2023 MISO Independent Energy and Peak Demand Forecast

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This report provides the tenth load forecast the State Utility Forecasting Group (SUFG) has prepared for the Midcontinent Independent System Operator Inc. (MISO). These forecasts project annual energy demand for the ten MISO local resource zones (LRZs) and the MISO system as a whole. Monthly peak loads[1] are also forecast at the LRZ and MISO system-wide levels. This forecast does not attempt to replicate the forecasts that are produced by MISO's load-serving entities (LSEs).

The forecast report for 2020 included projections on both gross (prior to adjustments for utility energy efficiency and demand response programs) and net (after those adjustments) bases. The energy efficiency/demand response (EE) adjustments were previously provided by MISO and were developed in the process of developing the annual MISO Transmission Expansion Plan (MTEP). No EE adjustments have been available since 2021. Thus, as in the 2021 and 2022 reports, all projections in this report are on a gross basis.

Econometric models are developed biennially for each state to project annual retail sales of electricity. The 2023 report uses the same state econometric models as those used in the 2022 report. Forecasts of metered load at the LRZ level were developed by allocating the portion of each state's sales to the appropriate LRZ and adjusting for distribution system losses and normal weather. LRZ monthly peak demand projections were developed using normalized monthly peak conversion factors, which translated annual energy into monthly peak demand based on historical observations assuming normal peak weather conditions. The LRZ monthly peak demand forecasts are on a non-coincident basis.[2] MISO system level monthly peak projections were developed from the LRZ monthly peak forecasts using monthly coincidence factors by LRZ.

The state econometric models were developed using publicly available economic data, namely annual electricity sales, prices for electricity and natural gas, personal income, population, employment, gross state product (GSP), and annual cooling and heating degree days. Economic and population projections acquired from S&P Global (formerly IHS Markit) and price projections developed by SUFG based on projections from the Energy Information Administration (EIA) were used to produce projections of future retail sales. Weather variables were held constant at their 30-year normal values. Table ES-1 provides the compound annual growth rate (CAGR) for each state energy forecast.

Table ES-1. State Retail Sales CAGR (2024-2043) (%)

STATE	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
Gross	1.11	-0.10	1.19	1.50	1.52	0.73	0.51	0.48	0.64	0.56	1.12	0.43	1.77	1.61	0.87

LRZ level annual energy forecasts were developed by allocating the state energy forecasts to the individual LRZs on a proportional basis. Additionally, adjustments for distribution losses and normal weather were made to produce a forecast at the metered load level. Table ES-2 provides the CAGR for each LRZ energy forecast.

Table ES-2. LRZ Metered Load CAGR (2024-2043) (%)

LRZ	1	2	3	4	5	6	7	8	9	10
Gross	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

[1] Due to the voluminous nature of including twelve monthly 20-year forecasts for ten LRZs and the MISO system, only a representative month (July) is included in the main body of this report. The monthly forecasts are available in Appendix C.

[2] Throughout this report, coincidence is stated in reference to the overall MISO system. Thus, the LRZ peak demand forecasts are for the highest level of demand for that particular LRZ, which would be coincident at the LRZ level but non-coincident at the MISO system level.

LRZ monthly non-coincident peak demand projections were developed using normal peak conversion factors which were determined from historical relationships between hourly load factors and weather conditions. Since these conversion factors were held constant for the forecast period by assuming normal peak weather conditions, the LRZ monthly peak demand projections have the same growth rates as the energy projections in Table ES-2.[3]

MISO system-wide energy and peak demand projections were developed from the LRZ-level projections. Since each LRZ does not experience its peak demand at the same time as the others (or as the entire MISO system), the MISO monthly coincident peak demand is less than the arithmetic sum of the individual LRZ monthly non-coincident peak demands. The MISO system monthly coincident peak demand is determined by applying monthly coincidence factors to LRZ monthly non-coincident peak demands and summing across LRZs. These monthly coincidence factors represent the ratio of the LRZ's load at the time of the overall MISO system monthly peak to the LRZ's monthly non-coincident peak. Since coincidence is not an issue for annual energy, the MISO energy projections are found from the simple sum of the individual LRZs' energy projections. Table ES-3 provides the compound annual growth rates for the MISO annual energy and July peak demand forecasts.

Table ES-3. MISO Annual Energy and July Coincident Peak Demand CAGR (2024-2043) (%)

MISO-System	Gross
Energy	0.80
July Peak Demand	0.79

[3] It should be noted that if customer sectors grow at different rates, the assumption that energy and peak demand will grow at the same rate is unlikely to hold true. However, there has been very little long-term change in the relationship between energy and peak demand in the MISO region, with weather variations having a much larger impact.

INTRODUCTION

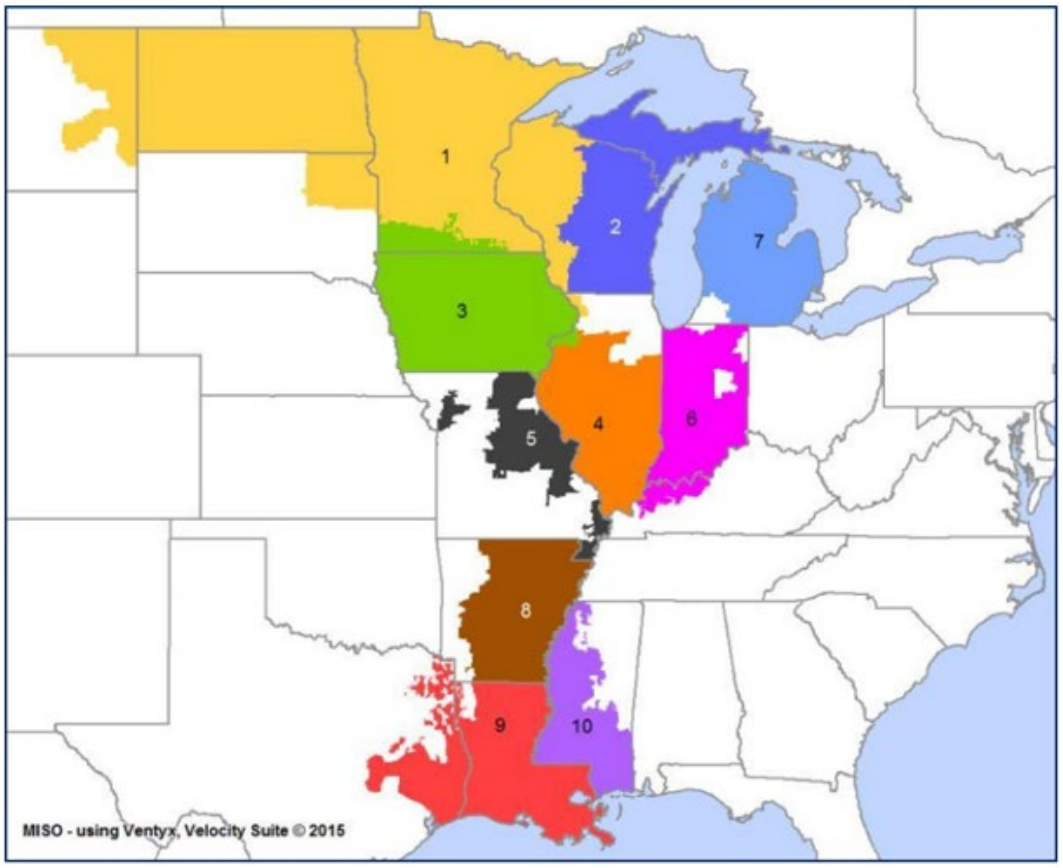
INTRODUCTION

This report represents the tenth load forecast the State Utility Forecasting Group (SUFG) has prepared for the Midcontinent Independent System Operator Inc. (MISO). These forecasts project annual energy and monthly peak[4] demand for the ten MISO local resource zones (LRZs) and the MISO system as a whole. This forecast does not attempt to replicate the forecasts that are produced by MISO's load-serving entities (LSEs).

OVERVIEW

The MISO market footprint consists of a number of individual Local Balancing Authorities (LBAs). It covers all or parts of 17 states and is divided into 10 LRZs.[5] Figure 1 displays the MISO market footprint at the LRZ level.

Figure 1: MISO 2018 Planning Year LRZ Map



Source: MISO, 2018

[4] This is the 5th forecast that includes monthly projections (previous forecasts were done on summer and winter seasonal bases). Due to the voluminous nature of including twelve monthly 20-year forecasts for ten LRZs and the MISO system, only a representative month (July) is included in the body of this report. The monthly forecasts are available in Appendix C.

[5] A very small amount of load in Oklahoma and Tennessee is served by MISO LBAs in LRZ 8. Rather than developing individual state econometric models for those states, it is assumed that these loads grow at the rate of the rest of LRZ 8.

INTRODUCTION

Econometric models were developed for each state to project annual retail sales of electricity. Forecasts of metered load at the LRZ level were developed by allocating the portion of each state's sales to the appropriate LRZ and adjusting for distribution system losses and weather based on the difference between the estimate of LRZ retail sales from state sales forecasts for the year 2022 and the weather-normalized LRZ metered load for the year 2022 for each LRZ. LRZ monthly peak demand projections were developed using normalized monthly peak load conversion factors, which translated annual energy into monthly peak demand based on historical observations assuming normal peak weather conditions. The LRZ peak demand forecasts are on a non-coincident basis,[6] which means each zone may reach its zonal peak at a different time. MISO system level projections were developed from the LRZ forecasts. For the MISO-wide peak demands, coincidence factors were used.

REPORT STRUCTURE

In this report, the second section explains the forecasting methodology and provides data sources. The third section summarizes state energy projection profiles including descriptions of the state econometric models and the resulting energy forecasts. The fourth section covers forecast results by LRZ and the fifth section provides MISO system level forecast results. The report contains four appendices. Appendix A provides details of the state energy forecasting models and methodology. Appendix B explains the calculation of allocation factors and the process of allocating the state energy forecasts to LRZ-level forecasts. Appendix C provides the methodology for determining monthly peak demand forecasts and forecast results of monthly peak by LRZ and at the MISO level. Appendix D lists high and low forecasts of energy and peak demand at state, LRZ and MISO levels.

[6] Throughout this report, coincidence is stated in reference to the overall MISO system. Thus, the LRZ peak demand forecasts are for the highest level of demand for that particular LRZ, which would be coincident at the LRZ level but non-coincident at the MISO system level.

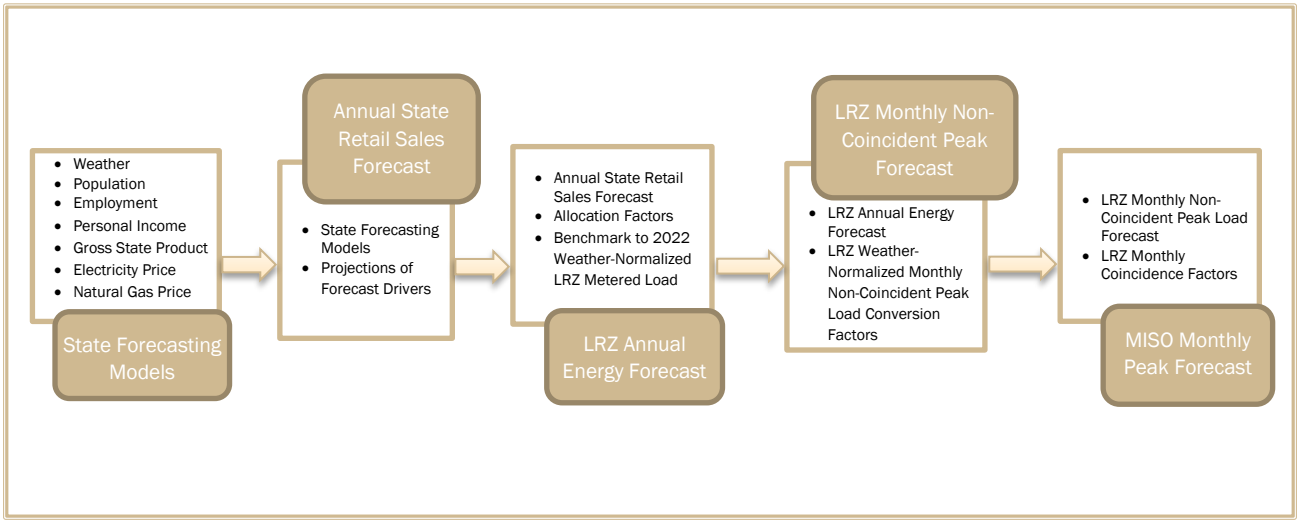
FORECASTING METHODOLOGY

FORECASTING METHODOLOGY

OVERVIEW

This study employed a multi-step approach to forecast annual energy and monthly peak demand at the MISO LRZ and system-wide levels. Econometric models were used for each state to forecast retail sales for a 20-year period, namely 2024 to 2043. The statewide energy forecasts were then used to construct annual energy forecasts at the LRZ level based on allocation factors. The LRZ annual energy forecasts were used, in turn, to develop monthly non-coincident peak demand projections by LRZ. The LRZ monthly coincident peak projections were estimated from LRZ monthly non-coincident peak demand projections by applying the zonal monthly coincidence factors. MISO system-wide energy and peak forecasts were aggregated from LRZ energy forecast and LRZ coincident peak forecast, respectively. The overall process flow chart is illustrated in Figure 2 below. It shows the five major steps in the process and the key inputs at each step.

Figure 2: Process Flow Chart



STATEWIDE ANNUAL ELECTRIC ENERGY FORECASTS

Econometric models of retail electricity sales were developed for each state using statewide historical data to determine the appropriate drivers of electricity consumption and the statistical relationship between those drivers and energy consumption. SUFG developed numerous possible model specifications for each state and selected the model that had a good fit (significant t-statistics, high R-squared values, and a significant F-statistic), passed the statistical tests (for heteroskedasticity and serial correlation), and had a set of drivers that included at least one driver that was tied to the overall growth in the state (such as employment, population or gross state product). The model formulations by state are provided in Appendix A. All the state econometric models used in the 2023 forecast were developed in 2022.

CONVERSION OF RETAIL SALES TO METERED LOAD AND BENCHMARKING TO 2022 LEVELS

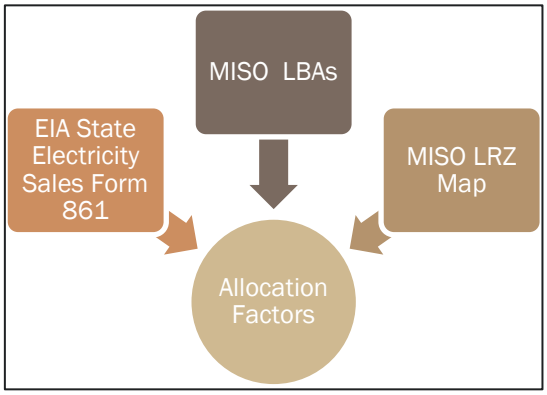
The state-level forecasts represent annual (calendar year) retail sales (electricity usage at the customer locations). This is driven by data availability, since statewide historical sales are available from the U.S. Department of Energy's Energy Information Administration (EIA). Since 2022 state electricity sales data were not available at the time this report was prepared, the state sales numbers for that year represent a forecast value that is not adjusted for energy efficiency (EE) programs. The LRZ-level forecasts are at the metered level (in

essence, loads at the substations where the transmission network operated by MISO connects to the distribution systems). The difference between the metered load and the retail sale is caused by losses between the substations and customers.[7] Since the historical metered loads at the LRZ-level are known for 2022 (they were provided by MISO), SUFG benchmarked the LRZ-level forecasts to the weather-normalized metered load levels for that year. This benchmarking accomplishes two objectives: it converts the forecast from the retail sales level to the metered load level and it captures savings from EE programs for 2022.

LRZ ENERGY FORECASTS

The LRZ annual energy forecasts were produced after the individual state annual forecasts were developed. This was done by allocating the fraction of each state's load to the appropriate LBA within that state (herein referred to as the load fraction) and summing across the various LBAs within each LRZ (see Figure 3). Since not all regions within a state experience load growth at the same rate, the load fraction of each state may change over time. The historical load fractions of each state were calculated and used to determine the future allocation factors. Additional adjustments have also been made to account for LBAs that operate in more than one state. In these cases, the market share of the LBA's load in each state within its service territory has been calculated in order to determine its load fraction for that state. In addition, distribution losses of each LRZ were incorporated. After LRZ annual energy forecasts were estimated, the MISO system-wide energy forecast was obtained by summing the LRZ energy forecasts. See Appendix B for additional details on the allocation process.

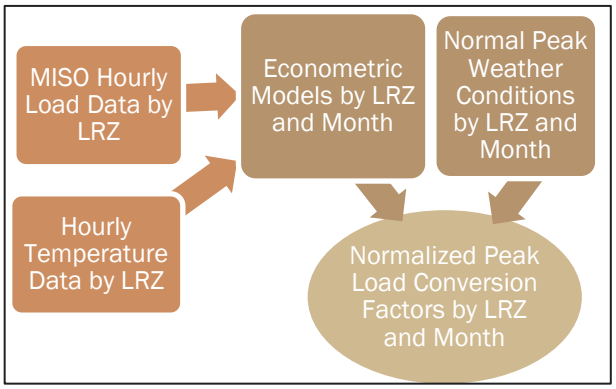
Figure 3: Structure and Logic Diagram for Allocation Factors



LRZ NON-COINCIDENT MONTHLY PEAK DEMAND FORECASTS

Normalized peak load conversion factors by LRZ and month were used to convert annual energy forecasts by LRZ to monthly non-coincident peak demand forecasts by LRZ. To estimate normalized peak load conversion factors, econometric models by LRZ and month were constructed to capture the relationships between hourly load factors and the corresponding weather conditions. Historical hourly load data by LRZ provided by MISO were used to calculate hourly load factors, which were expressed as annual average hourly load divided by each hourly load record. Normal peak weather conditions were then plugged into the econometric models to calculate normalized peak load conversion factors, Figure 4 illustrates the process of estimating normalized peak load conversion factors. Please see Appendix C for additional information on the peak demand forecast methodology.

Figure 4: Structure and Logic Diagram for Peak Load Conversion Factors



[7] These losses occur mainly in the distribution system of the load serving entities and may include some low voltage transmission lines that are not under MISO operation.

FORECASTING METHODOLOGY

MISO-LEVEL FORECASTS

The LRZ monthly non-coincident peak demand projections were converted to MISO-level monthly coincident peak demands using historical average coincidence factors. The coincidence factor for each LRZ is determined at the time of the MISO system-wide peak demand using the ratio of the LRZ's demand at the time of the MISO-wide (coincident) peak demand divided by the LRZ's demand at the time of the LRZ's individual (non-coincident) peak demand. The MISO system-wide monthly peak demand forecasts were obtained by summing the LRZ monthly coincident peak demands. Since coincidence is not an issue with annual energy, the MISO system-wide annual energy forecast is the arithmetic sum of the LRZ annual energy forecasts.

DATA SOURCES

Historical annual energy sales data and electricity and natural gas prices by state were obtained from EIA. Historical population data by state were obtained from the Census Bureau. Historical macroeconomic data, such as personal income, were obtained from the Bureau of Economic Analysis (BEA); gross state product (GSP) data were obtained from S&P Global (formerly IHS Markit) to avoid inconsistency in BEA data due to a change in industry classification systems; and employment data were obtained from the Bureau of Labor Statistics (BLS). Projections of macroeconomic data and population were retrieved from S&P Global. Electricity and natural gas price projections were developed by SUFG. Actual monthly heating and cooling degree days on a 65°Fahrenheit basis for all 15 states were obtained from the National Oceanic and Atmospheric Administration (NOAA), and were aggregated to annual data by state. Normal weather by state used in projections were obtained from NOAA. Zonal hourly temperature records were acquired from the Midwest Regional Climate Center (MRCC). Table 1 summarizes data sources used in this study.

Table 1: Data Sources

Data	Content	Historical Data Source	Data Used in Projection
Electricity sales	GWhs, annual retail electricity sales by state, 1990-2021	EIA	N/A
Electricity prices	Cents/KWh, 2012$, 1990-2020	EIA*	SUFG projection based on EIA data
Natural gas prices	Dollars/Mcf, 2012$, 1990-2020	EIA*	SUFG projection based on EIA data
Real personal income	Thousands, 2012$, 1990-2020	BEA*	S&P Global
Population	Number of people, 1990-2020	Census Bureau	S&P Global
Manufacturing & non-manufacturing employment	Number of jobs, 1990-2021	BLS	S&P Global
Non-farm employment	Number of jobs, 1990-2021	BLS	S&P Global
Gross state product	Millions, 2012$, 1990-2020	S&P Global	S&P Global
Cooling degree days (CDDs)	Summations of monthly cooling degree days, base 65°F, 1970-2020	NOAA	NOAA 30-year normal
Heating degree days (HDDs)	Summations of monthly heating degree days, base 65°F, 1970-2020	NOAA	NOAA 30-year normal
Hourly Temperature	Historical hourly temperature of selected weather stations, 1997-2022	MRCC	Normal peak temperatures

** Original data were in nominal dollars. SUFG converted them to real 2012 dollars using consumer price index data obtained from BLS.*

ARKANSAS

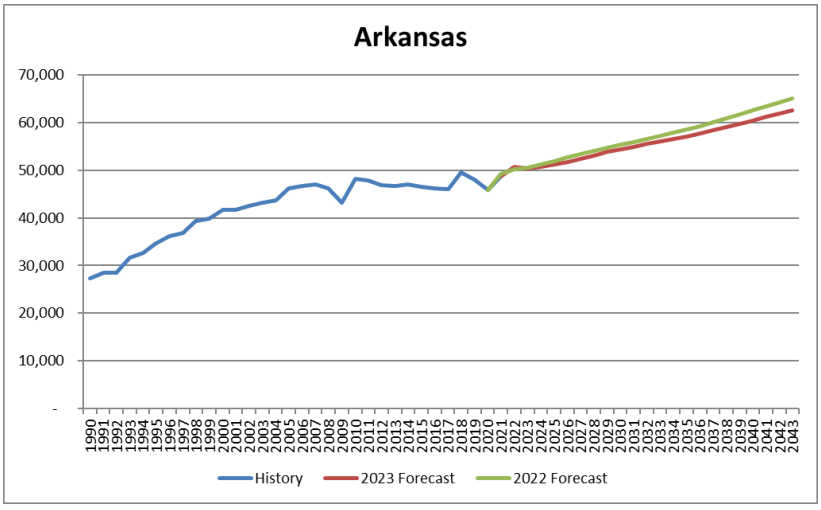
The Arkansas state econometric model uses real electricity price, real GSP, CDDs, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 2.

Table 2: Arkansas Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP
-0.07	1.62

Arkansas annual electricity sales are projected to grow at 1.11% in this forecast, which is slightly lower than the 1.27% growth rate projected in the 2022 forecast. Figure 5 shows Arkansas sales projection for the 2022 and 2023 forecasts.

Figure 5: Arkansas Energy Forecast (Annual Retail Sales in GWh)



Most of Arkansas's loads are in LRZ 8. A portion of the Arkansas annual energy forecast was allocated to LRZ 8 based on the historical average of the load fractions of the period of 2017 to 2021, as shown in Table 3. See Appendix B for more information on the historical load fractions and the process of developing allocation factors.

Table 3: Arkansas Allocation Factors

LRZ8	Non-MISO
72.93%	27.07%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rate for Arkansas's LRZ is shown in Table 4.

Table 4: Arkansas LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy[8]
LRZ8	1.11

[8] The compound annual growth rates for LRZ-level energy forecast and non-coincident peak load forecast are the same.

STATE BY STATE RESULTS

ILLINOIS

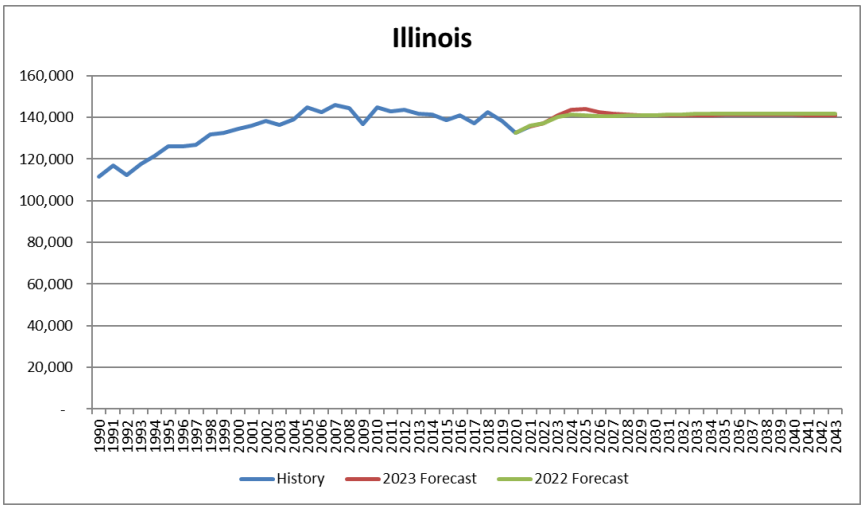
The Illinois state econometric model uses real electricity and natural gas prices, non-manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 5.

Table 5: Illinois Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Non-Manufacturing Employment
-0.50	-0.39	-0.14

Illinois annual electricity sales are projected to grow at -0.10% in this forecast, which is lower than the 0.05% growth rate projected in the 2022 forecast. Figure 6 shows Illinois sales projection for the 2022 and 2023 forecasts. Despite having a slightly lower growth rate, the 2023 forecast is nearly identical to the 2022 forecast due to a slightly higher starting point.

Figure 6: Illinois Energy Forecasts (Annual Retail Sales in GWh)



Illinois has loads in LRZ 1, LRZ 3 and LRZ 4, with roughly 2/3 of the state's loads located outside MISO. The Illinois annual energy forecast was allocated to the three LRZs based on historical average of load fractions for the period of 2017 to 2021, as show in Table 6. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 6: Illinois Allocation Factors

LRZ1	LRZ3	LRZ4	Non-MISO
0.0002%	1.48%	32.92%	65.60%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load. The resulting forecast growth rates for Illinois related LRZs are shown in Table 7.

Table 7: Illinois LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ3	1.43
LRZ4	-0.10

INDIANA

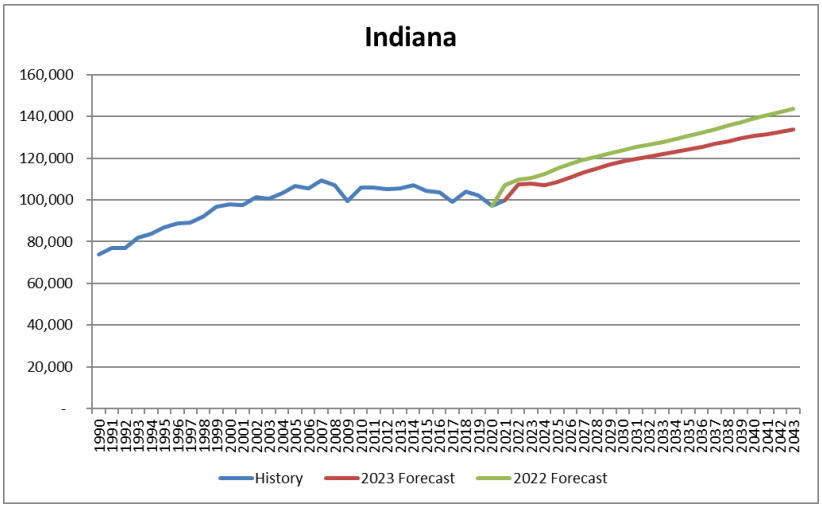
The Indiana state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 8.

Table 8: Indiana Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP
-0.53	1.59

Indiana annual electricity sales are projected to grow at 1.19% in this forecast, which is slightly lower than the 1.33% growth rate projected in the 2022 forecast. Figure 7 shows Indiana sales projections for the 2022 and 2023 forecasts.

Figure 7: Indiana Energy Forecasts (Annual Retail Sales in GWh)



Most of Indiana's loads are in LRZ 6. Per the request of MISO staff and due to concerns over providing utility-specific information in states that only have a single MISO utility, the load fraction of Indiana and Kentucky are combined (IN+KY). IN+KY forecasts are allocated to LRZ 6 based on the historical average of the load fractions for the period of 2017 to 2021, as shown in Table 9. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 9: Indiana and Kentucky Allocation Factors

LRZ6	Non-MISO
50.66%	49.34%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load. The resulting forecast growth rate of LRZ 6 is shown in Table 10.

