	1	11,807	37,696	76,413	96,767	11,807	37,696	76,413	96,767
Solar PV - 92	1	6,948	22,170	44,915	56,841	6,948	22,170	44,915	56,841
Solar PV - 93	1	5,948	19,288	39,077	49,369	5,983	19,308	39,134	49,481
Solar PV - 94	1	5,986	19,107	38,715	49,017	5,986	19,107	38,715	49,017
Solar PV - 95	1	4,835	15,428	31,276	39,589	4,835	15,428	31,277	39,588
Solar PV - 96	1	4,366	13,943	28,239	35,716	4,366	13,939	28,232	35,688
Solar PV - 97	1	4,463	13,920	28,767	36,560	4,461	13,930	28,691	36,497
Solar PV - 98	1	3,028	9,533	19,194	24,319	3,018	9,418	19,153	24,258
Solar PV - 99	1	3,043	9,713	19,680	24,896	3,043	9,713	19,680	24,896
Solar PV - 100	1	2,817	8,972	18,340	23,163	2,812	8,972	18,337	23,178
Solar PV - 101	1	2,685	8,569	17,362	21,990	2,685	8,566	17,353	21,936
Solar PV - 102	1	2,391	8,082	16,447	20,777	2,381	8,066	16,419	20,747
Solar PV - 103	1	2,462	7,860	15,895	20,107	2,462	7,860	15,895	20,107
Solar PV - 104	1	2,110	6,744	13,736	17,373	2,120	6,778	13,738	17,375
Solar PV - 105	1	2,039	6,537	13,184	16,670	2,040	6,523	13,174	16,668
Solar PV - 106	1	2,105	6,689	13,558	17,134	2,102	6,696	13,544	17,138
Solar PV - 107	1	1,979	6,317	12,797	16,194	1,979	6,317	12,797	16,194
Solar PV - 108	1	1,963	6,272	12,673	16,047	1,964	6,273	12,682	16,047
Solar PV - 109	1	1,957	6,247	12,629	15,995	1,957	6,247	12,632	15,995
Solar PV - 110	1	1,812	5,938	12,057	15,299	1,836	5,962	12,100	15,331
Solar PV - 111	1	1,650	5,272	10,701	13,534	1,655	5,288	10,705	13,534
Solar PV - 112	1	1,693	5,411	10,915	13,829	1,694	5,411	10,915	13,829
Solar PV - 113	1	1,913	6,103	12,331	15,589	1,920	6,109	12,349	15,614
Solar PV - 114	1	1,084	3,458	7,010	8,882	1,084	3,458	7,010	8,882
Solar PV - 115	1	617	1,953	3,973	5,026	615	1,956	3,979	5,021
Solar PV - 116	1	139,141	416,993	557,324	559,281	139,141	416,993	557,324	559,281
Solar PV - 117	1	124,756	372,112	361,687	363,841	125,263	371,805	359,251	362,089
Solar PV - 118	1	10,059	38,952	39,049	39,082	9,945	38,879	38,980	39,013
Solar PV - 119	1	42,505	102,142	85,646	80,390	42,537	101,703	85,048	80,331
Solar PV - 120	1	51,126	153,229	153,335	153,793	51,117	153,251	153,335	153,793
Solar PV - 121	1	19,292	57,133	57,060	57,582	19,293	56,862	56,991	57,860
Solar PV - 122	1	139,611	417,878	417,098	420,415	139,611	418,204	416,944	420,022
Solar PV - 123	1	49,543	172,231	173,134	173,687	49,793	172,108	173,011	173,536
Solar PV - 124	1	136,238	401,484	447,221	429,650	136,018	401,172	445,074	427,162
Solar PV - 125	1	15,795	39,274	54,782	54,271	15,550	37,612	54,240	52,977
Solar PV - 126	1	123,003	258,615	212,838	187,647	122,917	256,928	210,263	186,169
Solar PV - 127	1	127,404	373,534	459,096	450,253	128,002	371,671	458,686	448,165
Solar PV - 128	1	110,063	359,619	396,782	388,145	110,405	359,545	396,181	387,783
Solar PV - 129	1	140,400	420,605	400,906	392,572	140,400	420,607	398,741	387,362
Solar PV - 130	1	25,690	102,676	140,011	140,638	25,682	102,661	140,024	140,638
Solar PV - 131	1	42,113	168,270	230,233	228,404	42,113	168,270	229,953	227,930
Solar PV - 132	1	40,643	158,827	169,186	169,887	40,782	158,827	169,186	169,887
Solar PV - 133	1	116,041	243,079	241,956	243,722	116,124	243,030	241,961	243,493
Solar PV - 134	1	91,869	278,131	334,512	335,827	92,119	276,387	335,135	335,811
Solar PV - 135	1	-	222,985	215,754	216,704	-	222,633	214,867	215,767
Solar PV - 136	1	-	166,474	166,789	167,058	-	166,474	166,789	167,058
Solar PV - 137	1	60,937	147,596	180,845	181,325	60,937	147,596	180,845	181,325
Solar PV - 138	1	-	-	-	24,999	-	-	-	24,994
Solar PV - 139	1	-	232,657	210,500	197,759	-	232,287	209,924	194,776
Solar PV - 140	1	-	224,675	221,607	215,939	-	224,078	223,008	214,483
Solar PV - 141	1	-	233,937	226,851	225,595	-	233,905	226,550	223,464
Solar PV - 142	1	-	231,454	231,834	232,165	-	231,454	231,770	232,165
Solar PV - 143	1	-	190,528	76,274	63,049	-	193,408	77,592	63,878
Solar PV - 144	1	-	232,651	210,937	193,146	-	231,960	210,944	192,775
Solar PV - 145	1	-	224,599	224,287	217,687	-	224,083	224,454	218,071
Solar PV - 146	1	-	233,937	227,529	225,222	-	233,832	226,658	224,767
Solar PV - 147	1	-	231,454	231,884	232,165	-	231,454	231,884	232,165
Solar PV - 148	1	-	218,728	219,091	218,742	-	218,730	219,099	219,311

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Solar PV - 149	1	-	-	216,409	198,107	-	-	211,576	194,811
Solar PV - 150	1	-	-	219,161	210,788	-	-	219,554	210,266
Solar PV - 151	1	-	-	224,290	221,493	-	-	223,620	220,499
Solar PV - 152	1	-	-	231,314	232,079	-	-	231,320	232,090
Solar PV - 153	1	-	-	49,380	49,334	-	-	49,312	49,207
Solar PV - 154	1	-	-	218,488	206,628	-	-	219,419	203,552
Solar PV - 155	1	-	-	220,241	212,153	-	-	221,069	211,663
Solar PV - 156	1	-	-	223,851	222,792	-	-	225,205	221,436
Solar PV - 157	1	-	-	231,142	232,047	-	-	231,420	232,114
Solar PV - 158	1	-	-	41,493	43,831	-	-	41,882	44,743
Solar PV - 159	1	-	-	224,038	215,604	-	-	223,864	213,680
Solar PV - 160	1	-	-	219,385	209,231	-	-	219,764	209,428
Solar PV - 161	1	-	-	224,255	220,156	-	-	222,863	217,267
Solar PV - 162	1	-	-	231,357	232,141	-	-	231,162	231,873
Solar PV - 163	1	-	-	86,743	90,110	-	-	85,215	90,952
Solar PV - 164	1	-	-	229,520	219,059	-	-	226,012	217,949
Solar PV - 165	1	-	-	222,231	216,991	-	-	223,059	217,646
