2022 MISO Energy and Peak Demand Forecasting for System Planning

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This report provides the ninth 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 were available last year and this year. Thus, as in the 2021 report, all projections in this report are on a gross basis.

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, weather and existing EE programs. 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 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 (2023-2042) (%)

STATE	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
Gross	1.27	0.05	1.33	1.75	1.78	0.91	0.69	0.61	0.85	0.67	1.51	0.76	2.07	1.75	1.07

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, normal weather and existing EE programs 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 (2023-2042) (%)

LRZ	1	2	3	4	5	6	7	8	9	10
Gross	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

[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 (2023-2042) (%)

MISO-System	Gross
Energy	0.99
July Peak Demand	0.98

[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

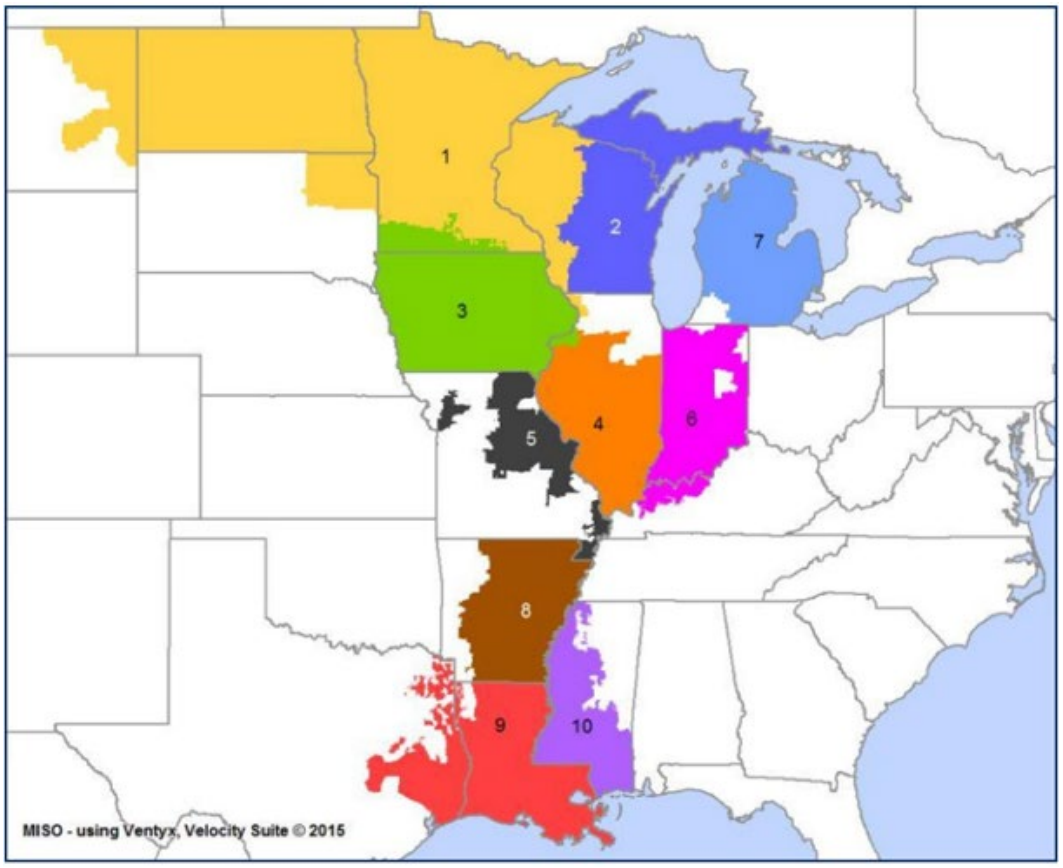
INTRODUCTION

This report represents the ninth 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 4th 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, weather, and existing energy efficiency (EE) programs based on the difference between the estimate of LRZ retail sales from state sales forecasts for the year 2021 and the weather-normalized LRZ metered load for the year 2021 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.

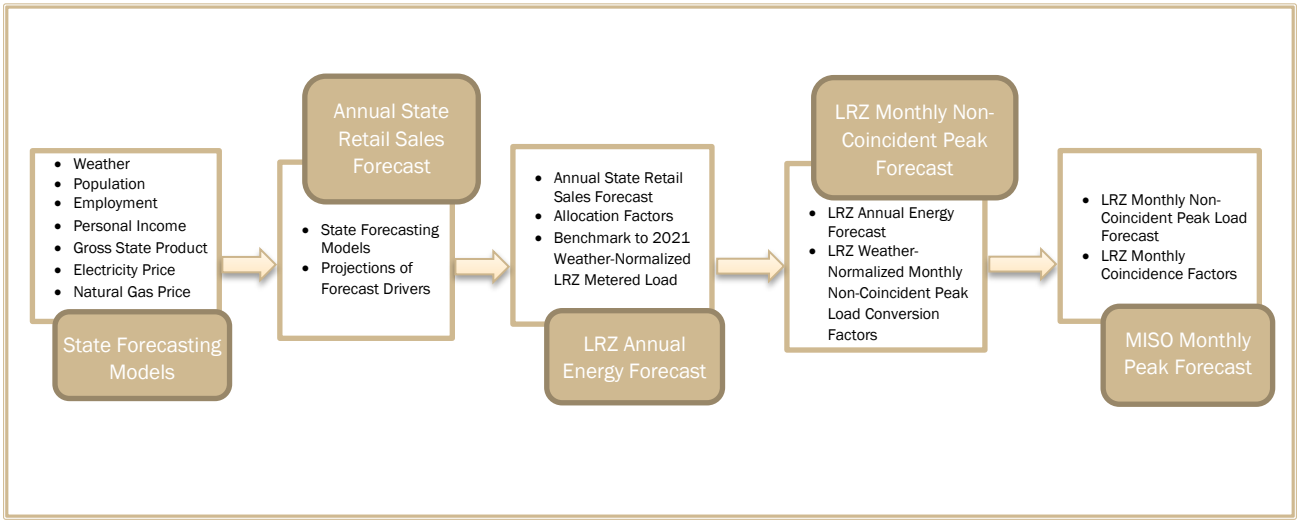
FORECASTING METHODOLOGY

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 2023 to 2042. 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.

CONVERSION OF RETAIL SALES TO METERED LOAD AND BENCHMARKING TO 2021 LEVELS

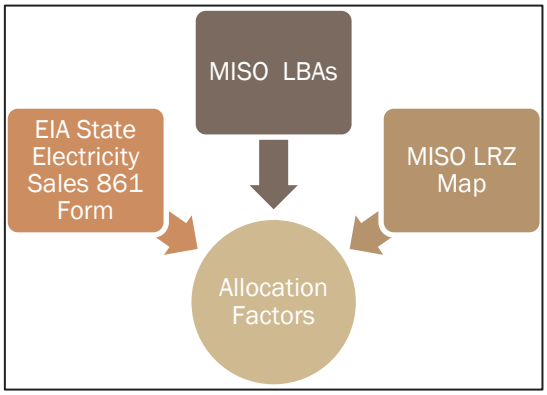
The state-level forecasts represent annual (calendar year) retail sales (electricity usage at the customer locations). This is driven by data availability, since statewide historical sales are available from the U.S. Department of Energy's Energy Information Administration (EIA). Since 2021 state electricity 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 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 2021 (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 2021.

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.

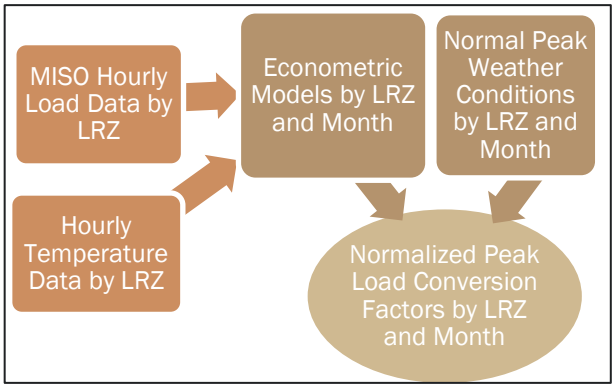
Figure 3: Structure and Logic Diagram for Allocation Factors



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, 1990-2020	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, 1997-2021	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.*

STATE BY STATE RESULTS

STATE-BY-STATE RESULTS

ARKANSAS

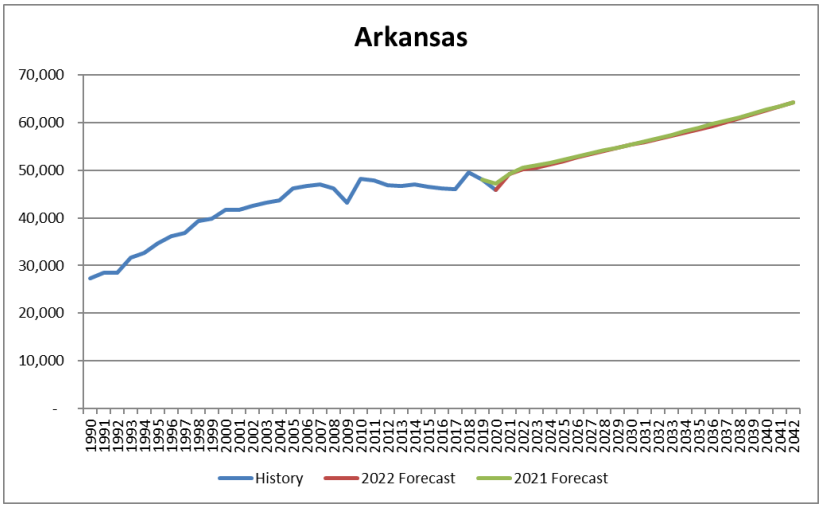
The Arkansas state econometric model uses real electricity price, real GSP, CDDs, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 2.

Table 2: Arkansas Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP
-0.32	1.85

Arkansas annual electricity sales are projected to grow at 1.27% in this forecast, which is very similar to the 1.21% growth rate projected in the 2021 forecast. Figure 5 shows Arkansas sales projection for the 2021 and 2022 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 2016 to 2020, 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
72.40%	27.60%

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 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 2023-2042 (%)

LRZ	Annual Energy[8]
LRZ8	1.27

[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

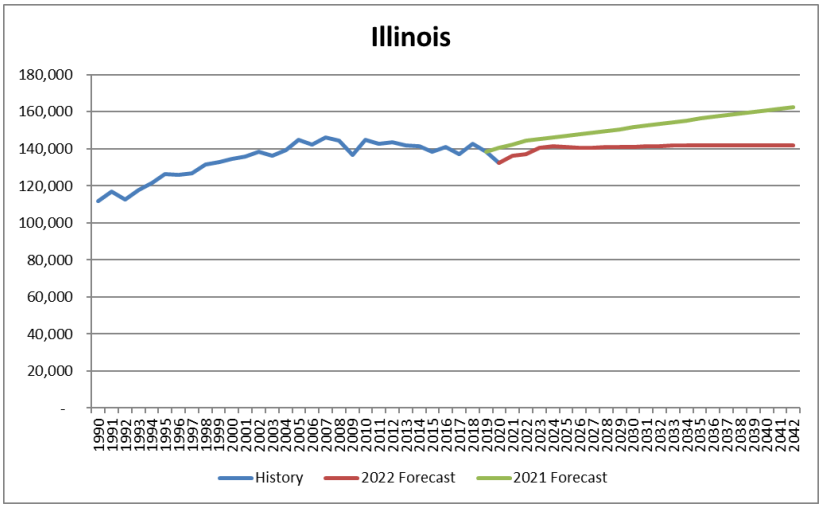
The Illinois state econometric model uses real electricity and natural gas prices, non-manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 5.

Table 5: Illinois Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Non-Manufacturing Employment
-0.46	0.10	0.05

Illinois annual electricity sales are projected to grow at 0.05% in this forecast, which is substantially lower than the 0.59% growth rate projected in the 2021 forecast. It should be noted that the primary economic driver for the econometric model was changed from real GSP to non-manufacturing employment. SUFG was unable to construct an acceptable model with real GSP as a driver for this forecast. Figure 6 shows Illinois sales projection for the 2021 and 2022 forecasts.

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 2016 to 2020, 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%	1.47%	32.68%	65.85%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ3	1.68
LRZ4	0.05

STATE BY STATE RESULTS

INDIANA

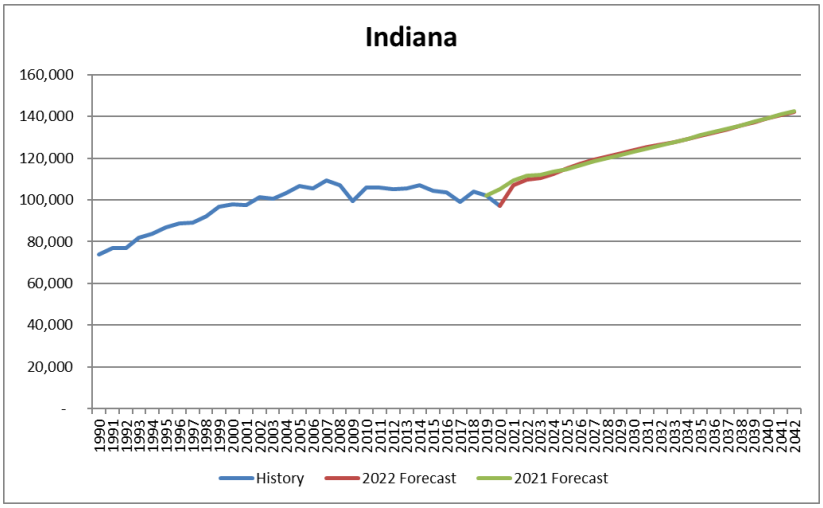
The Indiana state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 8.

Table 8: Indiana Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP
-0.48	1.86

Indiana annual electricity sales are projected to grow at 1.33% in this forecast, which is slightly higher than the 1.23% growth rate projected in the 2021 forecast. Figure 7 shows Indiana sales projections for the 2021 and 2022 forecasts. Despite having a slightly higher growth rate, the 2022 forecast lies closely to the 2021 forecast due to a slightly lower starting point.

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 2016 to 2020, 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
50.48%	49.52%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ6	1.53

STATE BY STATE RESULTS

IOWA

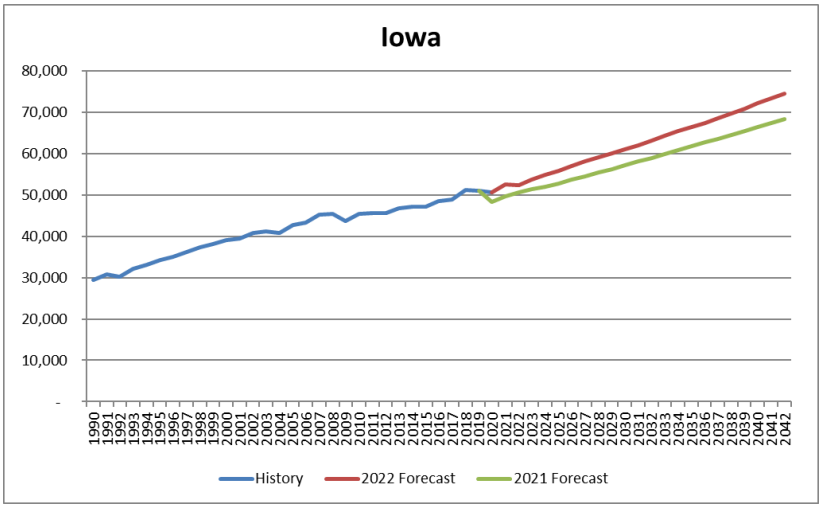
The Iowa state econometric model uses real electricity price, real GSP, real personal income per person and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 11.

Table 11: Iowa Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP	Real Personal Income/Population
-0.30	2.01	1.93

Iowa annual electricity sales are projected to grow at 1.75% in this forecast, which is higher than the 1.52% growth rate projected in the 2021 forecast. Figure 8 shows sales projection for the 2021 and 2022 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 2016 to 2020, 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
1.81%	91.42%	6.77%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ3	1.68

STATE BY STATE RESULTS

KENTUCKY

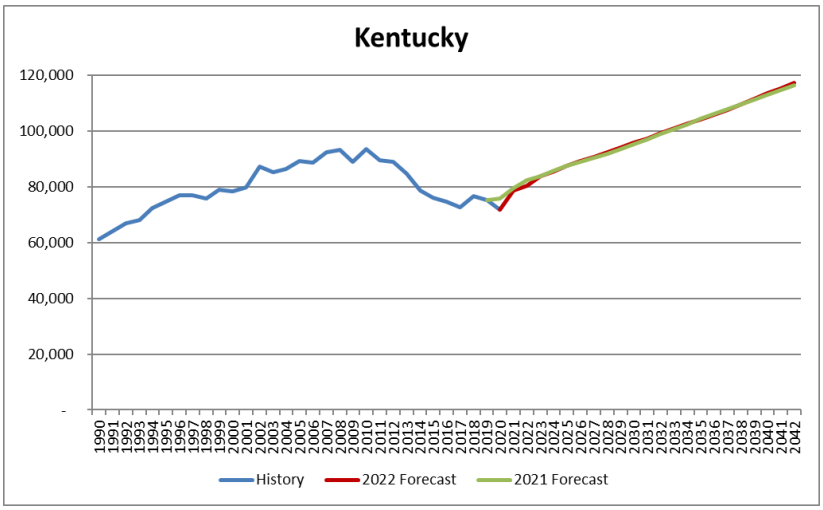
The Kentucky state econometric model uses real electricity and natural gas prices, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 14.

Table 14: Kentucky Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.35	0.54	1.85

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 1.78% in this forecast, which is similar to the 1.76% growth rate projected in the 2021 forecast. Figure 9 shows Kentucky sales projection for the 2021 and 2022 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 2016 to 2020, 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
50.48%	49.52%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ6	1.53

STATE BY STATE RESULTS

LOUISIANA

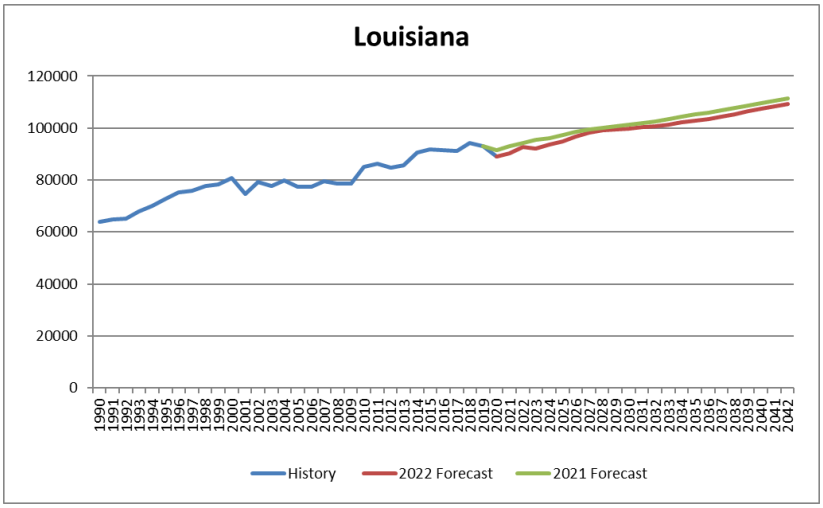
The Louisiana state econometric model uses real electricity and natural gas prices, real GSP excluding the mining sector, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 17.