Table 10: Indiana and Kentucky LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ6	1.34

STATE BY STATE RESULTS

IOWA

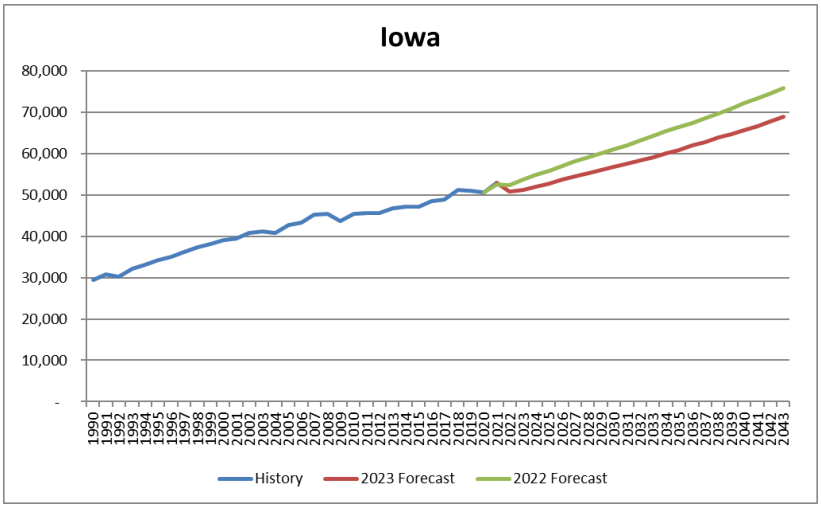
The Iowa state econometric model uses real electricity price, real GSP, real personal income per person and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 11.

Table 11: Iowa Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP	Real Personal Income/Population
-0.03	1.70	1.75

Iowa annual electricity sales are projected to grow at 1.50% in this forecast, which is lower than the 1.75% growth rate projected in the 2022 forecast. Figure 8 shows sales projection for the 2022 and 2023 forecasts.

Figure 8: Iowa Energy Forecasts (Annual Retail Sales in GWh)



Iowa has loads in LRZ 1 and LRZ 3. The Iowa annual energy forecast was allocated to the two LRZs based on the historical average of the load fractions for the period of 2017 to 2021, as shown in Table 12. See Appendix B for more information on the historical load fractions and the process of developing allocation factors.

Table 12: Iowa Allocation Factors

LRZ1	LRZ3	Non-MISO
1.75%	91.07%	7.18%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Iowa's LRZs are shown in Table 13.

Table 13: Iowa LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ3	1.43

STATE BY STATE RESULTS

KENTUCKY

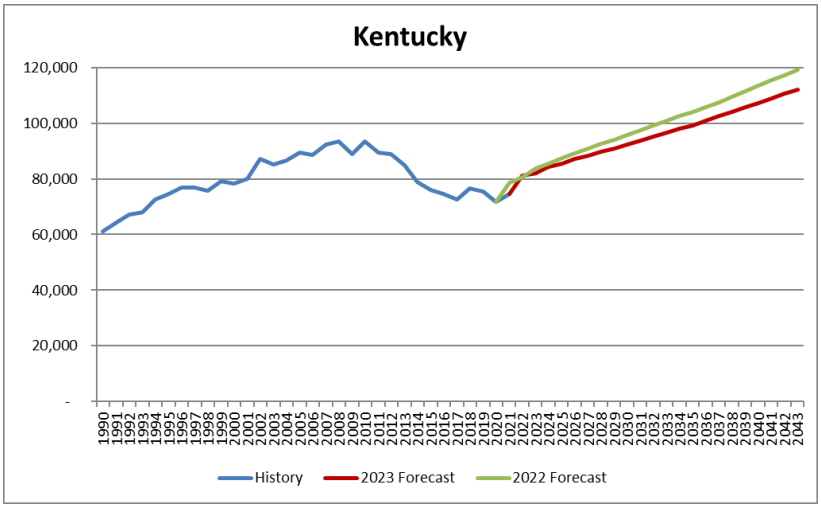
The Kentucky state econometric model uses real electricity and natural gas prices, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 14.

Table 14: Kentucky Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.20	0.26	1.59

For the state of Kentucky, SUFG observed a dramatic drop in electricity sales occurred starting in 2013. This was caused by the closure of the Paducah Gaseous Diffusion Plant (PGDP) in mid-2013, which represented a 3 GW load on the Tennessee Valley Authority system and accounted for more than 10% of the state's retail sales. With this large drop in load, SUFG could not fit an econometric model for the state. Therefore, the 2013 and subsequent years historical load were adjusted up to what it would have been if the PGDP had operated at its full capacity. SUFG then developed the econometric model with the adjusted electricity load and used the model to produce a load forecast for the state of Kentucky. The PGDP load was then subtracted from the forecast load derived from the econometric model to serve as the final state load forecast for Kentucky. Kentucky electricity sales are projected to grow at 1.52% in this forecast, which is lower than the 1.78% growth rate projected in the 2022 forecast. Figure 9 shows Kentucky sales projection for the 2022 and 2023 forecasts.

Figure 9: Kentucky Energy Forecasts (Annual Retail Sales in GWh)



Only a small portion of Kentucky's loads are in LRZ 6, with most of the loads occurring outside of MISO. Per the request of MISO staff and due to concerns over providing utility-specific information in states that only have a single MISO utility, the load fraction of Indiana and Kentucky are combined (IN+KY). IN+KY forecasts were allocated to LRZ 6 based on the historical average of the load fractions for the period of 2017 to 2021, as shown in Table 15. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 15: Indiana and Kentucky Allocation Factors

LRZ6	Non-MISO
50.66%	49.34%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rate for Indiana and Kentucky's LRZ is shown in Table 16.

Table 16: Indiana and Kentucky LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ6	1.34

STATE BY STATE RESULTS

LOUISIANA

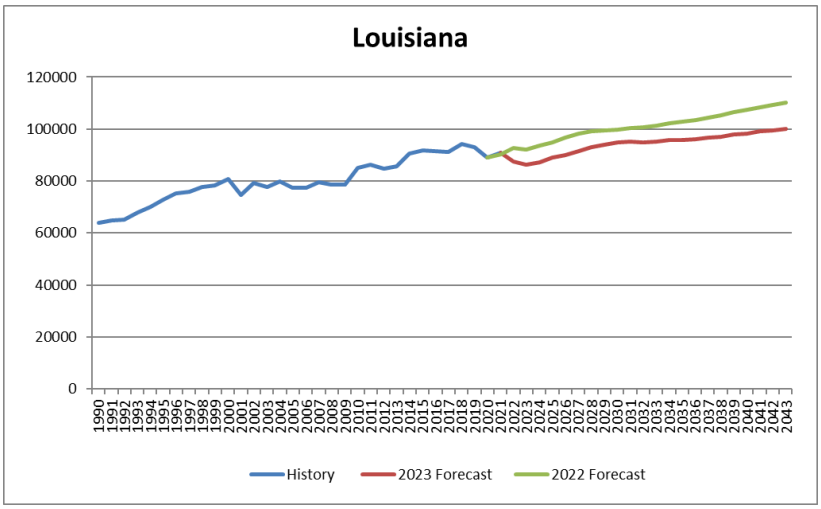
The Louisiana state econometric model uses real electricity and natural gas prices, real GSP excluding the mining sector, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 17.

Table 17: Louisiana Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP Excluding Mining Sector
-0.08	-0.13	1.41%

Louisiana annual electricity sales are projected to grow at 0.73% in this forecast, which is lower than the 0.91% growth rate projected in the 2022 forecast. Figure 10 shows Louisiana sales projections for the 2022 and 2023 forecasts.

Figure 10: Louisiana Energy Forecasts (Annual Retail Sales in GWh)



Most of Louisiana's loads are in LRZ 9. The Louisiana annual energy forecast was allocated to LRZ 9 based on the historical average of the load fractions for the period of 2017 to 2021, as shown in Table 18. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 18: Louisiana Allocation Factors

LRZ9	Non-MISO
92.88%	7.12%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rate for Louisiana's LRZ is shown in Table 19.

Table 19: Louisiana LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ9	0.94

STATE BY STATE RESULTS

MICHIGAN

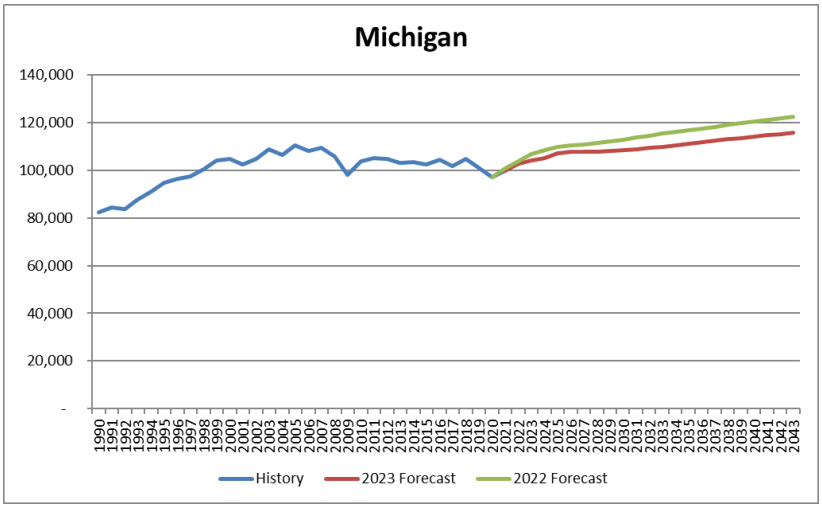
The Michigan state econometric model uses real electricity and natural gas prices, real GSP, non-farm employment and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 20.

Table 20: Michigan Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP	Non-Farm Employment
-0.49	-0.37	1.25	-0.10

Michigan annual electricity sales are projected to grow at 0.51% in this forecast, which is lower than the 0.69% growth rate projected in the 2022 forecast. Figure 11 shows sales projections for the 2022 and 2023 forecasts.

Figure 11: Michigan Energy Forecasts (Annual Retail Sales in GWh)



Michigan has loads in LRZ 1, LRZ 2 and LRZ 7. The Michigan forecast was allocated to the three LRZs based on the historical average of the load fractions for the period of 2017 to 2021, as shown in Table 21. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 21: Michigan Allocation Factors

LRZ1	LRZ2	LRZ7	Non-MISO
0.14%	4.26%	91.72%	3.88%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Michigan's LRZs are shown in Table 22.

Table 22: Michigan LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ2	0.85
LRZ7	0.51

STATE BY STATE RESULTS

MINNESOTA

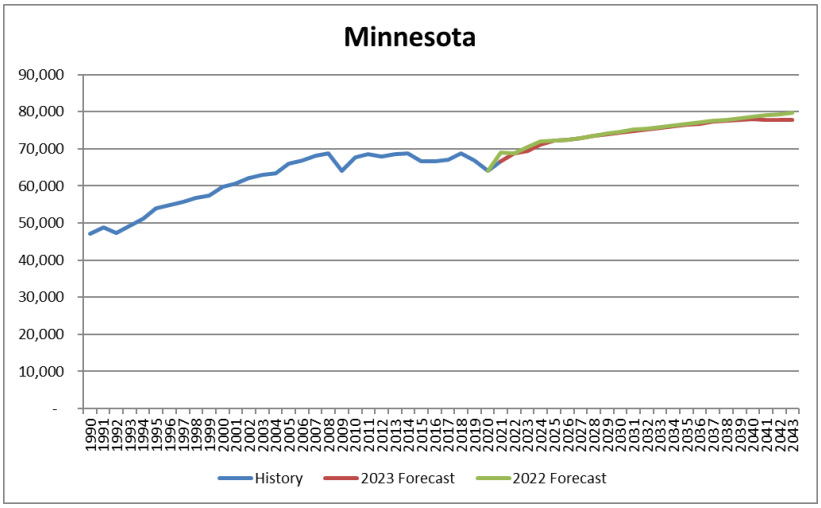
The Minnesota state econometric model uses real electricity and natural gas prices, population, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 23.

Table 23: Minnesota Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Population
-0.07	-0.10	0.36

Minnesota annual electricity sales are projected to grow at 0.48% in this forecast, which is slightly lower than the 0.61% growth rate projected in the 2022 forecast. Figure 12 shows electricity sales projection for the 2022 and 2023 forecasts.

Figure 12: Minnesota Energy Forecasts (Annual Retail Sales in GWh)



Minnesota has loads in LRZ 1 and LRZ 3. The Minnesota forecast was allocated to the two LRZs based on the historical average of the load fractions of 2017 to 2021, as shown in Table 24. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 24: Minnesota Allocation Factors

LRZ1	LRZ3	Non-MISO
97.77%	0.93%	1.30%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Minnesota's LRZs are shown in Table 25.

Table 25: Minnesota LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ3	1.43

STATE BY STATE RESULTS

MISSISSIPPI

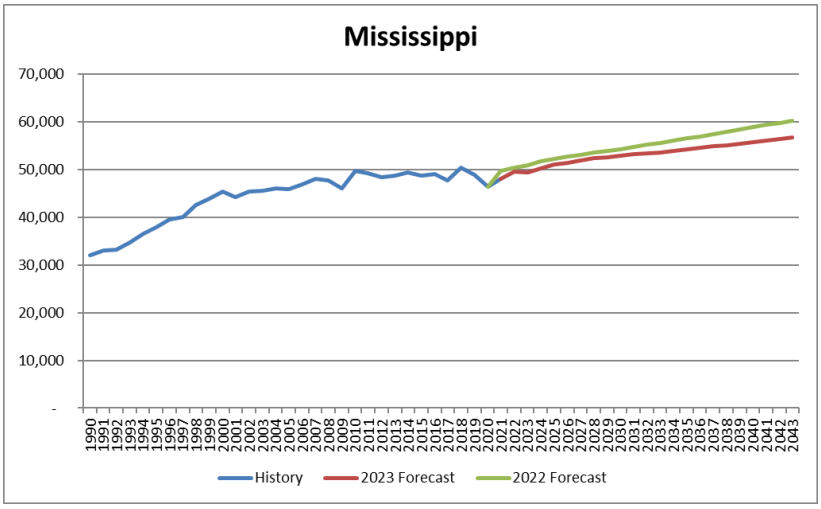
The Mississippi state econometric model uses real electricity price, real GSP, population, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 26.

Table 26: Mississippi Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP	Population
-0.19	1.39	0.003

Mississippi annual electricity sales are projected to grow at 0.64% in this forecast, which is slightly lower than the 0.85% growth rate projected in the 2022 forecast. Figure 13 shows sales projections for the 2022 and 2023 forecasts.

Figure 13: Mississippi Energy Forecasts (Annual Retail Sales in GWh)



Almost half of Mississippi's load is in LRZ 10. The Mississippi forecast was allocated to LRZ 10 based on the historical average of the load fractions of the period of 2017 to 2021, as shown in Table 27. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 27: Mississippi Allocation Factors

LRZ10	Non-MISO
44.18%	55.82%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load. The resulting forecast growth rate for Mississippi's LRZ is shown in Table 28.

Table 28: Mississippi LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ10	0.64

STATE BY STATE RESULTS

MISSOURI

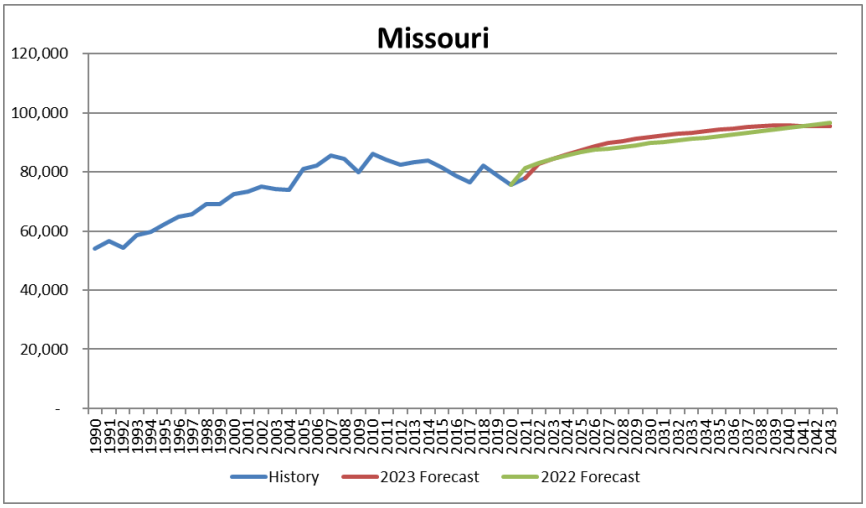
The Missouri state econometric model uses real electricity price, population, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 29.

Table 29: Missouri Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Population
-0.09	0.27

Missouri annual electricity sales are projected to grow at 0.56% in this forecast, which is slightly lower than the 0.67% growth rate projected in the 2022 forecast. Figure 14 shows sales projections for the 2022 and 2023 forecasts. Despite having higher forecast for most of the years in the forecast period, the 2023 forecast has a lower growth rate due to a slightly higher starting point and a slightly lower ending point.

Figure 14: Missouri Energy Forecasts (Annual Retail Sales in GWh)



Missouri has loads in LRZ 5 and LRZ 8. The Missouri forecast was allocated to the two LRZs based on the trend of historical load fractions, as shown in Table 30. Based on the projections of the values from the model drivers for the state of Missouri and for the St. Louis metropolitan statistical area from S&P Global, the non-MISO region is projected to grow faster than the MISO region. Therefore, the allocation factor for LRZ 5 is reduced from 45.79% in 2022 to 41.72% in 2043. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 30: Missouri Allocation Factors

LRZ5	LRZ8	Non-MISO
Reduced from 45.79% in 2022 to 41.72% in 2043	0.02%	Change accordingly

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Missouri's LRZs are shown in Table 31.

Table 31: Missouri LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ5	0.12
LRZ8	1.11

STATE BY STATE RESULTS

MONTANA

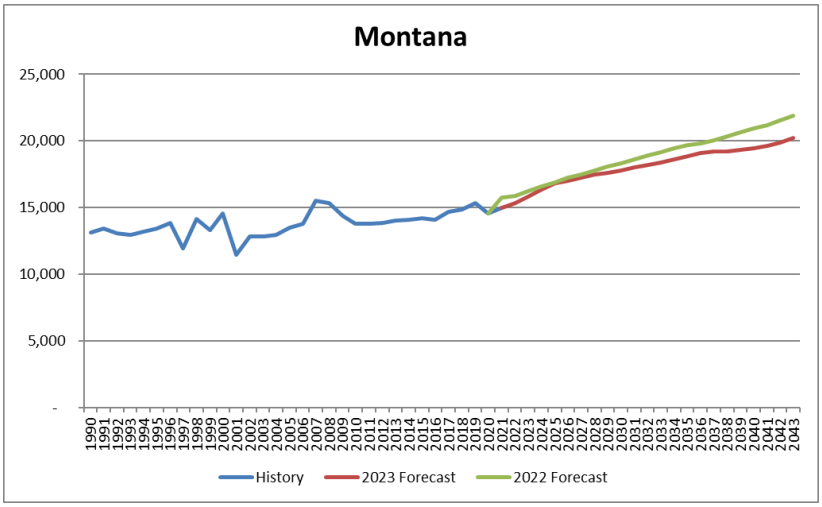
The Montana state econometric model uses real electricity and natural gas prices, real personal income per capita, manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 32.

Table 32: Montana Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Real Income/Population	Manufacturing Employment
0.12	0.16	1.70	-0.11

Montana annual electricity sales are projected to grow at 1.12% in this forecast, which is lower than the 1.51% growth rate projected in the 2022 forecast. Figure 15 shows sales projections for the 2022 and 2023 forecasts.

Figure 15: Montana Energy Forecasts (Annual Retail Sales in GWh)



A small portion of Montana's loads is located in LRZ 1, with the remainder outside MISO. Per the request of MISO staff and due to concerns over providing utility-specific information in states that only have a single MISO utility, the load fractions of Montana and North Dakota are combined (MT+ND). The MT+ND forecasts were allocated to LRZ1 based on the historical average of the load fractions of the period of 2019 to 2021, as shown in Table 33. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 33: Montana and North Dakota Allocation Factors

LRZ1	Non-MISO
30.68%	69.32%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rate for Montana's LRZ is shown in Table 34.

Table 34: Montana and North Dakota LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62

NORTH DAKOTA

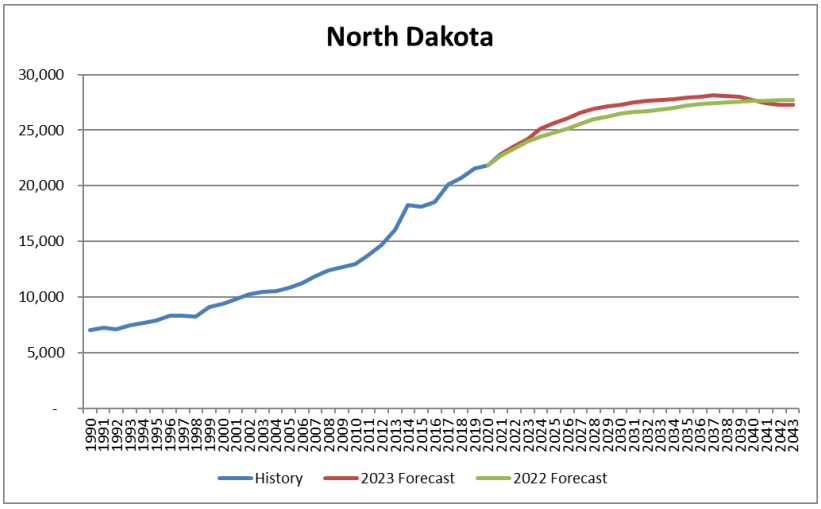
The North Dakota state econometric model uses real electricity price, population, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 35.

Table 35: North Dakota Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Population
-0.05	0.13

North Dakota annual electricity sales are projected to grow at 0.43% in this forecast, which is lower than the 0.76% growth rate projected in the 2022 forecast. Figure 16 shows sales projection for the 2022 and 2023 forecasts. Despite having a lower growth rate, the 2023 forecast is higher than the 2022 forecast for most of the forecast period before falling below at the end.

Figure 16: North Dakota Energy Forecasts (Annual Retail Sales in GWh)



North Dakota has loads located in LRZ 1. Per the request of MISO staff and due to concerns over providing utility-specific data in states that only have a single MISO utility, the load fraction of Montana and North Dakota are combined (MT+ND). The MT+ND forecast was allocated to LRZ 1 based on the historical average of the load fractions of the period of 2019 to 2021, as shown in Table 36. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 36: Montana and North Dakota Allocation Factors

LRZ1	Non-MISO
30.68%	69.32%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rate for North Dakota's LRZ is shown in Table 37.

Table 37: Montana and North Dakota LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62

STATE BY STATE RESULTS

SOUTH DAKOTA

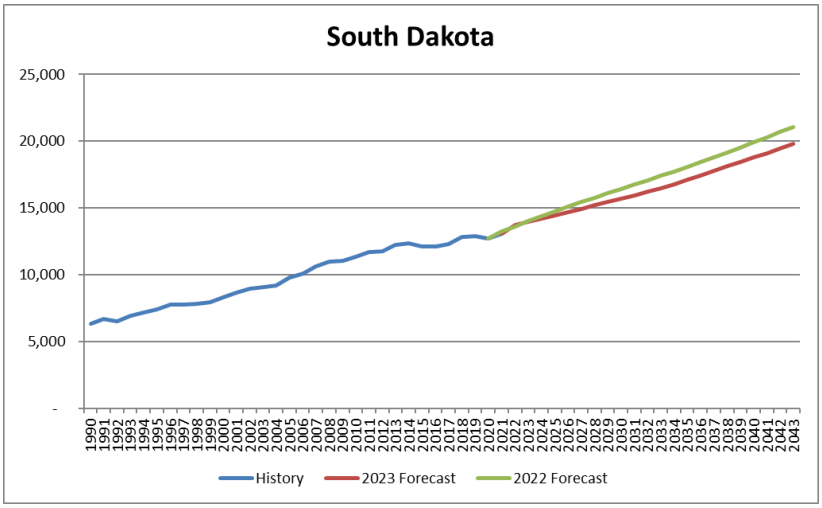
The South Dakota state econometric model uses real electricity price, real GSP, non-manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 38.

Table 38: South Dakota Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP	Non-Manufacturing Employment
-0.08	1.94	0.37

South Dakota electricity sales are projected to grow at 1.77% in this forecast, which is lower than the 2.07% growth rate projected in the 2022 forecast. Figure 17 shows the sales projections for the 2022 and 2023 forecasts.

Figure 17: South Dakota Energy Forecasts (Annual Retail Sales in GWh)



South Dakota has loads in LRZ 1 and LRZ 3. The South Dakota sales forecast was allocated to the two LRZs based on the historical average of the load fractions of the period of 2017-2021, as shown in Table 39. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 39: South Dakota Allocation Factors

LRZ1	LRZ3	Non-MISO
23.70%	1.94%	74.36%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for South Dakota's LRZs are shown in Table 40.

Table 40: South Dakota LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ3	1.43

STATE BY STATE RESULTS

TEXAS

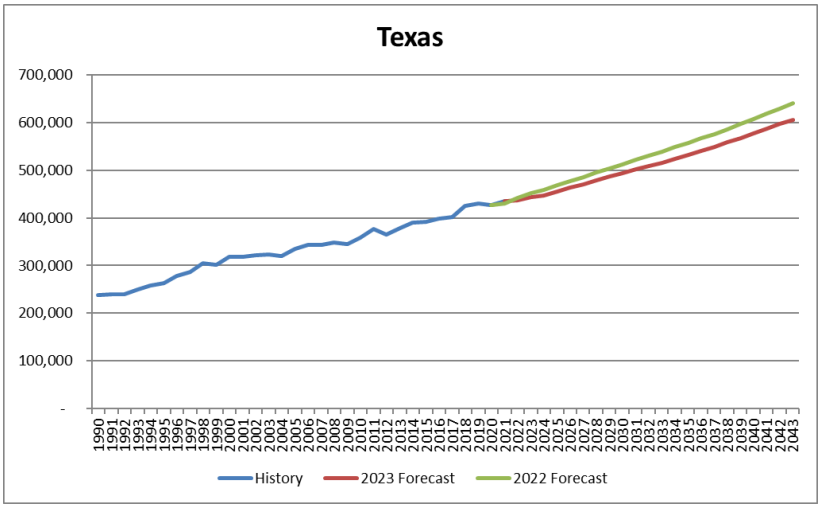
The Texas state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 41.

Table 41: Texas Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real GSP
-0.09	2.48

Texas annual electricity sales are projected to grow at 1.61% in this forecast, which is lower than the 1.75% growth rate projected in the 2022 forecast. Figure 18 shows sales projections for the 2022 and 2023 forecasts.

Figure 18: Texas Energy Forecasts (Annual Retail Sales in GWh)



Texas has loads in LRZ 8 and LRZ 9. The Texas sales forecast was allocated to the two LRZs based on the historical average of the load fractions of the period of 2017-2021, as shown in Table 42. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 42: Texas Allocation Factors

LRZ8	LRZ9	Non-MISO
0.0051%	5.37%	94.62%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Texas's LRZs are shown in Table 43.

Table 43: Texas LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ8	1.11
LRZ9	0.94

STATE BY STATE RESULTS

WISCONSIN

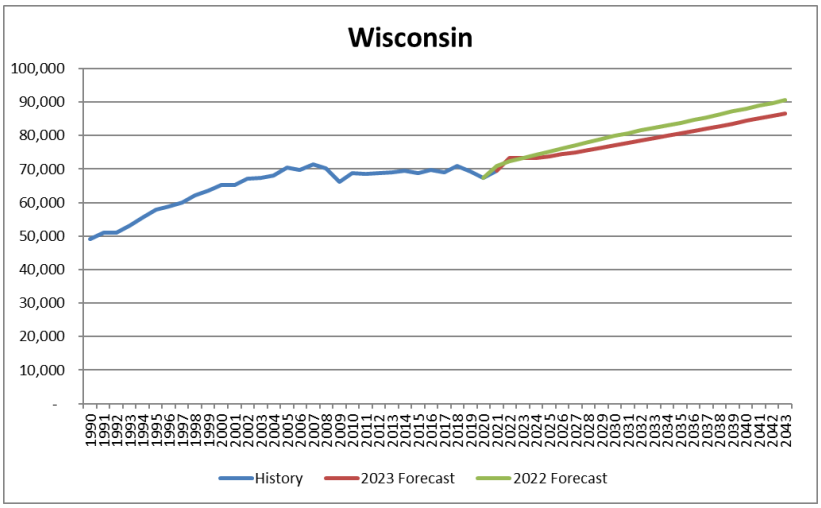
The Wisconsin state econometric model uses real electricity and natural gas prices, real GSP, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 44.