Solar PV - 166	1	-	-	227,172	225,267	-	-	224,993	224,062
Solar PV - 167	1	-	-	231,424	232,165	-	-	231,226	232,165
Solar PV - 168	1	-	-	150,458	120,947	-	-	156,357	123,782
Solar PV - 169	1	-	-	227,570	219,867	-	-	226,477	220,534
Solar PV - 170	1	-	-	220,557	213,684	-	-	221,304	212,946
Solar PV - 171	1	-	-	227,326	223,594	-	-	224,692	221,352
Solar PV - 172	1	-	-	231,262	232,165	-	-	231,131	232,161
Solar PV - 173	1	-	-	53,151	43,900	-	-	54,092	44,792
ST Coal - 1	1	-	-	-	-	-	-	-	-
ST Coal - 2	1	506,998	701,033	636,731	844,410	517,718	707,319	640,351	846,220
ST Coal - 3	1	-	-	-	-	-	-	-	-
ST Coal - 4	1	-	-	-	-	-	-	-	-
ST Coal - 5	1	2,412,047	8,400	-	-	2,503,517	8,400	-	-
ST Coal - 6	1	3,536,751	3,205,920	3,630,984	3,581,342	3,632,670	3,408,996	3,848,868	3,849,863
ST Coal - 7	1	3,647,896	2,641,574	2,674,546	1,828,167	3,804,869	2,740,093	2,820,584	2,067,061
ST Coal - 8	1	3,783,349	1,848,574	1,895,143	1,334,460	4,037,434	2,016,924	2,131,446	1,323,407
ST Coal - 9	1	1,157,675	1,059,465	992,842	1,073,563	1,255,100	1,136,044	1,103,056	1,115,722
ST Coal - 10	1	24,925	10,648	-	-	28,538	11,163	-	-
ST Coal - 11	1	-	-	-	-	-	-	-	-
ST Coal - 12	1	-	-	-	-	-	-	-	-
ST Coal - 13	1	-	-	-	-	-	-	-	-
ST Coal - 14	1	-	-	-	-	-	-	-	-
ST Coal - 15	1	-	-	-	-	-	-	-	-
ST Coal - 16	1	-	-	-	-	-	-	-	-
ST Coal - 17	1	75,857	59,431	-	-	77,108	63,541	-	-
ST Coal - 18	1	-	-	-	-	-	-	-	-
ST Coal - 19	1	-	-	-	-	-	-	-	-
ST Coal - 20	1	1,269,475	376,006	296,796	110,688	1,452,525	497,339	417,023	325,500
ST Coal - 21	1	1,375,108	-	-	-	1,547,201	-	-	-
ST Coal - 22	1	-	-	-	-	-	-	-	-
ST Coal - 23	1	3,355,787	-	-	-	3,537,568	-	-	-
ST Coal - 24	1	-	-	-	-	-	-	-	-
ST Coal - 25	1	4,954,591	-	-	-	5,039,874	-	-	-
ST Coal - 26	1	-	-	-	-	-	-	-	-
ST Coal - 27	1	-	-	-	-	-	-	-	-
ST Coal - 28	1	-	-	-	-	-	-	-	-
ST Coal - 29	1	-	-	-	-	-	-	-	-
ST Coal - 30	1	-	-	-	-	-	-	-	-
ST Coal - 31	1	-	-	-	-	-	-	-	-
ST Coal - 32	1	-	-	-	-	-	-	-	-
ST Gas - 1	1	-	-	-	-	-	-	-	-
ST Gas - 2	1	933	508	651	891	985	479	758	1,136
ST Gas - 3	1	-	-	-	-	-	-	-	-
ST Gas - 4	1	-	-	-	-	-	-	-	-
ST Gas - 5	1	5,565	10,495	14,172	12,855	5,976	10,846	14,839	13,237
ST Gas - 6	1	-	521,634	545,228	515,564	-	547,132	573,551	540,852
ST Gas - 7	1	23,553	58,152	76,081	98,534	31,695	69,379	90,387	115,318
ST Gas - 8	1	23,230	56,787	74,836	97,113	31,107	68,744	88,615	114,207
ST Gas - 9	1	-	-	-	-	-	-	-	-
ST Other - 1	1	39,084	39,933	39,485	39,634	39,224	39,961	39,494	39,649
ST Other - 2	1	2,959	6,812	6,639	8,806	3,179	7,178	7,049	9,406
ST Renewable - 1	1	-	-	-	-	-	-	-	-
ST Renewable - 2	1	-	-	-	-	-	-	-	-
ST Renewable - 3	1	175,200	175,200	175,200	175,680	175,200	175,200	175,200	175,680

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
ST Renewable - 4	1	-	-	-	-	-	-	-	-
ST Renewable - 5	1	-	-	-	-	-	-	-	-
ST Renewable - 6	1	-	-	-	-	-	-	-	-
ST Renewable - 7	1	-	-	-	-	-	-	-	-
ST Renewable - 8	1	55,189	55,189	55,188	55,339	55,189	55,189	55,188	55,339
ST Renewable - 9	1	49,057	49,057	49,056	49,190	49,057	49,057	49,056	49,190
ST Renewable - 10	1	206,648	206,648	206,648	207,215	206,648	206,648	206,648	207,215
ST Renewable - 11	1	122,641	122,641	122,640	122,976	122,641	122,641	122,640	122,976
ST Renewable - 12	1	75,425	75,425	75,424	75,630	75,425	75,425	75,424	75,630
ST Renewable - 13	1	202,970	202,970	202,969	203,525	202,970	202,970	202,969	203,525
ST Renewable - 14	1	202,970	202,970	202,969	203,525	202,970	202,970	202,969	203,525
ST Renewable - 15	1	-	-	-	-	-	-	-	-
ST Renewable - 16	1	68,679	68,679	68,678	68,867	68,679	68,679	68,678	68,867
ST Renewable - 17	1	55,189	55,189	55,188	55,339	55,189	55,189	55,188	55,339
ST Renewable - 18	1	55,189	55,189	55,188	55,339	55,189	55,189	55,188	55,339
ST Renewable - 19	1	-	-	-	-	-	-	-	-
ST Renewable - 20	1	-	-	-	-	-	-	-	-
ST Renewable - 21	1	180,895	180,895	180,894	181,390	180,895	180,895	180,894	181,390
ST Renewable - 22	1	91,981	91,981	91,980	92,232	91,981	91,981	91,980	92,232
ST Renewable - 23	1	55,189	55,189	55,188	55,339	55,189	55,189	55,188	55,339
ST Renewable - 24	1	58,194	58,194	58,193	58,352	58,194	58,194	58,193	58,352
Wind - 1	1	66,135	65,635	65,832	-	66,211	65,621	65,906	-
Wind - 2	1	-	-	-	74,973	-	-	-	75,040
Wind - 3	1	1,564,994	1,568,452	1,562,887	-	1,568,045	1,568,344	1,562,888	-
Wind - 4	1	-	-	-	1,698,502	-	-	-	1,698,502
Wind - 5	1	114,770	114,345	110,864	-	114,342	113,061	109,805	-
Wind - 6	1	-	-	-	134,694	-	-	-	134,486
Wind - 7	1	1,704,394	1,697,715	1,687,510	1,706,308	1,704,394	1,697,710	1,687,046	1,706,308
Wind - 8	1	264,963	264,414	263,437	264,114	264,963	264,414	263,463	264,174
Wind - 9	1	882,909	828,538	829,948	784,460	882,909	825,684	826,116	776,837
Wind - 10	1	884,346	850,076	845,918	839,689	884,346	849,270	843,493	835,064
Wind - 11	1	135,720	184,508	-	-	135,972	184,338	-	-
Wind - 12	1	-	-	224,952	212,926	-	-	224,435	211,617
Wind - 13	1	430,327	731,039	730,305	-	432,464	730,451	727,838	-
Wind - 14	1	-	-	-	828,584	-	-	-	819,342
Wind - 15	1	57,512	58,223	58,080	-	57,687	58,237	58,080	-
Wind - 16	1	-	-	-	68,280	-	-	-	68,260
Wind - 17	1	278,974	-	-	-	280,935	-	-	-
Wind - 18	1	-	329,007	317,968	308,521	-	327,146	317,329	305,379
Wind - 19	1	408,505	340,939	317,395	306,696	408,505	343,153	315,653	304,784
Wind - 20	1	-	-	-	-	-	-	-	-
Wind - 21	1	26,932	25,784	25,809	25,672	26,932	25,695	25,701	25,591