Table 17: Louisiana Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP Excluding Mining Sector
-0.33	0.25	1.77%

Louisiana annual electricity sales are projected to grow at 0.91% in this forecast, which is slightly higher than the 0.83% growth rate projected in the 2021 forecast. Figure 10 shows Louisiana sales projections for the 2021 and 2022 forecasts. Despite having a higher growth rate, the 2022 forecast lies slightly lower than the 2021 forecast due to a lower starting point.

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 2016 to 2020, 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
92.81%	7.19%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ9	1.11

STATE BY STATE RESULTS

MICHIGAN

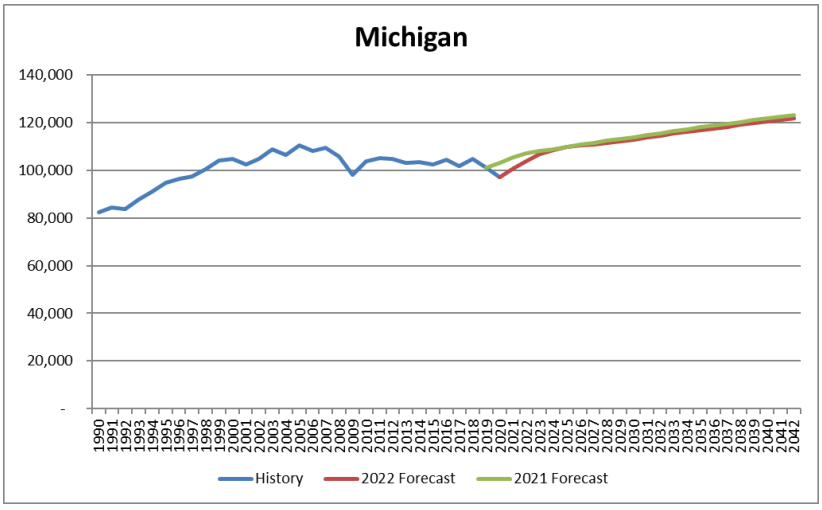
The Michigan state econometric model uses real electricity and natural gas prices, real GSP, non-farm employment and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 20.

Table 20: Michigan Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP	Non-Farm Employment
-0.46	0.10	1.49	-0.03

Michigan annual electricity sales are projected to grow at 0.69% in this forecast, which is close to the 0.72% growth rate projected in the 2021 forecast. Figure 11 shows sales projections for the 2021 and 2022 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 2016 to 2020, 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%	4.33%	91.71%	3.82%

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 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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ2	1.05
LRZ7	0.69

STATE BY STATE RESULTS

MINNESOTA

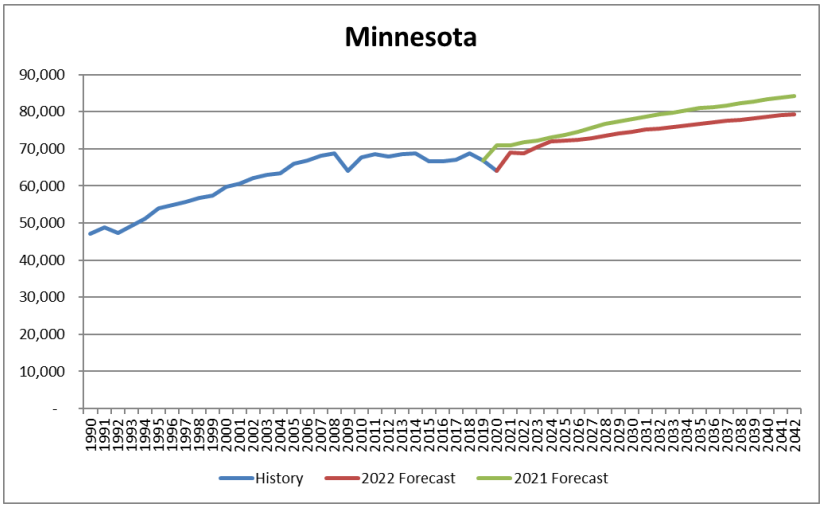
The Minnesota state econometric model uses real electricity and natural gas prices, population, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 23.

Table 23: Minnesota Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Population
-0.31	0.30	0.40

Minnesota annual electricity sales are projected to grow at 0.61% in this forecast, which is lower than the 0.82% growth rate projected in the 2021 forecast. Figure 12 shows electricity sales projection for the 2021 and 2022 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 2016 to 2020, 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
97.79%	0.96%	1.25%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ3	1.68

STATE BY STATE RESULTS

MISSISSIPPI

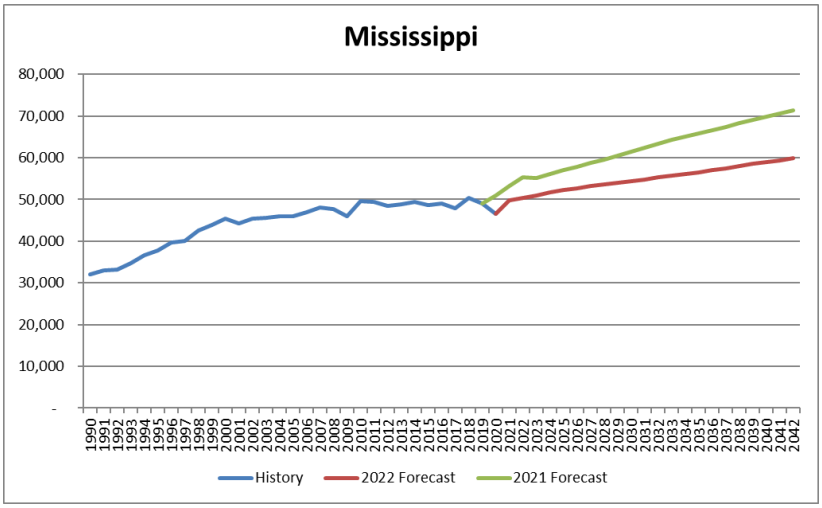
The Mississippi state econometric model uses real electricity price, real GSP, population, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 26.

Table 26: Mississippi Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP	Population
-0.35	1.66	0.06

Mississippi annual electricity sales are projected to grow at 0.85% in this forecast, which is much lower than the 1.30% growth rate projected in the 2021 forecast. The lower forecast results from a combination of the reformulation of the econometric model and a less optimistic real GSP projection from S&P Global. Figure 13 shows sales projections for the 2021 and 2022 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 2016 to 2020, 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
44.15%	55.85%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ10	0.85

STATE BY STATE RESULTS

MISSOURI

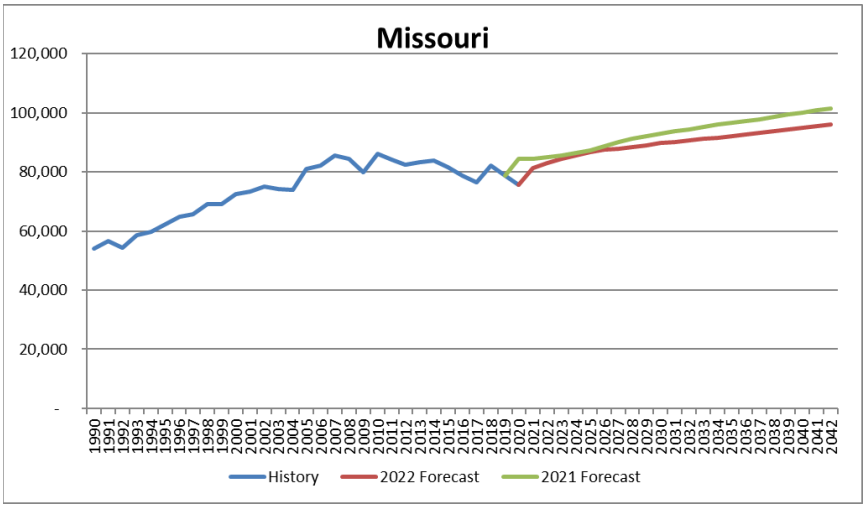
The Missouri state econometric model uses real electricity price, population, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 29.

Table 29: Missouri Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Population
-0.31	0.30

Missouri annual electricity sales are projected to grow at 0.67% in this forecast, which is lower than the 0.91% growth rate projected in the 2021 forecast. Figure 14 shows sales projections for the 2021 and 2022 forecasts.

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 46.67% in 2021 to 42.78% in 2042. 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 46.67% in 2021 to 42.78% in 2042	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 2023-2042 (%)

LRZ	Annual Energy
LRZ5	0.25
LRZ8	1.27

STATE BY STATE RESULTS

MONTANA

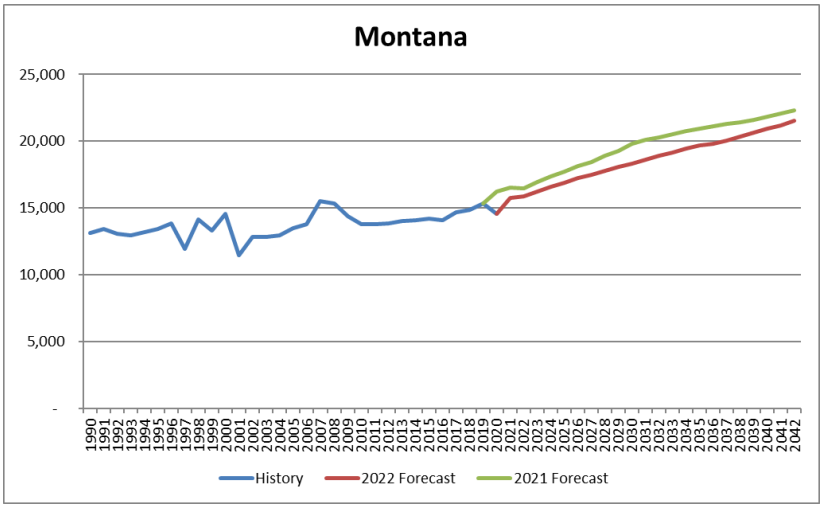
The Montana state econometric model uses real electricity and natural gas prices, real personal income per capita, manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 32.

Table 32: Montana Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Real Income/Population	Manufacturing Employment
-0.05	0.45	1.94	-0.40

Montana annual electricity sales are projected to grow at 1.51% in this forecast, which is close to the 1.55% growth rate projected in the 2021 forecast. Figure 15 shows sales projections for the 2021 and 2022 forecasts. Despite having identical growth rate, the 2022 forecast lies lower than the 2021 forecast due to a lower starting point.

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 2016 to 2020, 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
32.72%	67.28%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81

STATE BY STATE RESULTS

NORTH DAKOTA

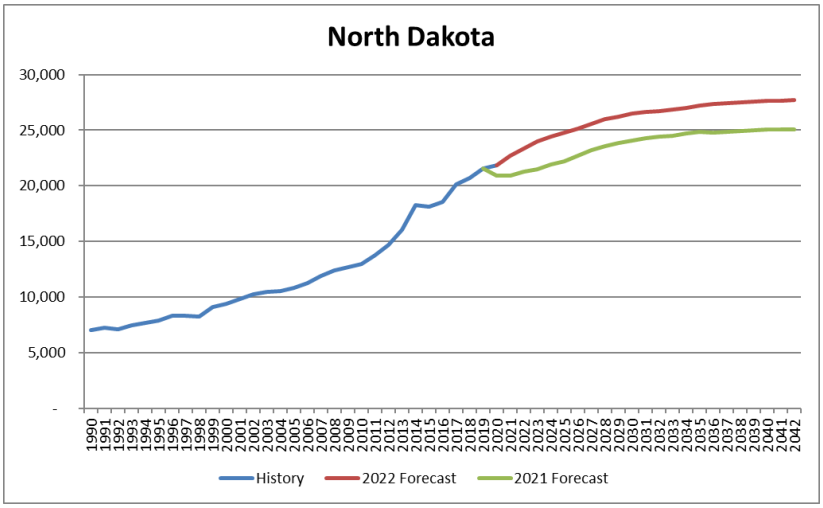
The North Dakota state econometric model uses real electricity price, population, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 35.

Table 35: North Dakota Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Population
-0.31	0.21

North Dakota annual electricity sales are projected to grow at 0.76% in this forecast, which is lower than the 0.87% growth rate projected in the 2021 forecast. Figure 16 shows sales projection for the 2021 and 2022 forecasts. Despite having similar growth rates, the 2022 forecast is noticeably higher than the 2021 forecast due to a substantially higher starting point.

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 2016 to 2020, 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
32.72%	67.28%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81

STATE BY STATE RESULTS

SOUTH DAKOTA

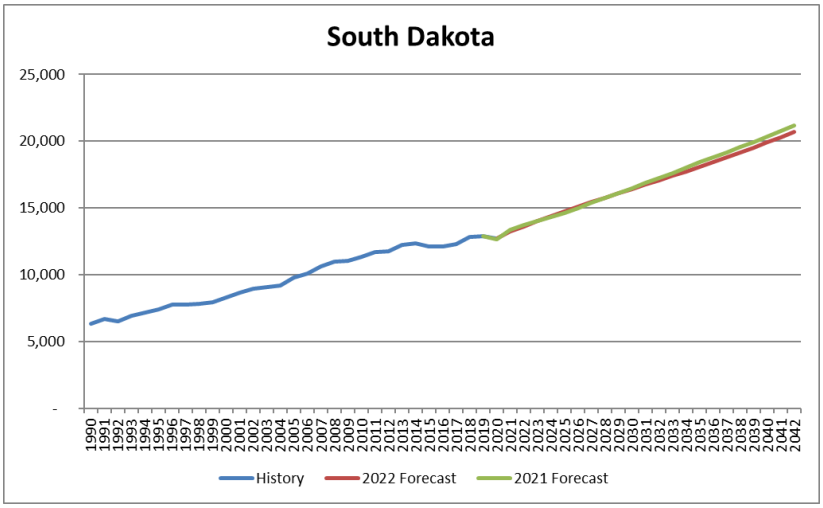
The South Dakota state econometric model uses real electricity price, real GSP, non-manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 38.

Table 38: South Dakota Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP	Non-Manufacturing Employment
-0.31	2.20	0.51

South Dakota electricity sales are projected to grow at 2.07% in this forecast, which is close to the 2.21% growth rate projected in the 2021 forecast. Figure 17 shows the sales projections for the 2021 and 2022 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 2016-2020, 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
24.62%	1.98%	73.40%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ3	1.68

STATE BY STATE RESULTS

TEXAS

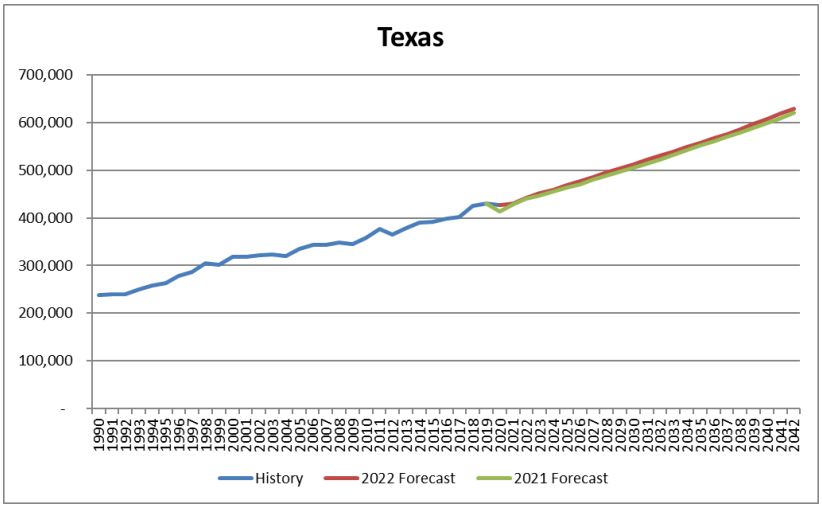
The Texas state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 41.

Table 41: Texas Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real GSP
-0.33	2.70

Texas annual electricity sales are projected to grow at 1.75% in this forecast, which is identical to the 1.74% growth rate projected in the 2021 forecast. Figure 18 shows sales projections for the 2021 and 2022 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 2016-2020, 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
0.0052%	5.39%	94.61%

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 2023-2042 (%)

LRZ	Annual Energy
LRZ8	1.27
LRZ9	1.11

STATE BY STATE RESULTS

WISCONSIN

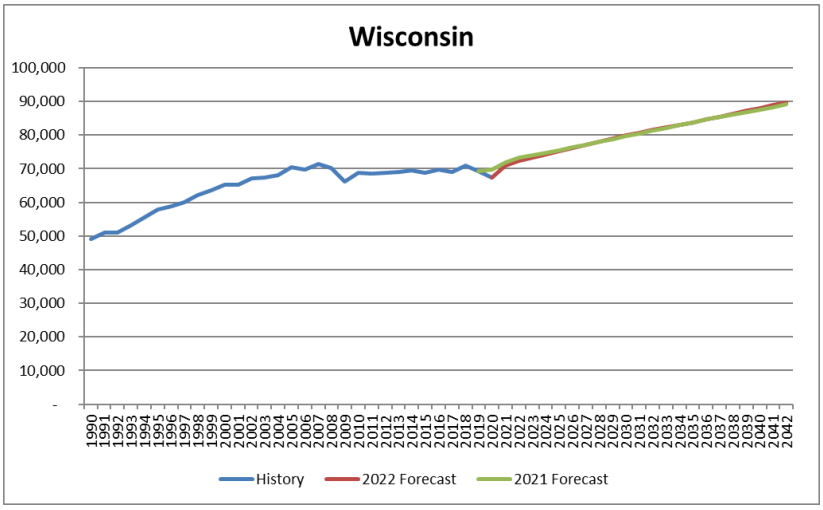
The Wisconsin state econometric model uses real electricity and natural gas prices, real GSP, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 44.