Table 44: Wisconsin Explanatory Variable CAGR for the Period of 2024-2043 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.51	-0.42	1.46

Wisconsin annual electricity sales are projected to grow at 0.87% in this forecast, which is slightly lower than the 1.07% growth rate projected in the 2022 forecast. Figure 19 shows sales projections for the 2022 and 2023 forecasts.

Figure 19: Wisconsin Energy Forecasts (Annual Retail Sales in GWh)



Wisconsin has loads in LRZ 1 and LRZ 2. Unlike other MISO states, Wisconsin has no non-MISO loads. The Wisconsin sales forecast was allocated to the two LRZs based on the historical average of the load fractions of the period of 2017-2021, as shown in the Table 45. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 45: Wisconsin Allocation Factors

LRZ1	LRZ2	Non-MISO
17.43%	82.57%	0.00%

Annual energy for the LRZs is determined by summing the allocated portions of the appropriate state sales forecasts and benchmarking to the most recent weather normalized metered load energy. The resulting forecast growth rates for Wisconsin's LRZs are shown in Table 46.

Table 46: Wisconsin LRZ Forecast CAGR for the Period of 2024-2043 (%)

LRZ	Annual Energy
LRZ1	0.62
LRZ2	0.85

LRZ FORECASTS

LRZ FORECASTS

ANNUAL LRZ ENERGY FORECASTS

Table 47 provides LRZ annual metered load forecasts on a gross basis. No EE adjustments were provided by MISO this year.

Table 47: Gross LRZ Energy Forecasts without EE Adjustments (Annual Metered Load in GWh)

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	93,744	62,522	51,632	48,914	36,143	81,494	91,700	37,037	115,299	21,880
2023	94,703	62,596	52,087	50,265	36,724	81,808	92,941	36,832	114,391	21,857
2024	96,820	62,644	52,919	51,169	37,219	82,463	94,054	37,049	115,356	22,175
2025	98,298	63,132	53,747	51,279	37,691	83,801	95,596	37,390	117,757	22,535
2026	98,969	63,610	54,616	50,721	38,124	85,379	96,251	37,804	119,279	22,755
2027	99,706	64,116	55,410	50,533	38,492	86,947	96,421	38,304	121,199	22,954
2028	100,673	64,645	56,107	50,374	38,659	88,291	96,409	38,801	123,139	23,139
2029	101,491	65,215	56,800	50,274	38,797	89,711	96,626	39,297	124,609	23,271
2030	102,124	65,788	57,521	50,242	38,925	90,916	96,925	39,734	125,894	23,393
2031	102,815	66,347	58,240	50,246	38,987	92,015	97,308	40,134	126,729	23,522
2032	103,545	66,888	59,013	50,259	39,010	93,163	97,749	40,541	127,065	23,628
2033	104,201	67,431	59,765	50,279	39,020	94,246	98,207	40,890	127,650	23,707
2034	104,881	68,011	60,632	50,276	39,028	95,408	98,707	41,267	128,729	23,813
2035	105,522	68,622	61,531	50,329	39,050	96,461	99,376	41,693	129,216	23,981
2036	106,250	69,250	62,502	50,353	39,078	97,662	99,986	42,153	130,043	24,122
2037	106,967	69,897	63,425	50,364	39,075	99,033	100,550	42,607	131,086	24,240
2038	107,560	70,542	64,385	50,344	39,054	100,220	101,084	43,104	132,048	24,372
2039	107,975	71,124	65,226	50,310	38,944	101,385	101,498	43,615	133,370	24,508
2040	108,362	71,766	66,136	50,301	38,730	102,639	101,984	44,165	134,490	24,659
2041	108,361	72,380	67,115	50,222	38,474	103,749	102,441	44,666	135,731	24,792
2042	108,484	72,971	68,219	50,216	38,245	104,945	102,986	45,168	136,846	24,920
2043	108,951	73,541	69,320	50,208	38,058	106,120	103,506	45,667	137,911	25,050
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

LRZ FORECASTS

LRZ NON-COINCIDENT PEAK DEMANDS

The LRZ-level monthly non-coincident [9] peak demands were calculated by applying the monthly weather normalized energy-to-peak conversion factors to the LRZ annual metered load projections. These values represent the projected monthly peak demands under normal weather conditions. Usually, the non-coincident peak of each LRZ does not occur at the same time when MISO reaches its system-wide peak. Table 48 shows July non-coincident peak demand projections by LRZ without EE adjustments. Monthly peak projections for each one of the twelve months are included in Appendix C.

Table 48: July Non-Coincident Peak Demand without EE Adjustments (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	16,244	11,644	9,461	9,367	7,334	14,934	18,643	7,306	20,393	4,557
2023	16,410	11,657	9,544	9,626	7,452	14,992	18,896	7,265	20,233	4,552
2024	16,776	11,666	9,696	9,799	7,552	15,112	19,122	7,308	20,403	4,618
2025	17,033	11,757	9,848	9,820	7,648	15,357	19,436	7,375	20,828	4,693
2026	17,149	11,846	10,007	9,713	7,736	15,646	19,569	7,457	21,097	4,739
2027	17,277	11,940	10,153	9,677	7,810	15,934	19,603	7,556	21,437	4,781
2028	17,444	12,039	10,281	9,647	7,844	16,180	19,601	7,654	21,780	4,819
2029	17,586	12,145	10,408	9,627	7,872	16,440	19,645	7,752	22,040	4,847
2030	17,696	12,252	10,540	9,621	7,898	16,661	19,706	7,838	22,267	4,872
2031	17,815	12,356	10,671	9,622	7,911	16,862	19,784	7,917	22,415	4,899
2032	17,942	12,457	10,813	9,625	7,915	17,073	19,873	7,997	22,474	4,921
2033	18,055	12,558	10,951	9,628	7,917	17,271	19,966	8,066	22,578	4,937
2034	18,173	12,666	11,110	9,628	7,919	17,484	20,068	8,140	22,769	4,960
2035	18,284	12,780	11,274	9,638	7,923	17,677	20,204	8,224	22,855	4,995
2036	18,410	12,896	11,452	9,643	7,929	17,897	20,328	8,315	23,001	5,024
2037	18,535	13,017	11,621	9,645	7,928	18,148	20,443	8,405	23,185	5,049
2038	18,638	13,137	11,797	9,641	7,924	18,366	20,552	8,503	23,356	5,076
2039	18,709	13,246	11,951	9,634	7,902	18,579	20,636	8,603	23,589	5,104
2040	18,776	13,365	12,118	9,633	7,858	18,809	20,734	8,712	23,788	5,136
2041	18,776	13,479	12,298	9,617	7,807	19,013	20,827	8,811	24,007	5,163
2042	18,798	13,590	12,500	9,616	7,760	19,232	20,938	8,910	24,204	5,190
2043	18,879	13,696	12,702	9,615	7,722	19,447	21,044	9,008	24,393	5,217
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

[9] Non-coincidence is from the perspective of the MISO system peak load.

LRZ FORECASTS

LRZ Forecasts

Each sub-section here provides information regarding the forecast for a specific LRZ. Rather than providing twelve monthly peak demand charts for each LRZ, a single month (July) is provided. Forecasts for all months are displayed in Appendix C.

LRZ 1

LRZ 1 consists of most of the state of Minnesota, parts of Montana, North Dakota, South Dakota, and Wisconsin, and small portions of Iowa, Illinois, and Michigan. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Monthly non-coincident peak demands are determined using weather information for Minneapolis-St. Paul, MN according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.62% for the period of 2024-2043, which is slightly lower than the rate projected in the 2022 forecast (0.81% for the period of 2023-2042). Figure 20 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 21 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 20: Gross LRZ 1 Energy (GWh)

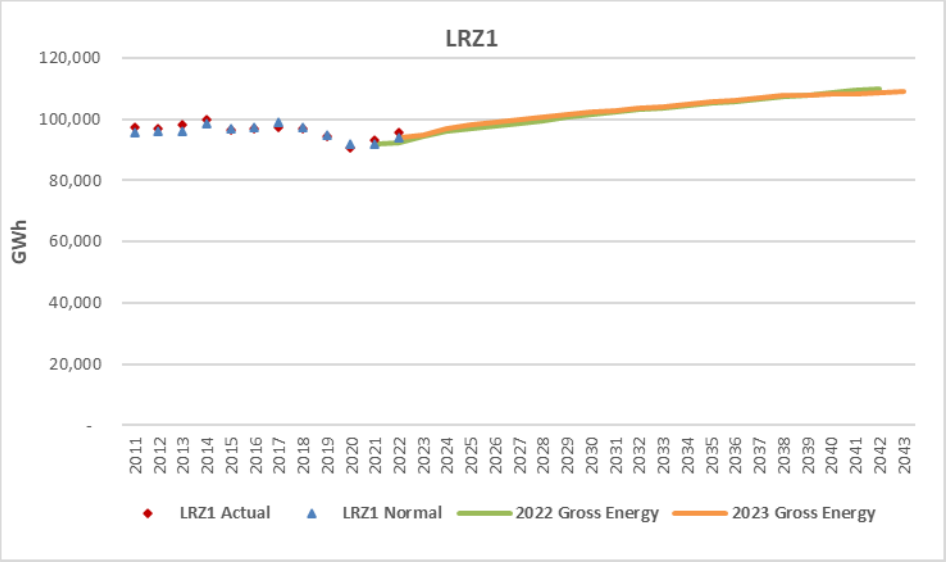
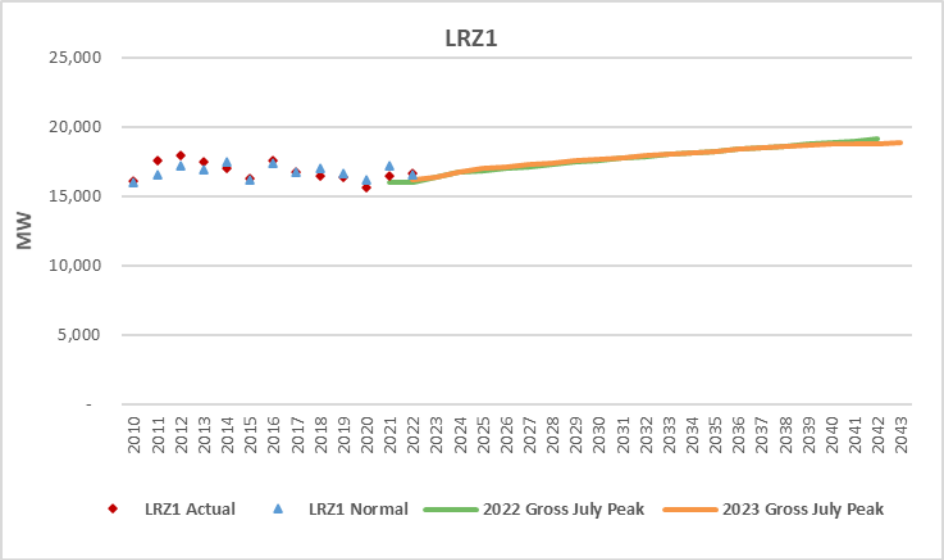


Figure 21: Gross LRZ 1 July Non-Coincident Peak Demand (MW)



LRZ 2

LRZ 2 is made up of most of the state of Wisconsin and a very small portion of Michigan. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Milwaukee, WI according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.85% for the period of 2024-2043. This is lower than the rate projected in the 2022 forecast (1.05% for the period of 2023-2042). Figure 22 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 23 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 22: Gross LRZ 2 Energy (GWh)

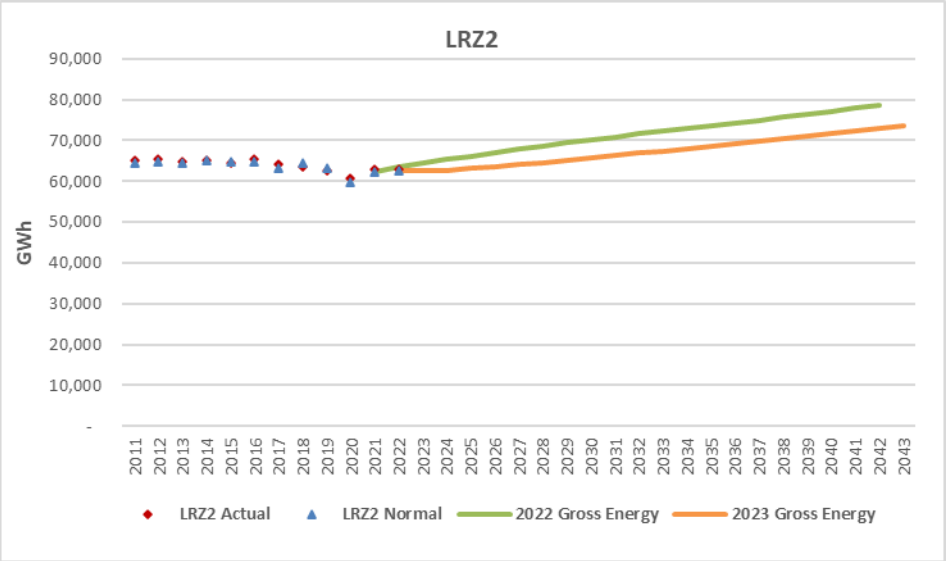
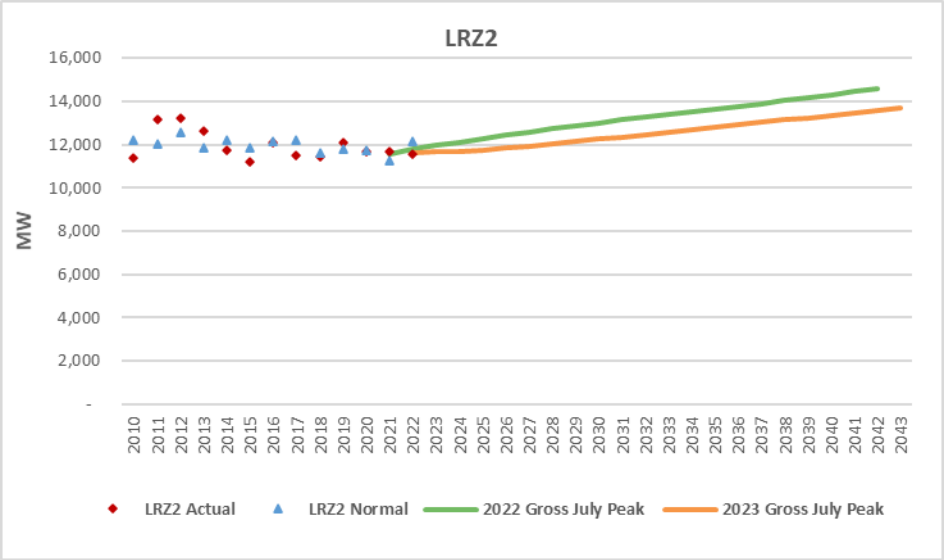


Figure 23: Gross LRZ 2 July Non-Coincident Peak Demand (MW)



LRZ 3

LRZ 3 consists of most of the state of Iowa and small portions of Illinois, Minnesota, and South Dakota. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Des Moines, IA according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 1.43% for the period of 2024- 2043, which is lower than the rate projected in the 2022 forecast (1.68% for the period of 2023- 2042). Figure 24 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 25 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 24: Gross LRZ 3 Energy (GWh)

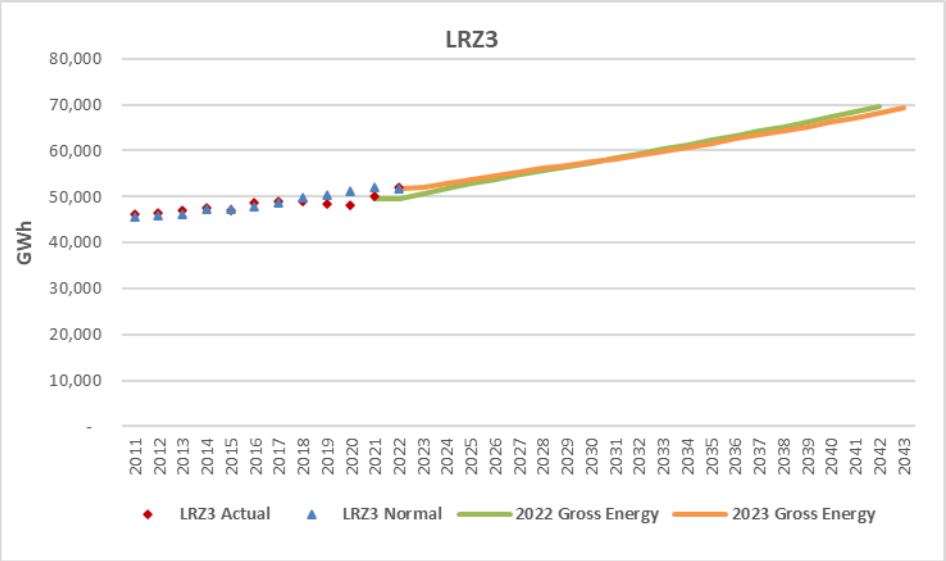
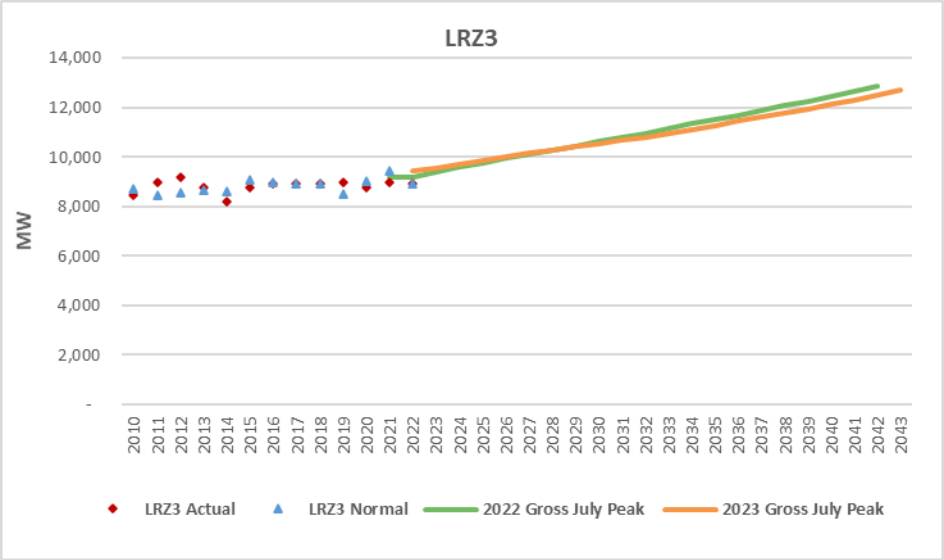


Figure 25: Gross LRZ 3 July Non-Coincident Peak Demand (MW)



LRZ 4

LRZ 4 consists of about 1/3 of the state of Illinois. The annual energy forecast for the LRZ is determined from that state's forecast using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Springfield, IL according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of -0.10% for the period of 2024-2043, which is lower than the rate projected in the 2022 forecast (0.05% for the period of 2023-2042). Figure 26 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 27 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 26: Gross LRZ 4 Energy (GWh)

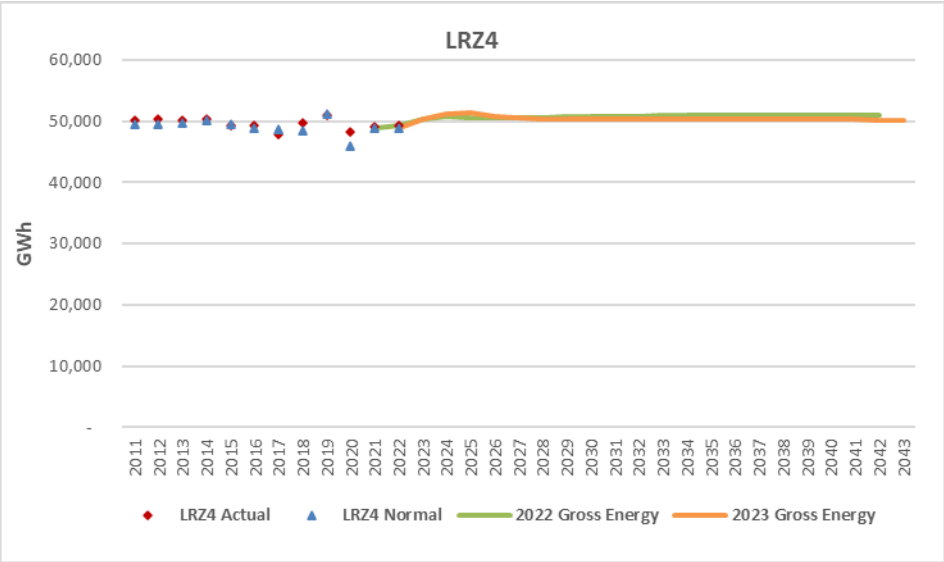
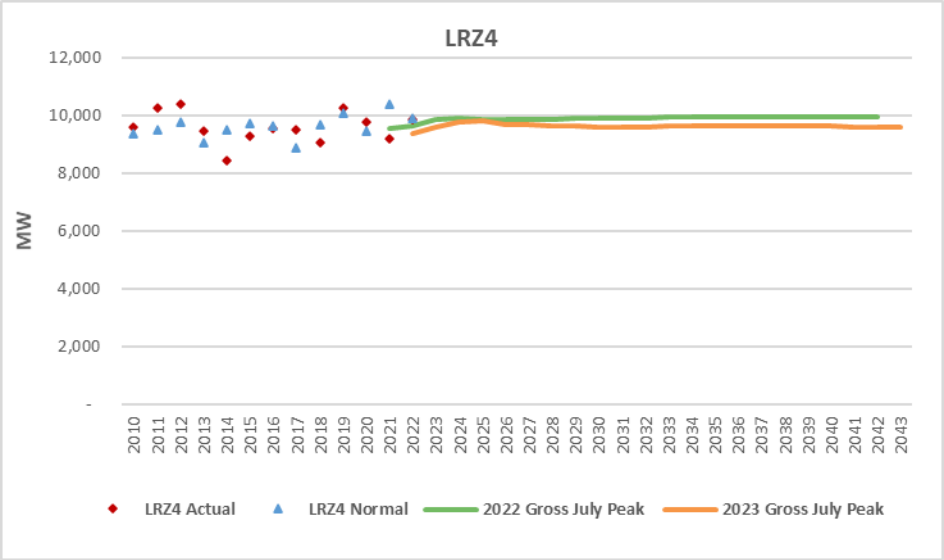


Figure 27: Gross LRZ 4 July Non-Coincident Peak Demand (MW)



LRZ 5

LRZ 5 consists of about half of the state of Missouri. The annual energy forecast for the LRZ is determined from that state's forecast using the allocation method described in Appendix B. Due to differences of growth rate in population projections between the state and the St. Louis Metropolitan Statistical Area, the allocation factor declines over time. Non-coincident monthly peak demands are determined using weather information for St. Louis, MO according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.12% for the period of 2024-2043. This is slightly lower than the rate projected in the 2022 forecast (0.25% for the period of 2023-2042). Figure 28 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 29 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 28: Gross LRZ 5 Energy (GWh)

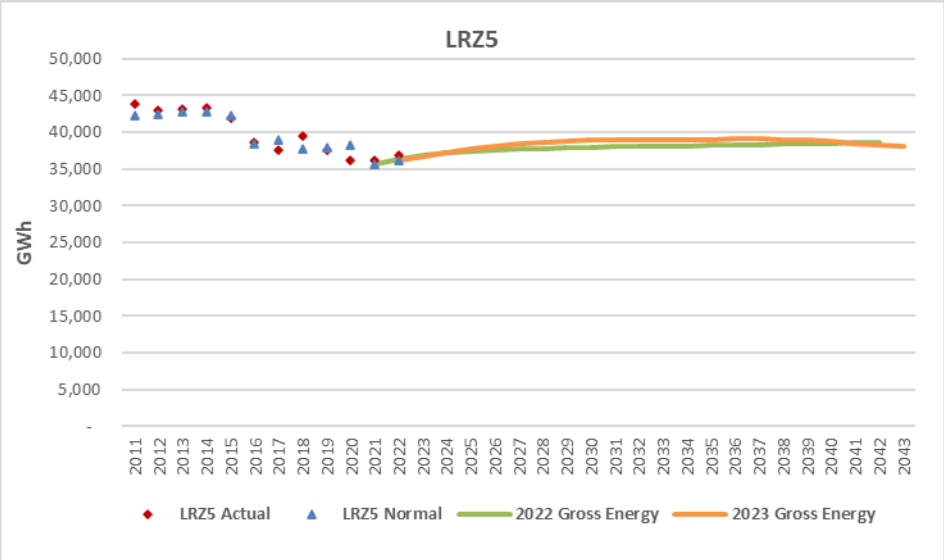
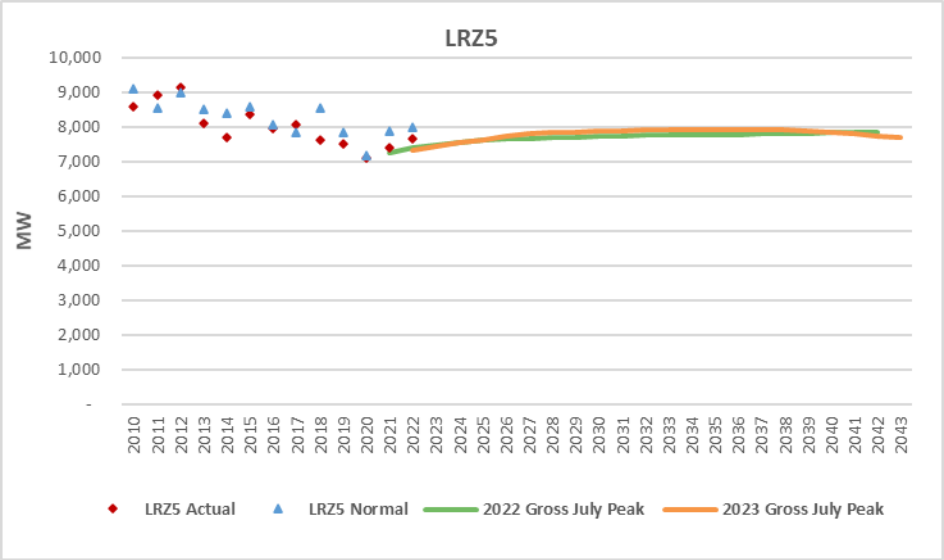


Figure 29: Gross LRZ 5 July Non-Coincident Peak Demand (MW)



LRZ 6

LRZ 6 is made up of portions of the states of Indiana and Kentucky. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Indianapolis, IN according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 1.34% for the period of 2024-2043. This is lower than the rate projected in the 2022 forecast (1.53% for the period of 2023-2042). Figure 30 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 31 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 30: Gross LRZ 6 Energy (GWh)

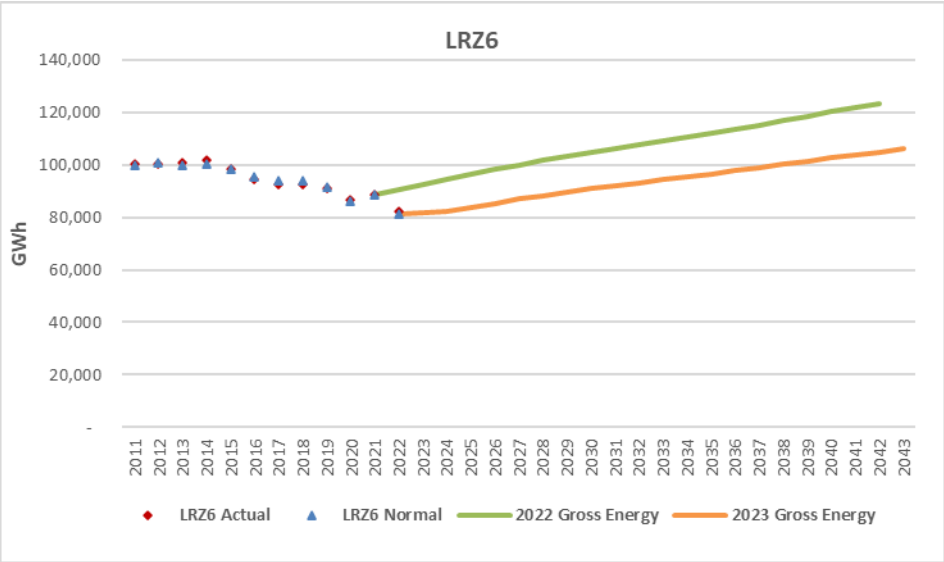
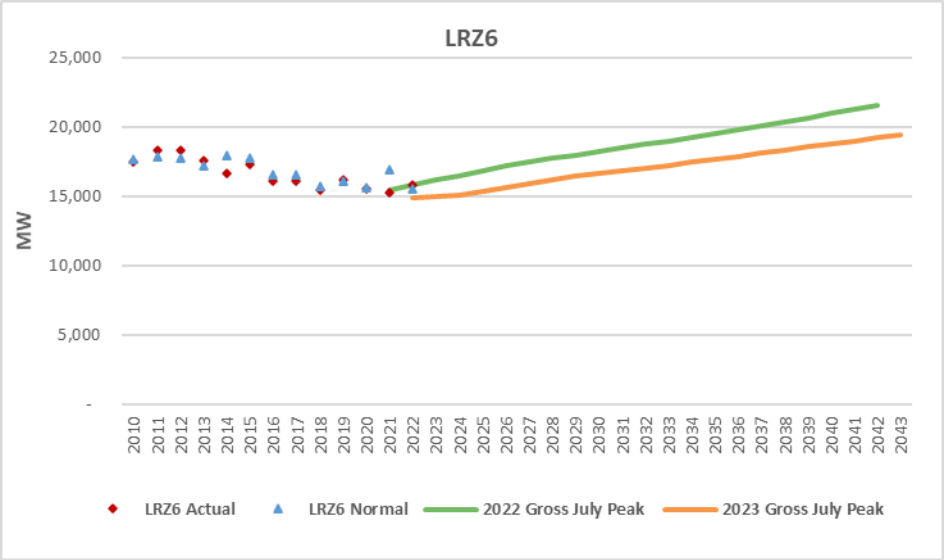