Wind - 22	1	25,860	26,942	-	-	25,607	26,722	-	-
Wind - 23	1	-	-	31,215	32,983	-	-	30,989	32,893
Wind - 24	1	1,179,657	962,119	944,752	898,607	1,180,450	946,445	923,022	877,604
Wind - 25	1	68,708	107,424	107,024	-	68,582	107,237	106,667	-
Wind - 26	1	-	-	-	117,506	-	-	-	116,215
Wind - 27	1	770,380	767,492	764,737	770,241	770,380	767,224	764,445	770,241
Wind - 28	1	446,493	418,977	419,268	396,789	446,493	417,729	418,464	393,522
Wind - 29	1	243,118	250,934	246,980	-	243,571	248,959	245,748	-
Wind - 30	1	-	-	-	182,041	-	-	-	181,633
Wind - 31	1	24,815	24,912	24,927	-	24,827	24,895	24,897	-
Wind - 32	1	-	-	-	12,564	-	-	-	12,561
Wind - 33	1	825,189	539,720	539,056	548,713	814,168	529,229	525,954	541,162
Wind - 34	1	751,800	519,610	491,077	565,269	737,588	510,603	479,858	555,088
Wind - 35	1	522,663	442,160	436,035	413,159	515,657	437,984	428,340	403,337
Wind - 36	1	65,659	65,171	65,610	-	65,747	65,217	65,688	-
Wind - 37	1	-	-	-	76,466	-	-	-	76,481
Wind - 38	1	1,320,483	1,153,149	1,189,980	1,112,480	1,318,544	1,149,612	1,184,559	1,106,660
Wind - 39	1	103,303	104,211	-	-	103,546	104,223	-	-
Wind - 40	1	-	-	104,870	105,050	-	-	104,870	105,023
Wind - 41	1	31,948	38,030	-	-	32,029	37,880	-	-
Wind - 42	1	-	-	42,462	42,280	-	-	42,372	42,132
Wind - 43	1	422,765	432,685	432,581	-	423,285	427,658	429,154	-
Wind - 44	1	-	-	-	563,257	-	-	-	559,583
Wind - 45	1	283,788	290,495	-	-	284,500	287,623	-	-
Wind - 46	1	-	-	335,704	361,863	-	-	332,760	360,545
Wind - 47	1	61,507	64,015	-	-	60,879	63,491	-	-
Wind - 48	1	-	-	73,881	78,316	-	-	73,521	78,140
Wind - 49	1	17,071	-	-	-	16,952	-	-	-
Wind - 50	1	-	19,183	19,102	20,459	-	19,049	18,906	20,402

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Wind - 51	1	635,680	778,756	-	-	636,273	775,952	-	-
Wind - 52	1	-	-	867,072	869,108	-	-	862,828	866,845
Wind - 53	1	561,293	489,836	507,288	469,124	559,701	485,588	504,005	468,316
Wind - 54	1	510,589	448,726	449,379	420,007	509,453	442,079	443,641	413,020
Wind - 55	1	169,210	169,731	-	-	169,692	169,683	-	-
Wind - 56	1	-	-	183,487	184,223	-	-	183,532	184,223
Wind - 57	1	186,904	187,533	-	-	187,450	187,533	-	-
Wind - 58	1	-	-	211,690	212,514	-	-	211,689	212,514
Wind - 59	1	807,955	805,642	807,143	809,580	807,955	805,559	806,698	808,825
Wind - 60	1	151,818	-	-	-	151,247	-	-	-
Wind - 61	1	-	169,957	176,221	177,601	-	170,319	175,999	177,458
Wind - 62	1	383,160	384,167	-	-	383,647	384,754	-	-
Wind - 63	1	-	-	428,011	428,473	-	-	427,094	425,782
Wind - 64	1	70,625	69,738	69,107	-	70,597	69,620	68,920	-
Wind - 65	1	-	-	-	78,122	-	-	-	77,706
Wind - 66	1	15,919	15,942	15,962	-	15,929	15,942	15,962	-
Wind - 67	1	-	-	-	18,704	-	-	-	18,704
Wind - 68	1	304,206	303,366	300,220	301,367	304,206	303,366	300,209	301,367
Wind - 69	1	386,277	260,852	260,591	268,640	372,258	256,411	252,975	262,494
Wind - 70	1	785,283	782,244	780,016	782,460	785,283	782,268	779,523	782,357
Wind - 71	1	296,991	296,172	293,111	294,220	296,991	296,172	293,111	294,220
Wind - 72	1	382,578	362,224	365,444	360,137	382,578	361,020	366,603	360,958
Wind - 73	1	163,664	164,509	-	-	163,071	163,924	-	-
Wind - 74	1	-	-	194,406	203,990	-	-	192,184	203,750
Wind - 75	1	6,330	7,381	7,456	-	6,287	7,380	7,456	-
Wind - 76	1	-	-	-	8,325	-	-	-	8,312
Wind - 77	1	-	-	-	-	-	-	-	-
Wind - 78	1	497,225	461,636	462,667	449,558	497,198	460,468	461,691	446,968
Wind - 79	1	-	-	-	-	-	-	-	-
Wind - 80	1	478,810	447,767	449,769	438,940	478,837	447,271	448,396	436,290
Wind - 81	1	172,907	171,733	166,280	-	172,922	171,692	166,077	-
Wind - 82	1	-	-	-	182,954	-	-	-	182,458
Wind - 83	1	-	-	-	-	-	-	-	-
Wind - 84	1	50,824	43,559	41,761	41,081	50,824	42,854	41,573	40,499
Wind - 85	1	622,723	624,159	-	-	623,553	624,235	-	-
Wind - 86	1	-	-	677,225	680,857	-	-	677,218	680,938
Wind - 87	1	204,668	204,599	-	-	204,783	204,599	-	-
Wind - 88	1	-	-	221,018	221,791	-	-	221,156	221,791
Wind - 89	1	6,583	3,959	-	-	6,579	3,933	-	-
Wind - 90	1	-	-	3,836	3,844	-	-	3,823	3,836
Wind - 91	1	13,389	8,195	-	-	13,336	8,107	-	-
Wind - 92	1	-	-	7,621	7,590	-	-	7,560	7,648
Wind - 93	1	13,151	7,958	-	-	13,137	7,925	-	-
Wind - 94	1	-	-	7,704	7,637	-	-	7,569	7,621
Wind - 95	1	13,395	8,093	-	-	13,390	8,078	-	-
Wind - 96	1	-	-	7,692	7,629	-	-	7,558	7,601
Wind - 97	1	6,696	4,048	-	-	6,694	4,034	-	-
Wind - 98	1	-	-	3,853	3,821	-	-	3,792	3,807
Wind - 99	1	6,698	4,053	-	-	6,701	4,021	-	-
Wind - 100	1	-	-	3,842	3,797	-	-	3,762	3,814
Wind - 101	1	567,647	568,619	566,929	565,408	566,868	567,746	567,173	562,881
Wind - 102	1	362,916	560,652	-	-	363,426	560,046	-	-
Wind - 103	1	-	-	605,673	583,984	-	-	603,893	577,758
Wind - 104	1	332,826	-	-	-	334,804	-	-	-
Wind - 105	1	-	387,132	371,704	361,851	-	384,317	367,936	358,733
Wind - 106	1	371,923	375,841	-	-	370,533	375,854	-	-
Wind - 107	1	-	-	346,609	348,437	-	-	346,409	347,673
Wind - 108	1	421,585	419,454	418,571	421,687	421,585	419,454	418,571	421,746
Wind - 109	1	979,500	917,705	909,418	914,880	979,500	912,927	904,808	912,872
Wind - 110	1	588,985	728,970	723,514	-	588,545	721,984	722,122	-
Wind - 111	1	-	-	-	760,454	-	-	-	756,141
Wind - 112	1	148,271	148,445	150,476	-	148,184	148,810	150,428	-
Wind - 113	1	-	-	-	172,223	-	-	-	172,268
Wind - 114	1	846,628	833,511	828,781	827,953	846,628	834,766	826,425	823,298