Table 44: Wisconsin Explanatory Variable CAGR for the Period of 2023-2042 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.47	0.07	1.75

Wisconsin annual electricity sales are projected to grow at 1.07% in this forecast, which is slightly higher than the 0.98% growth rate projected in the 2021 forecast. Figure 19 shows sales projections for the 2021 and 2022 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 2016-2020, 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
17.21%	82.79%	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 2023-2042 (%)

LRZ	Annual Energy
LRZ1	0.81
LRZ2	1.05

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
2021	91,831	62,363	49,596	48,886	35,633	88,463	90,676	38,021	109,504	21,035
2022	92,249	63,688	49,601	49,305	36,306	90,590	93,650	38,697	112,327	21,280
2023	94,470	64,504	50,750	50,397	36,798	92,560	96,137	39,052	112,273	21,520
2024	96,193	65,328	51,779	50,786	37,140	94,246	97,794	39,518	114,332	21,841
2025	96,949	66,155	52,726	50,561	37,417	96,494	98,797	39,988	115,850	22,059
2026	97,741	67,043	53,806	50,524	37,599	98,442	99,385	40,615	118,093	22,265
2027	98,482	67,872	54,761	50,535	37,667	100,004	99,836	41,191	119,906	22,456
2028	99,556	68,653	55,660	50,570	37,756	101,631	100,411	41,755	121,288	22,633
2029	100,531	69,423	56,538	50,649	37,868	103,143	101,167	42,231	122,216	22,766
2030	101,410	70,151	57,424	50,668	37,997	104,585	101,631	42,695	123,071	22,927
2031	102,294	70,892	58,331	50,762	38,062	106,091	102,401	43,171	123,911	23,132
2032	103,007	71,614	59,323	50,809	38,090	107,447	103,157	43,687	124,887	23,331
2033	103,659	72,309	60,343	50,860	38,112	108,924	103,893	44,179	125,989	23,515
2034	104,325	72,934	61,332	50,874	38,138	110,355	104,603	44,677	127,238	23,692
2035	105,099	73,569	62,303	50,911	38,190	111,827	105,243	45,223	128,317	23,880
2036	105,850	74,239	63,229	50,918	38,247	113,355	105,865	45,765	129,428	24,072
2037	106,547	74,976	64,217	50,912	38,320	114,963	106,546	46,362	130,856	24,285
2038	107,213	75,720	65,263	50,919	38,394	116,720	107,203	47,010	132,217	24,493
2039	107,960	76,449	66,321	50,926	38,448	118,452	107,836	47,663	133,946	24,706
2040	108,707	77,195	67,443	50,911	38,491	120,218	108,463	48,339	135,457	24,910
2041	109,362	77,899	68,526	50,885	38,549	121,877	109,030	48,966	136,952	25,086
2042	110,028	78,615	69,639	50,877	38,608	123,496	109,657	49,593	138,439	25,266
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	15,976	11,564	9,167	9,560	7,262	15,446	18,176	7,503	19,526	4,328
2022	16,049	11,809	9,168	9,642	7,399	15,817	18,772	7,637	20,029	4,378
2023	16,435	11,960	9,380	9,855	7,499	16,161	19,271	7,707	20,019	4,428
2024	16,735	12,113	9,571	9,931	7,569	16,456	19,603	7,799	20,387	4,494
2025	16,866	12,267	9,746	9,887	7,625	16,848	19,804	7,891	20,657	4,539
2026	17,004	12,431	9,945	9,880	7,662	17,188	19,922	8,015	21,057	4,581
2027	17,133	12,585	10,122	9,882	7,676	17,461	20,012	8,129	21,381	4,620
2028	17,320	12,730	10,288	9,889	7,695	17,745	20,127	8,240	21,627	4,657
2029	17,490	12,873	10,450	9,904	7,717	18,009	20,279	8,334	21,792	4,684
2030	17,642	13,008	10,614	9,908	7,744	18,261	20,372	8,426	21,945	4,717
2031	17,796	13,145	10,782	9,926	7,757	18,524	20,526	8,520	22,095	4,759
2032	17,920	13,279	10,965	9,936	7,763	18,761	20,678	8,621	22,269	4,800
2033	18,034	13,408	11,154	9,946	7,767	19,019	20,825	8,719	22,465	4,838
2034	18,149	13,524	11,336	9,948	7,772	19,268	20,968	8,817	22,688	4,875
2035	18,284	13,641	11,516	9,956	7,783	19,525	21,096	8,925	22,880	4,913
2036	18,415	13,766	11,687	9,957	7,795	19,792	21,221	9,032	23,079	4,953
2037	18,536	13,902	11,870	9,956	7,809	20,073	21,357	9,149	23,333	4,996
2038	18,652	14,040	12,063	9,957	7,825	20,380	21,489	9,277	23,576	5,039
2039	18,782	14,175	12,259	9,959	7,835	20,682	21,616	9,406	23,884	5,083
2040	18,912	14,314	12,466	9,956	7,844	20,991	21,741	9,539	24,153	5,125
2041	19,026	14,444	12,666	9,951	7,856	21,280	21,855	9,663	24,420	5,161
2042	19,142	14,577	12,872	9,949	7,868	21,563	21,981	9,787	24,685	5,198
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

[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 0.81% for the period of 2023-2042, which is slightly lower than the rate projected in the 2021 forecast (0.95% for the period of 2022-2041). Figure 20 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 21 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 20: Gross LRZ 1 Energy (GWh)

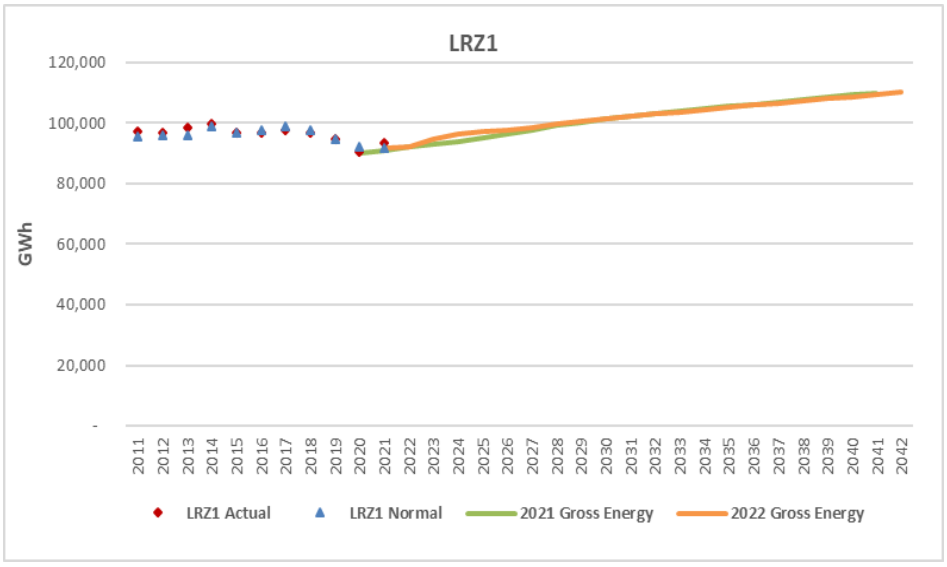
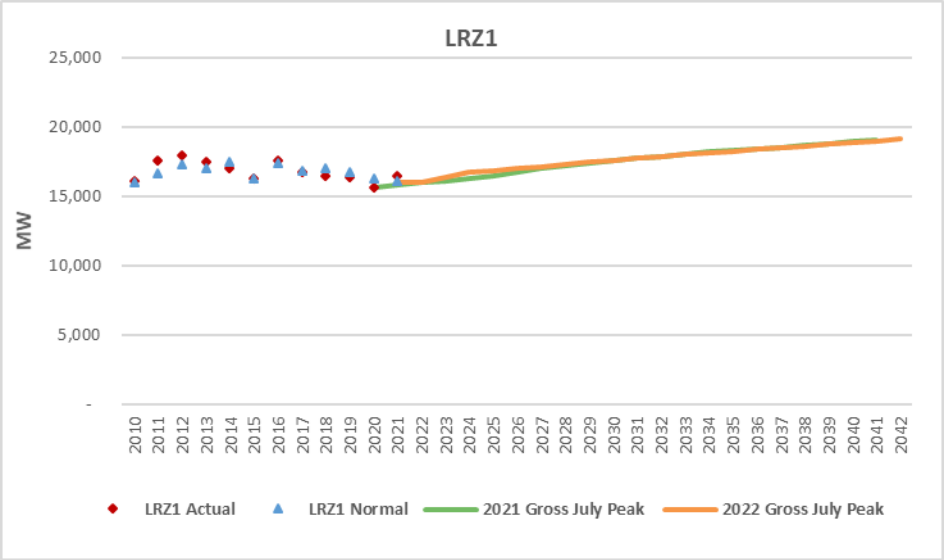


Figure 21: Gross LRZ 1 July Non-Coincident Peak Demand (MW)



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 1.05% for the period of 2023-2042. This is slightly higher than the rate projected in the 2021 forecast (0.96% for the period of 2022-2041). Figure 22 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 23 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 22: Gross LRZ 2 Energy (GWh)

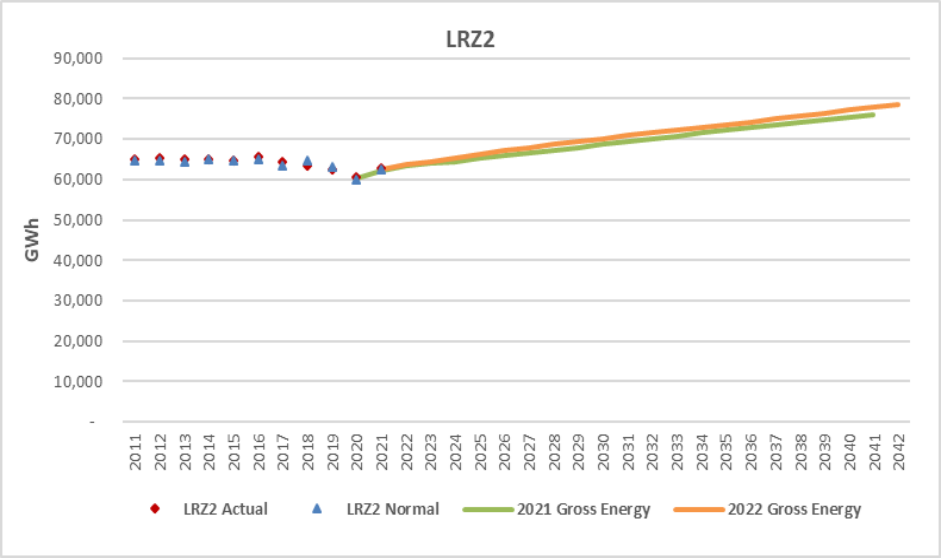
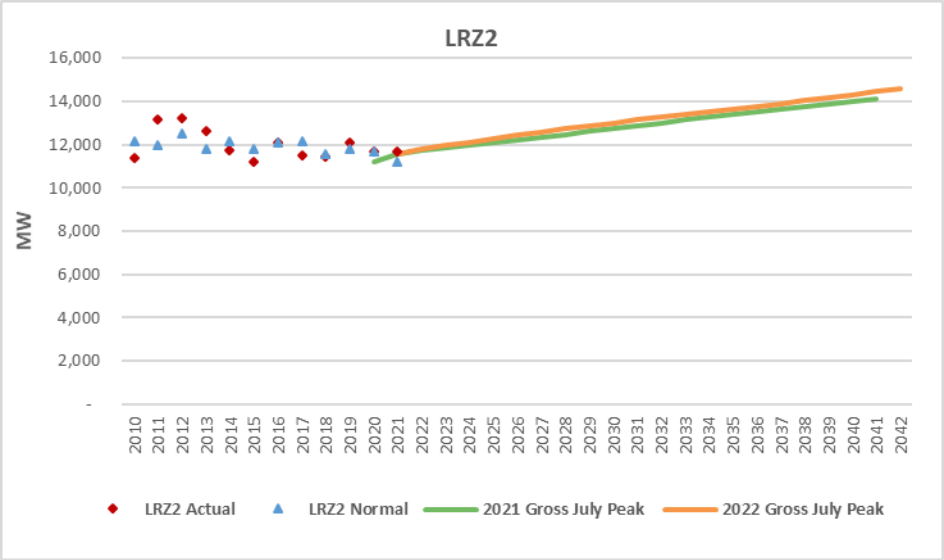


Figure 23: Gross LRZ 2 July Non-Coincident Peak Demand (MW)



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 1.68% for the period of 2023- 2042, which is higher than the rate projected in the 2021 forecast (1.48% for the period of 2022- 2041). Figure 24 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 25 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 24: Gross LRZ 3 Energy (GWh)

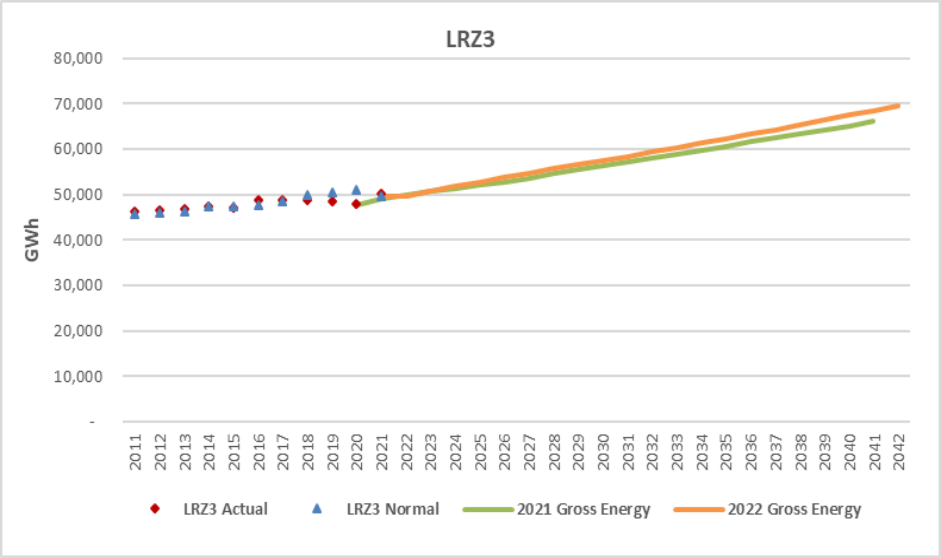
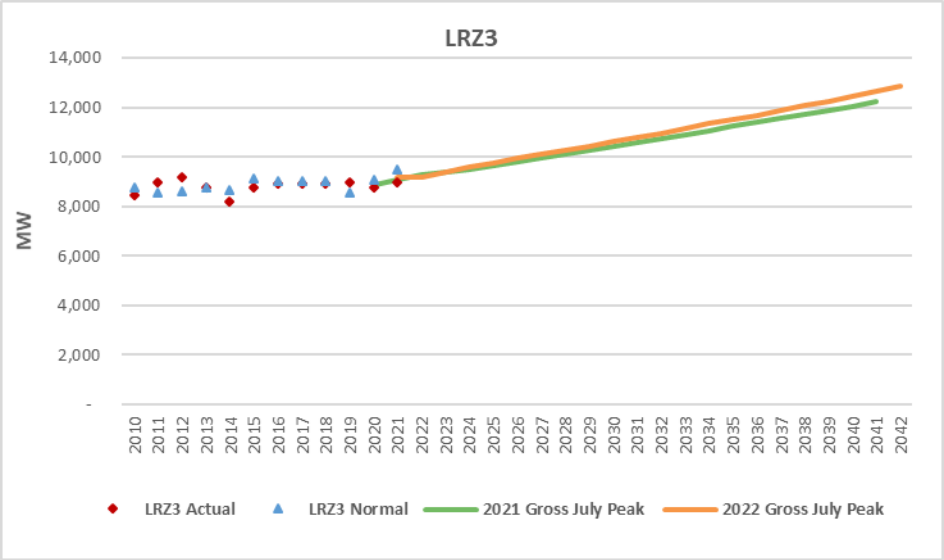


Figure 25: Gross LRZ 3 July Non-Coincident Peak Demand (MW)



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 0.05% for the period of 2023-2042, which is much lower than the rate projected in the 2021 forecast (0.59% for the period of 2022-2041). Figure 26 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 27 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 26: Gross LRZ 4 Energy (GWh)

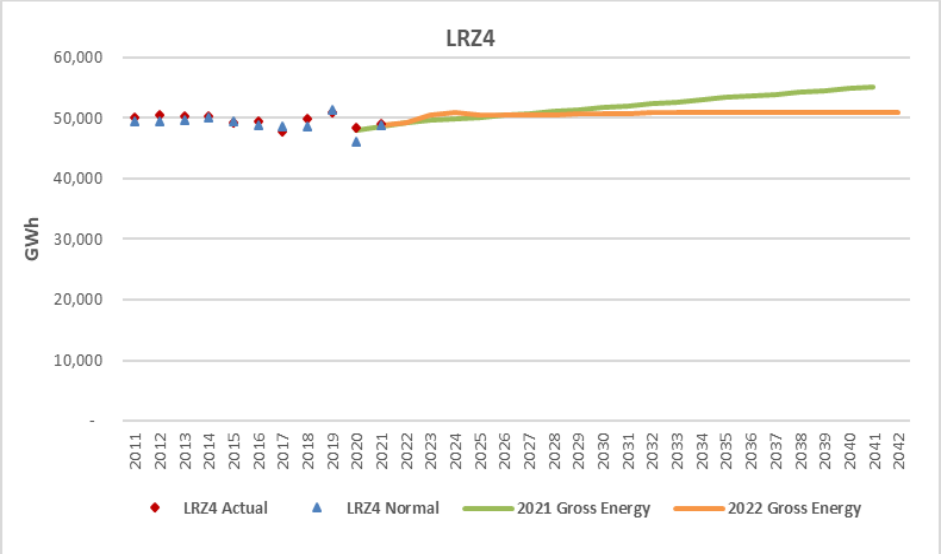
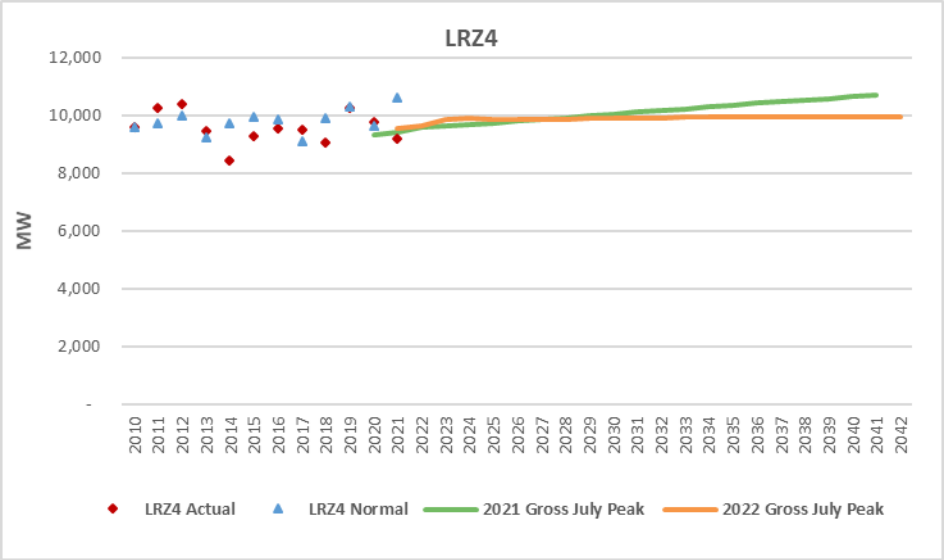


Figure 27: Gross LRZ 4 July Non-Coincident Peak Demand (MW)



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 0.25% for the period of 2023-2042. This is slightly lower than the rate projected in the 2021 forecast (0.36% for the period of 2022-2041). Figure 28 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 29 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 28: Gross LRZ 5 Energy (GWh)