Figure 31: Gross LRZ 6 July Non-Coincident Peak Demand (MW)



LRZ 7

LRZ 7 consists of most of the state of Michigan. The annual energy forecast for the LRZ is determined from that state's forecast using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Lansing, MI according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.51% for the period of 2024-2043. This is lower than the rate projected in the 2022 forecast (0.69% for the period of 2023-2042). Figure 32 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 33 provides gross non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 32: Gross LRZ 7 Energy (GWh)

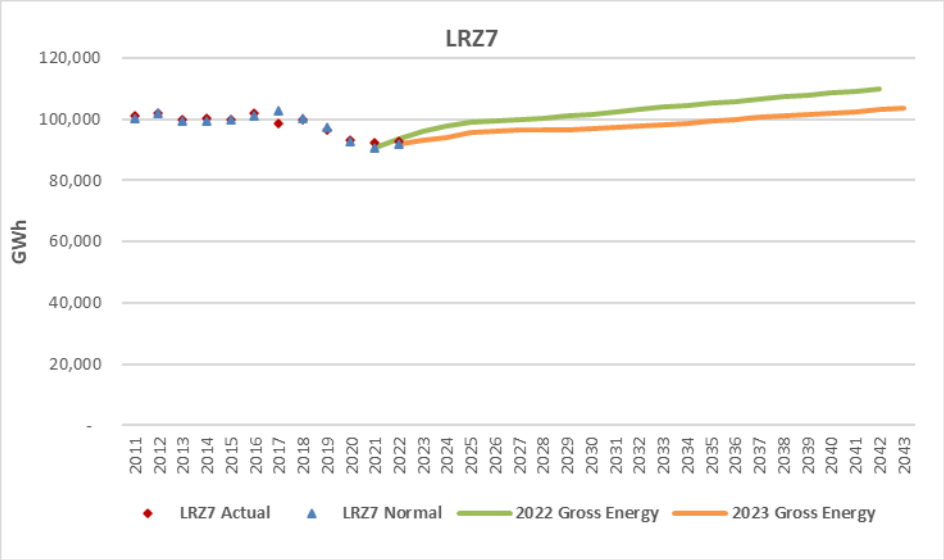
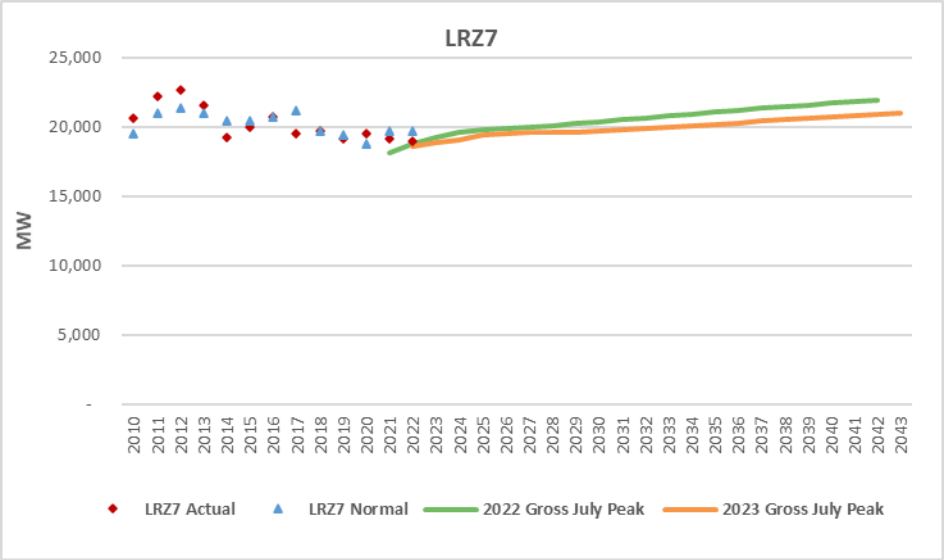


Figure 33: Gross LRZ 7 July Non-Coincident Peak Demand (MW)



LRZ 8

LRZ 8 consists of most of the state of Arkansas and very small portions of Missouri and Texas. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Little Rock, AR according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 1.11% for the period of 2024-2043, which is lower than the rate projected in the 2022 forecast (1.27% for the period of 2023-2042). Figure 34 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 35 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 34: Gross LRZ 8 Energy (GWh)

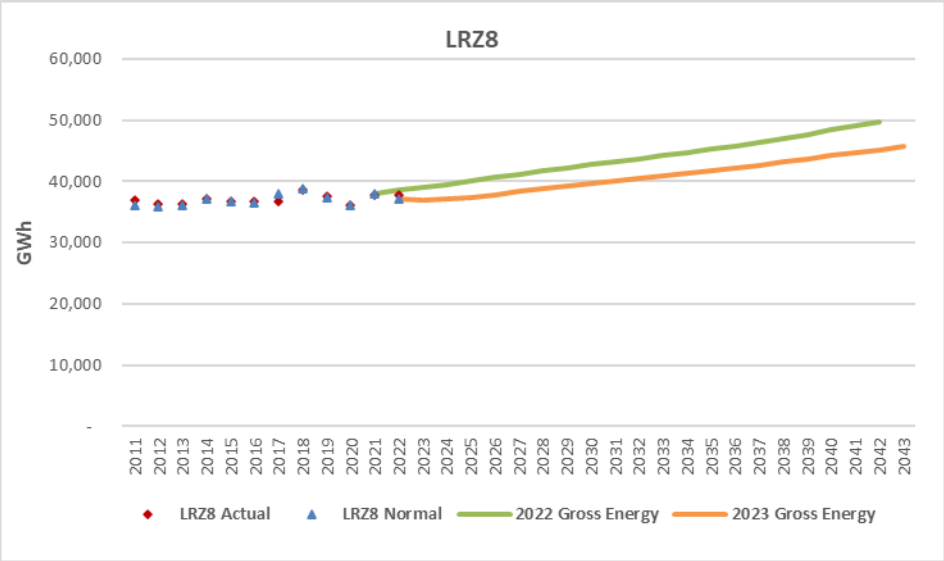
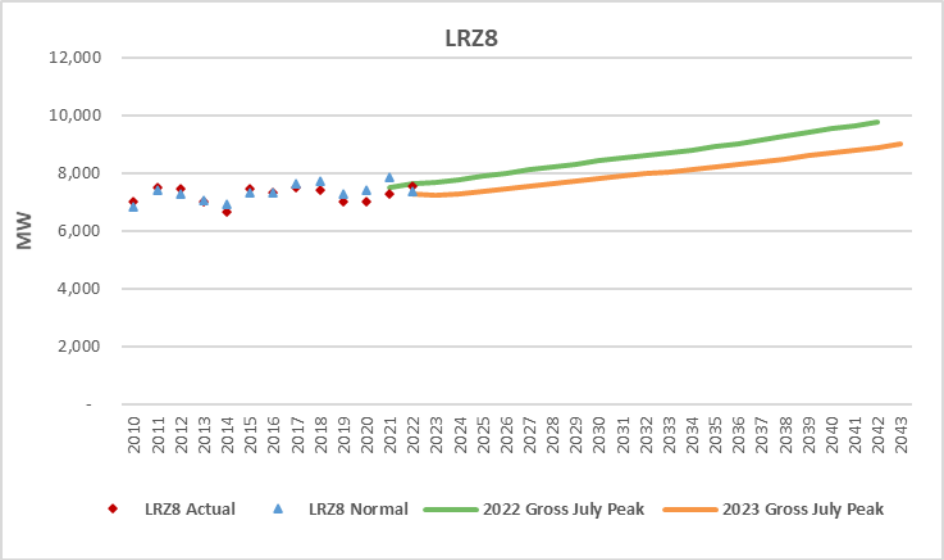


Figure 35: Gross LRZ 8 July Non-Coincident Peak Demand (MW)



LRZ 9

LRZ 9 consists of most of the state of Louisiana and a small portion of Texas. The annual energy forecast for the LRZ is determined from those states' forecasts using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Lake Charles, LA according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.94% for the period of 2024-2043. This rate is lower than the rate projected in the 2022 forecast (1.11% for the period of 2023-2042). Figure 36 shows annual gross energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 37 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 36: Gross LRZ 9 Energy (GWh)

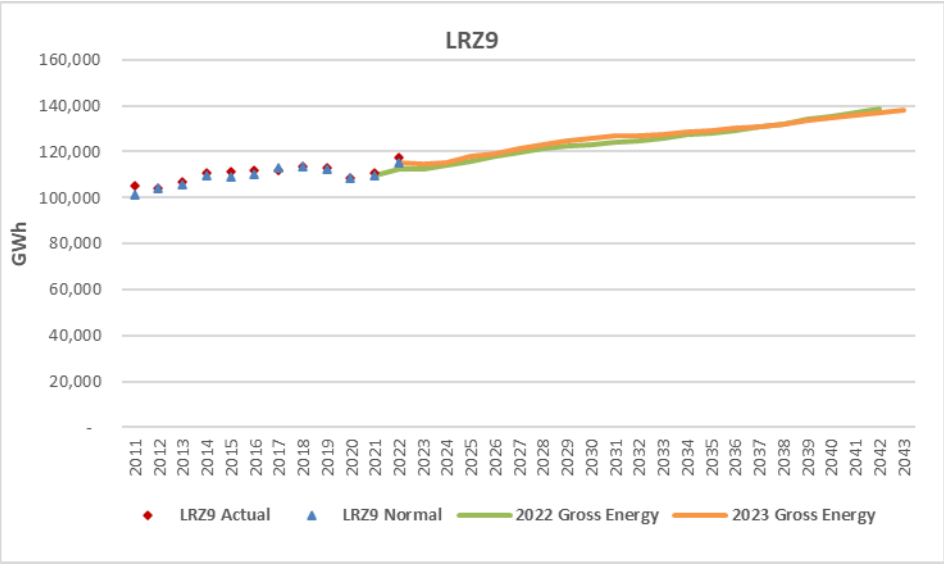
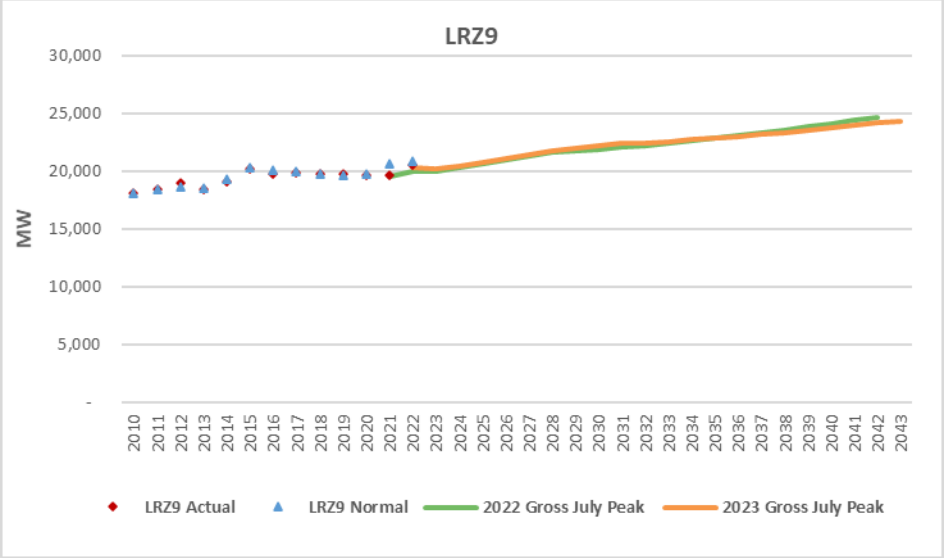


Figure 37: Gross LRZ 9 July Non-Coincident Peak Demand (MW)



LRZ 10

LRZ 10 consists of almost half of the state of Mississippi. The annual energy forecast for the LRZ is determined from that state's forecast using the allocation method described in Appendix B. Non-coincident monthly peak demands are determined using weather information for Jackson, MS according to the methodology described in Appendix C.

Annual gross energy is projected to grow at a CAGR of 0.64% for the period of 2024-2043. This growth rate is lower than that in the 2022 forecast (0.85% for the period of 2023-2042), Figure 38 shows annual energy forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical energy levels. Figure 39 provides gross July non-coincident peak forecasts for the 2022 and 2023 forecasts along with actual and weather-normalized historical July peaks.

Figure 38: Gross LRZ 10 Energy (GWh)

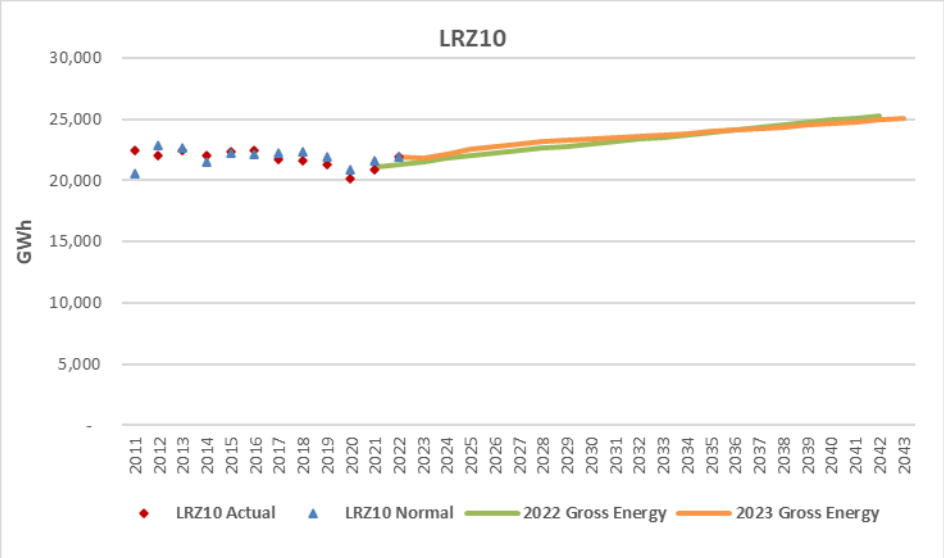
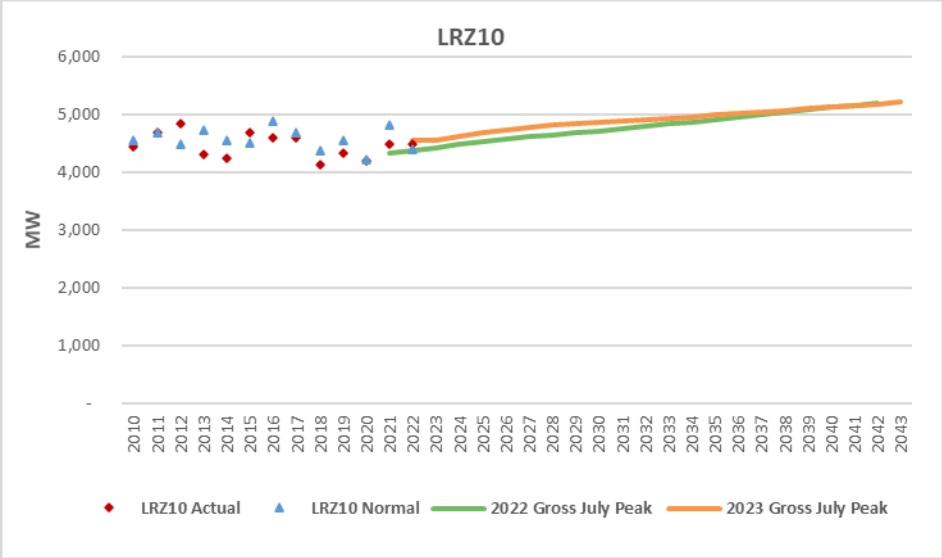


Figure 39: Gross LRZ 10 July Non-Coincident Peak Demand (MW)



MISO FORECASTS

MISO FORECASTS

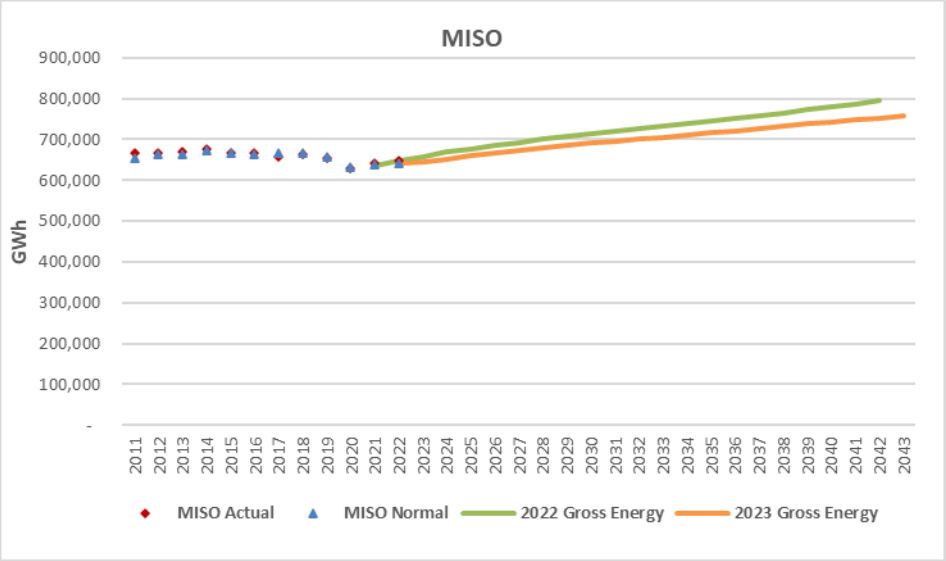
MISO ANNUAL ENERGY FORECAST

The MISO annual energy forecast is obtained by summing the individual LRZ metered load forecasts. Table 49 and Figure 40 provide the MISO-level energy forecast. Please note the forecasts are for the specified calendar year, not the MISO planning year. The compound annual growth rate for the period of 2024-2043 is 0.80%, which is lower than that in the 2022 forecast (0.99% for the period of 2023-2042).

Table 49: Gross MISO System Energy (Annual Metered Load in GWh)

Year	MISO Energy without EE Adjustments
2022	640,364
2023	644,204
2024	651,867
2025	661,224
2026	667,508
2027	674,080
2028	680,237
2029	686,091
2030	691,462
2031	696,343
2032	700,860
2033	705,395
2034	710,752
2035	715,782
2036	721,400
2037	727,243
2038	732,713
2039	737,953
2040	743,231
2041	747,932
2042	753,000
2043	758,334
Compound Annual Growth Rates (%)	
2024-2028	1.07
2024-2033	0.88
2024-2043	0.80

Figure 40: Gross MISO System Energy Forecast (Metered Load in GWh)



MISO SYSTEM COINCIDENT PEAK DEMAND FORECAST

Not all LRZs experience peak demands at the same time. This load diversity means that the MISO system peak demand level is less than the arithmetic sum of the LRZ non-coincident peak demands. The MISO system coincident peak demand is determined by applying coincidence factors to individual LRZ non-coincident peak demands and summing across LRZs. These coincidence factors represent the ratio of the LRZ's load at the time of the overall MISO system peak to the LRZ's non-coincident peak. Coincidence factors were calculated from hourly load records by LRZ over the 2010 to 2022 timeframe. Table 50 lists the average monthly coincidence factors estimated using the actual zonal monthly coincidence factors from 2010 to 2022. When the coincidence factor equals one, it means the peak for the zone coincides with the MISO system-wide peak. Table 51 and Figure 41 provide the MISO system July peak demand forecast.[10]

Table 50: MISO Monthly Coincidence Factors

Month / LRZ	Average Monthly Coincidence Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
1	0.9705	0.9791	0.9654	0.9540	0.9577	0.9425	0.9284	0.9416	0.9395	0.9414	0.9666	0.9763
2	0.9610	0.9843	0.9699	0.9674	0.9750	0.9853	0.9814	0.9610	0.9894	0.9668	0.9626	0.9718
3	0.9809	0.9832	0.9784	0.9505	0.9614	0.9522	0.9598	0.9770	0.9590	0.9736	0.9731	0.9747
4	0.9763	0.9819	0.9882	0.9759	0.9646	0.9416	0.9813	0.9617	0.9607	0.9815	0.9627	0.9734
5	0.9902	0.9785	0.9759	0.9568	0.9531	0.9455	0.9853	0.9634	0.9579	0.9756	0.9800	0.9725
6	0.9764	0.9738	0.9860	0.9652	0.9715	0.9803	0.9806	0.9725	0.9626	0.9790	0.9727	0.9818
7	0.9527	0.9737	0.9773	0.9529	0.9543	0.9844	0.9565	0.9763	0.9634	0.9544	0.9680	0.9675
8	0.9693	0.9744	0.9373	0.9527	0.9323	0.9599	0.9473	0.9285	0.9491	0.9546	0.9656	0.9604
9	0.9391	0.9420	0.9029	0.8985	0.9659	0.9505	0.9551	0.9297	0.9475	0.9329	0.9549	0.9456
10	0.9696	0.9526	0.9178	0.9168	0.9576	0.9374	0.9382	0.9188	0.9510	0.9579	0.9678	0.9453

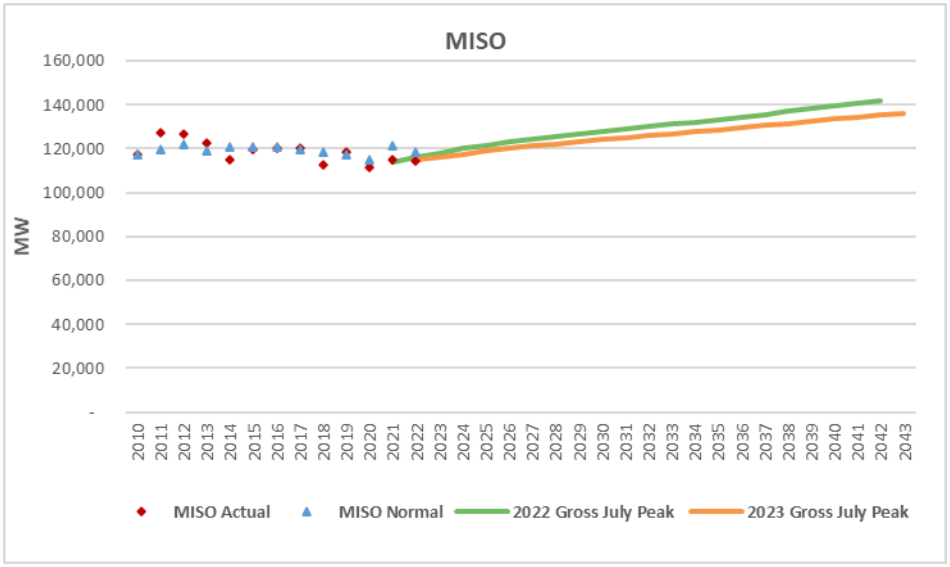
[10] MISO system monthly peak demand forecasts for each one of the twelve months are displayed in Appendix C.

MISO FORECASTS

Table 51: MISO System July Coincident Peak Demand (Metered Load in MW)

Year	MISO July CP without EE Adjustments
2022	115,155
2023	115,875
2024	117,239
2025	118,906
2026	120,025
2027	121,185
2028	122,259
2029	123,290
2030	124,240
2031	125,106
2032	125,911
2033	126,717
2034	127,665
2035	128,567
2036	129,567
2037	130,604
2038	131,577
2039	132,504
2040	133,441
2041	134,277
2042	135,180
2043	136,125
Compound Annual Growth Rates (%)	
2024-2028	1.05
2024-2033	0.87
2024-2043	0.79

Figure 41: MISO System July Coincident Peak Demand (Metered Load in MW)



MISO FORECASTS

MISO SYSTEM HIGH AND LOW FORECASTS

Alternate 90/10 (High/Low) forecasts were developed. Figure 42 shows the MISO system energy forecasts for the Low, Base and High scenarios and Table 52 provides the growth rates for energy and July peaks. Appendix D contains more information on the high and low forecasts.

Figure 42: Gross MISO System Energy for Alternate Forecasts (Annual Metered Load in GWh)

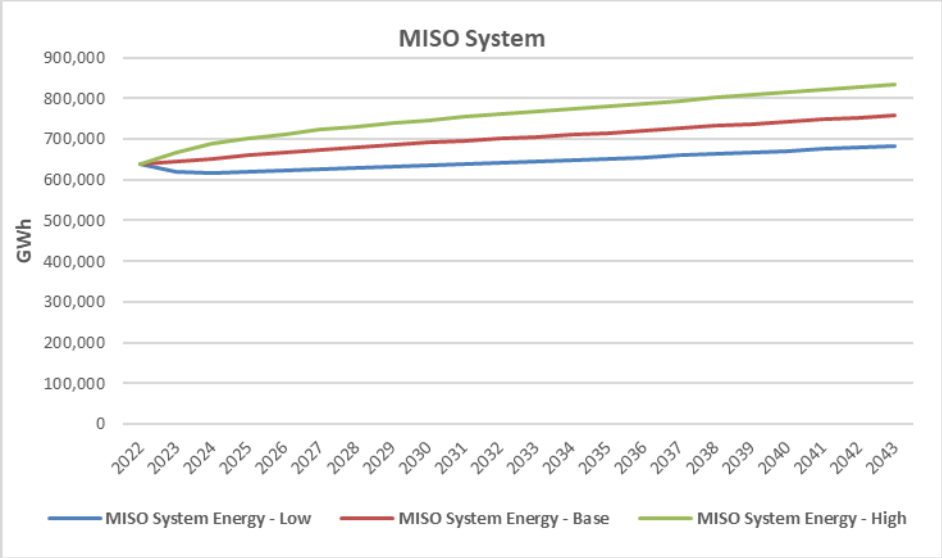


Table 52: Gross MISO System CAGRs for Alternate Forecasts (2024-2043)

	BASE	HIGH	LOW
Energy	0.80	1.02	0.55
July Peak	0.79	1.01	0.54

APPENDIX A STATE MODELS

APPENDIX A STATE ELECTRIC ENERGY FORECASTING MODELS

SUFG developed econometric models of annual retail electricity sales for each of 15 MISO states using Eviews, a statistical analysis program. The econometric models are based on historical values for a variety of explanatory variables (or drivers). The candidate variables and their data sources are provided in Table 53.

Table 53: Dependent and Explanatory Variables

Variables	Eviews Name	Historical Data Source	Projected Data Source
Dependent variable:			
Electricity sales	ELECTRICITY_SALES	U.S. Energy Information Administration (EIA)	N/A
Explanatory variables:			
Electricity prices	REAL_ELECTRICITY_PRICE	EIA*	SUFG projection based on EIA data
Natural gas prices	REAL_NATURAL_GAS_PRICE	EIA*	SUFG projection based on EIA data
Real personal income	REAL_INCOME	U.S. Bureau of Economic Analysis (BEA)*	S&P Global
Population	POPULATION	Census Bureau	S&P Global
Manufacturing employment	MANUFACTURING_EMP	U.S. Bureau of Labor Statistics (BLS)	S&P Global
Non-manufacturing employment	NON_MANUFACTURING_EMP	BLS	S&P Global
Non-farm employment	NON_FARM_EMP	BLS	S&P Global
Gross state product	REAL_GSP	S&P Global	S&P Global
Cooling degree days	CDD	National Oceanic and Atmospheric Administration (NOAA)	NOAA
Heating degree days	HDD	NOAA	NOAA

** Original data were in nominal dollars. SUFG converted them to real 2012 dollars using consumer price index data obtained from BLS.*

Each state's electricity sales forecast was determined using projections of values for the applicable drivers for that state. Table 54 provides compound annual growth rates for explanatory variables over the forecast period (2024-2043). Cells with no entry indicate that the corresponding variables are not included in that state's model. CDDs and HDDs were held constant at their 30-year normal values from NOAA for the projections. The projections provided in Table 54 are from a macroeconomic forecast by S&P Global, except the electricity price forecast and the natural gas price forecast. Those were developed by SUFG using a similar method adopted in the 2015 forecast, with details being provided in the 2015 report.