Wind - 115	1	673,765	797,892	792,712	-	679,567	795,543	797,762	-
Wind - 116	1	-	-	-	638,928	-	-	-	641,164
Wind - 117	1	382,797	388,196	-	-	381,438	388,199	-	-
Wind - 118	1	-	-	432,581	434,650	-	-	432,148	433,770
Wind - 119	1	363,104	364,436	364,726	365,584	363,104	364,436	364,726	365,584
Wind - 120	1	773,895	746,809	743,076	740,584	773,895	745,188	741,706	738,191
Wind - 121	1	84,299	88,494	83,925	-	85,395	87,914	83,377	-

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Wind - 122	1	-	-	-	89,887	-	-	-	90,602
Wind - 123	1	488,587	485,833	485,163	-	488,587	486,024	485,163	-
Wind - 124	1	-	-	-	640,636	-	-	-	640,641
Wind - 125	1	495,197	491,473	-	-	495,956	491,316	-	-
Wind - 126	1	-	-	570,813	566,483	-	-	570,883	566,414
Wind - 127	1	-	-	-	-	-	-	-	-
Wind - 128	1	53,547	45,524	43,676	42,500	53,547	45,384	43,154	41,758
Wind - 129	1	415,076	413,249	411,901	415,704	415,076	413,249	411,901	415,704
Wind - 130	1	70,649	70,596	-	-	70,934	70,626	-	-
Wind - 131	1	-	-	85,278	85,511	-	-	85,277	85,511
Wind - 132	1	351,174	685,469	-	-	347,127	681,902	-	-
Wind - 133	1	-	-	765,181	749,897	-	-	764,965	740,909
Wind - 134	1	165,831	165,237	164,703	166,324	165,831	165,261	164,725	166,267
Wind - 135	1	419,466	417,850	416,603	420,351	419,466	417,998	416,712	420,319
Wind - 136	1	286,007	292,248	292,638	317,727	285,321	290,128	292,263	316,899
Wind - 137	1	28,522	34,875	34,953	-	28,556	34,756	34,840	-
Wind - 138	1	-	-	-	33,742	-	-	-	33,584
Wind - 139	1	36,509	36,540	-	-	36,610	36,543	-	-
Wind - 140	1	-	-	43,726	43,743	-	-	43,726	43,770
Wind - 141	1	38,877	-	-	-	39,257	-	-	-
Wind - 142	1	-	46,128	44,335	43,224	-	46,039	44,317	42,483
Wind - 143	1	372,565	373,566	-	-	372,416	374,121	-	-
Wind - 144	1	-	-	426,490	427,449	-	-	425,499	424,925
Wind - 145	1	75,292	76,438	-	-	75,151	76,385	-	-
Wind - 146	1	-	-	85,179	85,482	-	-	84,902	85,409
Wind - 147	1	40,767	38,827	39,083	38,386	40,767	38,640	38,917	38,199
Battery Storage - 8	2	-	-	-	3,734	-	-	-	3,722
Battery Storage - 9	2	-	-	-	3,485	-	-	-	3,482
Battery Storage - 10	2	-	-	-	3,582	-	-	-	3,564
Battery Storage - 11	2	-	-	-	3,545	-	-	-	3,554
Battery Storage - 12	2	-	-	-	3,602	-	-	-	3,595
Battery Storage - 13	2	-	-	-	3,481	-	-	-	3,447
CC - 22	2	126,101	130,765	200,193	170,076	128,351	144,136	215,076	185,116
CC - 23	2	4,076,977	4,127,075	4,179,570	4,150,895	4,101,708	4,155,425	4,206,265	4,187,081
CC - 24	2	360,213	363,541	365,687	365,033	361,159	364,699	366,972	365,955
CC - 25	2	3,621,567	3,603,191	3,648,116	3,610,300	3,653,982	3,664,416	3,694,527	3,665,329
CC - 26	2	3,669,766	3,695,145	3,750,782	3,708,479	3,693,068	3,732,703	3,783,278	3,740,314
CC - 27	2	3,971,675	3,896,870	3,919,481	3,790,957	3,986,840	3,931,533	3,943,110	3,833,681
CC - 28	2	4,118,025	4,655,769	4,640,471	4,598,548	4,154,664	4,695,453	4,661,974	4,642,930
CC - 29	2	-	3,110,804	3,072,272	3,110,447	-	3,115,635	3,082,554	3,112,808
CC - 30	2	-	447,992	446,675	453,835	-	448,669	447,261	453,945
CC - 31	2	-	476,707	474,290	482,888	-	477,357	475,138	483,128
CC - 32	2	-	475,828	475,795	481,088	-	476,362	476,459	480,884
CC - 33	2	-	4,024,901	3,958,654	4,032,676	-	4,032,128	3,973,466	4,044,107
CC - 34	2	-	-	369,734	377,585	-	-	370,730	379,302
CC - 35	2	-	-	-	2,317,057	-	-	-	2,318,361
CC - 36	2	715,903	719,108	744,150	701,719	721,968	731,496	758,780	713,404
CC - 37	2	1,580,974	1,542,937	1,557,819	1,585,938	1,588,928	1,550,975	1,564,986	1,601,206
Conventional Hydro - 24	2	20,209	20,206	20,203	20,195	20,210	20,206	20,205	20,195
Conventional Hydro - 25	2	41,800	41,800	41,800	41,800	41,800	41,800	41,800	41,800
Conventional Hydro - 26	2	3,513	3,501	3,499	3,498	3,511	3,500	3,500	3,498
Conventional Hydro - 27	2	92,238	92,238	92,196	92,171	92,241	92,239	92,207	92,173
Conventional Hydro - 28	2	25,440	25,427	25,410	25,369	25,444	25,428	25,414	25,381
Conventional Hydro - 29	2	10,815	10,805	10,796	10,793	10,808	10,804	10,800	10,793
Conventional Hydro - 30	2	104,100	104,134	104,100	104,052	104,109	104,148	104,110	104,054
Conventional Hydro - 31	2	29,736	29,732	29,693	29,689	29,739	29,730	29,699	29,693
Conventional Hydro - 32	2	38,825	38,816	38,801	38,789	38,826	38,817	38,802	38,789
Conventional Hydro - 33	2	25,453	25,433	25,410	25,360	25,458	25,435	25,417	25,369
Conventional Hydro - 34	2	178,045	178,034	177,883	177,857	178,078	178,058	177,908	177,870
Conventional Hydro - 35	2	34,828	34,819	34,800	34,782	34,830	34,817	34,804	34,782
Conventional Hydro - 36	2	86,927	86,925	86,909	86,879	86,935	86,923	86,917	86,880
Conventional Hydro - 37	2	15,501	15,500	15,499	15,498	15,501	15,499	15,499	15,498
Conventional Hydro - 38	2	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Conventional Hydro - 39	2	9,400	9,400	9,400	9,400	9,400	9,400	9,400	9,400
Conventional Hydro - 40	2	32,915	32,912	32,900	32,889	32,915	32,913	32,902	32,891
Conventional Hydro - 41	2	55,930	55,923	55,895	55,877	55,933	55,924	55,894	55,876
Conventional Hydro - 42	2	26,337	26,340	26,303	26,285	26,340	26,338	26,307	26,292
Conventional Hydro - 43	2	21,513	21,509	21,501	21,493	21,513	21,510	21,503	21,493
Conventional Hydro - 44	2	10,638	10,630	10,632	10,630	10,637	10,630	10,632	10,630
Conventional Hydro - 45	2	33,726	33,726	33,726	33,726	33,726	33,726	33,726	33,726