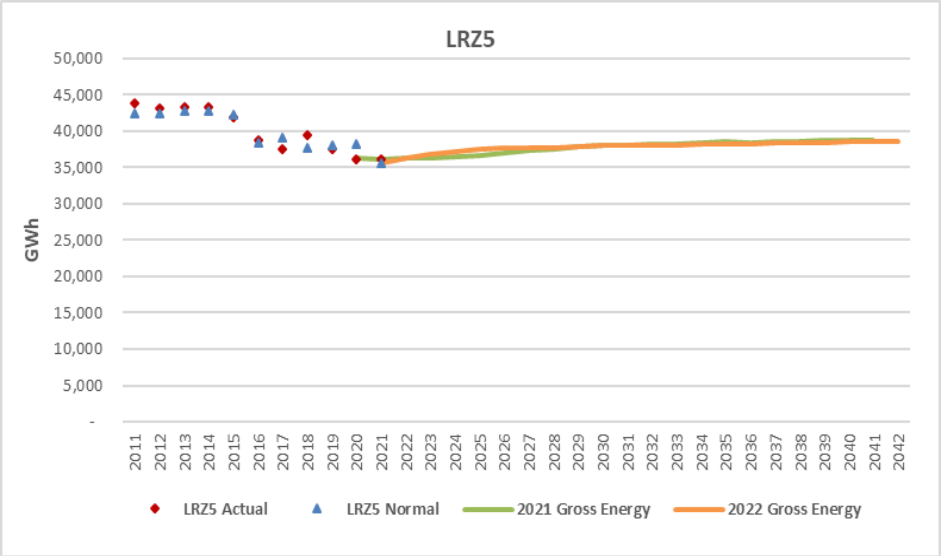
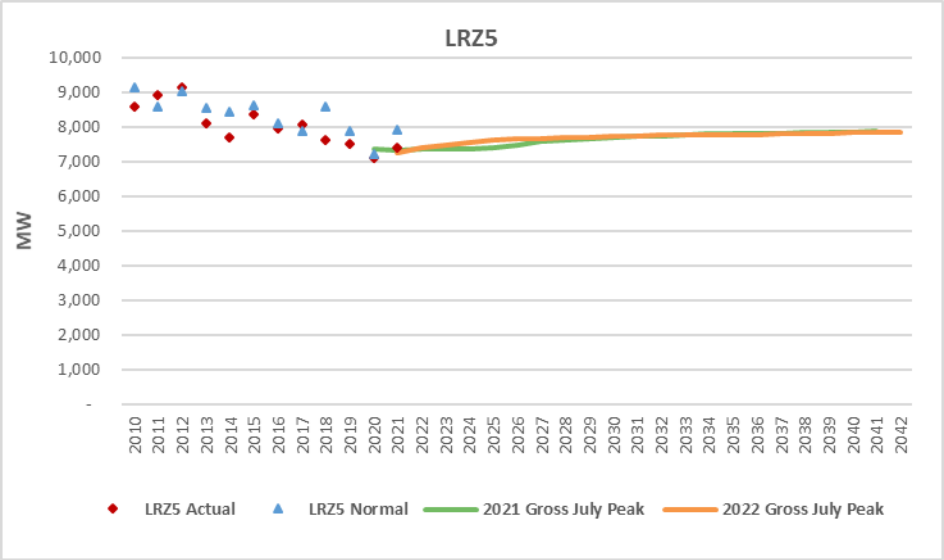


Figure 29: Gross LRZ 5 July Non-Coincident Peak Demand (MW)



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 1.53% for the period of 2023-2042. This is slightly higher than the rate projected in the 2021 forecast (1.46% for the period of 2022-2041). Figure 30 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 31 provides gross July non-coincident peak forecasts for the2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 30: Gross LRZ 6 Energy (GWh)

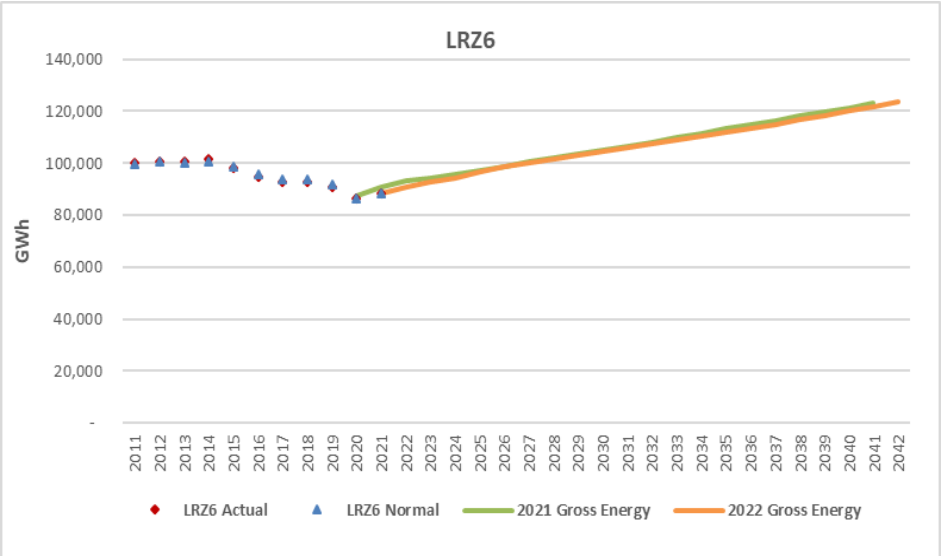
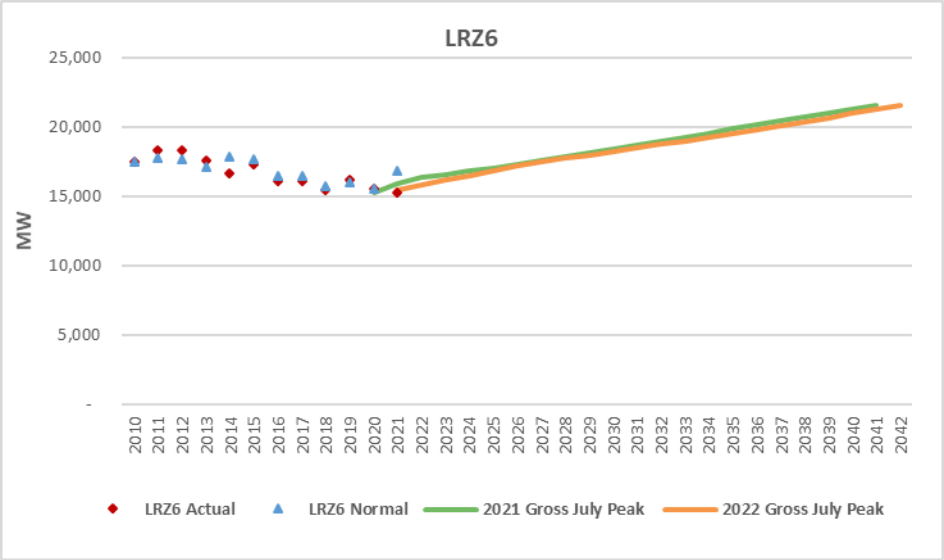


Figure 31: Gross LRZ 6 July Non-Coincident Peak Demand (MW)



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 0.69% for the period of 2023-2042. This is close to the rate projected in the 2021 forecast (0.72% for the period of 2022-2041). Figure 32 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 33 provides gross non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 32: Gross LRZ 7 Energy (GWh)

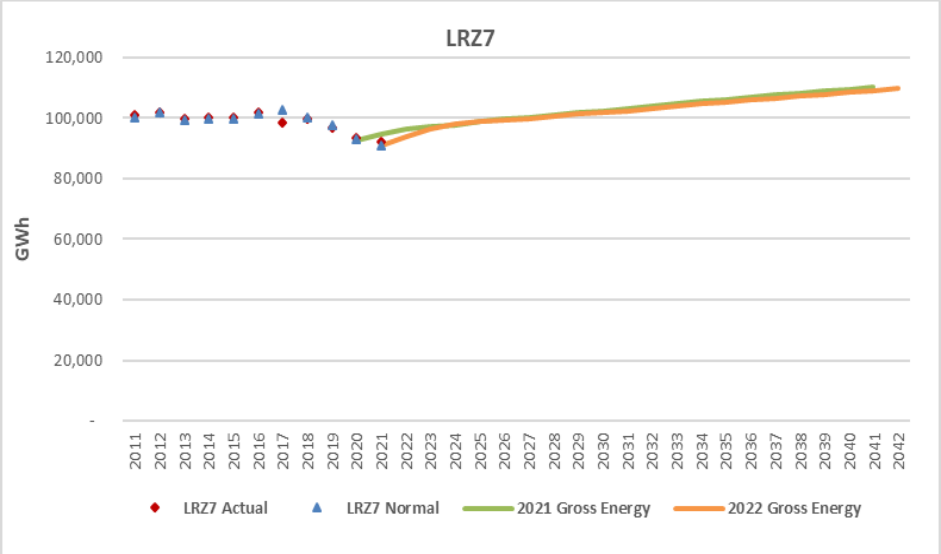
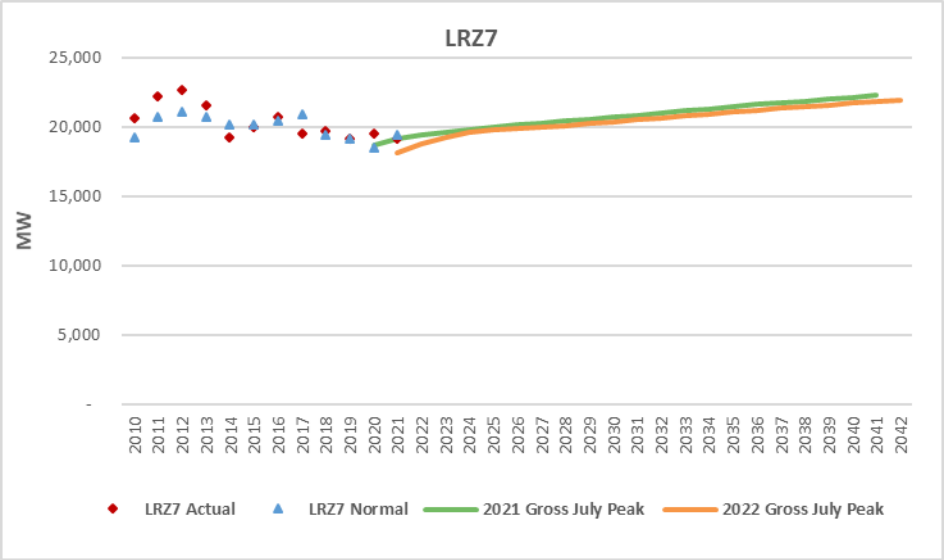


Figure 33: Gross LRZ 7 July Non-Coincident Peak Demand (MW)



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 1.27% for the period of 2023-2042, which is close to the rate projected in the 2021 forecast (1.21% for the period of 2022-2041). Figure 34 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 35 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 34: Gross LRZ 8 Energy (GWh)

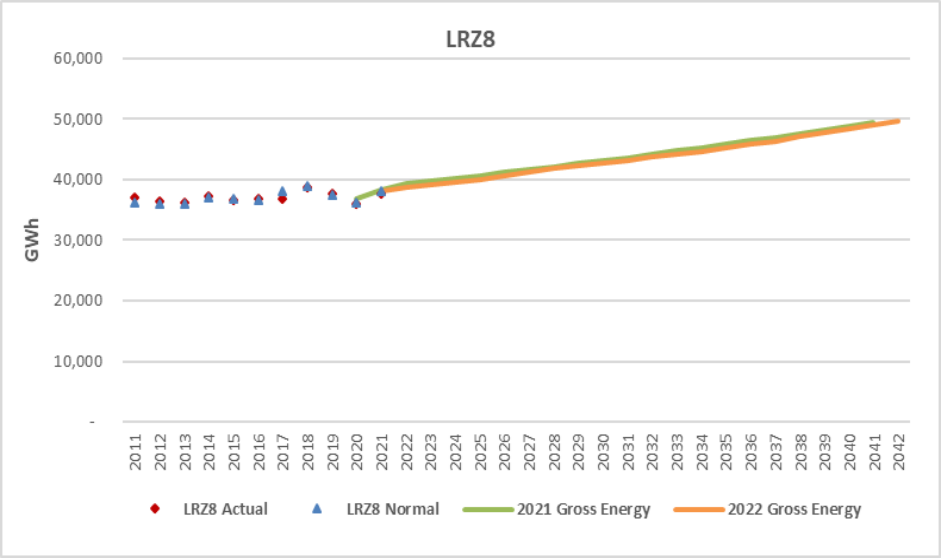
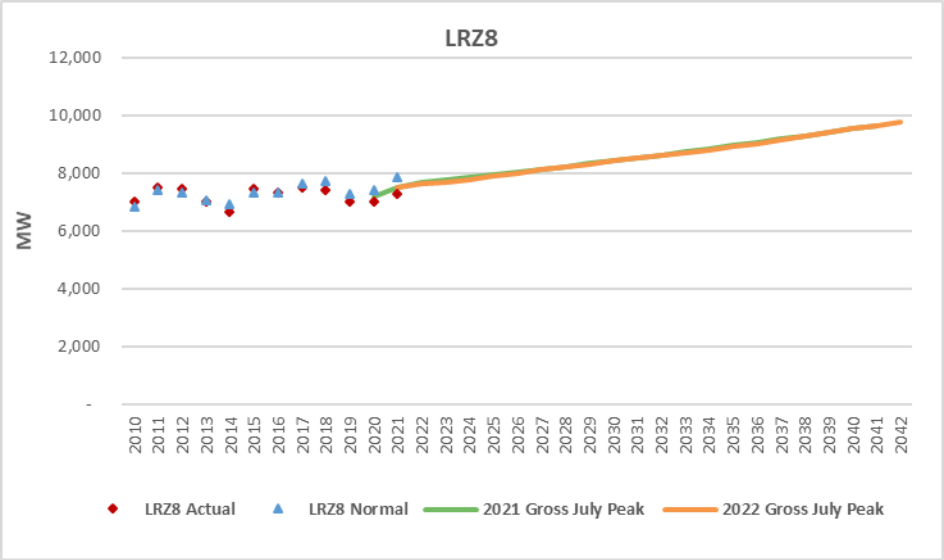


Figure 35: Gross LRZ 8 July Non-Coincident Peak Demand (MW)



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 1.11% for the period of 2023-2042. This rate is very close to the rate projected in the 2021 forecast (1.04% for the period of 2022-2041). Figure 36 shows annual gross energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 37 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 36: Gross LRZ 9 Energy (GWh)

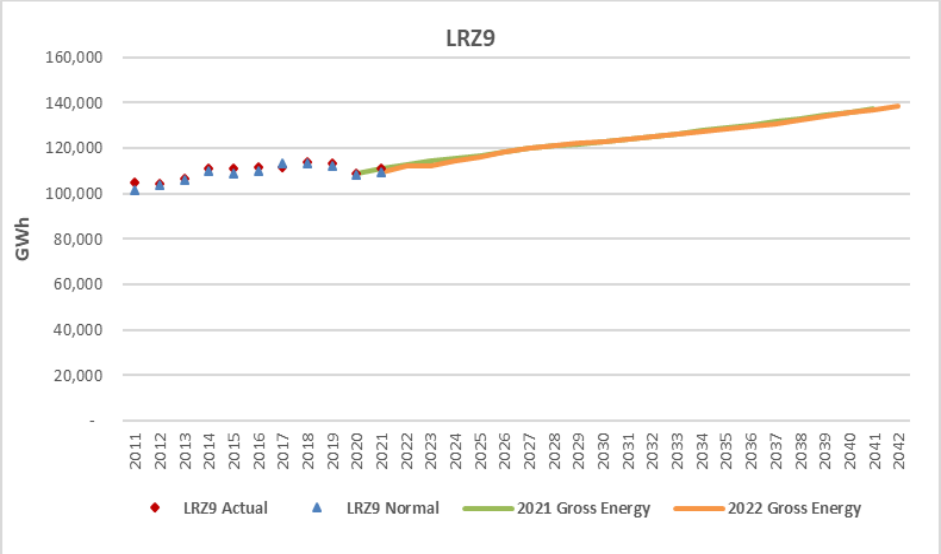
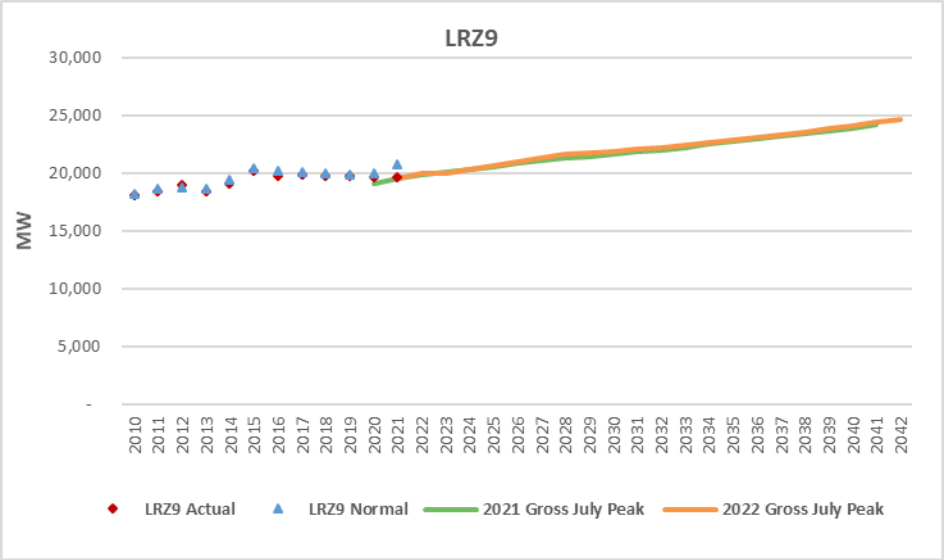


Figure 37: Gross LRZ 9 July Non-Coincident Peak Demand (MW)



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 0.85% for the period of 2023-2042. This growth rate is much lower than that in the 2021 forecast (1.30% for the period of 2022-2041), Figure 38 shows annual energy forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical energy levels. Figure 39 provides gross July non-coincident peak forecasts for the 2021 and 2022 forecasts along with actual and weather-normalized historical July peaks.