APPENDIX A STATE MODELS

Table 54: Explanatory Variable CAGR for the Period of 2024-2043 (%)

Variables	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
REAL_ELECTRICITY_PRICE	-0.07	-0.50	-0.53	-0.03	-0.20	-0.08	-0.49	-0.07	-0.19	-0.09	0.12	-0.05	-0.08	-0.09	-0.51
REAL_NATURAL_GAS_PRICE		-0.39			0.26	-0.13	-0.37	-0.10			0.16				-0.42
REAL_INCOME															
POPULATION								0.36	0.003	0.27		0.13			
REAL_INCOME/POPULATION				1.75							1.70				
REAL_GSP	1.62		1.59	1.70	1.59	1.41*	1.25		1.39				1.94	2.48	1.46
MANUFACTURING_EMP											-0.11				
NON_MANUFACTURING_EMP		-0.14											0.37		
NON_FARM_EMP							-0.10								

** For LA, real GSP excluding the mining sector was used.*

Table 55 provides state-level forecasts. The retail sales by state for the year 2022 are not actual observed values since EIA had not published the final release of that year's data at the time the forecast was prepared. Therefore, the state econometric models were used to "forecast" 2022 values (as well as 2023 values) to provide continuity between the historical data and the forecast period (2024 to 2043).

APPENDIX A STATE MODELS

Table 55: Gross State Energy Forecasts (Annual Retail Sales in GWh)

Year	AR	IL	IN	IA	KY	LA	MI	MN
1990	27,365	111,577	73,982	29,437	61,097	63,826	82,367	47,167
1991	28,440	116,869	77,034	30,781	64,194	64,704	84,519	48,755
1992	28,451	112,521	76,977	30,208	67,068	65,098	83,840	47,412
1993	31,663	117,786	81,931	32,104	68,149	67,756	87,589	49,211
1994	32,619	121,490	83,808	33,039	72,485	70,132	91,160	51,155
1995	34,671	126,231	87,006	34,301	74,548	72,827	94,701	53,959
1996	36,137	125,990	88,901	34,999	77,019	75,269	96,302	54,942
1997	36,858	126,953	89,147	36,148	76,836	75,886	97,391	55,674
1998	39,315	131,697	92,059	37,318	75,850	77,716	100,506	56,744
1999	39,789	132,682	96,735	38,034	79,098	78,267	103,981	57,399
2000	41,611	134,697	97,775	39,088	78,316	80,690	104,772	59,782
2001	41,732	136,034	97,734	39,444	79,975	74,693	102,409	60,687
2002	42,450	138,447	101,429	40,898	87,267	79,261	104,714	62,162
2003	43,108	136,248	100,468	41,207	85,220	77,769	108,877	63,087
2004	43,672	139,254	103,094	40,903	86,521	79,737	106,606	63,340
2005	46,165	144,986	106,549	42,757	89,351	77,389	110,445	66,019
2006	46,636	142,448	105,664	43,337	88,743	77,468	108,018	66,770
2007	47,055	146,055	109,420	45,270	92,404	79,567	109,297	68,231
2008	46,135	144,620	106,981	45,488	93,428	78,726	105,781	68,794
2009	43,173	136,688	99,312	43,641	88,897	78,670	98,121	64,004
2010	48,194	144,761	105,994	45,445	93,569	85,080	103,649	67,800
2011	47,928	142,886	105,818	45,655	89,538	86,369	105,054	68,533
2012	46,860	143,540	105,173	45,709	89,048	84,731	104,818	67,989
2013	46,683	141,805	105,487	46,705	84,764	85,808	103,038	68,644
2014	47,080	141,540	106,943	47,202	78,839	90,628	103,314	68,719
2015	46,465	138,620	104,515	47,147	76,039	91,676	102,480	66,579
2016	46,188	141,050	103,705	48,431	74,554	91,453	104,468	66,546
2017	46,086	137,196	98,966	48,922	72,634	91,206	101,899	67,153
2018	49,603	142,655	104,194	51,211	76,611	94,186	104,869	68,708
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	45,851	132,469	97,156	50,640	71,800	89,127	97,012	64,055
2021	48,663	135,689	99,740	52,893	74,517	90,819	99,813	66,589
2022	50,696	137,356	107,652	50,770	81,309	87,643	102,621	68,807
2023	50,415	141,150	107,728	51,173	81,963	86,397	104,010	69,404
2024	50,711	143,689	106,958	51,980	84,250	87,056	105,255	71,092
2025	51,177	143,998	108,800	52,824	85,512	88,989	106,981	72,169
2026	51,744	142,430	110,871	53,750	87,099	89,999	107,714	72,505
2027	52,428	141,904	113,288	54,580	88,317	91,479	107,904	72,870
2028	53,109	141,457	115,090	55,304	89,633	92,897	107,891	73,488
2029	53,787	141,176	117,007	56,023	91,007	93,864	108,134	74,049
2030	54,385	141,085	118,444	56,770	92,365	94,699	108,469	74,407
2031	54,933	141,097	119,670	57,511	93,688	95,091	108,897	74,808
2032	55,490	141,134	120,873	58,309	95,145	94,996	109,390	75,275
2033	55,967	141,190	121,990	59,084	96,539	95,162	109,903	75,676
2034	56,483	141,182	123,194	59,980	98,031	95,744	110,462	76,090
2035	57,066	141,330	124,338	60,908	99,330	95,716	111,211	76,426
2036	57,696	141,399	125,487	61,911	100,965	96,046	111,894	76,844
2037	58,318	141,429	126,929	62,863	102,700	96,570	112,526	77,300
2038	58,998	141,372	128,248	63,857	104,133	97,008	113,123	77,693
2039	59,696	141,275	129,429	64,729	105,654	97,790	113,587	77,890
2040	60,450	141,251	130,642	65,672	107,349	98,335	114,129	78,115
2041	61,137	141,029	131,702	66,695	108,864	98,988	114,641	77,920
2042	61,823	141,012	132,757	67,843	110,580	99,499	115,251	77,774
2043	62,507	140,991	133,837	68,986	112,226	99,979	115,833	77,920
Compound Annual Growth Rates (%)								
2024-2028	1.16	-0.39	1.85	1.56	1.56	1.64	0.62	0.83
2024-2033	1.10	-0.19	1.47	1.43	1.52	0.99	0.48	0.70
2024-2043	1.11	-0.10	1.19	1.50	1.52	0.73	0.51	0.48

Table 55: Gross State Energy Forecasts (Annual Retail Sales in GWh) – continued

Year	MS	MO	MT	ND	SD	TX	WI
1990	32,127	53,925	13,125	7,014	6,334	237,415	49,198
1991	33,019	56,514	13,407	7,255	6,685	240,352	51,032
1992	33,241	54,411	13,096	7,128	6,494	239,431	50,925
1993	34,749	58,622	12,929	7,432	6,905	250,084	53,156
1994	36,627	59,693	13,184	7,681	7,174	258,180	55,412
1995	37,868	62,259	13,419	7,883	7,414	263,279	57,967
1996	39,622	64,843	13,820	8,314	7,736	278,450	58,744
1997	40,089	65,711	11,917	8,282	7,773	286,704	60,094
1998	42,510	69,010	14,145	8,220	7,824	304,705	62,061
1999	43,980	69,045	13,282	9,112	7,922	301,844	63,547
2000	45,336	72,643	14,580	9,413	8,283	318,263	65,146
2001	44,287	73,213	11,447	9,810	8,627	318,044	65,218
2002	45,452	75,001	12,831	10,219	8,937	320,846	66,999
2003	45,544	74,240	12,825	10,461	9,080	322,686	67,241
2004	46,033	74,054	12,957	10,516	9,214	320,615	67,976
2005	45,901	80,940	13,479	10,840	9,811	334,258	70,336
2006	46,936	82,015	13,815	11,245	10,056	342,724	69,821
2007	48,153	85,533	15,532	11,906	10,603	343,829	71,301
2008	47,721	84,382	15,326	12,416	10,974	347,815	70,122
2009	46,049	79,897	14,354	12,649	11,010	345,351	66,286
2010	49,687	86,085	13,771	12,956	11,356	358,458	68,752
2011	49,338	84,255	13,788	13,737	11,680	376,065	68,612
2012	48,388	82,435	13,863	14,717	11,734	365,104	68,820
2013	48,782	83,407	14,045	16,033	12,210	378,817	69,124
2014	49,409	83,878	14,102	18,240	12,355	389,670	69,495
2015	48,692	81,504	14,207	18,129	12,102	392,337	68,699
2016	49,050	78,618	14,101	18,520	12,130	398,662	69,736
2017	47,829	76,461	14,710	20,140	12,314	401,880	69,079
2018	50,390	82,056	14,839	20,670	12,857	424,419	70,960
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	46,482	75,726	14,584	21,819	12,696	426,863	67,448
2021	48,015	77,763	14,962	22,863	13,041	435,628	69,427
2022	49,527	82,701	15,359	23,565	13,736	436,478	73,309
2023	49,476	84,417	15,819	24,201	13,952	442,643	73,330
2024	50,195	85,876	16,366	25,128	14,188	447,587	73,327
2025	51,009	87,265	16,813	25,651	14,439	454,791	73,851
2026	51,507	88,568	17,032	26,040	14,688	463,113	74,415
2027	51,957	89,731	17,225	26,552	14,940	470,016	75,040
2028	52,377	90,490	17,494	26,932	15,197	478,343	75,706
2029	52,677	91,177	17,630	27,121	15,437	486,491	76,410
2030	52,951	91,852	17,802	27,295	15,678	493,836	77,114
2031	53,244	92,398	18,025	27,482	15,930	501,182	77,794
2032	53,483	92,862	18,225	27,604	16,206	508,521	78,449
2033	53,662	93,311	18,384	27,733	16,479	515,536	79,105
2034	53,902	93,769	18,604	27,785	16,784	523,746	79,806
2035	54,283	94,239	18,850	27,896	17,101	532,479	80,535
2036	54,602	94,734	19,089	28,016	17,435	540,769	81,290
2037	54,870	95,166	19,187	28,108	17,766	549,355	82,070
2038	55,168	95,567	19,207	28,058	18,106	558,081	82,850
2039	55,475	95,771	19,303	28,014	18,433	566,932	83,559
2040	55,817	95,742	19,431	27,706	18,768	576,470	84,337
2041	56,118	95,615	19,604	27,409	19,103	586,197	85,084
2042	56,408	95,551	19,863	27,288	19,448	596,241	85,795
2043	56,703	95,578	20,232	27,279	19,811	605,969	86,481
Compound Annual Growth Rates (%)							
2024-2028	1.07	1.32	1.68	1.75	1.73	1.68	0.80
2024-2033	0.74	0.93	1.30	1.10	1.68	1.58	0.85
2024-2043	0.64	0.56	1.12	0.43	1.77	1.61	0.87

APPENDIX A STATE MODELS

The state energy forecasting models and associated modeling statistics follow. The EViews software package is used for linear regression modeling.

Arkansas

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2020
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	14577.14	4905.851	2.971379	0.0078	
@MOVAV(REAL_ELECTRICITY_PRICE,5)	-1320.14	361.0086	-3.656797	0.0017	-0.2153
REAL_GSP	0.252686	0.018873	13.38904	0.0000	0.6335
CDD	4.339142	0.596359	7.276056	0.0000	0.1768
HDD	1.896174	0.425043	4.461134	0.0003	0.1448

R-squared	0.967459	Mean dependent var	44863.74
Adjusted R-squared	0.960608	S.D. dependent var	3215.611
S.E. of regression	638.2167	Durbin-Watson stat	1.753187
F-statistic	141.2183		
Prob(F-statistic)	0		

Illinois

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2020
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	77147.21	22190.13	3.476645	0.0027	
REAL_ELECTRICITY_PRICE	-1869.748	776.8886	-2.406713	0.0271	-0.1221
REAL_NATURAL_GAS_PRICE(-2)	1406.952	242.6221	5.798946	0.0000	0.0704
NON_MANUFACTURING_EMPLOYMENT	0.00841	0.003525	2.385612	0.0282	0.3260
CDD	8.457229	3.036706	2.785001	0.0122	0.0627
HDD	2.374131	1.291028	1.838947	0.0825	0.0993

R-squared	0.814864	Mean dependent var	138985.5
Adjusted R-squared	0.763437	S.D. dependent var	4913.8
S.E. of regression	2389.96	Durbin-Watson stat	1.449995
F-statistic	15.84516		
Prob(F-statistic)	0.000005		

APPENDIX A STATE MODELS

Indiana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1993 2020
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	66750.05	8393.376	7.952705	0.0000	
REAL_ELECTRICITY_PRICE(-2)	-4388.95	544.3594	-8.062597	0.0000	-0.4027
REAL_GSP	0.169377	0.011101	15.25816	0.0000	0.5751
CDD	7.225633	2.465616	2.930559	0.0075	0.0786
HDD	2.197827	1.10663	1.986055	0.0591	0.1206

R-squared	0.933875	Mean dependent var	99751.45
Adjusted R-squared	0.922375	S.D. dependent var	7616.108
S.E. of regression	2121.939	Durbin-Watson stat	0.709392
F-statistic	81.20692		
Prob(F-statistic)	0.000000		

Iowa

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1991 2020
Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	12514.99	4437.984	2.819972	0.0093	
REAL_ELECTRICITY_PRICE	-970.2282	333.7564	-2.906995	0.0075	-0.1525
REAL_GSP	0.106326	0.035967	2.956182	0.0067	0.3557
REAL_INCOME/POPULATION	532.5188	193.5147	2.751826	0.0109	0.4989
CDD	2.242394	1.014558	2.210217	0.0365	0.0504

R-squared	0.983879	Mean dependent var	41902.51
Adjusted R-squared	0.9813	S.D. dependent var	6198.481
S.E. of regression	847.629	Durbin-Watson stat	1.357803
F-statistic	381.451		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Kentucky

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2020
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	2097.454	8951.325	0.234318	0.8172	
REAL_ELECTRICITY_PRICE(-2)	-1879.299	838.2396	-2.241959	0.0371	-0.1740
REAL_NATURAL_GAS_PRICE(-2)	763.2273	229.4647	3.326121	0.0036	0.0542
REAL_GSP	0.370996	0.051509	7.202509	0.0000	0.8181
CDD	2.942817	2.04753	1.437252	0.1669	0.0469
HDD	5.329319	1.330207	4.006384	0.0008	0.2688

R-squared	0.9014	Mean dependent var	86209.3
Adjusted R-squared	0.875452	S.D. dependent var	5397.98
S.E. of regression	1905.019	Durbin-Watson stat	1.27362
F-statistic	34.73942		
Prob(F-statistic)	0.000000		

Louisiana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1990 2020
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	57238.11	8855.185	6.463796	0.0000	
REAL_ELECTRICITY_PRICE(-2)	-3004.702	451.3653	-6.656917	0.0000	-0.2377
REAL_NATURAL_GAS_PRICE	-1209.49	229.1152	-5.278958	0.0000	-0.0358
REAL_GSP_EXCLUDING_MINING	0.177579	0.027287	6.507905	0.0000	0.4200
CDD	4.886854	2.252596	2.169432	0.0398	0.1834
HDD	3.986261	1.818207	2.192413	0.0379	0.0724

R-squared	0.951491	Mean dependent var	79962.67
Adjusted R-squared	0.941789	S.D. dependent var	8564.109
S.E. of regression	2066.259	Durbin-Watson stat	1.636977
F-statistic	98.07332		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Michigan

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2020
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	45564.1	19349.29	2.35482	0.0301	
REAL_ELECTRICITY_PRICE	-2207.11	525.2016	-4.202412	0.0005	-0.2464
@MOVAV(REAL_NATURAL_GAS_PRICE,5)	1559.92	311.9962	4.999809	0.0001	0.1059
REAL_GSP	0.07757	0.016936	4.580086	0.0002	0.3564
NON_FARM_EMP	0.0067	0.003068	2.184284	0.0424	0.2787
CDD	5.16105	2.038124	2.532256	0.0209	0.0414
R-squared	0.84106	Mean dependent var		103865	
Adjusted R-squared	0.79692	S.D. dependent var		3492.42	
S.E. of regression	1573.86	Durbin-Watson stat		1.36005	
F-statistic	19.0506				
Prob(F-statistic)	1E-06				

Minnesota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1990 2020
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	-14234.65	6682.925	-2.130002	0.0432	
REAL_ELECTRICITY_PRICE(-2)	-2230.988	372.6243	-5.987232	0.0000	-0.3302
REAL_NATURAL_GAS_PRICE(-2)	417.879	161.4484	2.588312	0.0158	0.0399
POPULATION	0.015641	0.000804	19.44234	0.0000	1.3814
CDD	7.189726	2.019484	3.560179	0.0015	0.0775
HDD	0.939257	0.463741	2.025393	0.0536	0.1206
R-squared	0.969647	Mean dependent var		61515.69	
Adjusted R-squared	0.963577	S.D. dependent var		7226.252	
S.E. of regression	1379.121	Durbin-Watson stat		1.156561	
F-statistic	159.7299				
Prob(F-statistic)	0.000000				

APPENDIX A STATE MODELS

Mississippi

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2020
Included observations: 24

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	-39034.62	12087.26	-3.229401	0.0047	
@MOVAV(REAL_ELECTRICITY_PRICE,2)	-1120.654	360.348	-3.109922	0.0060	-0.1981
REAL_GSP	0.182658	7.54E-02	2.421617	0.0262	0.3917
POPULATION	0.022149	0.006202	3.571478	0.0022	1.4137
CDD	3.257198	0.690131	4.719679	0.0002	0.1609
HDD	2.426106	0.525674	4.615233	0.0002	0.1223

R-squared	0.949832	Mean dependent var	46874.5
Adjusted R-squared	0.935897	S.D. dependent var	2494.53
S.E. of regression	631.5819	Durbin-Watson stat	1.37038
F-statistic	68.15906		
Prob(F-statistic)	0.000000		

Missouri

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 2001 2020
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	-14583.3	19051.68	-0.76546	0.4551	
@MOVAV(REAL_ELECTRICITY_PRICE,5)	-5337.131	920.1089	-5.800543	0.0000	-0.6348
POPULATION	0.021567	0.003857	5.592009	0.0000	1.7520
CDD	6.405779	2.373575	2.698789	0.0158	0.1248

R-squared	0.76497	Mean dependent var	80127.95
Adjusted R-squared	0.720902	S.D. dependent var	4118.204
S.E. of regression	2175.637	Durbin-Watson stat	1.379508
F-statistic	17.35878		
Prob(F-statistic)	0.000028		

APPENDIX A STATE MODELS

Montana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2020
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	4453.363	3227.18	1.379955	0.1845	
REAL_ELECTRICITY_PRICE	-1462.341	240.9104	-6.070063	0.0000	-0.8121
@MOVAV(REAL_NATURAL_GAS_PRICE,4)	368.8542	57.75616	6.386404	0.0000	0.1552
REAL_INCOME/POPULATION	251.0363	22.43375	11.19012	0.0000	0.8148
MANUFACTURING_EMPLOYMENT	0.176138	0.069527	2.53339	0.0208	0.2466
CDD	1.787297	0.788724	2.266062	0.0360	0.0597
HDD	0.59262	0.212666	2.786623	0.0122	0.3054

R-squared	0.892447	Mean dependent var	13905.6
Adjusted R-squared	0.856596	S.D. dependent var	987.169
S.E. of regression	373.828	Durbin-Watson stat	1.99929
F-statistic	24.89327		
Prob(F-statistic)	0.000000		

North Dakota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1998 2020
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	-45483.58	2992.852	-15.1974	0.0000	
REAL_ELECTRICITY_PRICE(-1)	-1653.527	436.6278	-3.787041	0.0012	-0.6023
POPULATION	0.099336	0.00471	21.09099	0.0000	3.4842
HDD	0.430274	0.234524	1.834666	0.0823	0.2599

R-squared	0.98073	Mean dependent var	14057.8
Adjusted R-squared	0.977687	S.D. dependent var	4383.83
S.E. of regression	654.8333	Durbin-Watson stat	1.33368
F-statistic	322.3271		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

South Dakota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 2002 2020
Included observations: 19

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	-4442.326	1555.404	-2.856058	0.0135	
@MOVAV(REAL_ELECTRICITY_PRICE,3)	-218.3588	80.01937	-2.728824	0.0172	-0.1547
REAL_GSP	0.225894	0.022883	9.871808	0.0000	0.8306
NON_MANUFACTURING_EMPLOYMENT	0.01553	0.006526	2.379543	0.0333	0.4676
CDD	0.423035	0.193503	2.186194	0.0477	0.0280
HDD	0.296789	0.058359	5.085567	0.0002	0.1923

R-squared	0.99382	Mean dependent var	11262.47
Adjusted R-squared	0.991443	S.D. dependent var	1306.958
S.E. of regression	120.8964	Durbin-Watson stat	2.128826
F-statistic	418.1256		
Prob(F-statistic)	0.000000		

Texas

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 2000 2020
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	92280.11	18305.82	5.041025	0.0001	
REAL_ELECTRICITY_PRICE(-3)	-2794.02	832.7144	-3.35532	0.0040	-0.0514
REAL_GSP	0.135601	0.004399	30.82259	0.0000	0.5509
CDD	26.32188	5.42259	4.854116	0.0002	0.2248
HDD	17.46056	4.356632	4.007812	0.0010	0.0860

R-squared	0.990997	Mean dependent var	364573.8
Adjusted R-squared	0.988746	S.D. dependent var	37662.66
S.E. of regression	3995.407	Durbin-Watson stat	1.82739
F-statistic	440.2934		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Wisconsin

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1995 2020
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2020 (weather at means)
C	34560.4	1988.435	17.38071	0.0000	
@MOVAV(REAL_ELECTRICITY_PRICE,5)	-672.2878	298.2643	2.254001	0.0350	-0.0979
REAL_NATURAL_GAS_PRICE	539.4977	83.18807	6.485277	0.0000	0.0411
REAL_GSP	0.125575	0.009123	13.76534	0.0000	0.5431
CDD	2.228281	1.062538	2.097132	0.0483	0.0207

R-squared	0.959287	Mean dependent var	67028.59
Adjusted R-squared	0.951532	S.D. dependent var	3710.281
S.E. of regression	816.8335	Durbin-Watson stat	1.582447
F-statistic	123.7015		
Prob(F-statistic)	0.000000		

APPENDIX B ALLOCATION FACTORS

APPENDIX B ALLOCATION FACTORS

Allocation factors were used to convert annual electricity sales forecasts at the state level to the MISO LRZ level energy forecasts. The shares of electricity sales within the MISO market footprint were calculated from sales of the LBAs within the MISO market footprint. The correspondence between LBAs and LRZs within MISO is displayed in Table 56. EIA Form 861's historical annual electricity sales data from 2009 to 2021 were used to estimate annual MISO load fractions at the state level.

The MISO market footprint covers all or parts of 17 states and is divided into 10 LRZs.[11] Figure 1 in Chapter 1 displays the MISO market footprint at the LRZ level.

Table 56: MISO Local Balancing Authorities

LBA	Local Balancing Authority (MISO)	LRZ	LBA	Local Balancing Authority (MISO)	LRZ
DPC	Dairy Land Power Cooperative	1	AMMO	Ameren - Missouri	5
GRE	Great River Energy	1	CWLD	Columbia Water & Light District	5
MDU	Montana-Dakota Utilities	1	BREC	Big Rivers Electric Cooperative	6
MP	Minnesota Power, Inc.	1	CIN	Cinergy	6
NSP	Northern States Power	1	HE	Hoosier Energy	6
OTP	Otter Tail Power Company	1	IPL	Indianapolis Power and Light	6
SMP	Southern Minnesota Municipal Power Association	1	NIPS	Northern Indiana Public Service Company	6
ALTE	Alliant East	2	SIGE	Southern Indiana Gas and Electric	6
MGE	Madison Gas and Electric	2	CONS	Consumers	7
MIUP	Michigan Upper Peninsula	2	DECO	Detroit Edison	7
UPPC	Upper Peninsula Power Company	2	EAI	Entergy Arkansas, Inc.	8
WEC	Wisconsin Electric Power Company	2	CLEC	Central Louisiana Electric Company	9
WPS	Wisconsin Public Service Company	2	EES	Entergy Electric System	9
ALTW	Alliant West	3	LAFA	Lafayette Utilities	9
MEC	MidAmerican Electric Company	3	LAGN	Louisiana Generating Company	9
MPW	Muscatine Power & Water	3	LEPA	Louisiana Energy and Power Authority	9
AMIL	Ameren - Illinois	4	EMBA	Entergy Mississippi	10
CWPLP	City Water Light & Power	4	SME	South Mississippi Electric Power Association	10
HMPL	Henderson Municipal Power & Light	6	GLH	GridLiance Heartland LLC	4
SIPC	Southern Illinois Power Cooperative	4			

Source: MISO, 2022

[11] A very small amount of load in Oklahoma and Tennessee is served by MISO LBAs in LRZ 8. Rather than developing individual state econometric models for those states, it is assumed that these loads grow at the rate of the rest of LRZ 8.

APPENDIX B ALLOCATION FACTORS

Table 57 summarizes the historical MISO load fractions at the state level for the period of 2009-2021. The category named "MISO Sales" includes all electricity sales from either MISO utilities or utilities listing a MISO LBA as the local balancing authority. At the request of MISO staff and due to concerns over providing utility-specific information in states that only have a single MISO utility, the annual electricity sales of Indiana and Kentucky are combined (IN+KY). Similarly, North Dakota and Montana have been combined (ND+MT).

Table 57: MISO Load Fraction at State Level (MWh), 2009-2021

State	2021 MISO Sales (MWhs)	2021 Non-MISO Sales (MWhs)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AR	35,737,766	12,925,376	70.03%	70.57%	70.39%	70.52%	70.45%	72.23%	72.30%	71.94%	72.52%	72.99%	72.80%	72.89%	73.44%
IA	49,228,166	3,665,103	92.03%	92.92%	93.04%	93.22%	92.92%	93.05%	92.92%	92.85%	92.67%	92.69%	92.72%	92.93%	93.07%
IL	46,594,779	89,094,054	33.95%	34.55%	34.80%	33.91%	34.59%	34.84%	34.83%	34.45%	34.46%	34.80%	34.12%	34.27%	34.34%
IN+KY	88,323,228	85,933,804	47.37%	47.49%	48.49%	48.78%	49.94%	51.95%	51.86%	50.89%	50.29%	50.43%	50.90%	51.01%	50.69%
LA	84,478,464	6,340,882	91.82%	91.77%	91.74%	92.06%	92.20%	92.67%	92.66%	92.75%	92.88%	92.73%	92.78%	92.98%	93.02%
MI	95,901,605	3,911,676	95.28%	96.01%	96.16%	96.21%	96.10%	96.08%	96.09%	96.11%	96.12%	96.13%	96.21%	96.05%	96.08%
MN	65,735,029	854,139	98.66%	98.73%	98.73%	98.84%	98.75%	98.77%	98.76%	98.72%	98.73%	98.71%	98.67%	98.68%	99.72%
MO	35,174,045	42,588,996	48.83%	49.55%	49.35%	50.22%	49.40%	49.06%	48.98%	46.98%	46.64%	46.26%	46.52%	45.75%	45.23%
MS	21,066,664	26,948,700	45.58%	45.89%	45.24%	44.78%	44.73%	44.56%	45.06%	44.71%	44.30%	44.40%	44.23%	44.07%	43.87%
ND+MT	11,292,997	26,531,671	36.03%	37.35%	37.90%	36.76%	37.46%	36.30%	35.14%	34.48%	32.89%	33.16%	31.45%	30.74%	34.6%
SD	3,337,794	9,703,597	26.48%	26.87%	26.07%	26.02%	25.32%	25.26%	25.57%	25.85%	25.63%	25.49%	25.72%	25.75%	25.59%
TX	23,198,454	412,429,424	5.53%	5.66%	5.46%	5.99%	5.74%	5.60%	5.47%	5.45%	5.35%	5.42%	5.30%	5.18%	5.33%
WI	69,426,615	0	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Electric power sales, revenue, and energy efficiency Form 861 detailed data files, U.S. Energy Information Administration, calculated by SUFG.