Conventional Hydro - 46	2	9,180	9,180	9,180	9,205	9,180	9,180	9,180	9,205

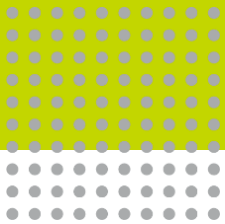
Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
CT Oil - 30	2	-	-	-	-	-	-	-	-
IC Gas - 7	2	92,708	96,099	105,594	103,614	93,797	100,573	110,120	107,534
IC Gas - 8	2	92,176	95,721	105,309	103,012	93,196	100,233	109,844	107,021
IC Gas - 9	2	92,515	95,934	103,066	100,026	93,803	100,523	107,626	104,332
IC Gas - 10	2	4,139	4,617	8,444	-	4,164	5,313	9,372	-
IC Gas - 11	2	92,713	97,321	102,501	102,354	93,949	101,400	107,405	106,499
IC Gas - 12	2	93,008	96,014	102,202	102,272	94,175	100,133	107,322	106,646
IC Gas - 13	2	94,454	96,985	101,813	101,693	95,325	101,316	106,847	106,448
IC Gas - 14	2	93,470	97,247	102,564	99,919	94,648	101,608	107,842	104,194
IC Gas - 15	2	95,445	97,518	103,828	103,581	96,470	101,972	108,855	107,657
IC Gas - 16	2	94,851	97,909	102,805	100,997	96,117	102,347	107,927	105,171
IC Gas - 17	2	93,466	97,944	103,643	102,187	94,919	102,188	108,802	106,280
IC Gas - 18	2	73,439	90,139	103,155	103,369	74,229	94,106	106,756	107,386
IC Gas - 19	2	73,712	90,959	104,253	104,009	74,617	95,040	107,704	107,605
IC Gas - 20	2	72,595	91,554	103,482	104,182	73,953	95,525	107,043	107,748
IC Oil - 15	2	-	-	-	-	-	-	-	-
IC Oil - 16	2	-	-	-	-	-	-	-	-
IC Oil - 17	2	-	-	-	49	-	-	-	49
IC Oil - 18	2	-	-	-	-	-	-	-	-
IC Renewable - 2	2	1,595	310	279	455	1,696	481	418	682
IC Renewable - 3	2	10,848	3,302	2,842	2,816	11,558	4,083	3,597	3,834
Interruptible Loads - 12	2	(0)	-	6	185	(0)	-	6	210
Interruptible Loads - 13	2	-	-	-	-	-	-	-	-
Interruptible Loads - 14	2	(0)	(0)	(0)	139	(0)	(0)	(0)	123
Interruptible Loads - 15	2	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Interruptible Loads - 16	2	(0)	(0)	(0)	126	(0)	(0)	(0)	156
Interruptible Loads - 17	2	(0)	(0)	(0)	14	(0)	(0)	(0)	16
Interruptible Loads - 18	2	-	-	6	87	-	-	6	146
Interruptible Loads - 19	2	-	-	-	-	-	-	-	-
Nuclear - 4	2	4,558,103	5,043,297	4,577,398	4,572,890	4,558,103	5,043,297	4,577,398	4,572,890
Nuclear - 5	2	5,041,072	4,617,994	4,617,881	5,056,102	5,041,072	4,617,994	4,617,881	5,056,102
PV + BATT - 21	2	-	-	47,593	42,031	-	-	47,593	42,031
PV + BATT - 22	2	-	-	51,913	185,888	-	-	51,953	185,833
PV + BATT - 23	2	-	-	23,384	20,555	-	-	23,366	20,434
PV + BATT - 24	2	-	-	61,121	53,962	-	-	61,121	53,962
PV + BATT - 25	2	-	-	69,649	240,852	-	-	69,634	240,888
PV + BATT - 26	2	-	-	38,704	125,614	-	-	38,704	125,614
PV + BATT - 27	2	-	-	25,396	22,460	-	-	25,396	22,460
PV + BATT - 28	2	-	-	28,408	25,106	-	-	28,408	25,106
PV + BATT - 29	2	-	-	42,039	37,188	-	-	42,039	37,188
PV + BATT - 30	2	-	-	77,162	68,748	-	-	77,305	68,707
PV + BATT - 31	2	-	-	154,316	136,350	-	-	154,316	136,350
Solar PV - 174	2	449,061	450,568	448,581	449,985	449,040	450,161	448,473	449,840
Solar PV - 175	2	231,734	231,746	232,325	232,240	231,609	232,006	232,216	232,455
Solar PV - 176	2	290,822	290,967	291,479	291,680	290,822	290,967	291,479	291,680
Solar PV - 177	2	2,094	2,095	2,099	2,100	2,094	2,095	2,099	2,100
Solar PV - 178	2	350,189	348,125	344,086	345,455	350,112	348,421	343,429	345,767
Solar PV - 179	2	580,373	577,748	580,343	581,176	580,402	577,821	580,473	581,918
Solar PV - 180	2	116,328	116,234	116,473	116,574	116,328	116,234	116,473	116,574
Solar PV - 181	2	464,696	464,377	465,449	465,796	464,696	464,377	465,449	465,796
Solar PV - 182	2	252,783	252,637	253,067	253,378	252,789	252,646	253,060	253,363
Solar PV - 183	2	186,099	185,865	186,388	185,394	186,099	185,865	186,388	185,393
Solar PV - 184	2	9,120	29,069	58,873	74,550	9,121	29,074	58,902	74,527
Solar PV - 185	2	7,163	22,871	46,319	58,572	7,163	22,872	46,319	58,568
Solar PV - 186	2	4,797	15,316	31,004	39,207	4,797	15,316	31,004	39,207
Solar PV - 187	2	4,090	13,057	26,446	33,446	4,090	13,057	26,446	33,446
Solar PV - 188	2	3,540	11,304	22,885	28,939	3,540	11,304	22,885	28,939
Solar PV - 189	2	3,343	10,665	21,609	27,327	3,343	10,665	21,609	27,327
Solar PV - 190	2	2,823	9,011	18,254	23,083	2,823	9,011	18,254	23,083
Solar PV - 191	2	2,402	7,665	15,534	19,643	2,402	7,665	15,534	19,643
Solar PV - 192	2	2,076	6,628	13,419	16,970	2,076	6,628	13,419	16,970
Solar PV - 193	2	2,017	6,430	13,027	16,483	2,017	6,431	13,033	16,471
Solar PV - 194	2	1,917	6,115	12,390	15,674	1,917	6,117	12,390	15,674
Solar PV - 195	2	1,813	5,789	11,724	14,826	1,813	5,789	11,724	14,826
Solar PV - 196	2	1,807	5,757	11,607	14,686	1,807	5,758	11,607	14,689
Solar PV - 197	2	1,799	5,746	11,634	14,712	1,799	5,746	11,634	14,712
Solar PV - 198	2	1,778	5,677	11,494	14,535	1,778	5,677	11,494	14,535
Solar PV - 199	2	1,657	5,289	10,707	13,537	1,657	5,289	10,707	13,537
Solar PV - 200	2	1,658	5,293	10,726	13,565	1,658	5,293	10,726	13,565
Solar PV - 201	2	1,466	4,683	9,484	11,997	1,466	4,683	9,484	11,997
Solar PV - 202	2	1,442	4,605	9,325	11,769	1,442	4,605	9,325	11,769

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Solar PV - 203	2	1,404	4,485	9,080	11,481	1,404	4,485	9,079	11,481
Solar PV - 204	2	1,372	4,381	8,872	11,221	1,372	4,381	8,872	11,221
Solar PV - 205	2	1,347	4,301	8,708	11,012	1,347	4,301	8,708	11,012
Solar PV - 206	2	1,165	3,721	7,531	9,524	1,165	3,721	7,531	9,524
Solar PV - 207	2	-	104,465	104,656	104,730	-	104,465	104,656	104,730