Figure 38: Gross LRZ 10 Energy (GWh)

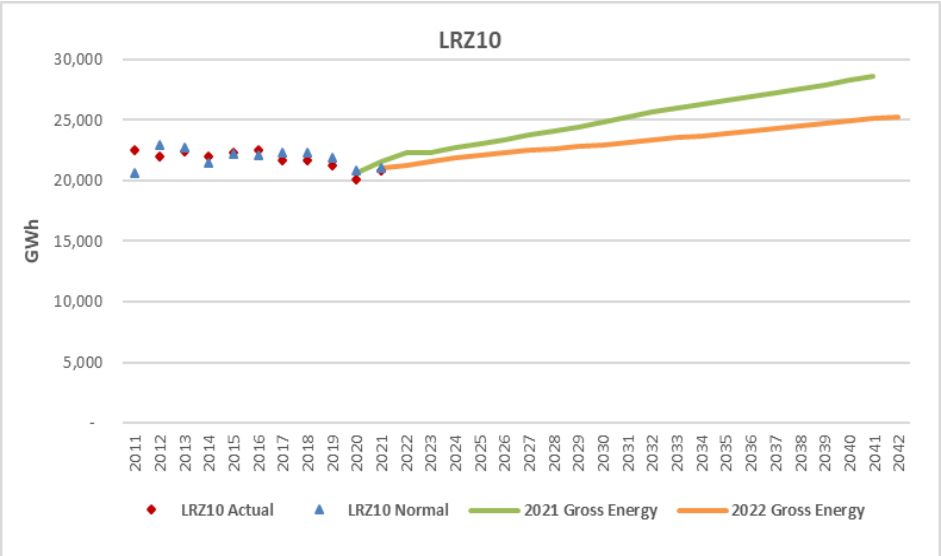
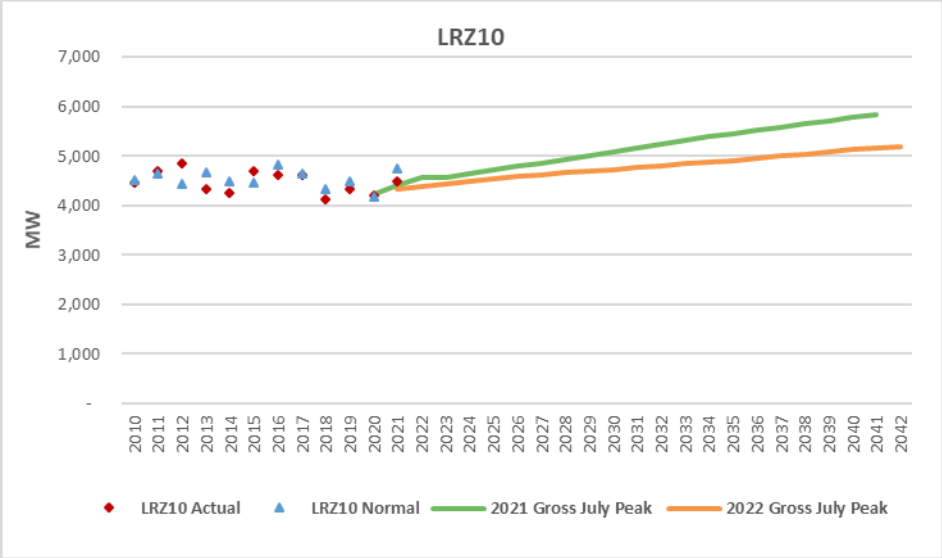


Figure 39: Gross LRZ 10 July Non-Coincident Peak Demand (MW)



MISO FORECASTS

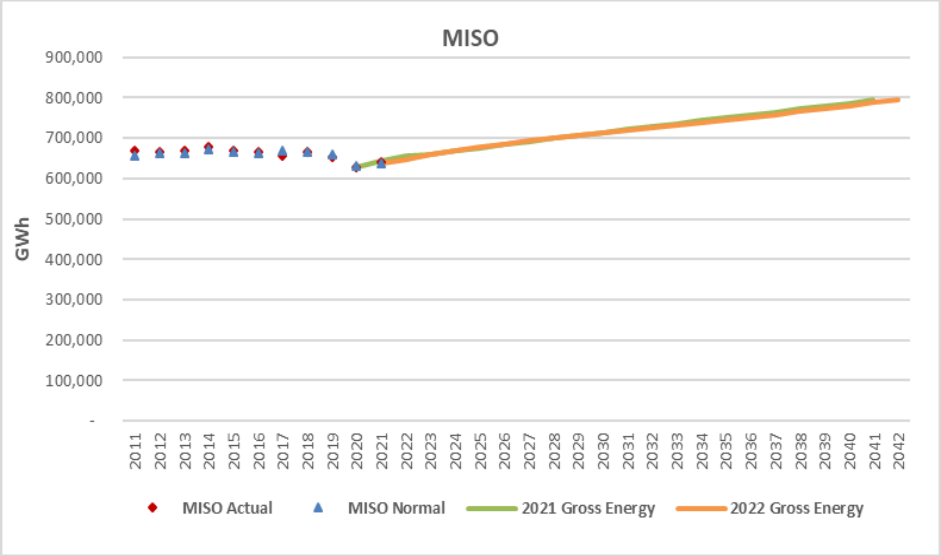
MISO ANNUAL ENERGY FORECAST

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 2023-2042 is 0.99%, which is very close to that in the 2021 forecast (1.02% for the period of 2022-2041).

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

Year	MISO Energy without EE Adjustments
2021	636,008
2022	647,695
2023	658,460
2024	668,957
2025	676,996
2026	685,513
2027	692,709
2028	699,912
2029	706,532
2030	712,558
2031	719,048
2032	725,351
2033	731,785
2034	738,167
2035	744,562
2036	750,968
2037	757,983
2038	765,152
2039	772,706
2040	780,132
2041	787,131
2042	794,217
Compound Annual Growth Rates (%)	
2023-2027	1.28
2023-2032	1.08
2023-2042	0.99

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 2021 timeframe. Table 50 lists the average monthly coincidence factors estimated using the actual zonal monthly coincidence factors from 2010 to 2021. 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	0.9710	0.9790	0.9722	0.9545	0.9563	0.9487	0.9330	0.9466	0.9350	0.9384	0.9687	0.9770
2	0.9615	0.9840	0.9752	0.9696	0.9729	0.9841	0.9827	0.9653	0.9885	0.9652	0.9664	0.9723
3	0.9817	0.9835	0.9848	0.9464	0.9582	0.9488	0.9611	0.9824	0.9655	0.9714	0.9708	0.9766
4	0.9786	0.9825	0.9902	0.9747	0.9616	0.9495	0.9797	0.9636	0.9616	0.9882	0.9620	0.9712
5	0.9894	0.9783	0.9754	0.9532	0.9492	0.9449	0.9888	0.9614	0.9672	0.9736	0.9801	0.9702
6	0.9819	0.9780	0.9856	0.9640	0.9745	0.9816	0.9865	0.9707	0.9665	0.9780	0.9728	0.9802
7	0.9522	0.9720	0.9837	0.9523	0.9692	0.9834	0.9578	0.9743	0.9624	0.9535	0.9701	0.9664
8	0.9667	0.9769	0.9355	0.9487	0.9273	0.9594	0.9467	0.9290	0.9533	0.9569	0.9713	0.9636
9	0.9359	0.9397	0.8949	0.9129	0.9649	0.9520	0.9557	0.9365	0.9467	0.9456	0.9546	0.9452
10	0.9684	0.9539	0.9137	0.9281	0.9542	0.9336	0.9334	0.9230	0.9545	0.9630	0.9680	0.9433

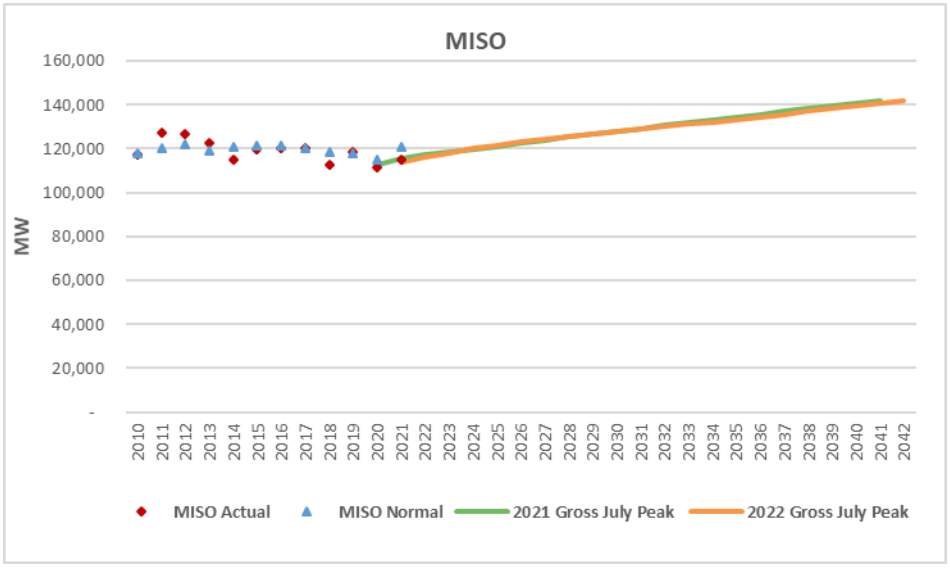
[10] MISO system monthly peak demand forecasts for each one of the twelve months are displayed in Appendix C.

MISO FORECASTS

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

Year	MISO July CP without EE Adjustments
2021	114,077
2022	116,195
2023	118,136
2024	120,000
2025	121,423
2026	122,922
2027	124,188
2028	125,454
2029	126,625
2030	127,688
2031	128,838
2032	129,955
2033	131,094
2034	132,222
2035	133,352
2036	134,483
2037	135,723
2038	136,991
2039	138,322
2040	139,632
2041	140,866
2042	142,117
Compound Annual Growth Rates (%)	
2023-2027	1.26
2023-2032	1.07
2023-2042	0.98

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



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)

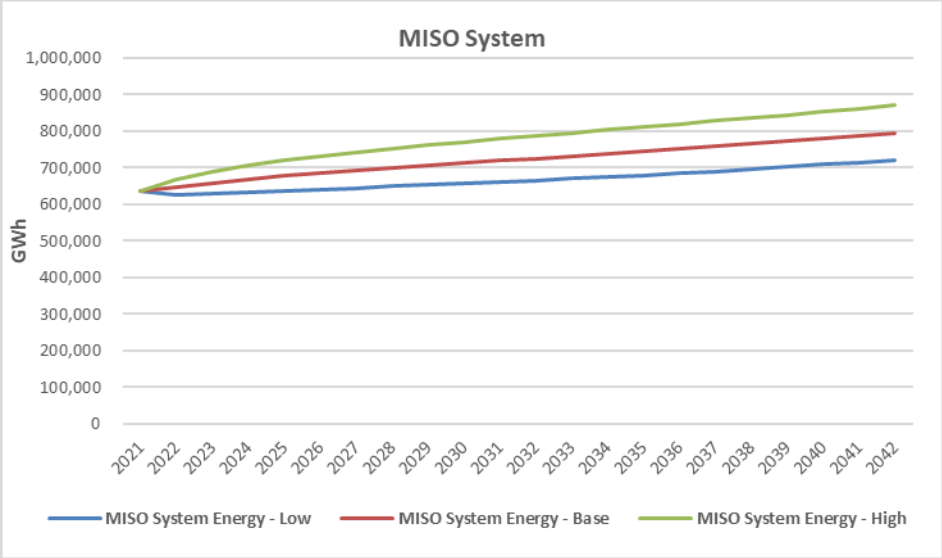


Table 52: Gross MISO System CAGRs for Alternate Forecasts (2023-2042)

	BASE	HIGH	LOW
Energy	0.99	1.23	0.73
July Peak	0.98	1.21	0.72

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 (2023-2042). 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 2023-2042 (%)

Variables	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
REAL_ELECTRICITY_PRICE	-0.32	-0.46	-0.48	-0.30	-0.35	-0.33	-0.46	-0.31	-0.35	-0.31	-0.05	-0.31	-0.31	-0.33	-0.47
REAL_NATURAL_GAS_PRICE		0.10			0.54	0.25	0.10	0.30			0.45				0.07
REAL_INCOME															
POPULATION								0.40	0.06	0.30		0.21			
REAL_INCOME/POPULATION				1.93							1.94				
REAL_GSP	1.85		1.86	2.01	1.85	1.77*	1.49		1.66				2.20	2.70	1.75
MANUFACTURING_EMP											-0.40				
NON_MANUFACTURING_EMP		0.05											0.51		
NON_FARM_EMP							-0.03								

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

Table 55 provides state-level forecasts. The retail sales by state for the year 2021 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" 2021 values (as well as 2022 values) to provide continuity between the historical data and the forecast period (2023 to 2042).

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	49,257	136,162	107,214	52,471	78,613	90,333	100,630	68,979
2022	50,132	137,330	109,773	52,453	80,524	92,605	103,932	68,836
2023	50,592	140,371	110,572	53,665	83,862	91,963	106,692	70,609
2024	51,195	141,454	112,457	54,781	85,518	93,746	108,531	71,915
2025	51,804	140,827	115,188	55,844	87,510	94,837	109,643	72,215
2026	52,617	140,726	117,554	57,046	89,235	96,711	110,296	72,552
2027	53,362	140,756	119,222	58,107	90,849	98,087	110,796	72,821
2028	54,094	140,853	120,936	59,101	92,551	98,996	111,435	73,486
2029	54,710	141,073	122,489	60,069	94,175	99,444	112,274	74,102
2030	55,311	141,126	123,884	61,050	95,810	99,842	112,788	74,635
2031	55,927	141,388	125,461	62,052	97,397	100,233	113,644	75,165
2032	56,596	141,518	126,455	63,152	99,250	100,732	114,482	75,557
2033	57,233	141,663	127,836	64,283	100,973	101,379	115,299	75,882
2034	57,878	141,699	129,205	65,383	102,609	102,166	116,087	76,212
2035	58,586	141,803	130,689	66,458	104,216	102,764	116,797	76,673
2036	59,288	141,822	132,242	67,485	105,874	103,406	117,488	77,145
2037	60,061	141,806	133,892	68,583	107,601	104,355	118,243	77,538
2038	60,901	141,827	135,592	69,745	109,592	105,206	118,972	77,854
2039	61,747	141,844	137,293	70,920	111,529	106,442	119,675	78,243
2040	62,622	141,804	138,984	72,167	113,547	107,392	120,371	78,666
2041	63,435	141,731	140,572	73,372	115,445	108,340	120,999	79,004
2042	64,246	141,708	142,073	74,610	117,345	109,271	121,696	79,331
Compound Annual Growth Rates (%)								
2023-2027	1.34	0.07	1.90	2.01	2.02	1.62	0.95	0.77
2023-2032	1.25	0.09	1.50	1.83	1.89	1.02	0.79	0.76
2023-2042	1.27	0.05	1.33	1.75	1.78	0.91	0.69	0.61

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	49,808	81,225	15,755	22,688	13,263	430,348	70,967
2022	50,389	83,048	15,886	23,316	13,579	442,421	72,414
2023	50,958	84,524	16,205	23,975	14,023	452,481	73,267
2024	51,717	85,666	16,591	24,403	14,390	459,131	74,177
2025	52,235	86,653	16,909	24,805	14,715	467,883	75,130
2026	52,722	87,418	17,253	25,108	15,073	476,276	76,182
2027	53,175	87,909	17,508	25,590	15,424	485,471	77,168
2028	53,593	88,474	17,811	25,958	15,759	494,870	78,090
2029	53,908	89,073	18,061	26,233	16,079	503,985	78,987
2030	54,289	89,715	18,295	26,475	16,405	512,645	79,850
2031	54,775	90,237	18,640	26,629	16,734	521,150	80,711
2032	55,245	90,678	18,892	26,728	17,086	530,244	81,550
2033	55,681	91,122	19,169	26,837	17,417	539,102	82,358
2034	56,101	91,589	19,459	27,008	17,746	548,199	83,079
2035	56,547	92,096	19,685	27,191	18,080	557,467	83,819
2036	57,000	92,632	19,829	27,323	18,421	566,572	84,601
2037	57,504	93,210	20,042	27,392	18,776	576,104	85,463
2038	57,998	93,801	20,331	27,492	19,153	586,148	86,334
2039	58,501	94,352	20,664	27,597	19,531	596,226	87,188
2040	58,985	94,881	20,934	27,639	19,919	607,255	88,064
2041	59,401	95,442	21,210	27,665	20,304	618,038	88,892
2042	59,827	96,007	21,534	27,703	20,688	628,975	89,731
Compound Annual Growth Rates (%)							
2023-2027	1.07	0.99	1.95	1.64	2.41	1.77	1.31
2023-2032	0.90	0.78	1.72	1.21	2.22	1.78	1.20
2023-2042	0.85	0.67	1.51	0.76	2.07	1.75	1.07

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 2020 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, 2021

[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 2009-2020. 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), 2009-2020

State	2020 MISO Sales (MWhs)	2020 Non-MISO Sales (MWhs)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AR	33,421,451	12,429,552	70.03%	70.57%	70.39%	70.52%	70.45%	72.23%	72.30%	71.94%	72.52%	72.99%	72.80%	72.89%
IA	47,058,180	3,581,682	92.03%	92.92%	93.04%	93.22%	92.92%	93.05%	92.92%	92.85%	92.67%	92.69%	92.72%	92.93%
IL	45,402,457	87,066,820	33.95%	34.55%	34.80%	33.91%	34.59%	34.84%	34.83%	34.45%	34.46%	34.80%	34.12%	34.27%
IN+KY	86,179,330	82,776,813	47.37%	47.49%	48.49%	48.78%	49.94%	51.95%	51.86%	50.89%	50.29%	50.43%	50.90%	51.01%
LA	82,873,005	6,253,680	91.82%	91.77%	91.74%	92.06%	92.20%	92.67%	92.66%	92.75%	92.88%	92.73%	92.78%	92.98%
MI	93,177,020	3,834,886	95.28%	96.01%	96.16%	96.21%	96.10%	96.08%	96.09%	96.11%	96.12%	96.13%	96.21%	96.05%
MN	63,209,233	845,373	98.66%	98.73%	98.73%	98.84%	98.75%	98.77%	98.76%	98.72%	98.73%	98.71%	98.67%	98.68%
MO	34,648,125	41,077,587	48.83%	49.55%	49.35%	50.22%	49.40%	49.06%	48.98%	46.98%	46.64%	46.26%	46.52%	45.75%
MS	20,485,981	25,996,059	45.58%	45.89%	45.24%	44.78%	44.73%	44.56%	45.06%	44.71%	44.30%	44.40%	44.23%	44.07%
ND+MT	11,189,060	25,214,571	36.03%	37.35%	37.90%	36.76%	37.46%	36.30%	35.14%	34.48%	32.89%	33.16%	31.45%	30.74%
SD	3,269,071	9,426,774	26.48%	26.87%	26.07%	26.02%	25.32%	25.26%	25.57%	25.85%	25.63%	25.49%	25.72%	25.75%
TX	22,125,633	404,737,634	5.53%	5.66%	5.46%	5.99%	5.74%	5.60%	5.47%	5.45%	5.35%	5.42%	5.30%	5.18%
WI	67,448,361	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%

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 2020)