Table 58 shows the average percentage of annual electricity sales at the state level that was located in each MISO LRZ. The last row named "Non-MISO" lists the average percentage of electricity sales from non-MISO utilities at the state level.

Table 58: MISO Load Fraction (Average % of State-Level Electricity Sales from 2009 to 2021)

MISO LRZ	AR	IA	IL	IN+KY	LA	MI	MN	MO	MS	ND+MT	SD	TX	WI
1		1.78%	0.0002%			0.14%	97.26%			34.47%	23.96%		16.97%
2						4.66%							83.03%
3		91.07%	1.45%				1.46%				1.86%		
4			33.01%										
5								47.83%					
6				49.89%									
7						91.26%							
8	71.78%							0.02%				0.01%	
9					92.47%							5.52%	
10									44.72%				
Percentage of Non-MISO Sales	28.22%	7.15%	65.55%	50.11%	7.53%	3.95%	1.27%	52.15%	55.28%	65.53%	74.18%	94.48%	0.00%

Source: Electric power sales, revenue, and energy efficiency Form 861 detailed data files, U.S. Energy Information Administration, calculated by SUFG.

APPENDIX B ALLOCATION FACTORS

Table 59 summarizes the percentage of MISO electricity sales in each state for the period of 2009-2021 and the thirteen-year average by LRZ. For most states, the percentage of electricity sales from MISO utilities was quite stable during this period.

Table 59: State Level MISO Load Fraction by MISO LRZs

MISO LRZ	State	State Level MISO Load Fraction													
		Average	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	IA	1.78%	1.78%	1.77%	1.76%	1.73%	1.78%	1.83%	1.87%	1.84%	1.77%	1.80%	1.76%	1.66%	1.76%
	IL	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%
	MI	0.14%	0.14%	0.14%	0.14%	0.13%	0.14%	0.14%	0.13%	0.13%	0.14%	0.14%	0.14%	0.14%	0.14%
	MN	97.26%	96.60%	96.73%	96.76%	96.93%	96.89%	96.76%	97.16%	97.76%	97.78%	97.77%	97.74%	97.77%	97.80%
	ND+MT	34.47%	35.99%	37.35%	37.90%	36.76%	37.46%	36.30%	34.45%	33.82%	32.89%	33.16%	31.45%	30.74%	29.86%
	SD	23.96%	24.64%	24.97%	24.28%	24.24%	23.51%	23.51%	23.76%	24.03%	23.70%	23.63%	23.87%	23.77%	23.52%
	WI	16.97%	16.84%	16.59%	16.94%	16.23%	17.02%	17.05%	17.11%	15.62%	17.34%	17.51%	17.48%	17.24%	17.58%
2	MI	4.66%	4.32%	5.22%	5.28%	4.89%	4.94%	5.14%	4.89%	4.58%	4.19%	4.14%	4.39%	4.25%	4.30%
	WI	83.03%	83.16%	83.41%	83.06%	83.77%	82.98%	82.95%	82.89%	84.38%	82.66%	82.49%	82.52%	82.76%	82.42%
3	IA	91.07%	90.25%	91.14%	91.28%	91.48%	91.15%	91.22%	91.04%	91.02%	90.90%	90.89%	90.96%	91.26%	91.31%
	IL	1.45%	1.40%	1.42%	1.45%	1.42%	1.42%	1.40%	1.45%	1.47%	1.48%	1.46%	1.45%	1.45%	1.55%
	MN	1.46%	2.06%	2.00%	1.97%	1.91%	1.86%	2.01%	1.60%	0.96%	0.95%	0.93%	0.93%	0.91%	0.92%
	SD	1.86%	1.84%	1.90%	1.79%	1.77%	1.80%	1.75%	1.81%	1.82%	1.93%	1.86%	1.85%	1.98%	2.07%
4	IL	33.01%	32.55%	33.12%	33.35%	32.49%	33.17%	33.44%	33.38%	32.98%	32.98%	33.33%	32.68%	32.82%	32.78%
5	MO	47.83%	48.56%	49.41%	49.22%	50.08%	49.26%	49.04%	48.96%	46.96%	46.62%	46.23%	46.50%	45.74%	45.21%
6	IN+KY	49.89%	47.35%	47.49%	48.49%	48.60%	49.94%	51.95%	51.19%	50.21%	50.29%	50.43%	50.90%	51.00%	50.69%
7	MI	91.26%	90.82%	90.65%	90.75%	91.19%	91.02%	90.80%	91.07%	91.40%	91.79%	91.84%	91.68%	91.66%	91.64%
8	AR	71.78%	70.03%	70.57%	70.39%	70.52%	70.45%	72.23%	72.30%	71.94%	72.52%	72.99%	72.80%	72.89%	73.44%
	MO	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
	TX	0.0056%	0.0060%	0.0065%	0.0063%	0.0060%	0.0058%	0.0057%	0.0057%	0.0054%	0.0051%	0.0054%	0.0051%	0.0050%	0.0051%
9	LA	92.47%	91.82%	91.77%	91.74%	92.06%	92.20%	92.67%	92.66%	92.75%	92.88%	92.73%	92.78%	92.98%	93.02%
	TX	5.52%	5.52%	5.65%	5.46%	5.98%	5.73%	5.59%	5.46%	5.45%	5.35%	5.72%	5.29%	5.18%	5.32%
10	MS	44.72%	45.58%	45.89%	45.24%	44.78%	44.73%	44.56%	45.06%	44.71%	44.30%	44.40%	44.23%	44.07%	43.87%

Source: Electric power sales, revenue, and energy efficiency Form 861 detailed data files, U.S. Energy Information Administration, calculated by SUFG.

In determining the future allocation factors, a number of elements were considered. These include the stability of the historical market shares, any distinct upward or downward trend in historical market shares, and information regarding expected growth for sub-state areas where those areas are particularly indicative of either the MISO or the non-MISO portion of the state. For example, most of the MISO portion of Missouri is in or near the St. Louis metropolitan area. Since economic drivers for the St. Louis area grow slower than the entire state of Missouri, the share of electricity sales in the MISO portion is reduced over time. A similar analysis was performed for Illinois using the Chicago metropolitan area, but did not indicate that an adjustment is warranted. Table 60 provides allocation factors for each LRZ. The allocation factors were then applied to the state load forecasts to obtain LRZ-level forecasts of annual calendar-year energy sales. These were then converted to LRZ metered load forecasts.

APPENDIX B ALLOCATION FACTORS

Table 60: Allocation Factors to Convert State Sales to LRZ Energy Sales

MISO LRZ	State	Allocation Factor	
		Basis	Forecasting Period
1	IA	Historical average (2017-2021)	Constant at 1.75%
	IL	Historical average (2017-2021)	Constant at 0.0002%
	MI	Historical average (2017-2021)	Constant at 0.14%
	MN	Historical average (2017-2021)	Constant at 97.77%
	ND+MT	Historical average (2019-2021)	Constant at 30.68%
	SD	Historical average (2017-2021)	Constant at 23.70%
	WI	Historical average (2017-2021)	Constant at 17.43%
2	MI	Historical average (2017-2021)	Constant at 4.26%
	WI	Historical average (2017-2021)	Constant at 82.57%
3	IA	Historical average (2017-2021)	Constant at 91.07%
	IL	Historical average (2017-2021)	Constant at 1.48%
	MN	Historical average (2017-2021)	Constant at 0.93%
	SD	Historical average (2017-2021)	Constant at 1.94%
4	IL	Historical average (2017-2021)	Constant at 32.92%
5	MO	St. Louis vs. state growth Decrease over time	Reduced from 45.79% in 2022 to 41.72%in 2043[12]
6	IN+KY	Historical average (2017-2021)	Constant at 50.66%
7	MI	Historical average (2017-2021)	Constant at 91.72%
8	AR	Historical average (2017-2021)	Constant at 72.93%
	MO	Historical average (2017-2021)	Constant at 0.02%
	TX	Historical average (2017-2021)	Constant at 0.0051%
9	LA	Historical average (2017-2021)	Constant at 92.88%
	TX	Historical average (2017-2021)	Constant at 5.37%
10	MS	Historical average (2017-2021)	Constant at 44.18%

[12] Based on the projections of the values for the model drivers for the state of Missouri and for the St. Louis metropolitan statistical area from IHS Markit, the non-MISO region is projected to grow faster than the MISO region. Therefore, the allocation factor for LRZ5 is reduced from 45.79% in 2022 to 41.72%in 2043.

APPENDIX C PEAK DEMAND

APPENDIX C PEAK DEMAND MODELS AND FORECAST RESULTS

Peak load conversion factors were used to translate annual metered load at the MISO LRZ level to monthly non-coincident peak demands. These conversion factors are based on normal weather conditions at the time of peak demand and are determined from historical relationships between hourly load factors and corresponding weather conditions.

The process involves three steps: (1) determine the relationship between hourly load (relative to the average hourly load for the year) and temperature using historical data, (2) estimate the normal weather condition when monthly peak demand occurs and calculate the monthly peak load factor under the normal peak weather condition, and (3) calculate the monthly peak load given the monthly normal peak load factor.

The zonal hourly load data were obtained from MISO and contain thirteen years of hourly load observations of LRZ-level loads from January 1, 2010 to December 31, 2022. Actual hourly weather data from 1997 to 2022 were obtained from the Midwest Regional Climate Center. For each LRZ, one weather station was selected to be centrally located within the load center of a particular LRZ. Table 61 lists the selected weather stations by LRZ.

Table 61: Selected Weather Stations by LRZ, Midwest Regional Climate Center

LRZ	City	Station WBAN ID	Station Call Sign
1	Minneapolis-St. Paul, MN	14922	KMSP
2	Milwaukee, WI	14839	KMKE
3	Des Moines, IA	14933	KDSM
4	Springfield, IL	93822	KSPI
5	St. Louis, MO	13994	KSTL
6	Indianapolis, IN	93819	KIND
7	Lansing, MI	14836	KLAN
8	Little Rock, AR	13963	KLIT
9	Lake Charles, LA	03937	KLCH
10	Jackson, MS	03940	KJAN

Multiple linear regression (MLR) analysis was employed to estimate the relationship of hourly load factor and temperature quantitatively. In this study, several MLR models were developed such as classical models with seasonal dummy variables, autoregressive models and models with moving average of hourly temperatures, etc. There are an extremely large number of possible models for peak load factor forecasting using various techniques and methodologies. Multiple statistics such as R squared values, Akaike information criterion (AIC) and mean absolute percentage error (MAPE) are used to measure the advantages of one model over another.

MISO provided thirteen years of zonal hourly load records from 2010 to 2022. Preliminary data screening and sample selection are necessary for peak load factor modeling. Since monthly peaks are unlikely to occur on weekends and national holidays, SUFG decided to only select work-day hourly records for regression analysis.

The multiple linear regression model used to estimate hourly load factors given specific hourly temperature conditions is constructed as follows.

$$Houly\ load\ factor_{mij} = C_{0mi} + C_{1mi} * Temp_{mij} + C_{2mi} * Temp_{mij}^2 + C_{3mi} * Average\ daily\ temp_{mij-1} + C_{4mi} * Average\ daily\ temp_{mij-2} + \sum_{t=0}^{23} C_{5mit} * h_{mij} + \sum_{t=0}^{23} C_{6mit} * h_{mij} * Temp_{mij}$$

where m represents month, which equals to 1, 2, 3, …12;

i represents zone, which equals to 1, 2, 3, …10;

j is the index of each hourly load record for month *m*, and zone *i;*

t represents the hour of the day when the hourly load *j* occurs, which equals to 0,1,2, …23;

$Hourly\ load\ factor_{mij}$ is the hourly load factor for record *j* of month *m*, and zone *i;*

$Temp_{mij}$ is the temperature when the hourly load *j* occurs for month *m*, and zone *i*;

$Average\ daily\ temp_{mij-1}$ is the average hourly temperature of the day which is one day before the day when the hourly load *j* occurs for month *m*, and zone *i*;

$Average\ daily\ temp_{mij-2}$ is the average hourly temperature of the day which is two days before the day when the hourly load *j* occurs for month *m*, and zone *i*;

h_{mij} is a binary variable, which equals 1 for the hour of a day that the hourly load *j* occurs for month *m*, and zone *i; otherwise, it is 0.*

Other than the current hourly temperature, the averages of hourly temperatures of previous day and the day before yesterday were used as weather-related variables. Other than weather related variables, hourly dummy variables were included to indicate load change during the 24-hour cycle. The hourly load factor was used as the dependent variable for the peak demand model.

By fitting the actual temperature records and the hour when the monthly peak occurred, the fitted monthly peak load factor can be obtained via the regression model.

The historical average of actual observed peak weather conditions and the most likely hour when peak demand occurred were used as the normal peak weather condition. Given the historical hourly zonal load data from 2010 to 2022, Table 62 summarizes the normalized July peak load factors and the corresponding normal weather conditions. The Temp column lists the normalized July peak hour temperature. The AVGT-L1 indicates the normalized average hourly temperature of the day which is one day ahead of the day when July peak occurs. The AVGT-L2 represents the normalized average hourly temperature of the day which is two days ahead of the day when July peak occurs. The Hour column represents the most likely hour when the July peak occurs. Based on historical records, most July peaks occur in late afternoon around 4 PM.

Table 62: Normalized July Peak Load Factors and Weather Conditions (Fahrenheit)

LRZ	Normal LF	Temp	AVGT-L1	AVGT_L2	Hour
LRZ1	0.6588	90.2	79.6	76.7	16
LRZ2	0.6130	88.7	78.8	78.2	16
LRZ3	0.6230	94.7	83.2	79.9	16
LRZ4	0.5961	92.7	82.2	79.8	16
LRZ5	0.5626	95.5	87.1	84.6	16
LRZ6	0.6229	91.1	81.4	79.9	14
LRZ7	0.5615	90.2	79.5	77.9	15
LRZ8	0.5787	96.8	85.2	84.4	15
LRZ9	0.6454	91.0	84.2	84.2	16
LRZ10	0.5481	93.5	84.3	82.8	16

APPENDIX C PEAK DEMAND

Historical monthly normalized peak demand is estimated by using the relationship between peak demand and the corresponding load factor. Assuming the total annual energy is fixed, the normalized peak demand is calculated using the following formula:

$$Historical\ NormalizedMPD_{miy} = \frac{Actual\ monthly\ peak\ demand_{miy} * fitted\ monthly\ peak\ load\ factor_{miy}}{fitted\ normalized\ monthly\ peak\ load\ factor_{mi}}$$

where $Historical\ NormalizedMPD_{miy}$ is normalized monthly peak demand for month m, zone i and year y.

The following tables display monthly non-coincident peak forecasts by LRZ for each month.

Table 63: Gross January Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	13,887	9,025	7,620	7,667	5,939	12,874	12,893	6,133	18,097	3,669
2023	14,029	9,035	7,687	7,879	6,034	12,923	13,067	6,099	17,955	3,665
2024	14,343	9,042	7,810	8,021	6,115	13,027	13,224	6,135	18,106	3,718
2025	14,561	9,113	7,932	8,038	6,193	13,238	13,440	6,191	18,483	3,778
2026	14,661	9,182	8,060	7,950	6,264	13,487	13,532	6,260	18,722	3,815
2027	14,770	9,255	8,177	7,921	6,324	13,735	13,556	6,343	19,023	3,849
2028	14,913	9,331	8,280	7,896	6,352	13,947	13,555	6,425	19,328	3,880
2029	15,035	9,413	8,383	7,880	6,375	14,172	13,585	6,507	19,559	3,902
2030	15,128	9,496	8,489	7,875	6,396	14,362	13,627	6,580	19,760	3,922
2031	15,231	9,577	8,595	7,876	6,406	14,536	13,681	6,646	19,891	3,944
2032	15,339	9,655	8,709	7,878	6,410	14,717	13,743	6,713	19,944	3,962
2033	15,436	9,733	8,820	7,881	6,411	14,888	13,807	6,771	20,036	3,975
2034	15,537	9,817	8,948	7,881	6,413	15,072	13,878	6,833	20,205	3,993
2035	15,632	9,905	9,081	7,889	6,416	15,238	13,972	6,904	20,282	4,021
2036	15,739	9,996	9,224	7,893	6,421	15,428	14,058	6,980	20,411	4,045
2037	15,846	10,089	9,360	7,894	6,420	15,644	14,137	7,055	20,575	4,064
2038	15,934	10,182	9,502	7,891	6,417	15,832	14,212	7,138	20,726	4,087
2039	15,995	10,266	9,626	7,886	6,399	16,016	14,270	7,222	20,934	4,109
2040	16,052	10,359	9,760	7,884	6,364	16,214	14,338	7,313	21,110	4,135
2041	16,052	10,448	9,905	7,872	6,322	16,389	14,403	7,396	21,304	4,157
2042	16,070	10,533	10,068	7,871	6,284	16,578	14,479	7,479	21,479	4,178
2043	16,140	10,615	10,230	7,870	6,253	16,764	14,552	7,562	21,647	4,200
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 64: Gross February Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	13,666	8,667	7,251	7,440	5,702	12,394	12,339	5,590	16,041	3,347
2023	13,806	8,677	7,315	7,645	5,793	12,442	12,506	5,559	15,915	3,344
2024	14,114	8,684	7,431	7,783	5,871	12,542	12,656	5,592	16,049	3,392
2025	14,330	8,752	7,548	7,800	5,946	12,745	12,863	5,644	16,383	3,447
2026	14,428	8,818	7,670	7,715	6,014	12,985	12,952	5,706	16,595	3,481
2027	14,535	8,888	7,781	7,686	6,072	13,224	12,974	5,782	16,862	3,511
2028	14,676	8,961	7,879	7,662	6,098	13,428	12,973	5,857	17,132	3,540
2029	14,795	9,040	7,976	7,647	6,120	13,644	13,002	5,932	17,336	3,560
2030	14,888	9,120	8,078	7,642	6,140	13,828	13,042	5,997	17,515	3,578
2031	14,988	9,197	8,179	7,642	6,150	13,995	13,094	6,058	17,631	3,598
2032	15,095	9,272	8,287	7,645	6,154	14,169	13,153	6,119	17,678	3,614
2033	15,190	9,348	8,393	7,648	6,155	14,334	13,215	6,172	17,759	3,627
2034	15,290	9,428	8,515	7,647	6,157	14,511	13,282	6,229	17,909	3,643
2035	15,383	9,513	8,641	7,655	6,160	14,671	13,372	6,293	17,977	3,668
2036	15,489	9,600	8,777	7,659	6,165	14,854	13,454	6,363	18,092	3,690
2037	15,594	9,689	8,907	7,660	6,164	15,062	13,530	6,431	18,237	3,708
2038	15,680	9,779	9,042	7,657	6,161	15,242	13,602	6,506	18,371	3,728
2039	15,741	9,859	9,160	7,652	6,143	15,420	13,658	6,583	18,555	3,749
2040	15,797	9,948	9,287	7,651	6,110	15,610	13,723	6,666	18,711	3,772
2041	15,797	10,034	9,425	7,639	6,069	15,779	13,784	6,742	18,884	3,792
2042	15,815	10,116	9,580	7,638	6,033	15,961	13,858	6,818	19,039	3,812
2043	15,883	10,195	9,735	7,637	6,004	16,140	13,928	6,893	19,187	3,832
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 65: Gross March Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	12,465	8,179	6,738	6,575	4,999	11,191	11,841	4,942	14,397	2,783
2023	12,593	8,189	6,797	6,756	5,079	11,234	12,001	4,915	14,284	2,780
2024	12,874	8,195	6,906	6,878	5,148	11,324	12,145	4,944	14,404	2,820
2025	13,071	8,259	7,014	6,893	5,213	11,507	12,344	4,989	14,704	2,866
2026	13,160	8,322	7,127	6,818	5,273	11,724	12,429	5,045	14,894	2,894
2027	13,258	8,388	7,231	6,792	5,324	11,939	12,451	5,111	15,134	2,919
2028	13,387	8,457	7,322	6,771	5,347	12,124	12,449	5,178	15,376	2,943
2029	13,495	8,532	7,413	6,758	5,366	12,319	12,477	5,244	15,560	2,960
2030	13,580	8,607	7,507	6,753	5,384	12,484	12,516	5,302	15,720	2,975
2031	13,671	8,680	7,600	6,754	5,392	12,635	12,565	5,355	15,824	2,992
2032	13,768	8,750	7,701	6,755	5,395	12,793	12,622	5,410	15,866	3,005
2033	13,856	8,822	7,799	6,758	5,397	12,942	12,681	5,456	15,939	3,015
2034	13,946	8,897	7,913	6,758	5,398	13,101	12,746	5,507	16,074	3,029
2035	14,031	8,977	8,030	6,765	5,401	13,246	12,832	5,563	16,135	3,050
2036	14,128	9,059	8,157	6,768	5,405	13,411	12,911	5,625	16,238	3,068
2037	14,223	9,144	8,277	6,770	5,404	13,599	12,984	5,685	16,368	3,083
2038	14,302	9,228	8,402	6,767	5,402	13,762	13,053	5,752	16,488	3,100
2039	14,357	9,305	8,512	6,762	5,386	13,922	13,106	5,820	16,654	3,117
2040	14,409	9,389	8,631	6,761	5,357	14,094	13,169	5,893	16,793	3,136
2041	14,409	9,469	8,759	6,750	5,321	14,247	13,228	5,960	16,948	3,153
2042	14,425	9,546	8,903	6,750	5,290	14,411	13,298	6,027	17,088	3,170
2043	14,487	9,621	9,046	6,749	5,264	14,572	13,366	6,094	17,221	3,186
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 66: Gross April Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	11,248	7,721	6,313	5,494	4,614	9,979	11,039	4,316	15,719	2,805
2023	11,363	7,730	6,369	5,645	4,688	10,017	11,189	4,292	15,595	2,802
2024	11,617	7,736	6,470	5,747	4,751	10,097	11,323	4,317	15,727	2,842
2025	11,794	7,796	6,572	5,759	4,812	10,261	11,508	4,357	16,054	2,889
2026	11,874	7,855	6,678	5,697	4,867	10,454	11,587	4,405	16,262	2,917
2027	11,963	7,918	6,775	5,676	4,914	10,646	11,608	4,463	16,523	2,942
2028	12,079	7,983	6,860	5,658	4,935	10,811	11,606	4,521	16,788	2,966
2029	12,177	8,053	6,945	5,646	4,953	10,985	11,632	4,579	16,988	2,983
2030	12,253	8,124	7,033	5,643	4,969	11,132	11,668	4,630	17,163	2,999
2031	12,336	8,193	7,121	5,643	4,977	11,267	11,714	4,677	17,277	3,015
2032	12,423	8,260	7,216	5,645	4,980	11,408	11,767	4,724	17,323	3,029
2033	12,502	8,327	7,307	5,647	4,981	11,540	11,823	4,765	17,403	3,039
2034	12,584	8,399	7,413	5,647	4,982	11,682	11,883	4,809	17,550	3,052
2035	12,661	8,474	7,523	5,653	4,985	11,811	11,963	4,858	17,616	3,074
2036	12,748	8,552	7,642	5,655	4,989	11,959	12,037	4,912	17,729	3,092
2037	12,834	8,631	7,755	5,657	4,988	12,126	12,105	4,965	17,871	3,107
2038	12,905	8,711	7,872	5,654	4,986	12,272	12,169	5,023	18,002	3,124
2039	12,955	8,783	7,975	5,650	4,972	12,414	12,219	5,082	18,183	3,141
2040	13,001	8,862	8,086	5,649	4,944	12,568	12,277	5,147	18,335	3,161
2041	13,001	8,938	8,206	5,641	4,912	12,704	12,332	5,205	18,505	3,178
2042	13,016	9,011	8,341	5,640	4,882	12,850	12,398	5,263	18,657	3,194
2043	13,072	9,081	8,476	5,639	4,859	12,994	12,461	5,322	18,802	3,211
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 67: Gross May Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	12,565	9,073	7,504	7,478	5,698	12,138	14,584	5,497	18,101	3,775
2023	12,694	9,083	7,570	7,685	5,790	12,184	14,781	5,467	17,958	3,771
2024	12,978	9,090	7,691	7,823	5,868	12,282	14,958	5,499	18,109	3,826
2025	13,176	9,161	7,811	7,840	5,942	12,481	15,204	5,549	18,486	3,888
2026	13,266	9,230	7,938	7,754	6,011	12,716	15,308	5,611	18,725	3,926
2027	13,365	9,304	8,053	7,726	6,069	12,950	15,335	5,685	19,027	3,961
2028	13,494	9,381	8,154	7,701	6,095	13,150	15,333	5,759	19,331	3,993
2029	13,604	9,463	8,255	7,686	6,117	13,361	15,368	5,832	19,562	4,015
2030	13,689	9,546	8,360	7,681	6,137	13,541	15,415	5,897	19,764	4,036
2031	13,781	9,628	8,464	7,682	6,147	13,705	15,476	5,957	19,895	4,059
2032	13,879	9,706	8,577	7,684	6,150	13,876	15,546	6,017	19,948	4,077
2033	13,967	9,785	8,686	7,687	6,152	14,037	15,619	6,069	20,039	4,091
2034	14,058	9,869	8,812	7,686	6,153	14,210	15,698	6,125	20,209	4,109
2035	14,144	9,958	8,943	7,694	6,157	14,367	15,805	6,188	20,285	4,138
2036	14,242	10,049	9,084	7,698	6,161	14,546	15,902	6,256	20,415	4,162
2037	14,338	10,143	9,218	7,700	6,161	14,750	15,992	6,324	20,579	4,183
2038	14,417	10,236	9,357	7,697	6,157	14,927	16,077	6,397	20,730	4,205
2039	14,473	10,321	9,480	7,691	6,140	15,100	16,142	6,473	20,937	4,229
2040	14,525	10,414	9,612	7,690	6,106	15,287	16,220	6,555	21,113	4,255
2041	14,525	10,503	9,754	7,678	6,066	15,452	16,292	6,629	21,308	4,278
2042	14,541	10,589	9,915	7,677	6,030	15,630	16,379	6,704	21,483	4,300
2043	14,604	10,671	10,075	7,676	6,000	15,805	16,462	6,778	21,650	4,322
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 68: Gross June Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	15,058	10,730	8,943	8,922	6,881	13,461	17,103	6,718	19,863	4,359
2023	15,212	10,743	9,021	9,168	6,991	13,513	17,335	6,680	19,706	4,354
2024	15,552	10,751	9,166	9,333	7,086	13,621	17,542	6,720	19,872	4,418
2025	15,790	10,835	9,309	9,353	7,175	13,842	17,830	6,782	20,286	4,489
2026	15,897	10,917	9,459	9,251	7,258	14,103	17,952	6,857	20,548	4,533
2027	16,016	11,004	9,597	9,217	7,328	14,362	17,984	6,947	20,879	4,573
2028	16,171	11,095	9,718	9,188	7,360	14,584	17,981	7,038	21,213	4,610
2029	16,303	11,192	9,838	9,170	7,386	14,819	18,022	7,128	21,466	4,636
2030	16,404	11,291	9,963	9,164	7,410	15,018	18,078	7,207	21,688	4,660
2031	16,515	11,387	10,087	9,164	7,422	15,199	18,149	7,279	21,832	4,686
2032	16,632	11,480	10,221	9,167	7,426	15,389	18,231	7,353	21,890	4,707
2033	16,738	11,573	10,351	9,171	7,428	15,568	18,317	7,416	21,990	4,723
2034	16,847	11,672	10,501	9,170	7,430	15,760	18,410	7,485	22,176	4,744
2035	16,950	11,777	10,657	9,180	7,434	15,934	18,535	7,562	22,260	4,777
2036	17,067	11,885	10,825	9,184	7,440	16,132	18,649	7,646	22,403	4,805
2037	17,182	11,996	10,985	9,186	7,439	16,358	18,754	7,728	22,582	4,829
2038	17,277	12,107	11,151	9,182	7,435	16,555	18,854	7,818	22,748	4,855
2039	17,344	12,207	11,297	9,176	7,414	16,747	18,931	7,911	22,976	4,882
2040	17,406	12,317	11,455	9,175	7,373	16,954	19,021	8,011	23,169	4,912
2041	17,406	12,422	11,624	9,160	7,325	17,138	19,106	8,101	23,383	4,939
2042	17,426	12,524	11,816	9,159	7,281	17,335	19,208	8,192	23,575	4,964
2043	17,501	12,621	12,006	9,158	7,245	17,529	19,305	8,283	23,758	4,990
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 69: Gross July Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	16,244	11,644	9,461	9,367	7,334	14,934	18,643	7,306	20,393	4,557
2023	16,410	11,657	9,544	9,626	7,452	14,992	18,896	7,265	20,233	4,552
2024	16,776	11,666	9,696	9,799	7,552	15,112	19,122	7,308	20,403	4,618
2025	17,033	11,757	9,848	9,820	7,648	15,357	19,436	7,375	20,828	4,693
2026	17,149	11,846	10,007	9,713	7,736	15,646	19,569	7,457	21,097	4,739
2027	17,277	11,940	10,153	9,677	7,810	15,934	19,603	7,556	21,437	4,781
2028	17,444	12,039	10,281	9,647	7,844	16,180	19,601	7,654	21,780	4,819
2029	17,586	12,145	10,408	9,627	7,872	16,440	19,645	7,752	22,040	4,847
2030	17,696	12,252	10,540	9,621	7,898	16,661	19,706	7,838	22,267	4,872
2031	17,815	12,356	10,671	9,622	7,911	16,862	19,784	7,917	22,415	4,899
2032	17,942	12,457	10,813	9,625	7,915	17,073	19,873	7,997	22,474	4,921
2033	18,055	12,558	10,951	9,628	7,917	17,271	19,966	8,066	22,578	4,937
2034	18,173	12,666	11,110	9,628	7,919	17,484	20,068	8,140	22,769	4,960
2035	18,284	12,780	11,274	9,638	7,923	17,677	20,204	8,224	22,855	4,995
2036	18,410	12,896	11,452	9,643	7,929	17,897	20,328	8,315	23,001	5,024
2037	18,535	13,017	11,621	9,645	7,928	18,148	20,443	8,405	23,185	5,049
2038	18,638	13,137	11,797	9,641	7,924	18,366	20,552	8,503	23,356	5,076
2039	18,709	13,246	11,951	9,634	7,902	18,579	20,636	8,603	23,589	5,104
2040	18,776	13,365	12,118	9,633	7,858	18,809	20,734	8,712	23,788	5,136
2041	18,776	13,479	12,298	9,617	7,807	19,013	20,827	8,811	24,007	5,163
2042	18,798	13,590	12,500	9,616	7,760	19,232	20,938	8,910	24,204	5,190
2043	18,879	13,696	12,702	9,615	7,722	19,447	21,044	9,008	24,393	5,217
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 70: Gross August Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	15,629	11,293	9,026	9,058	7,152	14,095	17,855	7,133	20,741	4,519
2023	15,789	11,306	9,105	9,309	7,267	14,149	18,097	7,094	20,577	4,515
2024	16,142	11,315	9,250	9,476	7,364	14,262	18,314	7,135	20,751	4,580
2025	16,388	11,403	9,395	9,496	7,458	14,494	18,614	7,201	21,183	4,655
2026	16,500	11,489	9,547	9,393	7,544	14,767	18,742	7,281	21,457	4,700
2027	16,623	11,580	9,686	9,358	7,616	15,038	18,775	7,377	21,802	4,741
2028	16,784	11,676	9,808	9,329	7,649	15,270	18,772	7,473	22,151	4,779
2029	16,921	11,779	9,929	9,310	7,677	15,516	18,815	7,568	22,415	4,807
2030	17,026	11,882	10,055	9,304	7,702	15,724	18,873	7,653	22,647	4,832
2031	17,141	11,983	10,181	9,305	7,714	15,914	18,947	7,730	22,797	4,858
2032	17,263	12,081	10,316	9,307	7,719	16,113	19,033	7,808	22,857	4,880
2033	17,373	12,179	10,447	9,311	7,721	16,300	19,122	7,875	22,962	4,897
2034	17,486	12,284	10,599	9,311	7,722	16,501	19,220	7,948	23,156	4,919
2035	17,593	12,394	10,756	9,320	7,727	16,683	19,350	8,030	23,244	4,953
2036	17,714	12,508	10,926	9,325	7,732	16,891	19,469	8,119	23,393	4,982
2037	17,834	12,624	11,087	9,327	7,732	17,128	19,579	8,206	23,580	5,007
2038	17,933	12,741	11,255	9,323	7,728	17,333	19,683	8,302	23,754	5,034
2039	18,002	12,846	11,402	9,317	7,706	17,535	19,763	8,400	23,991	5,062
2040	18,066	12,962	11,561	9,315	7,663	17,752	19,858	8,506	24,193	5,093
2041	18,066	13,073	11,732	9,301	7,613	17,944	19,947	8,603	24,416	5,121
2042	18,087	13,180	11,925	9,299	7,568	18,151	20,053	8,699	24,617	5,147
2043	18,164	13,283	12,118	9,298	7,531	18,354	20,154	8,795	24,808	5,174
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 71: Gross September Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	14,513	10,421	8,744	8,710	6,683	13,723	17,002	6,719	19,212	4,284
2023	14,661	10,434	8,821	8,951	6,790	13,775	17,232	6,682	19,061	4,280
2024	14,989	10,442	8,962	9,112	6,882	13,886	17,438	6,721	19,222	4,342
2025	15,218	10,523	9,103	9,132	6,969	14,111	17,724	6,783	19,622	4,412
2026	15,322	10,603	9,250	9,032	7,049	14,377	17,846	6,858	19,875	4,455
2027	15,436	10,687	9,384	8,999	7,117	14,641	17,877	6,949	20,195	4,494
2028	15,586	10,775	9,502	8,970	7,148	14,867	17,875	7,039	20,519	4,531
2029	15,712	10,870	9,620	8,953	7,173	15,106	17,915	7,129	20,763	4,556
2030	15,810	10,966	9,742	8,947	7,197	15,309	17,971	7,208	20,978	4,580
2031	15,917	11,059	9,864	8,948	7,208	15,494	18,042	7,281	21,117	4,605
2032	16,030	11,149	9,995	8,950	7,213	15,687	18,123	7,355	21,173	4,626
2033	16,132	11,240	10,122	8,953	7,215	15,870	18,208	7,418	21,270	4,642
2034	16,237	11,336	10,269	8,953	7,216	16,065	18,301	7,486	21,450	4,662
2035	16,336	11,438	10,421	8,962	7,220	16,243	18,425	7,564	21,531	4,695
2036	16,449	11,543	10,585	8,967	7,225	16,445	18,538	7,647	21,669	4,723
2037	16,560	11,651	10,742	8,969	7,225	16,676	18,643	7,729	21,843	4,746
2038	16,652	11,758	10,904	8,965	7,221	16,876	18,742	7,820	22,003	4,772
2039	16,716	11,855	11,047	8,959	7,200	17,072	18,818	7,912	22,223	4,798
2040	16,776	11,962	11,201	8,957	7,161	17,283	18,908	8,012	22,410	4,828
2041	16,776	12,065	11,367	8,943	7,114	17,470	18,993	8,103	22,617	4,854
2042	16,795	12,163	11,554	8,942	7,071	17,671	19,094	8,194	22,803	4,879
2043	16,867	12,258	11,740	8,941	7,037	17,869	19,191	8,285	22,980	4,905
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 72: Gross October Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	11,807	8,220	6,760	6,248	4,563	10,789	12,024	5,279	17,335	3,324
2023	11,927	8,230	6,819	6,421	4,636	10,831	12,186	5,250	17,198	3,321
2024	12,194	8,236	6,928	6,536	4,698	10,917	12,332	5,280	17,343	3,369
2025	12,380	8,301	7,036	6,550	4,758	11,094	12,534	5,329	17,704	3,424
2026	12,465	8,363	7,150	6,479	4,813	11,303	12,620	5,388	17,933	3,457
2027	12,558	8,430	7,254	6,455	4,859	11,511	12,643	5,459	18,222	3,487
2028	12,679	8,500	7,345	6,435	4,880	11,689	12,641	5,530	18,513	3,515
2029	12,782	8,574	7,436	6,422	4,898	11,877	12,670	5,601	18,734	3,535
2030	12,862	8,650	7,531	6,418	4,914	12,036	12,709	5,663	18,928	3,554
2031	12,949	8,723	7,625	6,418	4,922	12,182	12,759	5,720	19,053	3,573
2032	13,041	8,794	7,726	6,420	4,925	12,334	12,817	5,778	19,104	3,590
2033	13,124	8,866	7,824	6,422	4,926	12,477	12,877	5,828	19,192	3,602
2034	13,209	8,942	7,938	6,422	4,927	12,631	12,942	5,882	19,354	3,618
2035	13,290	9,022	8,056	6,429	4,930	12,771	13,030	5,942	19,427	3,643
2036	13,382	9,105	8,183	6,432	4,933	12,930	13,110	6,008	19,551	3,665
2037	13,472	9,190	8,303	6,433	4,933	13,111	13,184	6,073	19,708	3,683
2038	13,547	9,275	8,429	6,431	4,930	13,268	13,254	6,144	19,853	3,703
2039	13,599	9,351	8,539	6,426	4,916	13,422	13,308	6,216	20,052	3,723
2040	13,648	9,436	8,658	6,425	4,889	13,588	13,372	6,295	20,220	3,746
2041	13,648	9,517	8,787	6,415	4,857	13,735	13,432	6,366	20,407	3,766
2042	13,663	9,594	8,931	6,414	4,828	13,894	13,503	6,438	20,574	3,786
2043	13,722	9,669	9,075	6,413	4,804	14,049	13,572	6,509	20,734	3,806
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 73: Gross November Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	12,907	8,367	6,908	6,533	4,834	10,776	12,128	5,101	14,688	2,995
2023	13,039	8,377	6,969	6,713	4,912	10,818	12,292	5,073	14,573	2,992
2024	13,330	8,384	7,081	6,834	4,978	10,905	12,439	5,103	14,696	3,036
2025	13,534	8,449	7,191	6,849	5,041	11,082	12,643	5,150	15,001	3,085
2026	13,626	8,513	7,308	6,774	5,099	11,290	12,730	5,207	15,195	3,115
2027	13,727	8,581	7,414	6,749	5,148	11,497	12,752	5,276	15,440	3,142
2028	13,861	8,651	7,507	6,728	5,170	11,675	12,751	5,344	15,687	3,168
2029	13,973	8,728	7,600	6,715	5,189	11,863	12,780	5,413	15,874	3,186
2030	14,060	8,804	7,696	6,710	5,206	12,022	12,819	5,473	16,038	3,203
2031	14,155	8,879	7,793	6,711	5,214	12,168	12,870	5,528	16,144	3,220
2032	14,256	8,952	7,896	6,713	5,217	12,319	12,928	5,584	16,187	3,235
2033	14,346	9,024	7,997	6,715	5,219	12,463	12,989	5,632	16,262	3,245
2034	14,440	9,102	8,113	6,715	5,220	12,616	13,055	5,684	16,399	3,260
2035	14,528	9,184	8,233	6,722	5,223	12,756	13,143	5,743	16,461	3,283
2036	14,628	9,268	8,363	6,725	5,226	12,914	13,224	5,806	16,566	3,302
2037	14,727	9,354	8,486	6,727	5,226	13,096	13,299	5,869	16,699	3,319
2038	14,809	9,441	8,615	6,724	5,223	13,253	13,369	5,937	16,822	3,337
2039	14,866	9,519	8,727	6,719	5,208	13,407	13,424	6,007	16,990	3,355
2040	14,919	9,605	8,849	6,718	5,180	13,573	13,488	6,083	17,133	3,376
2041	14,919	9,687	8,980	6,708	5,146	13,719	13,549	6,152	17,291	3,394
2042	14,936	9,766	9,128	6,707	5,115	13,877	13,621	6,221	17,433	3,412
2043	15,000	9,842	9,275	6,706	5,090	14,033	13,689	6,290	17,569	3,429
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 74: Gross December Non-Coincident Peak Demand (Metered Load in MW)