Solar PV - 208	2	58,784	143,266	190,579	190,929	58,784	143,272	190,602	190,798
Solar PV - 209	2	28,339	68,471	68,571	68,526	28,339	68,440	68,467	68,248
Solar PV - 210	2	42,188	294,186	294,789	295,489	42,188	294,186	294,789	295,489
Solar PV - 211	2	75,023	187,327	251,204	251,565	75,023	187,328	251,203	251,447
Solar PV - 212	2	44,428	107,440	142,812	143,042	44,428	107,472	142,812	143,042
Solar PV - 213	2	29,946	75,998	99,180	99,363	29,946	75,998	99,180	99,363
Solar PV - 214	2	32,813	77,336	103,234	103,422	32,813	77,336	103,234	103,422
Solar PV - 215	2	47,847	119,601	158,125	158,478	47,847	119,601	158,125	158,478
Solar PV - 216	2	85,476	211,479	281,579	284,217	85,476	211,530	281,846	284,474
Solar PV - 217	2	168,039	419,894	420,627	421,548	168,039	419,894	420,627	421,548
Solar PV - 218	2	-	-	173,981	174,421	-	-	173,981	174,421
Solar PV - 219	2	357,033	356,568	356,986	357,215	357,033	356,568	356,986	357,215
ST Coal - 33	2	473,024	-	-	-	516,752	-	-	-
ST Coal - 34	2	-	-	-	-	-	-	-	-
ST Coal - 35	2	-	-	-	-	-	-	-	-
ST Coal - 36	2	-	-	-	-	-	-	-	-
ST Coal - 37	2	170,338	55,459	48,501	54,840	176,443	71,796	69,661	82,845
ST Coal - 38	2	-	-	-	-	-	-	-	-
ST Coal - 39	2	1,970,410	772,883	433,978	257,011	2,079,374	966,884	668,150	594,951
ST Coal - 40	2	3,038,884	1,102,061	849,494	392,473	3,059,133	1,197,861	986,248	531,663
ST Coal - 41	2	-	-	-	-	-	-	-	-
ST Coal - 42	2	-	-	-	-	-	-	-	-
ST Coal - 43	2	-	-	-	-	-	-	-	-
ST Coal - 44	2	-	-	-	-	-	-	-	-
ST Coal - 45	2	-	-	-	-	-	-	-	-
ST Coal - 46	2	-	-	-	-	-	-	-	-
ST Coal - 47	2	1,089,108	307,872	-	-	1,088,645	360,870	-	-
ST Coal - 48	2	3,706,771	2,286,551	1,811,302	1,633,440	3,735,400	2,556,444	2,021,096	1,837,705
ST Gas - 10	2	-	-	-	-	-	-	-	-
ST Gas - 11	2	-	-	-	-	-	-	-	-
ST Gas - 12	2	71,050	134,545	-	-	72,292	126,712	-	-
ST Gas - 13	2	58,644	69,580	145,805	98,225	57,771	67,329	149,408	109,945
ST Gas - 14	2	-	-	-	-	-	-	-	-
ST Gas - 15	2	-	-	-	-	-	-	-	-
ST Renewable - 25	2	108,537	108,537	108,536	108,834	108,537	108,537	108,536	108,834
ST Renewable - 26	2	190,093	190,093	190,092	190,613	190,093	190,093	190,092	190,613
ST Renewable - 27	2	306,601	306,601	306,600	307,440	306,601	306,601	306,600	307,440
Wind - 148	2	100,456	-	-	-	100,456	-	-	-
Wind - 149	2	-	113,570	113,537	113,974	-	113,570	113,537	113,974
Wind - 150	2	485,083	485,655	-	-	485,083	485,655	-	-
Wind - 151	2	-	-	552,593	554,349	-	-	552,593	554,349
Wind - 152	2	180,330	180,499	-	-	180,330	180,578	-	-
Wind - 153	2	-	-	203,549	204,730	-	-	203,549	204,730
Wind - 154	2	227,768	228,002	-	-	227,768	228,002	-	-
Wind - 155	2	-	-	259,173	259,995	-	-	259,173	259,978
Wind - 156	2	347,100	354,032	-	-	347,323	354,337	-	-
Wind - 157	2	-	-	405,374	407,633	-	-	405,575	407,767
Wind - 158	2	338,552	338,757	-	-	338,552	338,862	-	-
Wind - 159	2	-	-	488,833	490,246	-	-	488,833	490,246
Wind - 160	2	520,649	521,543	521,901	-	520,774	521,543	521,901	-
Wind - 161	2	-	-	-	668,166	-	-	-	668,166
Wind - 162	2	69,604	69,579	69,579	69,718	69,604	69,579	69,579	69,718
Wind - 163	2	81,962	81,893	81,849	-	81,963	81,893	81,849	-
Wind - 164	2	-	-	-	105,392	-	-	-	105,392
Wind - 165	2	351,350	352,475	352,763	354,089	351,347	352,475	352,757	354,081
Wind - 166	2	-	-	-	-	-	-	-	-
Wind - 167	2	219,801	219,580	220,001	219,633	219,801	219,609	220,003	219,642
Wind - 168	2	-	-	-	-	-	-	-	-
Wind - 169	2	41,877	41,910	41,953	42,064	41,877	41,910	41,953	42,064
Wind - 170	2	64,458	64,411	64,430	-	64,458	64,411	64,430	-
Wind - 171	2	-	-	-	73,835	-	-	-	73,835
Battery Storage - 14	3	-	-	-	3,335	-	-	-	3,298
Battery Storage - 15	3	-	-	-	3,314	-	-	-	3,275
Battery Storage - 16	3	-	-	-	3,595	-	-	-	3,551
CC - 38	3	2,184,530	2,186,544	2,255,063	2,025,146	2,209,053	2,202,826	2,283,091	2,023,334
CC - 39	3	2,033,115	2,024,058	2,199,713	2,092,641	2,039,256	2,040,290	2,207,541	2,091,628

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
CC - 40	3	2,062,427	2,802,271	2,889,976	2,789,280	2,123,569	2,835,845	2,903,017	2,816,477
CC - 41	3	304,140	319,506	306,346	320,189	304,633	320,378	306,256	317,972
CC - 42	3	203,208	201,331	186,262	208,455	205,334	201,634	187,626	208,112
CC - 43	3	318,524	330,294	321,627	329,469	318,690	330,854	321,327	329,818
CC - 44	3	-	329,194	313,538	332,560	-	331,525	314,712	332,205
CC - 45	3	-	346,969	335,741	353,228	-	347,241	335,397	353,509
CC - 46	3	-	357,343	341,124	359,835	-	358,734	340,631	359,309
CC - 47	3	-	1,726,158	1,673,022	1,693,318	-	1,744,601	1,697,346	1,710,839
CC - 48	3	-	-	-	490,214	-	-	-	490,978
CC - 49	3	-	-	-	1,352,941	-	-	-	1,352,382
CC - 50	3	22,721	-	-	-	23,863	-	-	-
Conventional Hydro - 63	3	15,397	15,393	15,393	15,393	15,396	15,393	15,393	15,393
Conventional Hydro - 64	3	11,399	11,400	11,396	11,396	11,399	11,401	11,396	11,396
Conventional Hydro - 65	3	366,785	366,802	366,737	366,659	366,797	366,793	366,737	366,683
CT Gas - 118	3	4,766	5,822	14,410	13,217	4,844	5,968	14,592	13,329
CT Gas - 119	3	311	122	229	842	398	113	225	802
CT Gas - 120	3	435	116	122	994	580	141	98	939
CT Gas - 121	3	368	119	119	728	416	135	152	731
CT Gas - 122	3	36	67	87	625	104	67	82	697
CT Gas - 123	3	38	63	91	553	82	63	77	613
CT Gas - 124	3	48	63	92	490	97	63	77	532
CT Gas - 125	3	86	69	106	672	166	69	85	734