MISO LRZ	AR	IA	IL	IN+KY	LA	MI	MN	MO	MS	ND+MT	SD	TX	WI
1		1.80%	0.0002%			0.14%	97.23%			34.98%	24.34%		16.99%
2						4.69%							83.01%
3		91.22%	1.44%				1.52%				1.88%		
4			32.91%										
5								48.26%					
6				49.78%									
7						91.24%							
8	71.54%							0.02%				0.01%	
9					92.41%							5.53%	
10									44.71%				
Percentage of Non-MISO Sales	28.46%	6.98%	65.65%	50.22%	7.59%	3.93%	1.25%	51.72%	55.29%	65.02%	73.78%	94.47%	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 2009-2020 and the twelve-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
1	IA	1.79%	1.78%	1.77%	1.76%	1.73%	1.78%	1.83%	1.87%	1.84%	1.77%	1.80%	1.76%	1.86%
	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%
	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%
	MN	97.17%	96.60%	96.73%	96.76%	96.93%	96.89%	96.76%	97.16%	97.76%	97.78%	97.77%	97.73%	97.91%
	ND+MT	35.23%	35.99%	37.35%	37.90%	36.76%	37.46%	36.30%	34.45%	33.82%	32.89%	33.16%	31.45%	32.27%
	SD	24.01%	24.64%	24.97%	24.28%	24.24%	23.51%	23.51%	23.76%	24.03%	23.70%	23.63%	23.87%	27.87%
	WI	16.88%	16.84%	16.59%	16.94%	16.23%	17.02%	17.05%	17.11%	15.62%	17.34%	17.51%	17.48%	18.11%
2	MI	4.73%	4.32%	5.22%	5.28%	4.89%	4.94%	5.14%	4.89%	4.58%	4.19%	4.14%	4.41%	4.33%
	WI	83.12%	83.16%	83.41%	83.06%	83.77%	82.98%	82.95%	82.89%	84.38%	82.66%	82.49%	82.52%	81.89%
3	IA	91.03%	90.25%	91.14%	91.28%	91.48%	91.15%	91.22%	91.04%	91.02%	90.90%	90.89%	90.96%	93.35%
	IL	1.44%	1.40%	1.42%	1.45%	1.42%	1.42%	1.40%	1.45%	1.47%	1.48%	1.46%	1.45%	1.49%
	MN	1.56%	2.06%	2.00%	1.97%	1.91%	1.86%	2.01%	1.60%	0.96%	0.95%	0.93%	0.95%	1.01%
	SD	1.83%	1.84%	1.90%	1.79%	1.77%	1.80%	1.75%	1.81%	1.82%	1.93%	1.86%	1.85%	2.44%
4	IL	33.04%	32.55%	33.12%	33.35%	32.49%	33.17%	33.44%	33.38%	32.98%	32.98%	33.33%	32.68%	31.44%
5	MO	48.26%	48.56%	49.41%	49.22%	50.08%	49.26%	49.04%	48.96%	46.96%	46.62%	46.23%	46.50%	48.23%
6	IN+KY	49.71%	47.35%	47.49%	48.49%	48.60%	49.94%	51.95%	51.19%	50.21%	50.29%	50.43%	50.90%	50.55%
7	MI	91.18%	90.82%	90.65%	90.75%	91.19%	91.02%	90.80%	91.07%	91.40%	91.79%	91.84%	91.66%	91.87%
8	AR	71.52%	70.03%	70.57%	70.39%	70.52%	70.45%	72.23%	72.30%	71.94%	72.52%	72.99%	72.80%	71.77%
	MO	0.02%	0.0200%	0.0198%	0.0196%	0.0199%	0.0199%	0.0199%	0.0207%	0.0205%	0.0199%	0.0249%	0.0214%	0.0201%
	TX	0.01%	0.00599%	0.00647%	0.00627%	0.00602%	0.00578%	0.00569%	0.00571%	0.00536%	0.00508%	0.00537%	0.00513%	0.0050%
9	LA	92.37%	91.82%	91.77%	91.74%	92.06%	92.20%	92.67%	92.66%	92.75%	92.88%	92.73%	92.78%	92.91%
	TX	5.56%	5.52%	5.65%	5.46%	5.98%	5.73%	5.59%	5.46%	5.45%	5.35%	5.72%	5.29%	5.14%
10	MS	44.86%	45.58%	45.89%	45.24%	44.78%	44.73%	44.56%	45.06%	44.71%	44.30%	44.40%	44.23%	43.11%

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 (2016-2020)	Constant at 1.81%
	IL	Historical average (2016-2020)	Constant at 0.0002%
	MI	Historical average (2016-2020)	Constant at 0.14%
	MN	Historical average (2016-2020)	Constant at 97.79%
	ND+MT	Historical average (2016-2020)	Constant at 32.72%
	SD	Historical average (2016-2020)	Constant at 24.62%
	WI	Historical average (2016-2020)	Constant at 17.21%
2	MI	Historical average (2016-2020)	Constant at 4.33%
	WI	Historical average (2016-2020)	Constant at 82.79%
3	IA	Historical average (2016-2020)	Constant at 91.42%
	IL	Historical average (2016-2020)	Constant at 1.47%
	MN	Historical average (2016-2020)	Constant at 0.96%[12]
	SD	Historical average (2016-2020)	Constant at 1.98%
4	IL	Historical average (2016-2020)	Constant at 32.68%
5	MO	St. Louis vs. state growth Decrease over time	Reduced from 46.67% in 2021 to 42.78% in 2042[13]
6	IN+KY	Historical average (2016-2020)	Constant at 50.48%
7	MI	Historical average (2016-2020)	Constant at 91.71%
8	AR	Historical average (2016-2020)	Constant at 72.40%
	MO	Historical average (2016-2020)	Constant at 0.02%
	TX	Historical average (2016-2020)	Constant at 0.0052%
9	LA	Historical average (2016-2020)	Constant at 92.81%
	TX	Historical average (2016-2020)	Constant at 5.39%
10	MS	Historical average (2016-2020)	Constant at 44.15%

[12] Minnesota's allocation factor in LRZ3 for 2016 dropped from previous years because of the transfer of Interstate Power and Light customers in 2016.

[13] 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 46.67% in 2021 to 42.78% in 2042.