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	13,751	8,928	7,394	7,098	5,600	11,573	12,790	5,579	16,230	3,222
2023	13,892	8,939	7,459	7,294	5,690	11,618	12,963	5,548	16,102	3,219
2024	14,202	8,946	7,578	7,426	5,767	11,711	13,118	5,580	16,238	3,265
2025	14,419	9,016	7,696	7,442	5,840	11,901	13,333	5,632	16,576	3,318
2026	14,518	9,084	7,821	7,360	5,907	12,125	13,425	5,694	16,790	3,351
2027	14,626	9,156	7,935	7,333	5,964	12,348	13,448	5,769	17,060	3,380
2028	14,767	9,232	8,034	7,310	5,990	12,539	13,447	5,844	17,334	3,407
2029	14,888	9,313	8,134	7,296	6,012	12,740	13,477	5,919	17,540	3,427
2030	14,980	9,395	8,237	7,291	6,031	12,911	13,519	5,985	17,721	3,445
2031	15,082	9,475	8,340	7,292	6,041	13,067	13,572	6,045	17,839	3,464
2032	15,189	9,552	8,451	7,293	6,044	13,230	13,634	6,106	17,886	3,479
2033	15,285	9,629	8,558	7,296	6,046	13,384	13,697	6,159	17,969	3,491
2034	15,385	9,712	8,682	7,296	6,047	13,549	13,767	6,216	18,120	3,507
2035	15,479	9,800	8,811	7,304	6,051	13,699	13,860	6,280	18,189	3,531
2036	15,586	9,889	8,950	7,307	6,055	13,869	13,946	6,349	18,305	3,552
2037	15,691	9,982	9,082	7,309	6,055	14,064	14,024	6,418	18,452	3,570
2038	15,778	10,074	9,220	7,306	6,051	14,233	14,099	6,492	18,588	3,589
2039	15,839	10,157	9,340	7,301	6,034	14,398	14,157	6,569	18,774	3,609
2040	15,895	10,248	9,471	7,300	6,001	14,576	14,224	6,652	18,931	3,631
2041	15,895	10,336	9,611	7,288	5,961	14,734	14,288	6,728	19,106	3,651
2042	15,913	10,421	9,769	7,287	5,926	14,904	14,364	6,803	19,263	3,670
2043	15,982	10,502	9,927	7,286	5,897	15,071	14,437	6,878	19,413	3,689
Compound Annual Growth Rates (%)										
2024-2028	0.98	0.79	1.47	-0.39	0.95	1.72	0.62	1.16	1.65	1.07
2024-2033	0.82	0.82	1.36	-0.19	0.53	1.50	0.48	1.10	1.13	0.74
2024-2043	0.62	0.85	1.43	-0.10	0.12	1.34	0.51	1.11	0.94	0.64

APPENDIX C PEAK DEMAND

Table 75: Gross MISO System Coincident Peak Demand by Month (Metered Load in MW)

Year\Month	1	2	3	4	5	6	7	8	9	10	11	12
2022	94,338	89,753	80,728	74,932	92,671	107,635	115,155	111,184	105,343	82,659	82,352	89,151
2023	94,898	90,311	81,245	75,366	93,219	108,294	115,875	111,873	105,992	83,119	82,857	89,698
2024	96,027	91,393	82,218	76,254	94,314	109,570	117,239	113,193	107,239	84,091	83,849	90,772
2025	97,400	92,692	83,385	77,357	95,674	111,136	118,906	114,810	108,769	85,308	85,047	92,067
2026	98,332	93,568	84,173	78,104	96,584	112,182	120,025	115,890	109,793	86,131	85,852	92,939
2027	99,314	94,489	84,993	78,884	97,535	113,268	121,185	117,010	110,856	86,996	86,693	93,851
2028	100,232	95,350	85,758	79,614	98,419	114,276	122,259	118,049	111,842	87,807	87,480	94,705
2029	101,102	96,170	86,492	80,306	99,259	115,239	123,290	119,043	112,786	88,573	88,231	95,518
2030	101,898	96,921	87,166	80,939	100,032	116,128	124,240	119,959	113,656	89,276	88,919	96,263
2031	102,619	97,606	87,783	81,513	100,731	116,936	125,106	120,793	114,449	89,909	89,548	96,941
2032	103,284	98,243	88,361	82,040	101,372	117,684	125,911	121,566	115,183	90,489	90,133	97,572
2033	103,951	98,879	88,937	82,571	102,019	118,436	126,717	122,342	115,920	91,074	90,718	98,203
2034	104,739	99,625	89,611	83,200	102,788	119,323	127,665	123,257	116,789	91,771	91,406	98,945
2035	105,477	100,331	90,251	83,788	103,508	120,163	128,567	124,125	117,614	92,420	92,056	99,645
2036	106,303	101,116	90,962	84,446	104,312	121,097	129,567	125,089	118,530	93,147	92,780	100,425
2037	107,163	101,933	91,699	85,132	105,150	122,066	130,604	126,088	119,480	93,907	93,531	101,236
2038	107,968	102,696	92,389	85,774	105,935	122,975	131,577	127,026	120,371	94,619	94,234	101,994
2039	108,741	103,424	93,042	86,391	106,691	123,845	132,504	127,921	121,223	95,309	94,905	102,717
2040	109,518	104,157	93,704	87,011	107,452	124,722	133,441	128,824	122,084	96,002	95,581	103,446
2041	110,209	104,805	94,288	87,565	108,135	125,506	134,277	129,631	122,854	96,626	96,181	104,090
2042	110,953	105,506	94,922	88,160	108,869	126,352	135,180	130,502	123,684	97,294	96,829	104,788
2043	111,736	106,247	95,591	88,786	109,635	127,237	136,125	131,414	124,552	97,992	97,514	105,524
Compound Annual Growth Rates (%)												
2024-2028	1.08	1.07	1.06	1.08	1.07	1.06	1.05	1.06	1.06	1.09	1.07	1.07
2024-2033	0.88	0.88	0.88	0.89	0.88	0.87	0.87	0.87	0.87	0.89	0.88	0.88
2024-2043	0.80	0.80	0.80	0.80	0.80	0.79	0.79	0.79	0.79	0.81	0.80	0.80

APPENDIX D HIGH AND LOW FORECASTS

Table 76: Gross State Energy Forecasts (Annual Retail Sales in GWh)—High

Year	AR	IL	IN	IA	KY	LA	MI	MN
1990	27,365	111,577	73,982	29,437	61,097	63,826	82,367	47,167
1991	28,440	116,869	77,034	30,781	64,194	64,704	84,519	48,755
1992	28,451	112,521	76,977	30,208	67,068	65,098	83,840	47,412
1993	31,663	117,786	81,931	32,104	68,149	67,756	87,589	49,211
1994	32,619	121,490	83,808	33,039	72,485	70,132	91,160	51,155
1995	34,671	126,231	87,006	34,301	74,548	72,827	94,701	53,959
1996	36,137	125,990	88,901	34,999	77,019	75,269	96,302	54,942
1997	36,858	126,953	89,147	36,148	76,836	75,886	97,391	55,674
1998	39,315	131,697	92,059	37,318	75,850	77,716	100,506	56,744
1999	39,789	132,682	96,735	38,034	79,098	78,267	103,981	57,399
2000	41,611	134,697	97,775	39,088	78,316	80,690	104,772	59,782
2001	41,732	136,034	97,734	39,444	79,975	74,693	102,409	60,687
2002	42,450	138,447	101,429	40,898	87,267	79,261	104,714	62,162
2003	43,108	136,248	100,468	41,207	85,220	77,769	108,877	63,087
2004	43,672	139,254	103,094	40,903	86,521	79,737	106,606	63,340
2005	46,165	144,986	106,549	42,757	89,351	77,389	110,445	66,019
2006	46,636	142,448	105,664	43,337	88,743	77,468	108,018	66,770
2007	47,055	146,055	109,420	45,270	92,404	79,567	109,297	68,231
2008	46,135	144,620	106,981	45,488	93,428	78,726	105,781	68,794
2009	43,173	136,688	99,312	43,641	88,897	78,670	98,121	64,004
2010	48,194	144,761	105,994	45,445	93,569	85,080	103,649	67,800
2011	47,928	142,886	105,818	45,655	89,538	86,369	105,054	68,533
2012	46,860	143,540	105,173	45,709	89,048	84,731	104,818	67,989
2013	46,683	141,805	105,487	46,705	84,764	85,808	103,038	68,644
2014	47,080	141,540	106,943	47,202	78,839	90,628	103,314	68,719
2015	46,465	138,620	104,515	47,147	76,039	91,676	102,480	66,579
2016	46,188	141,050	103,705	48,431	74,554	91,453	104,468	66,546
2017	46,086	137,196	98,966	48,922	72,634	91,206	101,899	67,153
2018	49,603	142,655	104,194	51,211	76,611	94,186	104,869	68,708
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	45,851	132,469	97,156	50,640	71,800	89,127	97,012	64,055
2021	48,663	135,689	99,740	52,893	74,517	90,819	99,813	66,589
2022	51,633	139,939	109,898	52,569	83,504	92,159	107,415	69,001
2023	51,625	143,954	110,405	53,336	84,521	91,776	109,966	69,639
2024	52,152	150,285	111,950	54,448	89,786	96,516	112,225	73,105
2025	52,823	151,427	114,512	55,549	91,853	99,541	114,923	74,593
2026	53,579	150,549	117,175	56,706	94,104	101,354	116,623	75,267
2027	54,325	150,599	120,130	57,737	95,843	103,479	117,349	75,945
2028	55,057	150,654	122,399	58,656	97,624	105,428	117,755	76,829
2029	55,774	150,841	124,738	59,554	99,433	106,871	118,396	77,635
2030	56,396	151,111	126,598	60,462	101,132	108,112	119,063	78,213
2031	56,973	151,494	128,176	61,366	102,828	108,977	119,819	78,818
2032	57,551	151,846	129,709	62,299	104,610	109,203	120,597	79,481
2033	58,052	152,250	131,126	63,246	106,259	109,669	121,376	80,063
2034	58,577	152,528	132,619	64,285	108,050	110,553	122,204	80,643
2035	59,176	152,897	134,003	65,341	109,590	110,801	123,190	81,148
2036	59,812	153,209	135,433	66,489	111,459	111,442	124,090	81,720
2037	60,450	153,495	137,119	67,564	113,387	112,246	124,944	82,328
2038	61,128	153,695	138,661	68,674	115,031	112,965	125,726	82,857
2039	61,846	153,842	140,063	69,673	116,764	113,947	126,386	83,185
2040	62,604	154,020	141,458	70,744	118,642	114,807	127,105	83,551
2041	63,289	153,987	142,734	71,872	120,380	115,890	127,782	83,469
2042	63,986	154,146	144,017	73,189	122,279	116,534	128,601	83,436
2043	64,663	154,281	145,282	74,392	124,050	117,363	129,358	83,710
Compound Annual Growth Rates (%)								
2024-2028	1.36	0.06	2.26	1.88	2.11	2.23	1.21	1.25
2024-2033	1.20	0.14	1.77	1.68	1.89	1.43	0.87	1.02
2024-2043	1.14	0.14	1.38	1.66	1.72	1.03	0.75	0.72

APPENDIX D HIGH AND LOW FORECASTS

Table 76: Gross State Energy Forecasts (Annual Retail Sales in GWh)—High - continued

Year	MS	MO	MT	ND	SD	TX	WI
1990	32,127	53,925	13,125	7,014	6,334	237,415	49,198
1991	33,019	56,514	13,407	7,255	6,685	240,352	51,032
1992	33,241	54,411	13,096	7,128	6,494	239,431	50,925
1993	34,749	58,622	12,929	7,432	6,905	250,084	53,156
1994	36,627	59,693	13,184	7,681	7,174	258,180	55,412
1995	37,868	62,259	13,419	7,883	7,414	263,279	57,967
1996	39,622	64,843	13,820	8,314	7,736	278,450	58,744
1997	40,089	65,711	11,917	8,282	7,773	286,704	60,094
1998	42,510	69,010	14,145	8,220	7,824	304,705	62,061
1999	43,980	69,045	13,282	9,112	7,922	301,844	63,547
2000	45,336	72,643	14,580	9,413	8,283	318,263	65,146
2001	44,287	73,213	11,447	9,810	8,627	318,044	65,218
2002	45,452	75,001	12,831	10,219	8,937	320,846	66,999
2003	45,544	74,240	12,825	10,461	9,080	322,686	67,241
2004	46,033	74,054	12,957	10,516	9,214	320,615	67,976
2005	45,901	80,940	13,479	10,840	9,811	334,258	70,336
2006	46,936	82,015	13,815	11,245	10,056	342,724	69,821
2007	48,153	85,533	15,532	11,906	10,603	343,829	71,301
2008	47,721	84,382	15,326	12,416	10,974	347,815	70,122
2009	46,049	79,897	14,354	12,649	11,010	345,351	66,286
2010	49,687	86,085	13,771	12,956	11,356	358,458	68,752
2011	49,338	84,255	13,788	13,737	11,680	376,065	68,612
2012	48,388	82,435	13,863	14,717	11,734	365,104	68,820
2013	48,782	83,407	14,045	16,033	12,210	378,817	69,124
2014	49,409	83,878	14,102	18,240	12,355	389,670	69,495
2015	48,692	81,504	14,207	18,129	12,102	392,337	68,699
2016	49,050	78,618	14,101	18,520	12,130	398,662	69,736
2017	47,829	76,461	14,710	20,140	12,314	401,880	69,079
2018	50,390	82,056	14,839	20,670	12,857	424,419	70,960
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	46,482	75,726	14,584	21,819	12,696	426,863	67,448
2021	48,015	77,763	14,962	22,863	13,041	435,628	69,427
2022	50,602	83,510	17,236	24,809	14,175	444,816	75,615
2023	51,024	85,891	18,207	26,392	14,502	452,960	76,162
2024	51,864	88,100	19,239	27,706	14,834	459,710	76,608
2025	52,755	90,308	20,176	28,571	15,146	471,878	77,527
2026	53,311	92,499	20,656	29,262	15,448	482,496	78,482
2027	53,798	94,119	21,083	30,059	15,748	491,481	79,359
2028	54,253	95,287	21,558	30,694	16,043	501,729	80,262
2029	54,573	96,345	21,866	31,151	16,320	511,696	81,180
2030	54,871	97,368	22,232	31,561	16,597	520,838	82,088
2031	55,175	98,244	22,624	31,965	16,878	529,955	82,951
2032	55,431	99,021	22,977	32,303	17,183	538,913	83,783
2033	55,628	99,775	23,349	32,633	17,480	547,522	84,589
2034	55,875	100,514	23,649	32,891	17,811	557,364	85,437
2035	56,275	101,256	24,041	33,196	18,155	567,718	86,318
2036	56,607	102,009	24,398	33,500	18,512	577,944	87,185
2037	56,890	102,695	24,624	33,767	18,864	587,815	88,095
2038	57,202	103,336	24,766	33,917	19,226	598,163	88,971
2039	57,533	103,768	24,982	34,059	19,577	608,650	89,788
2040	57,892	103,967	25,228	33,930	19,931	619,933	90,660
2041	58,204	104,071	25,521	33,803	20,286	631,210	91,517
2042	58,509	104,229	25,874	33,855	20,649	642,895	92,301
2043	58,810	104,470	26,358	34,003	21,031	654,289	93,072
Compound Annual Growth Rates (%)							
2024-2028	1.13	1.98	2.89	2.59	1.98	2.21	1.17
2024-2033	0.78	1.39	2.17	1.84	1.84	1.96	1.11
2024-2043	0.66	0.90	1.67	1.08	1.85	1.88	1.03

APPENDIX D HIGH AND LOW FORECASTS

Table 77: Gross LRZ Energy Forecasts (Annual Metered Load in GWh) —High

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	93,744	62,522	51,632	48,914	36,143	81,494	91,700	37,037	115,299	21,880
2023	96,946	65,092	54,212	51,264	37,366	84,066	98,263	37,716	120,494	22,541
2024	101,121	65,539	55,415	53,518	38,183	87,003	100,282	38,102	125,735	22,912
2025	103,327	66,382	56,506	53,925	39,005	88,999	102,692	38,592	129,543	23,306
2026	104,572	67,211	57,611	53,612	39,816	91,119	104,211	39,145	132,022	23,552
2027	105,820	67,938	58,610	53,630	40,374	93,143	104,860	39,690	134,724	23,767
2028	107,230	68,673	59,505	53,649	40,708	94,890	105,223	40,226	137,320	23,968
2029	108,462	69,430	60,380	53,716	40,996	96,679	105,796	40,750	139,383	24,109
2030	109,478	70,179	61,264	53,812	41,263	98,213	106,392	41,204	141,189	24,241
2031	110,519	70,897	62,146	53,948	41,453	99,626	107,068	41,625	142,611	24,375
2032	111,586	71,590	63,056	54,074	41,597	101,055	107,763	42,048	143,371	24,488
2033	112,572	72,264	63,980	54,218	41,723	102,378	108,459	42,414	144,356	24,575
2034	113,530	72,972	64,990	54,317	41,836	103,794	109,198	42,798	145,841	24,684
2035	114,467	73,713	66,017	54,448	41,958	105,055	110,079	43,236	146,705	24,861
2036	115,459	74,440	67,133	54,559	42,079	106,478	110,884	43,701	147,964	25,008
2037	116,440	75,198	68,179	54,661	42,166	108,036	111,647	44,167	149,369	25,133
2038	117,283	75,928	69,255	54,732	42,229	109,410	112,346	44,663	150,714	25,271
2039	117,940	76,605	70,223	54,785	42,195	110,762	112,936	45,187	152,337	25,417
2040	118,573	77,327	71,261	54,848	42,057	112,174	113,578	45,741	153,882	25,575
2041	118,792	78,037	72,346	54,836	41,877	113,474	114,183	46,241	155,654	25,713
2042	119,122	78,694	73,614	54,893	41,718	114,846	114,915	46,750	157,002	25,848
2043	119,811	79,338	74,777	54,941	41,599	116,155	115,592	47,246	158,522	25,981
Compound Annual Growth Rates (%)										
2024-2028	1.48	1.17	1.80	0.06	1.61	2.19	1.21	1.37	2.23	1.13
2024-2033	1.20	1.09	1.61	0.14	0.99	1.82	0.87	1.20	1.55	0.78
2024-2043	0.90	1.01	1.59	0.14	0.45	1.53	0.75	1.14	1.23	0.66

APPENDIX D HIGH AND LOW FORECASTS

Table 78: Gross Summer[13] Non-Coincident Peak Demand (Metered Load in MW) —High

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	16,244	11,644	9,461	9,367	7,334	14,934	18,643	7,306	20,741	4,557
2023	16,798	12,122	9,933	9,817	7,582	15,406	19,978	7,440	21,675	4,695
2024	17,522	12,205	10,154	10,249	7,747	15,944	20,388	7,516	22,618	4,772
2025	17,904	12,362	10,354	10,326	7,914	16,310	20,878	7,613	23,303	4,854
2026	18,120	12,517	10,556	10,267	8,079	16,698	21,187	7,722	23,749	4,905
2027	18,336	12,652	10,739	10,270	8,192	17,069	21,319	7,829	24,235	4,950
2028	18,580	12,789	10,903	10,274	8,260	17,389	21,393	7,935	24,702	4,992
2029	18,794	12,930	11,064	10,286	8,318	17,717	21,509	8,038	25,073	5,021
2030	18,970	13,070	11,225	10,305	8,372	17,998	21,631	8,128	25,398	5,049
2031	19,150	13,203	11,387	10,331	8,411	18,257	21,768	8,211	25,654	5,077
2032	19,335	13,332	11,554	10,355	8,440	18,519	21,909	8,294	25,790	5,100
2033	19,506	13,458	11,723	10,383	8,466	18,761	22,051	8,366	25,968	5,118
2034	19,672	13,590	11,908	10,402	8,489	19,021	22,201	8,442	26,235	5,141
2035	19,834	13,728	12,096	10,427	8,513	19,252	22,380	8,528	26,390	5,178
2036	20,006	13,863	12,301	10,448	8,538	19,513	22,544	8,620	26,617	5,208
2037	20,176	14,004	12,492	10,467	8,556	19,798	22,699	8,712	26,869	5,234
2038	20,322	14,140	12,690	10,481	8,568	20,050	22,841	8,810	27,111	5,263
2039	20,436	14,266	12,867	10,491	8,562	20,298	22,961	8,913	27,403	5,294
2040	20,546	14,401	13,057	10,503	8,534	20,557	23,092	9,023	27,681	5,327
2041	20,584	14,533	13,256	10,501	8,497	20,795	23,215	9,121	28,000	5,355
2042	20,641	14,655	13,488	10,512	8,465	21,046	23,363	9,222	28,242	5,383
2043	20,760	14,775	13,701	10,521	8,441	21,286	23,501	9,319	28,516	5,411
Compound Annual Growth Rates (%)										
2024-2028	1.48	1.17	1.80	0.06	1.61	2.19	1.21	1.37	2.23	1.13
2024-2033	1.20	1.09	1.61	0.14	0.99	1.82	0.87	1.20	1.55	0.78
2024-2043	0.90	1.01	1.59	0.14	0.45	1.53	0.75	1.14	1.23	0.66

[13] The summer peak is picked from monthly peaks, which is the highest value of monthly peaks of May through October for each LRZ.