CT Gas - 126	3	3,391	747	728	2,657	3,755	982	765	2,741
CT Gas - 127	3	2,310	652	428	2,084	2,944	733	529	2,104
CT Gas - 128	3	3,276	777	631	2,820	3,632	1,003	628	2,886
CT Gas - 129	3	749	134	193	787	815	199	273	818
CT Gas - 130	3	972	300	209	962	1,001	365	289	993
CT Gas - 131	3	44	15	83	581	73	15	68	586
CT Gas - 132	3	93	15	117	679	128	15	133	683
CT Gas - 133	3	102	15	85	567	145	15	101	571
CT Gas - 134	3	86	-	107	642	117	-	102	646
CT Gas - 135	3	1,526	578	944	1,905	1,608	616	972	2,024
CT Gas - 136	3	966	398	504	1,909	999	410	565	2,015
CT Gas - 137	3	8,104	3,086	4,590	8,088	8,058	3,230	4,890	7,505
CT Gas - 138	3	12,763	12,219	18,868	10,516	13,109	12,911	19,519	11,065
CT Gas - 139	3	58	33	107	495	126	33	112	520
CT Gas - 140	3	132	121	141	547	204	121	141	579
CT Gas - 141	3	130	120	125	633	198	120	125	662
CT Gas - 142	3	141	124	36	630	206	124	36	686
CT Gas - 143	3	130	124	144	632	210	124	144	683
CT Gas - 144	3	109	90	143	400	155	90	143	455
CT Gas - 145	3	121	120	139	633	190	120	135	667
CT Gas - 146	3	121	120	139	633	188	120	139	667
CT Gas - 147	3	63,632	35,752	53,288	37,326	65,232	37,406	54,414	37,785
CT Gas - 148	3	-	57,305	42,175	76,777	-	59,843	44,706	78,968
CT Gas - 149	3	4,018	1,534	2,263	5,328	4,087	1,488	2,332	5,207
CT Gas - 150	3	4,694	1,565	2,253	5,554	4,789	1,617	2,372	5,371
CT Oil - 31	3	-	-	-	29	-	-	-	29
CT Oil - 32	3	-	-	-	-	-	-	-	-
CT Oil - 33	3	-	-	-	-	-	-	-	28
CT Oil - 34	3	-	-	-	18	-	-	-	18
CT Oil - 35	3	-	-	-	-	-	-	-	-
CT Oil - 36	3	-	-	-	-	-	-	-	-
CT Oil - 37	3	-	-	-	-	-	-	-	-
CT Oil - 38	3	-	-	-	-	-	-	-	-
CT Oil - 39	3	-	-	-	-	-	-	-	-
CT Oil - 40	3	-	-	-	-	-	-	-	-
CT Oil - 41	3	-	-	-	-	-	-	-	-
CT Oil - 42	3	-	-	-	79	-	-	-	98
CT Oil - 43	3	-	-	-	-	-	-	-	-
CT Oil - 44	3	-	-	-	-	-	-	-	-
CT Other - 1	3	-	-	-	-	-	-	-	-
IC Oil - 19	3	-	-	-	-	-	-	-	-
IC Oil - 20	3	-	-	-	32	-	-	-	64
IC Oil - 21	3	-	-	-	51	-	-	-	51
IC Oil - 22	3	-	-	-	24	-	-	-	24
IC Oil - 23	3	-	-	-	51	-	-	-	51
IC Oil - 24	3	-	-	-	81	-	-	-	81
IC Oil - 25	3	-	-	-	13	-	-	-	13
IC Oil - 26	3	-	-	-	20	-	-	-	20
Interruptible Loads - 20	3	(0)	0	(0)	3	(0)	0	(0)	8

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
ST Coal - 55	3	106,099	81,415	64,029	32,765	106,074	82,221	64,823	32,812
ST Coal - 56	3	244,503	-	-	-	264,723	-	-	-
ST Coal - 57	3	1,458,696	774,172	703,932	422,927	1,494,239	809,993	706,370	415,036
ST Coal - 58	3	1,290,430	325,331	374,229	102,829	1,326,110	338,287	447,789	140,442
ST Coal - 59	3	2,967,844	1,064,730	686,050	501,570	2,983,784	972,293	690,864	505,688
ST Coal - 60	3	-	-	-	-	-	-	-	-
ST Coal - 61	3	30,612	29,137	27,102	23,224	30,644	29,299	27,205	24,113
ST Coal - 62	3	-	-	-	144	-	-	-	210
ST Coal - 63	3	3,666,649	3,224,051	2,939,507	2,738,717	3,664,503	3,238,538	2,939,958	2,697,217
ST Coal - 64	3	4,309,587	3,680,363	2,883,843	1,553,804	4,319,162	3,699,130	2,991,753	1,555,371
ST Coal - 65	3	14,331	612	72	544	14,493	1,066	144	630
ST Gas - 16	3	2,241	763	1,246	3,053	2,388	763	1,384	3,161
ST Gas - 17	3	3,974	1,686	3,104	7,651	4,030	1,820	3,065	7,808
ST Gas - 18	3	50,354	35,421	33,802	24,264	57,104	37,779	33,275	24,835
ST Gas - 19	3	812,992	796,401	740,096	716,137	812,989	795,860	743,782	717,816
ST Gas - 20	3	139	90	-	326	340	90	-	326
Wind - 172	3	506,806	574,995	581,289	585,244	507,866	574,816	580,457	584,444
Wind - 173	3	504,857	460,548	478,166	467,866	504,906	459,655	477,302	467,730
Wind - 174	3	81,065	-	-	-	81,188	-	-	-
Wind - 175	3	-	94,796	94,898	95,203	-	94,796	94,898	95,203
Wind - 176	3	971,906	966,877	970,605	974,019	971,906	965,789	970,834	974,299
Wind - 177	3	349,886	348,754	349,589	350,909	349,886	348,068	349,444	350,870
Wind - 178	3	286,923	289,093	-	-	287,258	289,142	-	-
Wind - 179	3	-	-	311,853	313,114	-	-	311,853	313,071
Wind - 180	3	107,730	108,432	-	-	107,741	108,413	-	-
Wind - 181	3	-	-	116,945	117,420	-	-	116,945	117,420
Wind - 182	3	1,257,796	1,253,632	1,256,647	1,260,739	1,257,796	1,253,763	1,256,780	1,260,503
Wind - 183	3	628,898	627,556	628,883	630,563	628,898	627,920	628,937	630,563
Wind - 184	3	762,177	768,189	765,885	-	760,982	768,511	763,846	-
Wind - 185	3	-	-	-	638,049	-	-	-	636,863
Wind - 186	3	80,885	80,923	81,061	80,803	80,885	80,916	81,061	80,803
Wind - 187	3	71,938	71,317	71,567	71,771	71,938	71,170	71,397	71,665
Wind - 188	3	459,441	518,323	520,715	522,343	462,821	519,153	520,147	521,600
Wind - 189	3	732,096	739,827	738,328	740,152	732,600	739,770	738,350	740,332
Wind - 190	3	104,431	126,112	125,378	-	104,239	125,221	125,121	-
Wind - 191	3	-	-	-	115,987	-	-	-	115,390
Wind - 192	3	758,672	763,135	-	-	759,402	763,475	-	-
Wind - 193	3	-	-	784,230	787,074	-	-	784,301	787,027
Wind - 194	3	935,563	938,681	939,107	941,888	935,563	938,681	939,107	942,106
Wind - 195	3	648,019	719,067	719,718	721,449	647,672	719,269	719,615	721,181
Wind - 196	3	159,665	161,151	161,378	-	159,767	161,151	161,378	-
Wind - 197	3	-	-	-	162,295	-	-	-	162,295
Wind - 198	3	512,514	513,659	510,014	511,013	512,514	513,510	510,019	511,013
Wind - 199	3	319,289	364,076	-	-	317,950	364,410	-	-
Wind - 200	3	-	-	421,389	427,930	-	-	420,653	426,533
Wind - 201	3	166,302	189,262	-	-	165,188	189,353	-	-
Wind - 202	3	-	-	210,511	214,028	-	-	210,546	213,488
Wind - 203	3	379,438	411,638	435,477	431,094	379,748	413,295	437,139	431,658