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 twelve years of hourly load observations of LRZ-level loads from January 1, 2010 to December 31, 2021. Actual hourly weather data from 1997 to 2021 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 twelve years of zonal hourly load records from 2010 to 2021. 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 2021, 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	0.6562	90.4	80.6	78.0	16
LRZ2	0.6156	88.2	78.8	78.2	16
LRZ3	0.6176	94.7	83.3	80.1	16
LRZ4	0.5838	92.7	82.6	79.9	16
LRZ5	0.5601	95.1	87.1	85.0	16
LRZ6	0.6538	90.7	81.4	79.9	14
LRZ7	0.5695	90.5	79.5	77.9	15
LRZ8	0.5785	96.8	84.9	84.1	15
LRZ9	0.6402	91.3	84.2	84.2	16
LRZ10	0.5548	93.8	84.2	82.7	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
2021	13,562	9,098	7,333	7,584	5,843	13,908	12,760	6,317	17,276	3,579
2022	13,623	9,291	7,334	7,649	5,953	14,243	13,178	6,429	17,722	3,621
2023	13,951	9,410	7,504	7,818	6,034	14,552	13,528	6,488	17,713	3,662
2024	14,206	9,530	7,656	7,879	6,090	14,818	13,761	6,566	18,038	3,716
2025	14,317	9,651	7,796	7,844	6,136	15,171	13,903	6,644	18,277	3,753
2026	14,434	9,781	7,956	7,838	6,165	15,477	13,985	6,748	18,631	3,788
2027	14,544	9,901	8,097	7,840	6,177	15,723	14,049	6,843	18,917	3,821
2028	14,702	10,015	8,230	7,845	6,191	15,979	14,130	6,937	19,135	3,851
2029	14,847	10,128	8,360	7,857	6,210	16,216	14,236	7,016	19,282	3,874
2030	14,976	10,234	8,491	7,860	6,231	16,443	14,301	7,093	19,417	3,901
2031	15,107	10,342	8,625	7,875	6,241	16,680	14,410	7,172	19,549	3,936
2032	15,212	10,447	8,772	7,882	6,246	16,893	14,516	7,258	19,703	3,970
2033	15,308	10,549	8,923	7,890	6,250	17,125	14,620	7,340	19,877	4,001
2034	15,407	10,640	9,069	7,892	6,254	17,350	14,720	7,423	20,074	4,031
2035	15,521	10,733	9,212	7,898	6,262	17,582	14,810	7,513	20,244	4,063
2036	15,632	10,830	9,349	7,899	6,272	17,822	14,897	7,603	20,419	4,096
2037	15,735	10,938	9,495	7,898	6,284	18,075	14,993	7,703	20,645	4,132
2038	15,833	11,046	9,650	7,899	6,296	18,351	15,085	7,810	20,859	4,167
2039	15,944	11,153	9,806	7,900	6,305	18,623	15,175	7,919	21,132	4,204
2040	16,054	11,262	9,972	7,898	6,312	18,901	15,263	8,031	21,371	4,238
2041	16,151	11,364	10,132	7,894	6,321	19,162	15,343	8,135	21,606	4,268
2042	16,249	11,469	10,297	7,893	6,331	19,416	15,431	8,239	21,841	4,299
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	13,389	8,642	6,982	7,417	5,682	13,519	12,226	5,781	15,265	3,085
2022	13,450	8,826	6,983	7,481	5,789	13,844	12,627	5,884	15,659	3,121
2023	13,773	8,939	7,144	7,646	5,867	14,145	12,962	5,938	15,651	3,156
2024	14,025	9,053	7,289	7,705	5,922	14,402	13,186	6,009	15,938	3,203
2025	14,135	9,167	7,423	7,671	5,966	14,746	13,321	6,080	16,150	3,236
2026	14,250	9,291	7,575	7,666	5,995	15,043	13,400	6,176	16,462	3,266
2027	14,358	9,405	7,709	7,667	6,006	15,282	13,461	6,263	16,715	3,294
2028	14,515	9,514	7,836	7,673	6,020	15,531	13,539	6,349	16,908	3,320
2029	14,657	9,620	7,959	7,685	6,038	15,762	13,641	6,422	17,037	3,339
2030	14,785	9,721	8,084	7,688	6,059	15,982	13,703	6,492	17,156	3,363
2031	14,914	9,824	8,212	7,702	6,069	16,212	13,807	6,564	17,274	3,393
2032	15,018	9,924	8,351	7,709	6,073	16,420	13,909	6,643	17,409	3,422
2033	15,113	10,020	8,495	7,717	6,077	16,645	14,008	6,718	17,563	3,449
2034	15,210	10,107	8,634	7,719	6,081	16,864	14,104	6,793	17,737	3,475
2035	15,323	10,195	8,771	7,724	6,089	17,089	14,190	6,877	17,888	3,503
2036	15,433	10,288	8,901	7,725	6,098	17,322	14,274	6,959	18,043	3,531
2037	15,534	10,390	9,040	7,725	6,110	17,568	14,366	7,050	18,242	3,562
2038	15,631	10,493	9,188	7,726	6,122	17,837	14,454	7,148	18,431	3,593
2039	15,740	10,594	9,337	7,727	6,130	18,101	14,540	7,247	18,672	3,624
2040	15,849	10,697	9,494	7,724	6,137	18,371	14,624	7,350	18,883	3,654
2041	15,945	10,795	9,647	7,721	6,147	18,625	14,701	7,446	19,091	3,679
2042	16,042	10,894	9,804	7,719	6,156	18,872	14,785	7,541	19,299	3,706
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	12,312	8,208	6,470	6,566	4,928	12,271	11,758	5,136	14,241	2,671
2022	12,368	8,383	6,471	6,622	5,021	12,566	12,144	5,227	14,609	2,702
2023	12,666	8,490	6,620	6,769	5,089	12,840	12,467	5,276	14,601	2,733
2024	12,897	8,598	6,755	6,821	5,137	13,073	12,681	5,338	14,869	2,773
2025	12,998	8,707	6,878	6,791	5,175	13,385	12,811	5,402	15,067	2,801
2026	13,104	8,824	7,019	6,786	5,200	13,655	12,888	5,487	15,358	2,827
2027	13,204	8,933	7,144	6,787	5,210	13,872	12,946	5,564	15,594	2,852
2028	13,348	9,036	7,261	6,792	5,222	14,098	13,021	5,641	15,774	2,874
2029	13,478	9,137	7,375	6,803	5,238	14,308	13,119	5,705	15,895	2,891
2030	13,596	9,233	7,491	6,805	5,255	14,508	13,179	5,768	16,006	2,911
2031	13,715	9,331	7,609	6,818	5,264	14,717	13,279	5,832	16,115	2,937
2032	13,810	9,426	7,739	6,824	5,268	14,905	13,377	5,902	16,242	2,963
2033	13,898	9,517	7,872	6,831	5,271	15,110	13,472	5,968	16,385	2,986
2034	13,987	9,600	8,001	6,833	5,275	15,308	13,564	6,035	16,548	3,008
2035	14,091	9,683	8,128	6,838	5,282	15,512	13,647	6,109	16,688	3,032
2036	14,191	9,771	8,248	6,839	5,290	15,724	13,728	6,182	16,833	3,057
2037	14,285	9,868	8,377	6,838	5,300	15,947	13,816	6,263	17,018	3,084
2038	14,374	9,966	8,514	6,839	5,310	16,191	13,902	6,351	17,195	3,110
2039	14,474	10,062	8,652	6,840	5,318	16,431	13,984	6,439	17,420	3,137
2040	14,574	10,160	8,798	6,838	5,324	16,676	14,065	6,530	17,617	3,163
2041	14,662	10,253	8,939	6,834	5,332	16,906	14,138	6,615	17,811	3,185
2042	14,752	10,347	9,085	6,833	5,340	17,131	14,220	6,699	18,004	3,208
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	11,058	7,731	6,064	5,491	4,586	10,867	10,911	4,477	14,837	2,713
2022	11,108	7,895	6,065	5,538	4,673	11,128	11,269	4,557	15,219	2,745
2023	11,375	7,997	6,206	5,660	4,736	11,370	11,568	4,599	15,212	2,776
2024	11,583	8,099	6,331	5,704	4,780	11,577	11,768	4,654	15,491	2,817
2025	11,674	8,201	6,447	5,679	4,816	11,853	11,888	4,709	15,696	2,845
2026	11,769	8,311	6,579	5,675	4,839	12,092	11,959	4,783	16,000	2,872
2027	11,859	8,414	6,696	5,676	4,848	12,284	12,013	4,851	16,246	2,897
2028	11,988	8,511	6,806	5,680	4,859	12,484	12,083	4,917	16,433	2,919
2029	12,105	8,606	6,913	5,689	4,874	12,670	12,174	4,973	16,559	2,937
2030	12,211	8,697	7,022	5,691	4,890	12,847	12,229	5,028	16,675	2,957
2031	12,318	8,788	7,133	5,701	4,899	13,032	12,322	5,084	16,789	2,984
2032	12,403	8,878	7,254	5,706	4,902	13,199	12,413	5,145	16,921	3,009
2033	12,482	8,964	7,379	5,712	4,905	13,380	12,502	5,203	17,070	3,033
2034	12,562	9,042	7,500	5,714	4,908	13,556	12,587	5,261	17,239	3,056
2035	12,655	9,120	7,618	5,718	4,915	13,737	12,664	5,325	17,385	3,080
2036	12,746	9,203	7,731	5,719	4,922	13,924	12,739	5,389	17,536	3,105
2037	12,830	9,295	7,852	5,718	4,932	14,122	12,821	5,460	17,729	3,132
2038	12,910	9,387	7,980	5,719	4,941	14,338	12,900	5,536	17,914	3,159
2039	13,000	9,477	8,110	5,720	4,948	14,550	12,976	5,613	18,148	3,187
2040	13,090	9,570	8,247	5,718	4,954	14,767	13,052	5,692	18,353	3,213
2041	13,169	9,657	8,379	5,715	4,961	14,971	13,120	5,766	18,555	3,236
2042	13,249	9,746	8,515	5,714	4,969	15,170	13,195	5,840	18,757	3,259
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	12,483	8,975	7,144	7,402	5,545	13,039	14,314	5,616	17,123	3,626
2022	12,540	9,166	7,145	7,466	5,650	13,353	14,784	5,716	17,564	3,668
2023	12,842	9,283	7,310	7,631	5,726	13,643	15,176	5,769	17,556	3,709
2024	13,076	9,402	7,458	7,690	5,780	13,891	15,438	5,837	17,878	3,765
2025	13,179	9,521	7,595	7,656	5,823	14,223	15,596	5,907	18,115	3,802
2026	13,286	9,649	7,750	7,650	5,851	14,510	15,689	6,000	18,466	3,838
2027	13,387	9,768	7,888	7,652	5,862	14,740	15,760	6,084	18,749	3,871
2028	13,533	9,880	8,017	7,657	5,875	14,980	15,851	6,168	18,965	3,901
2029	13,666	9,991	8,144	7,669	5,893	15,203	15,970	6,238	19,111	3,924
2030	13,785	10,096	8,271	7,672	5,913	15,415	16,044	6,307	19,244	3,952
2031	13,905	10,203	8,402	7,686	5,923	15,637	16,165	6,377	19,376	3,987
2032	14,002	10,307	8,545	7,693	5,927	15,837	16,284	6,453	19,528	4,021
2033	14,091	10,407	8,692	7,701	5,931	16,055	16,401	6,526	19,701	4,053
2034	14,181	10,497	8,834	7,703	5,935	16,266	16,513	6,599	19,896	4,084
2035	14,287	10,588	8,974	7,709	5,943	16,483	16,614	6,680	20,065	4,116
2036	14,389	10,684	9,107	7,710	5,952	16,708	16,712	6,760	20,238	4,149
2037	14,484	10,790	9,250	7,709	5,963	16,945	16,819	6,848	20,462	4,186
2038	14,574	10,898	9,400	7,710	5,975	17,204	16,923	6,944	20,674	4,222
2039	14,676	11,002	9,553	7,711	5,983	17,459	17,023	7,041	20,945	4,258
2040	14,777	11,110	9,714	7,709	5,990	17,720	17,122	7,140	21,181	4,294
2041	14,866	11,211	9,870	7,705	5,999	17,964	17,212	7,233	21,415	4,324
2042	14,957	11,314	10,031	7,704	6,008	18,203	17,311	7,326	21,647	4,355
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	14,659	10,666	8,571	8,865	6,782	14,635	16,855	6,919	18,881	4,128
2022	14,726	10,893	8,572	8,941	6,910	14,987	17,408	7,042	19,368	4,176
2023	15,080	11,032	8,770	9,139	7,003	15,313	17,871	7,106	19,358	4,223
2024	15,355	11,173	8,948	9,210	7,068	15,592	18,179	7,191	19,713	4,286
2025	15,476	11,315	9,112	9,169	7,121	15,964	18,365	7,277	19,975	4,329
2026	15,602	11,467	9,298	9,162	7,156	16,286	18,474	7,391	20,362	4,369
2027	15,721	11,608	9,463	9,164	7,169	16,545	18,558	7,495	20,675	4,407
2028	15,892	11,742	9,619	9,171	7,186	16,814	18,665	7,598	20,913	4,441
2029	16,048	11,874	9,770	9,185	7,207	17,064	18,806	7,685	21,073	4,468
2030	16,188	11,998	9,923	9,188	7,231	17,303	18,892	7,769	21,220	4,499
2031	16,329	12,125	10,080	9,205	7,244	17,552	19,035	7,856	21,365	4,539
2032	16,443	12,249	10,252	9,214	7,249	17,776	19,176	7,950	21,533	4,578
2033	16,547	12,367	10,428	9,223	7,253	18,021	19,312	8,039	21,723	4,614
2034	16,653	12,474	10,599	9,226	7,258	18,257	19,444	8,130	21,939	4,649
2035	16,777	12,583	10,766	9,232	7,268	18,501	19,563	8,229	22,125	4,686
2036	16,897	12,697	10,926	9,234	7,279	18,754	19,679	8,328	22,316	4,724
2037	17,008	12,824	11,097	9,233	7,293	19,020	19,805	8,436	22,562	4,766
2038	17,115	12,951	11,278	9,234	7,307	19,310	19,928	8,554	22,797	4,806
2039	17,234	13,075	11,461	9,235	7,317	19,597	20,045	8,673	23,095	4,848
2040	17,353	13,203	11,655	9,232	7,325	19,889	20,162	8,796	23,356	4,888
2041	17,458	13,324	11,842	9,228	7,337	20,164	20,267	8,910	23,614	4,923
2042	17,564	13,446	12,034	9,226	7,348	20,431	20,384	9,024	23,870	4,958
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	15,976	11,564	9,167	9,560	7,262	15,446	18,176	7,503	19,526	4,328
2022	16,049	11,809	9,168	9,642	7,399	15,817	18,772	7,637	20,029	4,378
2023	16,435	11,960	9,380	9,855	7,499	16,161	19,271	7,707	20,019	4,428
2024	16,735	12,113	9,571	9,931	7,569	16,456	19,603	7,799	20,387	4,494
2025	16,866	12,267	9,746	9,887	7,625	16,848	19,804	7,891	20,657	4,539
2026	17,004	12,431	9,945	9,880	7,662	17,188	19,922	8,015	21,057	4,581
2027	17,133	12,585	10,122	9,882	7,676	17,461	20,012	8,129	21,381	4,620
2028	17,320	12,730	10,288	9,889	7,695	17,745	20,127	8,240	21,627	4,657
2029	17,490	12,873	10,450	9,904	7,717	18,009	20,279	8,334	21,792	4,684
2030	17,642	13,008	10,614	9,908	7,744	18,261	20,372	8,426	21,945	4,717
2031	17,796	13,145	10,782	9,926	7,757	18,524	20,526	8,520	22,095	4,759
2032	17,920	13,279	10,965	9,936	7,763	18,761	20,678	8,621	22,269	4,800
2033	18,034	13,408	11,154	9,946	7,767	19,019	20,825	8,719	22,465	4,838
2034	18,149	13,524	11,336	9,948	7,772	19,268	20,968	8,817	22,688	4,875
2035	18,284	13,641	11,516	9,956	7,783	19,525	21,096	8,925	22,880	4,913
2036	18,415	13,766	11,687	9,957	7,795	19,792	21,221	9,032	23,079	4,953
2037	18,536	13,902	11,870	9,956	7,809	20,073	21,357	9,149	23,333	4,996
2038	18,652	14,040	12,063	9,957	7,825	20,380	21,489	9,277	23,576	5,039
2039	18,782	14,175	12,259	9,959	7,835	20,682	21,616	9,406	23,884	5,083
2040	18,912	14,314	12,466	9,956	7,844	20,991	21,741	9,539	24,153	5,125
2041	19,026	14,444	12,666	9,951	7,856	21,280	21,855	9,663	24,420	5,161
2042	19,142	14,577	12,872	9,949	7,868	21,563	21,981	9,787	24,685	5,198
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	15,441	11,285	8,745	9,079	7,046	15,285	17,469	7,383	19,716	4,368
2022	15,512	11,525	8,746	9,157	7,179	15,653	18,042	7,514	20,224	4,419
2023	15,885	11,672	8,949	9,360	7,277	15,993	18,521	7,583	20,215	4,469
2024	16,175	11,821	9,130	9,432	7,344	16,285	18,840	7,674	20,585	4,535
2025	16,302	11,971	9,297	9,390	7,399	16,673	19,033	7,765	20,859	4,581
2026	16,435	12,132	9,488	9,383	7,435	17,010	19,147	7,887	21,263	4,623
2027	16,559	12,282	9,656	9,385	7,449	17,280	19,233	7,998	21,589	4,663
2028	16,740	12,423	9,815	9,392	7,466	17,561	19,344	8,108	21,838	4,700
2029	16,904	12,562	9,970	9,406	7,489	17,822	19,490	8,201	22,005	4,728
2030	17,052	12,694	10,126	9,410	7,514	18,071	19,579	8,291	22,159	4,761
2031	17,200	12,828	10,286	9,427	7,527	18,331	19,728	8,383	22,310	4,804
2032	17,320	12,959	10,461	9,436	7,532	18,566	19,873	8,483	22,486	4,845
2033	17,430	13,085	10,641	9,446	7,537	18,821	20,015	8,579	22,684	4,883
2034	17,542	13,198	10,815	9,448	7,542	19,068	20,152	8,675	22,909	4,920
2035	17,672	13,313	10,986	9,455	7,552	19,322	20,275	8,782	23,103	4,959
2036	17,799	13,434	11,149	9,456	7,563	19,586	20,395	8,887	23,304	4,999
2037	17,916	13,567	11,324	9,455	7,578	19,864	20,526	9,003	23,560	5,043
2038	18,028	13,702	11,508	9,457	7,592	20,168	20,653	9,128	23,806	5,086
2039	18,153	13,834	11,695	9,458	7,603	20,467	20,774	9,255	24,117	5,130
2040	18,279	13,969	11,892	9,455	7,612	20,772	20,895	9,386	24,389	5,173
2041	18,389	14,096	12,083	9,450	7,623	21,059	21,004	9,508	24,658	5,209
2042	18,501	14,226	12,280	9,449	7,635	21,339	21,125	9,630	24,926	5,247
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	14,260	10,372	8,441	8,783	6,590	14,851	17,066	6,921	18,261	4,087
2022	14,325	10,592	8,442	8,859	6,714	15,208	17,626	7,044	18,732	4,135
2023	14,670	10,728	8,637	9,055	6,805	15,539	18,094	7,108	18,723	4,182
2024	14,937	10,865	8,812	9,125	6,869	15,822	18,406	7,193	19,066	4,244
2025	15,054	11,003	8,974	9,084	6,920	16,199	18,595	7,279	19,319	4,287
2026	15,177	11,150	9,157	9,078	6,953	16,526	18,705	7,393	19,693	4,327
2027	15,292	11,288	9,320	9,080	6,966	16,788	18,790	7,498	19,996	4,364
2028	15,459	11,418	9,473	9,086	6,982	17,061	18,898	7,600	20,226	4,398
2029	15,611	11,546	9,622	9,100	7,003	17,315	19,041	7,687	20,381	4,424
2030	15,747	11,667	9,773	9,104	7,027	17,558	19,128	7,771	20,523	4,455
2031	15,884	11,790	9,927	9,120	7,039	17,810	19,273	7,858	20,664	4,495
2032	15,995	11,910	10,096	9,129	7,044	18,038	19,415	7,952	20,826	4,534
2033	16,096	12,026	10,270	9,138	7,048	18,286	19,554	8,041	21,010	4,569
2034	16,200	12,130	10,438	9,141	7,053	18,526	19,687	8,132	21,218	4,604
2035	16,320	12,236	10,603	9,147	7,063	18,773	19,808	8,232	21,398	4,640
2036	16,437	12,347	10,761	9,148	7,073	19,030	19,925	8,330	21,584	4,678
2037	16,545	12,470	10,929	9,147	7,087	19,300	20,053	8,439	21,822	4,719
2038	16,648	12,593	11,107	9,149	7,100	19,595	20,177	8,557	22,049	4,759
2039	16,764	12,715	11,287	9,150	7,110	19,885	20,296	8,676	22,337	4,801
2040	16,880	12,839	11,478	9,147	7,118	20,182	20,414	8,799	22,589	4,840
2041	16,982	12,956	11,663	9,143	7,129	20,460	20,521	8,913	22,838	4,875
2042	17,085	13,075	11,852	9,141	7,140	20,732	20,639	9,027	23,086	4,910
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	11,591	8,195	6,472	6,632	5,027	11,692	11,863	5,472	16,518	3,286
2022	11,644	8,369	6,473	6,689	5,122	11,973	12,252	5,570	16,944	3,324
2023	11,924	8,476	6,622	6,837	5,191	12,234	12,578	5,621	16,935	3,362
2024	12,141	8,584	6,757	6,890	5,239	12,457	12,794	5,688	17,246	3,412
2025	12,237	8,693	6,880	6,859	5,278	12,754	12,925	5,755	17,475	3,446
2026	12,337	8,810	7,021	6,854	5,304	13,011	13,002	5,846	17,813	3,478
2027	12,430	8,919	7,146	6,856	5,314	13,218	13,061	5,928	18,087	3,508
2028	12,566	9,021	7,263	6,861	5,326	13,433	13,137	6,010	18,295	3,536
2029	12,689	9,123	7,378	6,871	5,342	13,632	13,236	6,078	18,435	3,557
2030	12,800	9,218	7,493	6,874	5,360	13,823	13,296	6,145	18,564	3,582
2031	12,911	9,316	7,612	6,887	5,369	14,022	13,397	6,213	18,691	3,614
2032	13,001	9,410	7,741	6,893	5,373	14,201	13,496	6,288	18,838	3,645
2033	13,084	9,502	7,874	6,900	5,377	14,397	13,592	6,359	19,004	3,674
2034	13,168	9,584	8,003	6,902	5,380	14,586	13,685	6,430	19,193	3,701
2035	13,266	9,667	8,130	6,907	5,387	14,780	13,769	6,509	19,355	3,731
2036	13,360	9,755	8,251	6,908	5,396	14,982	13,850	6,587	19,523	3,761
2037	13,448	9,852	8,380	6,907	5,406	15,195	13,939	6,673	19,738	3,794
2038	13,532	9,950	8,516	6,908	5,416	15,427	14,025	6,766	19,944	3,826
2039	13,627	10,046	8,654	6,909	5,424	15,656	14,108	6,860	20,205	3,860
2040	13,721	10,144	8,801	6,907	5,430	15,889	14,190	6,957	20,432	3,892
2041	13,804	10,236	8,942	6,903	5,438	16,108	14,264	7,048	20,658	3,919
2042	13,888	10,330	9,087	6,902	5,446	16,322	14,346	7,138	20,882	3,947
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	12,657	8,350	6,664	6,568	4,818	11,714	11,995	5,184	14,109	2,832
2022	12,714	8,528	6,665	6,624	4,909	11,996	12,389	5,277	14,473	2,865
2023	13,020	8,637	6,819	6,771	4,975	12,257	12,718	5,325	14,466	2,898
2024	13,258	8,747	6,957	6,823	5,022	12,480	12,937	5,389	14,731	2,941
2025	13,362	8,858	7,084	6,793	5,059	12,778	13,070	5,453	14,927	2,970
2026	13,471	8,977	7,229	6,788	5,084	13,036	13,148	5,538	15,216	2,998
2027	13,573	9,088	7,358	6,789	5,093	13,242	13,207	5,617	15,450	3,024
2028	13,721	9,193	7,479	6,794	5,105	13,458	13,283	5,694	15,628	3,047
2029	13,856	9,296	7,597	6,805	5,120	13,658	13,383	5,759	15,747	3,065
2030	13,977	9,393	7,716	6,807	5,137	13,849	13,445	5,822	15,857	3,087
2031	14,099	9,492	7,838	6,820	5,146	14,049	13,547	5,887	15,966	3,115
2032	14,197	9,589	7,971	6,826	5,150	14,228	13,647	5,957	16,091	3,141
2033	14,287	9,682	8,108	6,833	5,153	14,424	13,744	6,024	16,233	3,166
2034	14,379	9,766	8,241	6,835	5,156	14,613	13,838	6,092	16,394	3,190
2035	14,485	9,851	8,371	6,840	5,163	14,808	13,923	6,167	16,533	3,216
2036	14,589	9,941	8,496	6,841	5,171	15,010	14,005	6,240	16,677	3,241
2037	14,685	10,039	8,628	6,840	5,181	15,223	14,095	6,322	16,860	3,270
2038	14,777	10,139	8,769	6,841	5,191	15,456	14,182	6,410	17,036	3,298
2039	14,880	10,236	8,911	6,842	5,198	15,685	14,266	6,499	17,259	3,327
2040	14,983	10,336	9,062	6,840	5,204	15,919	14,349	6,591	17,453	3,354
2041	15,073	10,431	9,207	6,836	5,212	16,139	14,423	6,677	17,646	3,378
2042	15,165	10,527	9,357	6,835	5,220	16,353	14,507	6,762	17,837	3,402
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	13,389	8,960	7,073	7,138	5,236	12,640	12,692	5,711	15,173	3,129
2022	13,450	9,150	7,073	7,199	5,334	12,944	13,108	5,813	15,564	3,166
2023	13,774	9,267	7,237	7,359	5,407	13,226	13,456	5,866	15,557	3,202
2024	14,025	9,385	7,384	7,416	5,457	13,467	13,688	5,936	15,842	3,249
2025	14,135	9,504	7,519	7,383	5,498	13,788	13,829	6,007	16,053	3,282
2026	14,251	9,632	7,673	7,377	5,524	14,066	13,911	6,101	16,363	3,312
2027	14,359	9,751	7,809	7,379	5,534	14,290	13,974	6,188	16,615	3,341
2028	14,515	9,863	7,937	7,384	5,547	14,522	14,055	6,272	16,806	3,367
2029	14,658	9,974	8,062	7,396	5,564	14,738	14,160	6,344	16,935	3,387
2030	14,786	10,078	8,189	7,398	5,583	14,944	14,225	6,414	17,053	3,411
2031	14,915	10,185	8,318	7,412	5,592	15,159	14,333	6,485	17,170	3,441
2032	15,019	10,289	8,460	7,419	5,597	15,353	14,439	6,563	17,305	3,471
2033	15,114	10,388	8,605	7,427	5,600	15,564	14,542	6,637	17,458	3,498
2034	15,211	10,478	8,746	7,428	5,604	15,769	14,641	6,711	17,631	3,525
2035	15,324	10,569	8,885	7,434	5,611	15,979	14,731	6,793	17,780	3,553
2036	15,433	10,666	9,017	7,435	5,620	16,197	14,818	6,875	17,934	3,581
2037	15,535	10,772	9,158	7,434	5,630	16,427	14,913	6,964	18,132	3,613
2038	15,632	10,878	9,307	7,435	5,641	16,678	15,005	7,062	18,320	3,644
2039	15,741	10,983	9,458	7,436	5,649	16,926	15,094	7,160	18,560	3,675
2040	15,850	11,090	9,618	7,434	5,655	17,178	15,182	7,261	18,769	3,706
2041	15,945	11,192	9,772	7,430	5,664	17,415	15,261	7,356	18,977	3,732
2042	16,042	11,294	9,931	7,429	5,673	17,646	15,349	7,450	19,183	3,759
Compound Annual Growth Rates (%)										
2023-2027	1.05	1.28	1.92	0.07	0.59	1.95	0.95	1.34	1.66	1.07
2023-2032	0.97	1.17	1.75	0.09	0.38	1.67	0.79	1.25	1.19	0.90
2023-2042	0.81	1.05	1.68	0.05	0.25	1.53	0.69	1.27	1.11	0.85

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
2021	93,866	89,364	81,305	74,690	91,665	106,767	114,077	110,836	105,120	83,287	82,119	88,165
2022	95,578	90,985	82,790	76,073	93,386	108,763	116,195	112,898	107,085	84,833	83,615	89,768
2023	97,149	92,511	84,196	77,319	94,922	110,572	118,136	114,780	108,874	86,201	85,017	91,273
2024	98,689	93,976	85,534	78,555	96,434	112,324	120,000	116,598	110,596	87,570	86,371	92,723
2025	99,879	95,104	86,564	79,507	97,592	113,664	121,423	117,987	111,916	88,622	87,405	93,834
2026	101,143	96,295	87,645	80,519	98,818	115,076	122,922	119,451	113,305	89,748	88,498	95,008
2027	102,210	97,300	88,559	81,371	99,851	116,268	124,188	120,687	114,476	90,698	89,423	96,001
2028	103,276	98,312	89,480	82,221	100,879	117,458	125,454	121,923	115,647	91,638	90,352	96,999
2029	104,252	99,243	90,331	83,000	101,823	118,557	126,625	123,064	116,730	92,496	91,208	97,918
2030	105,144	100,093	91,106	83,709	102,680	119,554	127,688	124,100	117,712	93,280	91,987	98,756
2031	106,102	101,006	91,940	84,471	103,607	120,633	128,838	125,220	118,777	94,122	92,826	99,657
2032	107,031	101,888	92,746	85,213	104,510	121,683	129,955	126,310	119,812	94,943	93,640	100,531
2033	107,980	102,789	93,569	85,970	105,433	122,754	131,094	127,422	120,868	95,784	94,469	101,421
2034	108,923	103,682	94,383	86,723	106,349	123,816	132,222	128,523	121,914	96,619	95,291	102,304
2035	109,869	104,579	95,202	87,476	107,263	124,878	133,352	129,625	122,961	97,454	96,116	103,190
2036	110,817	105,479	96,022	88,231	108,180	125,941	134,483	130,729	124,009	98,291	96,943	104,078
2037	111,856	106,461	96,916	89,059	109,187	127,108	135,723	131,939	125,159	99,212	97,846	105,048
2038	112,920	107,468	97,832	89,905	110,216	128,301	136,991	133,176	126,334	100,153	98,769	106,040
2039	114,040	108,525	98,793	90,798	111,301	129,554	138,322	134,477	127,568	101,148	99,741	107,083
2040	115,141	109,566	99,740	91,675	112,365	130,787	139,632	135,755	128,783	102,123	100,697	108,111
2041	116,179	110,546	100,633	92,502	113,368	131,948	140,866	136,960	129,927	103,043	101,597	109,078
2042	117,229	111,538	101,536	93,339	114,385	133,125	142,117	138,182	131,086	103,974	102,509	110,057
Compound Annual Growth Rates (%)												
2023-2027	1.28	1.27	1.27	1.29	1.27	1.26	1.26	1.26	1.26	1.28	1.27	1.27
2023-2032	1.08	1.08	1.08	1.09	1.07	1.07	1.07	1.07	1.07	1.08	1.08	1.08
2023-2042	0.99	0.99	0.99	1.00	0.99	0.98	0.98	0.98	0.98	0.99	0.99	0.99