APPENDIX D HIGH AND LOW FORECASTS

Table 79: Gross Winter[14] Non-Coincident Peak Demand (Metered Load in MW) —High

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	13,887	9,025	7,620	7,667	5,939	12,874	12,893	6,133	18,097	3,669
2023	14,361	9,396	8,000	8,035	6,139	13,280	13,815	6,245	18,913	3,780
2024	14,980	9,460	8,178	8,389	6,274	13,744	14,099	6,309	19,735	3,842
2025	15,306	9,582	8,339	8,452	6,409	14,059	14,438	6,391	20,333	3,908
2026	15,491	9,701	8,502	8,403	6,542	14,394	14,652	6,482	20,722	3,949
2027	15,676	9,806	8,650	8,406	6,634	14,714	14,743	6,572	21,146	3,985
2028	15,885	9,913	8,782	8,409	6,689	14,990	14,794	6,661	21,554	4,019
2029	16,067	10,022	8,911	8,420	6,736	15,272	14,874	6,748	21,877	4,042
2030	16,218	10,130	9,041	8,435	6,780	15,515	14,958	6,823	22,161	4,065
2031	16,372	10,233	9,171	8,456	6,811	15,738	15,053	6,893	22,384	4,087
2032	16,530	10,334	9,306	8,476	6,835	15,964	15,151	6,963	22,504	4,106
2033	16,676	10,431	9,442	8,498	6,855	16,173	15,249	7,023	22,658	4,121
2034	16,818	10,533	9,591	8,514	6,874	16,396	15,353	7,087	22,891	4,139
2035	16,957	10,640	9,743	8,535	6,894	16,596	15,477	7,159	23,027	4,169
2036	17,104	10,745	9,907	8,552	6,914	16,820	15,590	7,237	23,224	4,193
2037	17,249	10,854	10,062	8,568	6,928	17,066	15,697	7,314	23,445	4,214
2038	17,374	10,960	10,221	8,579	6,939	17,283	15,795	7,396	23,656	4,237
2039	17,471	11,057	10,363	8,587	6,933	17,497	15,878	7,483	23,911	4,262
2040	17,565	11,162	10,517	8,597	6,910	17,720	15,969	7,574	24,153	4,288
2041	17,597	11,264	10,677	8,595	6,881	17,925	16,054	7,657	24,431	4,311
2042	17,646	11,359	10,864	8,604	6,855	18,142	16,157	7,741	24,643	4,334
2043	17,748	11,452	11,035	8,612	6,835	18,349	16,252	7,823	24,882	4,356
Compound Annual Growth Rates (%)										
2024-2028	1.48	1.17	1.80	0.06	1.61	2.19	1.21	1.37	2.23	1.13
2024-2033	1.20	1.09	1.61	0.14	0.99	1.82	0.87	1.20	1.55	0.78
2024-2043	0.90	1.01	1.59	0.14	0.45	1.53	0.75	1.14	1.23	0.66

[14] The winter peak is picked from monthly peaks, which is the highest value of monthly peaks of November through April for each LRZ.

APPENDIX D HIGH AND LOW FORECASTS

Table 80: Gross MISO System Energy (Annual Metered Load in GWh) —High

Year	MISO Energy
2022	640,364
2023	667,961
2024	687,810
2025	702,277
2026	712,872
2027	722,556
2028	731,392
2029	739,699
2030	747,235
2031	754,268
2032	760,629
2033	766,939
2034	773,960
2035	780,541
2036	787,704
2037	794,995
2038	801,831
2039	808,387
2040	815,016
2041	821,153
2042	827,403
2043	833,962
Compound Annual Growth Rates (%)	
2024-2028	1.55
2024-2033	1.22
2024-2043	1.02

APPENDIX D HIGH AND LOW FORECASTS

Table 81: Gross MISO System Coincident Peak Demand (Metered Load in MW) —High

Year	MISO Summer[15] CP	MISO Winter[16] CP
2022	115,155	94,338
2023	120,152	98,345
2024	123,654	101,277
2025	126,235	103,400
2026	128,131	104,963
2027	129,845	106,401
2028	131,396	107,712
2029	132,864	108,941
2030	134,199	110,055
2031	135,446	111,091
2032	136,579	112,027
2033	137,700	112,953
2034	138,944	113,985
2035	140,121	114,950
2036	141,395	116,003
2037	142,689	117,075
2038	143,903	118,080
2039	145,064	119,046
2040	146,239	120,021
2041	147,327	120,922
2042	148,440	121,839
2043	149,601	122,801
Compound Annual Growth Rates (%)		
2024-2028	1.53	1.55
2024-2033	1.20	1.22
2024-2043	1.01	1.02

[15] The MISO summer peak is picked from MISO monthly coincident peaks, which is the highest value of MISO monthly coincident peaks of May through October.

[16] The MISO winter peak is picked from MISO monthly coincident peaks, which is the highest value of MISO monthly coincident peaks of November through April.

APPENDIX D HIGH AND LOW FORECASTS

Table 82: Gross State Energy Forecasts (Annual Retail Sales in GWh) —Low

Year	AR	IL	IN	IA	KY	LA	MI	MN
1990	27,365	111,577	73,982	29,437	61,097	63,826	82,367	47,167
1991	28,440	116,869	77,034	30,781	64,194	64,704	84,519	48,755
1992	28,451	112,521	76,977	30,208	67,068	65,098	83,840	47,412
1993	31,663	117,786	81,931	32,104	68,149	67,756	87,589	49,211
1994	32,619	121,490	83,808	33,039	72,485	70,132	91,160	51,155
1995	34,671	126,231	87,006	34,301	74,548	72,827	94,701	53,959
1996	36,137	125,990	88,901	34,999	77,019	75,269	96,302	54,942
1997	36,858	126,953	89,147	36,148	76,836	75,886	97,391	55,674
1998	39,315	131,697	92,059	37,318	75,850	77,716	100,506	56,744
1999	39,789	132,682	96,735	38,034	79,098	78,267	103,981	57,399
2000	41,611	134,697	97,775	39,088	78,316	80,690	104,772	59,782
2001	41,732	136,034	97,734	39,444	79,975	74,693	102,409	60,687
2002	42,450	138,447	101,429	40,898	87,267	79,261	104,714	62,162
2003	43,108	136,248	100,468	41,207	85,220	77,769	108,877	63,087
2004	43,672	139,254	103,094	40,903	86,521	79,737	106,606	63,340
2005	46,165	144,986	106,549	42,757	89,351	77,389	110,445	66,019
2006	46,636	142,448	105,664	43,337	88,743	77,468	108,018	66,770
2007	47,055	146,055	109,420	45,270	92,404	79,567	109,297	68,231
2008	46,135	144,620	106,981	45,488	93,428	78,726	105,781	68,794
2009	43,173	136,688	99,312	43,641	88,897	78,670	98,121	64,004
2010	48,194	144,761	105,994	45,445	93,569	85,080	103,649	67,800
2011	47,928	142,886	105,818	45,655	89,538	86,369	105,054	68,533
2012	46,860	143,540	105,173	45,709	89,048	84,731	104,818	67,989
2013	46,683	141,805	105,487	46,705	84,764	85,808	103,038	68,644
2014	47,080	141,540	106,943	47,202	78,839	90,628	103,314	68,719
2015	46,465	138,620	104,515	47,147	76,039	91,676	102,480	66,579
2016	46,188	141,050	103,705	48,431	74,554	91,453	104,468	66,546
2017	46,086	137,196	98,966	48,922	72,634	91,206	101,899	67,153
2018	49,603	142,655	104,194	51,211	76,611	94,186	104,869	68,708
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	45,851	132,469	97,156	50,640	71,800	89,127	97,012	64,055
2021	48,663	135,689	99,740	52,893	74,517	90,819	99,813	66,589
2022	49,755	134,783	105,410	48,972	79,128	82,115	97,829	68,615
2023	49,214	138,335	105,053	49,009	79,410	79,833	98,065	69,171
2024	49,277	137,820	101,973	49,508	79,099	76,340	98,274	69,086
2025	49,533	137,454	103,103	50,096	79,658	77,128	99,026	69,746
2026	49,908	135,325	104,585	50,782	80,694	77,289	98,810	69,739
2027	50,531	134,321	106,452	51,426	81,415	78,118	98,466	69,795
2028	51,163	133,525	107,779	51,949	82,296	78,940	98,006	70,144
2029	51,794	132,877	109,267	52,494	83,316	79,425	97,864	70,475
2030	52,361	132,438	110,311	53,056	84,333	79,830	97,854	70,607
2031	52,894	132,156	111,190	53,635	85,346	79,841	97,969	70,799
2032	53,418	131,901	112,055	54,279	86,538	79,359	98,192	71,075
2033	53,887	131,720	112,836	54,916	87,672	79,190	98,432	71,293
2034	54,383	131,445	113,763	55,673	88,912	79,532	98,752	71,543
2035	54,952	131,361	114,656	56,464	89,977	79,127	99,251	71,708
2036	55,573	131,262	115,549	57,336	91,426	79,197	99,718	71,963
2037	56,186	131,086	116,743	58,164	92,993	79,450	100,118	72,283
2038	56,858	130,880	117,848	59,038	94,260	79,619	100,537	72,546
2039	57,555	130,579	118,832	59,787	95,591	80,144	100,784	72,593
2040	58,298	130,410	119,812	60,618	97,127	80,393	101,147	72,699
2041	58,977	130,011	120,683	61,527	98,484	80,783	101,495	72,364
2042	59,663	129,825	121,532	62,551	100,071	81,002	101,905	72,113
2043	60,340	129,645	122,415	63,595	101,554	81,212	102,328	72,157
Compound Annual Growth Rates (%)								
2024-2028	0.94	-0.79	1.39	1.21	1.00	0.84	-0.07	0.38
2024-2033	1.00	-0.50	1.13	1.16	1.15	0.41	0.02	0.35
2024-2043	1.07	-0.32	0.97	1.33	1.32	0.33	0.21	0.23

APPENDIX D HIGH AND LOW FORECASTS

Table 82: Gross State Energy Forecasts (Annual Retail Sales in GWh) —Low – continued

Year	MS	MO	MT	ND	SD	TX	WI
1990	32,127	53,925	13,125	7,014	6,334	237,415	49,198
1991	33,019	56,514	13,407	7,255	6,685	240,352	51,032
1992	33,241	54,411	13,096	7,128	6,494	239,431	50,925
1993	34,749	58,622	12,929	7,432	6,905	250,084	53,156
1994	36,627	59,693	13,184	7,681	7,174	258,180	55,412
1995	37,868	62,259	13,419	7,883	7,414	263,279	57,967
1996	39,622	64,843	13,820	8,314	7,736	278,450	58,744
1997	40,089	65,711	11,917	8,282	7,773	286,704	60,094
1998	42,510	69,010	14,145	8,220	7,824	304,705	62,061
1999	43,980	69,045	13,282	9,112	7,922	301,844	63,547
2000	45,336	72,643	14,580	9,413	8,283	318,263	65,146
2001	44,287	73,213	11,447	9,810	8,627	318,044	65,218
2002	45,452	75,001	12,831	10,219	8,937	320,846	66,999
2003	45,544	74,240	12,825	10,461	9,080	322,686	67,241
2004	46,033	74,054	12,957	10,516	9,214	320,615	67,976
2005	45,901	80,940	13,479	10,840	9,811	334,258	70,336
2006	46,936	82,015	13,815	11,245	10,056	342,724	69,821
2007	48,153	85,533	15,532	11,906	10,603	343,829	71,301
2008	47,721	84,382	15,326	12,416	10,974	347,815	70,122
2009	46,049	79,897	14,354	12,649	11,010	345,351	66,286
2010	49,687	86,085	13,771	12,956	11,356	358,458	68,752
2011	49,338	84,255	13,788	13,737	11,680	376,065	68,612
2012	48,388	82,435	13,863	14,717	11,734	365,104	68,820
2013	48,782	83,407	14,045	16,033	12,210	378,817	69,124
2014	49,409	83,878	14,102	18,240	12,355	389,670	69,495
2015	48,692	81,504	14,207	18,129	12,102	392,337	68,699
2016	49,050	78,618	14,101	18,520	12,130	398,662	69,736
2017	47,829	76,461	14,710	20,140	12,314	401,880	69,079
2018	50,390	82,056	14,839	20,670	12,857	424,419	70,960
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	46,482	75,726	14,584	21,819	12,696	426,863	67,448
2021	48,015	77,763	14,962	22,863	13,041	435,628	69,427
2022	48,453	81,896	13,482	22,320	13,296	428,152	71,240
2023	47,927	82,942	13,433	22,012	13,396	432,333	70,777
2024	48,530	83,655	13,495	22,547	13,475	435,524	70,376
2025	49,261	84,223	13,455	22,723	13,727	437,743	70,536
2026	49,705	84,633	13,417	22,800	13,929	443,789	70,758
2027	50,115	85,335	13,369	23,041	14,135	448,051	71,134
2028	50,503	85,684	13,429	23,165	14,353	455,058	71,587
2029	50,777	85,995	13,384	23,097	14,555	461,308	72,093
2030	51,035	86,328	13,369	23,029	14,763	466,850	72,617
2031	51,305	86,546	13,432	22,983	14,982	472,531	73,159
2032	51,532	86,697	13,484	22,896	15,232	478,184	73,647
2033	51,693	86,855	13,483	22,836	15,477	483,471	74,170
2034	51,923	87,030	13,562	22,668	15,754	490,018	74,737
2035	52,284	87,222	13,670	22,594	16,046	497,127	75,352
2036	52,587	87,457	13,780	22,523	16,360	503,705	75,986
2037	52,840	87,642	13,750	22,429	16,666	510,761	76,678
2038	53,129	87,791	13,638	22,197	16,984	517,812	77,353
2039	53,413	87,756	13,605	21,958	17,290	525,042	77,979
2040	53,745	87,504	13,627	21,466	17,606	532,847	78,666
2041	54,026	87,149	13,695	20,982	17,922	541,115	79,313
2042	54,305	86,864	13,851	20,705	18,246	549,481	79,954
2043	54,585	86,673	14,089	20,537	18,590	557,480	80,560
Compound Annual Growth Rates (%)							
2024-2028	1.00	0.60	-0.12	0.68	1.59	1.10	0.43
2024-2033	0.70	0.42	-0.01	0.14	1.55	1.17	0.59
2024-2043	0.62	0.19	0.23	-0.49	1.71	1.31	0.71

APPENDIX D HIGH AND LOW FORECASTS

Table 83: Gross LRZ Energy Forecasts (Annual Metered Load in GWh) —Low

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	93,744	62,522	51,632	48,914	36,143	81,494	91,700	37,037	115,299	21,880
2023	92,507	60,320	49,960	49,263	36,083	79,554	87,629	35,955	107,078	21,173
2024	92,564	60,010	50,430	49,079	36,256	78,091	87,815	36,001	103,699	21,439
2025	93,329	60,168	50,998	48,949	36,377	78,820	88,488	36,189	104,634	21,763
2026	93,430	60,336	51,626	48,191	36,431	79,906	88,294	36,463	105,157	21,958
2027	93,663	60,621	52,230	47,833	36,606	81,022	87,987	36,918	106,255	22,140
2028	94,185	60,963	52,726	47,549	36,606	81,974	87,576	37,379	107,508	22,311
2029	94,609	61,359	53,245	47,319	36,592	83,056	87,449	37,840	108,373	22,432
2030	94,856	61,776	53,781	47,163	36,584	83,945	87,440	38,254	109,114	22,546
2031	95,196	62,211	54,336	47,062	36,517	84,761	87,543	38,644	109,461	22,666
2032	95,600	62,609	54,956	46,971	36,420	85,648	87,742	39,026	109,302	22,766
2033	95,946	63,034	55,569	46,907	36,320	86,474	87,957	39,369	109,442	22,837
2034	96,331	63,499	56,297	46,809	36,223	87,408	88,242	39,731	110,178	22,939
2035	96,684	64,009	57,060	46,779	36,143	88,252	88,689	40,146	110,184	23,098
2036	97,134	64,532	57,901	46,744	36,077	89,262	89,106	40,601	110,644	23,232
2037	97,605	65,099	58,699	46,681	35,985	90,453	89,463	41,048	111,319	23,344
2038	97,955	65,653	59,541	46,608	35,877	91,476	89,837	41,539	111,909	23,471
2039	98,109	66,161	60,259	46,500	35,684	92,475	90,058	42,048	112,872	23,597
2040	98,273	66,722	61,058	46,440	35,397	93,560	90,383	42,590	113,587	23,743
2041	98,029	67,251	61,924	46,298	35,067	94,521	90,694	43,087	114,474	23,867
2042	97,955	67,778	62,905	46,232	34,768	95,572	91,060	43,587	115,192	23,991
2043	98,218	68,277	63,908	46,168	34,512	96,592	91,438	44,082	115,879	24,115
Compound Annual Growth Rates (%)										
2024-2028	0.44	0.39	1.12	-0.79	0.24	1.22	-0.07	0.94	0.91	1.00
2024-2033	0.40	0.55	1.08	-0.50	0.02	1.14	0.02	1.00	0.60	0.70
2024-2043	0.31	0.68	1.25	-0.32	-0.26	1.13	0.21	1.07	0.59	0.62

APPENDIX D HIGH AND LOW FORECASTS

Table 84: Gross Summer Non-Coincident Peak Demand (Metered Load in MW) —Low

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	16,244	11,644	9,461	9,367	7,334	14,934	18,643	7,306	20,741	4,557
2023	16,029	11,233	9,154	9,434	7,321	14,579	17,816	7,092	19,262	4,410
2024	16,039	11,176	9,240	9,399	7,357	14,311	17,854	7,101	18,654	4,465
2025	16,172	11,205	9,344	9,374	7,381	14,444	17,991	7,138	18,822	4,533
2026	16,189	11,236	9,459	9,228	7,392	14,643	17,951	7,192	18,916	4,573
2027	16,230	11,290	9,570	9,160	7,427	14,848	17,889	7,282	19,114	4,611
2028	16,320	11,353	9,661	9,106	7,427	15,022	17,805	7,373	19,339	4,647
2029	16,393	11,427	9,756	9,061	7,425	15,221	17,779	7,464	19,495	4,672
2030	16,436	11,505	9,854	9,032	7,423	15,383	17,778	7,546	19,628	4,696
2031	16,495	11,586	9,956	9,012	7,409	15,533	17,798	7,623	19,690	4,721
2032	16,565	11,660	10,070	8,995	7,390	15,696	17,839	7,698	19,662	4,742
2033	16,625	11,739	10,182	8,983	7,370	15,847	17,883	7,766	19,687	4,756
2034	16,692	11,825	10,315	8,964	7,350	16,018	17,941	7,837	19,819	4,777
2035	16,753	11,920	10,455	8,958	7,333	16,173	18,031	7,919	19,821	4,811
2036	16,831	12,018	10,609	8,951	7,320	16,358	18,116	8,009	19,903	4,839
2037	16,913	12,123	10,755	8,939	7,302	16,576	18,189	8,097	20,025	4,862
2038	16,973	12,227	10,910	8,925	7,280	16,764	18,265	8,194	20,131	4,888
2039	17,000	12,321	11,041	8,905	7,241	16,947	18,310	8,294	20,304	4,915
2040	17,028	12,426	11,188	8,893	7,182	17,145	18,376	8,401	20,433	4,945
2041	16,986	12,524	11,346	8,866	7,115	17,322	18,439	8,499	20,592	4,971
2042	16,973	12,622	11,526	8,853	7,055	17,514	18,513	8,598	20,721	4,997
2043	17,019	12,715	11,710	8,841	7,003	17,701	18,590	8,695	20,845	5,022
Compound Annual Growth Rates (%)										
2024-2028	0.44	0.39	1.12	-0.79	0.24	1.22	-0.07	0.94	0.91	1.00
2024-2033	0.40	0.55	1.08	-0.50	0.02	1.14	0.02	1.00	0.60	0.70
2024-2043	0.31	0.68	1.25	-0.32	-0.26	1.13	0.21	1.07	0.59	0.62

APPENDIX D HIGH AND LOW FORECASTS

Table 85: Gross Winter Non-Coincident Peak Demand (Metered Load in MW) —Low

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2022	13,887	9,025	7,620	7,667	5,939	12,874	12,893	6,133	18,097	3,669
2023	13,704	8,707	7,373	7,722	5,929	12,567	12,320	5,954	16,807	3,550
2024	13,712	8,662	7,442	7,693	5,957	12,336	12,346	5,962	16,277	3,595
2025	13,825	8,685	7,526	7,673	5,977	12,451	12,441	5,993	16,423	3,649
2026	13,840	8,709	7,619	7,554	5,986	12,623	12,414	6,038	16,505	3,682
2027	13,875	8,750	7,708	7,498	6,015	12,799	12,371	6,113	16,678	3,712
2028	13,952	8,800	7,781	7,453	6,015	12,949	12,313	6,190	16,874	3,741
2029	14,015	8,857	7,858	7,417	6,012	13,120	12,295	6,266	17,010	3,761
2030	14,052	8,917	7,937	7,393	6,011	13,261	12,294	6,335	17,126	3,780
2031	14,102	8,980	8,019	7,377	6,000	13,390	12,308	6,399	17,181	3,800
2032	14,162	9,037	8,110	7,363	5,984	13,530	12,336	6,462	17,156	3,817
2033	14,213	9,099	8,201	7,352	5,968	13,660	12,366	6,519	17,178	3,829
2034	14,270	9,166	8,308	7,337	5,952	13,808	12,406	6,579	17,293	3,846
2035	14,322	9,239	8,421	7,332	5,938	13,941	12,469	6,648	17,294	3,873
2036	14,389	9,315	8,545	7,327	5,928	14,101	12,528	6,723	17,367	3,895
2037	14,459	9,397	8,663	7,317	5,913	14,289	12,578	6,797	17,473	3,914
2038	14,511	9,477	8,787	7,306	5,895	14,450	12,631	6,878	17,565	3,936
2039	14,534	9,550	8,893	7,289	5,863	14,608	12,662	6,963	17,716	3,957
2040	14,558	9,631	9,011	7,279	5,816	14,780	12,707	7,053	17,829	3,981
2041	14,522	9,707	9,139	7,257	5,762	14,931	12,751	7,135	17,968	4,002
2042	14,511	9,783	9,283	7,247	5,713	15,097	12,803	7,218	18,081	4,023
2043	14,550	9,855	9,431	7,237	5,671	15,259	12,856	7,300	18,188	4,043
Compound Annual Growth Rates (%)										
2024-2028	0.44	0.39	1.12	-0.79	0.24	1.22	-0.07	0.94	0.91	1.00
2024-2033	0.40	0.55	1.08	-0.50	0.02	1.14	0.02	1.00	0.60	0.70
2024-2043	0.31	0.68	1.25	-0.32	-0.26	1.13	0.21	1.07	0.59	0.62

APPENDIX D HIGH AND LOW FORECASTS

Table 86: Gross MISO System Energy (Annual Metered Load in GWh)—Low

Year	MISO Energy
2022	640,364
2023	619,522
2024	615,386
2025	619,714
2026	621,790
2027	625,275
2028	628,777
2029	632,273
2030	635,458
2031	638,396
2032	641,040
2033	643,855
2034	647,657
2035	651,044
2036	655,232
2037	659,696
2038	663,865
2039	667,764
2040	671,755
2041	675,213
2042	679,040
2043	683,189
Compound Annual Growth Rates (%)	
2024-2028	0.54
2024-2033	0.50
2024-2043	0.55

APPENDIX D HIGH AND LOW FORECASTS

Table 87: Gross MISO System Coincident Peak Demand (Metered Load in MW) —Low

Year	MISO Summer[17] CP	MISO Winter[18] CP
2022	115,155	94,338
2023	111,444	91,312
2024	110,742	90,697
2025	111,512	91,334
2026	111,872	91,649
2027	112,483	92,179
2028	113,086	92,708
2029	113,697	93,233
2030	114,259	93,709
2031	114,780	94,145
2032	115,253	94,536
2033	115,754	94,951
2034	116,426	95,511
2035	117,037	96,008
2036	117,784	96,625
2037	118,577	97,284
2038	119,320	97,898
2039	120,010	98,475
2040	120,720	99,063
2041	121,337	99,572
2042	122,020	100,135
2043	122,757	100,744
Compound Annual Growth Rates (%)		
2024-2028	0.52	0.55
2024-2033	0.49	0.51
2024-2043	0.54	0.55

[17] The MISO summer peak is picked from MISO monthly coincident peaks, which is the highest value of MISO monthly coincident peaks of May through October.

[18] The MISO winter peak is picked from MISO monthly coincident peaks, which is the highest value of MISO monthly coincident peaks of November through April.