Wind - 204	3	256,334	256,867	257,352	257,115	256,440	256,616	257,383	257,115
Wind - 205	3	144,886	-	-	-	144,690	-	-	-
Wind - 206	3	-	182,862	184,042	184,347	-	183,025	184,106	183,904
Wind - 207	3	359,894	363,114	363,741	363,655	360,131	363,127	363,724	363,577
Wind - 208	3	732,308	692,347	707,287	683,752	732,308	690,713	706,782	680,036
Wind - 209	3	849,152	833,167	813,671	831,119	849,152	829,094	813,879	827,769
Wind - 210	3	313,997	313,552	315,094	314,757	313,997	313,476	315,084	314,689
Wind - 211	3	240,291	-	-	-	240,351	-	-	-
Wind - 212	3	-	282,256	283,061	284,008	-	282,204	283,086	284,033
Wind - 213	3	42,216	47,058	-	-	42,277	47,159	-	-
Wind - 214	3	-	-	55,618	55,956	-	-	55,577	55,956
Wind - 215	3	-	-	-	-	-	-	-	-
Wind - 216	3	176,379	175,457	176,367	176,933	176,379	175,337	176,379	176,989
Wind - 217	3	133,778	134,094	134,195	-	133,818	134,094	134,195	-
Wind - 218	3	-	-	-	153,186	-	-	-	153,186
Wind - 219	3	882,813	754,083	758,089	798,119	882,813	750,977	753,746	797,761
Wind - 220	3	1,696,614	1,574,927	1,581,704	1,614,985	1,696,614	1,571,133	1,576,080	1,609,436
Wind - 221	3	670,715	649,185	659,765	651,935	670,715	650,455	659,003	650,202
Wind - 222	3	968,296	943,298	957,938	953,094	968,296	946,148	956,475	949,484
Wind - 223	3	562,465	618,220	628,102	629,315	562,564	616,144	626,532	624,446
Wind - 224	3	871,692	792,571	836,049	831,763	871,692	797,807	838,242	831,974
Wind - 225	3	780,007	780,376	780,378	783,150	780,007	780,452	780,276	782,875
Wind - 226	3	364,832	323,589	339,834	332,280	364,832	324,560	339,991	333,718

Unit	MISO LRZ	With NTEC				Without NTEC			
		2025	2030	2035	2040	2025	2030	2035	2040
Wind - 227	3	510,206	510,410	507,010	508,495	510,206	510,481	507,170	508,919
Wind - 228	3	597,860	596,131	595,062	597,521	597,860	596,068	595,468	597,431
Wind - 229	3	390,127	417,944	422,530	-	390,209	417,796	422,291	-
Wind - 230	3	-	-	-	482,371	-	-	-	482,125
Wind - 231	3	801,139	876,702	876,537	-	801,047	876,126	876,015	-
Wind - 232	3	-	-	-	999,703	-	-	-	999,677
Wind - 233	3	277,261	379,042	391,106	391,320	278,721	379,740	392,063	391,942
Wind - 234	3	609,716	530,675	570,860	584,422	609,666	533,216	570,933	586,104
Wind - 235	3	28,176	-	-	-	28,170	-	-	-
Wind - 236	3	-	41,695	41,868	41,085	-	41,613	42,014	41,177
Wind - 237	3	307,469	340,944	341,237	341,981	307,789	341,030	341,200	341,925
Wind - 238	3	66,613	76,765	77,305	76,836	66,518	76,634	76,990	76,074
Wind - 239	3	778,944	780,449	781,327	782,592	778,944	780,289	781,335	782,627
Wind - 240	3	781,873	527,029	520,021	568,619	781,873	520,868	514,690	565,879
Wind - 241	3	396,538	388,194	394,521	397,128	396,538	388,692	394,252	397,214
Wind - 242	3	1,547,274	1,519,808	1,539,804	1,548,699	1,547,274	1,520,655	1,539,728	1,548,988
Wind - 243	3	991,561	982,800	970,055	978,767	991,561	982,754	967,885	978,900
Wind - 244	3	284,062	277,161	282,532	273,602	284,797	278,352	284,415	275,803
Wind - 245	3	931,576	996,475	1,002,556	1,000,116	937,757	996,342	1,002,272	998,863
Wind - 246	3	578,602	573,156	579,047	579,669	578,600	573,367	578,705	579,324
Wind - 247	3	64,662	63,894	-	-	64,112	63,367	-	-
Wind - 248	3	-	-	72,209	77,660	-	-	71,530	77,437
Wind - 249	3	824,013	811,855	818,894	819,978	824,013	813,413	818,108	820,081
Wind - 250	3	168,975	186,968	188,696	189,443	169,413	187,433	188,569	189,443
Wind - 251	3	1,284,570	1,454,847	1,467,784	-	1,289,545	1,450,354	1,467,469	-
Wind - 252	3	-	-	-	1,706,781	-	-	-	1,709,055
Wind - 253	3	57,835	47,695	48,188	51,095	57,835	47,335	47,887	51,006
Wind - 254	3	971,906	950,825	964,573	972,442	971,906	951,060	965,717	972,575
Wind - 255	3	378,515	412,620	417,003	418,023	377,557	412,206	416,195	415,459
Wind - 256	3	-	-	-	-	-	-	-	-
Wind - 257	3	339,705	334,342	338,325	339,848	339,705	333,979	337,281	338,332
Wind - 258	3	756,725	798,664	-	-	757,162	796,566	-	-
Wind - 259	3	-	-	957,398	947,906	-	-	957,846	947,672
Wind - 260	3	298,997	300,665	-	-	299,230	300,608	-	-
Wind - 261	3	-	-	334,466	335,232	-	-	334,445	335,478
Wind - 262	3	109,538	110,060	-	-	109,726	110,122	-	-
Wind - 263	3	-	-	123,267	123,535	-	-	123,216	123,533
Wind - 264	3	107,809	-	-	-	107,921	-	-	-
Wind - 265	3	-	125,344	125,275	125,681	-	125,304	125,297	125,716
Wind - 266	3	179,645	-	-	-	179,934	-	-	-
Wind - 267	3	-	208,886	208,858	209,674	-	208,903	208,921	209,593
Wind - 268	3	701,268	699,270	681,785	674,573	701,268	699,254	682,588	675,830
Wind - 269	3	1,226,224	1,131,912	1,119,479	1,160,517	1,226,224	1,130,876	1,112,993	1,157,757
Wind - 270	3	304,783	347,605	349,824	350,051	306,907	347,181	349,197	349,420
Wind - 271	3	507,880	519,977	521,048	-	508,303	519,816	521,011	-
Wind - 272	3	-	-	-	590,984	-	-	-	590,985
Wind - 273	3	442,729	504,445	509,698	510,374	443,867	504,628	509,209	511,318
Wind - 274	3	5,687	5,699	5,713	5,697	5,687	5,695	5,714	5,697
Wind - 275	3	467,081	477,486	478,179	478,080	467,189	477,472	478,177	478,084
Wind - 276	3	738,691	744,547	-	-	738,862	744,547	-	-
Wind - 277	3	-	-	637,118	640,111	-	-	637,118	640,111
Wind - 278	3	48,771	49,010	-	-	48,407	48,676	-	-
Wind - 279	3	-	-	55,252	59,156	-	-	54,736	58,998
Wind - 280	3	18,389	21,988	-	-	18,323	21,924	-	-
Wind - 281	3	-	-	25,864	25,976	-	-	25,920	25,911



9400 Ward Parkway
Kansas City, MO

816-605-7800
1898andCo.com