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	49,993	138,236	108,831	53,770	80,237	94,403	104,284	69,117
2022	51,230	139,912	112,018	54,252	82,719	98,146	109,050	69,030
2023	51,994	145,793	114,647	55,827	88,341	101,114	112,971	72,086
2024	52,860	148,051	117,449	57,250	91,055	104,447	115,825	73,927
2025	53,706	148,256	120,900	58,569	93,851	106,700	117,908	74,640
2026	54,643	148,845	123,858	60,003	96,241	109,387	119,205	75,315
2027	55,483	149,452	126,064	61,264	98,375	111,458	120,241	75,896
2028	56,300	150,050	128,245	62,453	100,542	112,918	121,298	76,827
2029	56,987	150,738	130,220	63,600	102,601	113,878	122,536	77,688
2030	57,645	151,153	132,038	64,743	104,576	114,692	123,382	78,441
2031	58,327	151,784	133,967	65,907	106,537	115,552	124,565	79,174
2032	59,056	152,230	135,291	67,142	108,715	116,399	125,689	79,763
2033	59,754	152,723	136,972	68,446	110,693	117,352	126,772	80,269
2034	60,441	153,046	138,631	69,687	112,628	118,432	127,828	80,765
2035	61,202	153,370	140,355	70,891	114,477	119,300	128,776	81,395
2036	61,945	153,633	142,188	72,062	116,368	120,259	129,683	82,021
2037	62,776	153,872	144,082	73,284	118,288	121,512	130,661	82,566
2038	63,652	154,150	146,004	74,562	120,490	122,648	131,575	83,018
2039	64,562	154,411	147,927	75,864	122,638	124,130	132,474	83,538
2040	65,484	154,572	149,800	77,238	124,840	125,377	133,346	84,102
2041	66,333	154,689	151,604	78,549	126,961	126,726	134,141	84,553
2042	67,199	154,842	153,333	79,956	129,043	127,816	135,046	84,992
Compound Annual Growth Rates (%)								
2023-2027	1.64	0.62	2.40	2.35	2.73	2.46	1.57	1.30
2023-2032	1.43	0.48	1.86	2.07	2.33	1.58	1.19	1.13
2023-2042	1.36	0.32	1.54	1.91	2.01	1.24	0.94	0.87

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	50,642	81,805	17,194	23,564	13,582	436,184	72,627
2022	51,757	84,208	17,929	25,030	14,037	450,759	74,762
2023	52,538	86,350	18,759	26,166	14,592	462,798	76,141
2024	53,424	88,241	19,630	26,981	15,035	473,644	77,500
2025	54,025	90,047	20,272	27,725	15,422	484,970	78,849
2026	54,577	91,349	20,877	28,330	15,833	495,660	80,249
2027	55,073	92,297	21,366	29,096	16,232	506,935	81,487
2028	55,532	93,271	21,874	29,721	16,606	518,256	82,646
2029	55,874	94,240	22,297	30,263	16,962	529,189	83,757
2030	56,284	95,231	22,725	30,741	17,323	539,648	84,825
2031	56,787	96,083	23,239	31,112	17,682	549,923	85,868
2032	57,279	96,838	23,645	31,427	18,062	560,636	86,884
2033	57,735	97,586	24,133	31,737	18,418	571,088	87,841
2034	58,163	98,335	24,504	32,114	18,773	581,818	88,710
2035	58,631	99,113	24,876	32,491	19,134	592,706	89,602
2036	59,097	99,907	25,138	32,808	19,499	603,747	90,497
2037	59,618	100,739	25,478	33,051	19,874	614,564	91,488
2038	60,127	101,570	25,890	33,351	20,273	626,230	92,455
2039	60,657	102,349	26,343	33,642	20,675	637,944	93,418
2040	61,159	103,105	26,731	33,864	21,082	650,717	94,387
2041	61,589	103,898	27,127	34,059	21,487	663,051	95,325
2042	62,032	104,685	27,545	34,269	21,889	675,629	96,237
Compound Annual Growth Rates (%)							
2023-2027	1.19	1.68	3.31	2.69	2.70	2.30	1.71
2023-2032	0.96	1.28	2.60	2.06	2.40	2.15	1.48
2023-2042	0.88	1.02	2.04	1.43	2.16	2.01	1.24

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
2021	91,831	62,363	49,596	48,886	35,633	88,463	90,676	38,021	109,504	21,035
2022	94,128	65,828	51,252	50,232	36,813	92,705	98,262	39,544	118,048	21,858
2023	97,967	67,124	52,779	52,343	37,592	96,633	101,796	40,134	121,530	22,187
2024	100,558	68,358	54,104	53,154	38,256	99,258	104,367	40,803	125,293	22,562
2025	101,988	69,551	55,297	53,228	38,882	102,232	106,244	41,456	128,058	22,815
2026	103,344	70,752	56,596	53,439	39,289	104,778	107,413	42,179	131,198	23,049
2027	104,593	71,809	57,742	53,657	39,547	106,844	108,346	42,828	133,786	23,258
2028	106,110	72,802	58,825	53,872	39,803	108,914	109,299	43,458	135,797	23,452
2029	107,497	73,764	59,873	54,119	40,066	110,834	110,414	43,989	137,311	23,596
2030	108,758	74,674	60,910	54,268	40,333	112,640	111,177	44,497	138,661	23,769
2031	109,992	75,577	61,970	54,494	40,528	114,492	112,243	45,024	140,044	23,982
2032	111,041	76,457	63,090	54,654	40,677	116,159	113,255	45,587	141,438	24,189
2033	112,024	77,287	64,270	54,832	40,816	117,901	114,231	46,125	142,920	24,382
2034	112,966	78,043	65,392	54,947	40,947	119,612	115,183	46,656	144,537	24,563
2035	114,036	78,813	66,483	55,064	41,100	121,313	116,036	47,244	145,962	24,761
2036	115,052	79,584	67,542	55,158	41,251	123,085	116,854	47,818	147,481	24,957
2037	116,012	80,436	68,646	55,244	41,415	124,901	117,735	48,459	149,268	25,177
2038	116,928	81,267	69,801	55,344	41,574	126,864	118,559	49,135	150,989	25,392
2039	117,918	82,093	70,977	55,437	41,706	128,802	119,369	49,838	153,043	25,616
2040	118,910	82,923	72,217	55,495	41,827	130,743	120,155	50,549	154,931	25,828
2041	119,786	83,725	73,399	55,537	41,964	132,611	120,871	51,205	156,892	26,009
2042	120,658	84,509	74,666	55,592	42,098	134,425	121,687	51,873	158,620	26,197
Compound Annual Growth Rates (%)										
2023-2027	1.65	1.70	2.27	0.62	1.28	2.54	1.57	1.64	2.43	1.19
2023-2032	1.40	1.46	2.00	0.48	0.88	2.07	1.19	1.43	1.70	0.96
2023-2042	1.10	1.22	1.84	0.32	0.60	1.75	0.94	1.36	1.41	0.88

APPENDIX D HIGH AND LOW FORECASTS

Table 78: Gross Summer[14] Non-Coincident Peak Demand (Metered Load in MW) —High

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2021	15,976	11,564	9,167	9,560	7,262	15,446	18,176	7,503	19,716	4,368
2022	16,376	12,206	9,473	9,823	7,502	16,187	19,697	7,804	21,254	4,539
2023	17,043	12,446	9,755	10,236	7,661	16,873	20,405	7,920	21,881	4,607
2024	17,494	12,675	10,000	10,394	7,797	17,331	20,920	8,052	22,559	4,685
2025	17,743	12,896	10,221	10,409	7,924	17,850	21,297	8,181	23,057	4,738
2026	17,979	13,119	10,461	10,450	8,007	18,295	21,531	8,324	23,622	4,786
2027	18,196	13,315	10,673	10,493	8,060	18,655	21,718	8,452	24,088	4,830
2028	18,460	13,499	10,873	10,535	8,112	19,017	21,909	8,576	24,450	4,870
2029	18,701	13,678	11,067	10,583	8,165	19,352	22,132	8,681	24,723	4,900
2030	18,921	13,846	11,258	10,612	8,220	19,667	22,285	8,781	24,966	4,936
2031	19,135	14,014	11,454	10,656	8,259	19,991	22,499	8,885	25,215	4,980
2032	19,318	14,177	11,661	10,688	8,290	20,282	22,702	8,996	25,466	5,023
2033	19,489	14,331	11,879	10,722	8,318	20,586	22,897	9,103	25,733	5,063
2034	19,653	14,471	12,087	10,745	8,345	20,885	23,088	9,207	26,024	5,101
2035	19,839	14,614	12,288	10,768	8,376	21,182	23,259	9,323	26,280	5,142
2036	20,016	14,757	12,484	10,786	8,407	21,491	23,423	9,437	26,554	5,183
2037	20,183	14,915	12,688	10,803	8,440	21,808	23,600	9,563	26,876	5,228
2038	20,342	15,069	12,902	10,823	8,473	22,151	23,765	9,697	27,186	5,273
2039	20,514	15,222	13,119	10,841	8,500	22,489	23,927	9,835	27,555	5,319
2040	20,687	15,376	13,348	10,852	8,524	22,828	24,085	9,976	27,895	5,363
2041	20,839	15,524	13,567	10,860	8,552	23,154	24,228	10,105	28,248	5,401
2042	20,991	15,670	13,801	10,871	8,579	23,471	24,392	10,237	28,559	5,440
Compound Annual Growth Rates (%)										
2023-2027	1.65	1.70	2.27	0.62	1.28	2.54	1.57	1.64	2.43	1.19
2023-2032	1.40	1.46	2.00	0.48	0.88	2.07	1.19	1.43	1.70	0.96
2023-2042	1.10	1.22	1.84	0.32	0.60	1.75	0.94	1.36	1.41	0.88

[14] 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[15] Non-Coincident Peak Demand (Metered Load in MW) —High

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2021	13,562	9,098	7,333	7,584	5,843	13,908	12,760	6,317	17,276	3,579
2022	13,901	9,603	7,578	7,793	6,037	14,575	13,827	6,570	18,624	3,719
2023	14,468	9,792	7,804	8,120	6,164	15,193	14,325	6,668	19,173	3,775
2024	14,850	9,972	8,000	8,246	6,273	15,606	14,686	6,779	19,767	3,839
2025	15,062	10,146	8,176	8,257	6,376	16,073	14,951	6,888	20,203	3,882
2026	15,262	10,322	8,369	8,290	6,443	16,473	15,115	7,008	20,699	3,922
2027	15,446	10,476	8,538	8,324	6,485	16,798	15,246	7,115	21,107	3,957
2028	15,670	10,621	8,698	8,357	6,527	17,124	15,380	7,220	21,424	3,990
2029	15,875	10,761	8,853	8,396	6,570	17,426	15,537	7,308	21,663	4,015
2030	16,061	10,894	9,006	8,419	6,614	17,709	15,645	7,393	21,876	4,044
2031	16,244	11,026	9,163	8,454	6,646	18,001	15,795	7,480	22,094	4,080
2032	16,399	11,154	9,329	8,479	6,670	18,263	15,937	7,574	22,314	4,116
2033	16,544	11,275	9,503	8,506	6,693	18,537	16,074	7,663	22,548	4,149
2034	16,683	11,385	9,669	8,524	6,714	18,806	16,208	7,752	22,803	4,179
2035	16,841	11,497	9,830	8,542	6,739	19,073	16,328	7,849	23,028	4,213
2036	16,991	11,610	9,987	8,557	6,764	19,352	16,444	7,945	23,268	4,246
2037	17,133	11,734	10,150	8,570	6,791	19,637	16,568	8,051	23,549	4,284
2038	17,268	11,856	10,321	8,586	6,817	19,946	16,683	8,163	23,821	4,320
2039	17,414	11,976	10,495	8,600	6,839	20,251	16,797	8,280	24,145	4,358
2040	17,561	12,097	10,678	8,609	6,859	20,556	16,908	8,398	24,443	4,395
2041	17,690	12,214	10,853	8,616	6,881	20,849	17,009	8,507	24,752	4,425
2042	17,819	12,328	11,040	8,624	6,903	21,135	17,124	8,618	25,025	4,457
Compound Annual Growth Rates (%)										
2023-2027	1.65	1.70	2.27	0.62	1.28	2.54	1.57	1.64	2.43	1.19
2023-2032	1.40	1.46	2.00	0.48	0.88	2.07	1.19	1.43	1.70	0.96
2023-2042	1.10	1.22	1.84	0.32	0.60	1.75	0.94	1.36	1.41	0.88

[15] 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
2021	636,008
2022	668,669
2023	690,086
2024	706,714
2025	719,751
2026	732,037
2027	742,410
2028	752,332
2029	761,464
2030	769,687
2031	778,346
2032	786,548
2033	794,787
2034	802,846
2035	810,810
2036	818,783
2037	827,294
2038	835,853
2039	844,800
2040	853,579
2041	861,998
2042	870,325
Compound Annual Growth Rates (%)	
2023-2027	1.84
2023-2032	1.46
2023-2042	1.23

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Summer[16] CP	MISO Winter[17] CP
2021	114,077	93,866
2022	119,956	98,630
2023	123,771	101,774
2024	126,725	104,217
2025	129,041	106,140
2026	131,211	107,958
2027	133,041	109,491
2028	134,791	110,957
2029	136,407	112,302
2030	137,860	113,517
2031	139,394	114,793
2032	140,849	116,001
2033	142,308	117,216
2034	143,734	118,404
2035	145,142	119,581
2036	146,551	120,760
2037	148,056	122,018
2038	149,569	123,286
2039	151,148	124,611
2040	152,696	125,911
2041	154,181	127,158
2042	155,653	128,390
Compound Annual Growth Rates (%)		
2023-2027	1.82	1.84
2023-2032	1.45	1.46
2023-2042	1.21	1.23

[16] 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.

[17] 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	48,520	134,087	105,598	51,168	76,993	86,263	96,976	68,842
2022	49,032	134,757	107,530	50,655	78,342	87,078	98,815	68,644
2023	49,202	135,445	106,512	51,501	79,657	82,801	100,421	69,138
2024	49,538	135,586	107,471	52,310	80,368	83,030	101,224	69,909
2025	49,905	134,283	109,492	53,116	81,655	82,975	101,363	69,792
2026	50,591	133,621	111,268	54,079	82,831	84,002	101,392	69,786
2027	51,243	133,174	112,386	54,953	83,947	84,726	101,359	69,746
2028	51,892	132,920	113,625	55,747	85,213	85,038	101,550	70,142
2029	52,428	132,774	114,750	56,541	86,484	85,005	102,004	70,529
2030	52,961	132,480	115,752	57,337	87,777	84,974	102,174	70,834
2031	53,528	132,447	116,982	58,176	89,055	84,983	102,716	71,156
2032	54,123	132,285	117,637	59,122	90,643	85,095	103,284	71,357
2033	54,720	132,193	118,682	60,115	92,106	85,407	103,828	71,500
2034	55,307	131,963	119,774	61,076	93,491	85,955	104,376	71,665
2035	55,963	131,834	121,007	62,015	94,864	86,174	104,837	71,956
2036	56,620	131,686	122,304	62,910	96,335	86,557	105,311	72,265
2037	57,346	131,463	123,706	63,884	97,895	87,235	105,835	72,521
2038	58,137	131,335	125,192	64,926	99,719	87,817	106,386	72,707
2039	58,943	131,148	126,696	65,978	101,465	88,795	106,872	72,946
2040	59,762	130,962	128,155	67,113	103,325	89,450	107,389	73,249
2041	60,527	130,713	129,553	68,204	105,065	90,136	107,854	73,448
2042	61,299	130,521	130,848	69,318	106,836	90,775	108,350	73,670
Compound Annual Growth Rates (%)								
2023-2027	1.02	-0.42	1.35	1.64	1.32	0.58	0.23	0.22
2023-2032	1.06	-0.26	1.11	1.55	1.45	0.30	0.31	0.35
2023-2042	1.16	-0.19	1.09	1.58	1.56	0.49	0.40	0.33

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	48,971	80,647	14,324	21,812	12,942	424,552	69,474
2022	49,022	81,893	13,843	21,603	13,120	434,096	70,302
2023	49,378	82,700	13,654	21,786	13,449	442,170	70,670
2024	50,013	83,095	13,555	21,822	13,676	444,672	71,183
2025	50,443	83,261	13,551	21,877	14,004	450,835	71,772
2026	50,869	83,484	13,638	21,869	14,315	456,952	72,525
2027	51,276	83,513	13,652	22,079	14,619	463,506	73,262
2028	51,654	83,668	13,745	22,191	14,916	471,585	73,971
2029	51,940	83,891	13,816	22,209	15,197	478,801	74,670
2030	52,297	84,190	13,862	22,209	15,490	485,659	75,354
2031	52,756	84,385	14,047	22,129	15,786	492,499	76,075
2032	53,210	84,513	14,151	22,019	16,112	499,907	76,748
2033	53,623	84,665	14,268	21,939	16,415	507,037	77,422
2034	54,032	84,851	14,417	21,891	16,716	514,471	78,010
2035	54,457	85,079	14,505	21,889	17,025	522,114	78,636
2036	54,894	85,355	14,520	21,830	17,347	529,508	79,298
2037	55,381	85,686	14,605	21,714	17,675	537,511	80,072
2038	55,864	86,025	14,762	21,631	18,031	545,879	80,837
2039	56,343	86,337	14,966	21,541	18,388	554,336	81,609
2040	56,814	86,642	15,130	21,400	18,757	563,631	82,393
2041	57,207	86,976	15,301	21,238	19,123	572,956	83,122
2042	57,620	87,320	15,521	21,120	19,486	582,215	83,889
Compound Annual Growth Rates (%)							
2023-2027	0.95	0.24	0.00	0.33	2.11	1.19	0.90
2023-2032	0.83	0.24	0.40	0.12	2.03	1.37	0.92
2023-2042	0.82	0.29	0.68	-0.16	1.97	1.46	0.91

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
2021	91,831	62,363	49,596	48,886	35,633	88,463	90,676	38,021	109,504	21,035
2022	90,413	61,741	47,952	48,381	35,801	88,485	89,039	37,847	106,620	20,702
2023	91,023	62,111	48,726	48,628	36,003	88,626	90,487	37,979	103,004	20,853
2024	91,872	62,566	49,461	48,679	36,025	89,421	91,210	38,239	103,359	21,121
2025	91,967	63,053	50,165	48,211	35,952	90,996	91,336	38,522	103,647	21,302
2026	92,199	63,671	51,020	47,973	35,906	92,401	91,362	39,052	104,959	21,483
2027	92,438	64,272	51,798	47,813	35,783	93,464	91,332	39,554	106,008	21,654
2028	93,069	64,861	52,511	47,722	35,705	94,657	91,504	40,055	106,750	21,814
2029	93,650	65,451	53,225	47,669	35,665	95,797	91,913	40,469	107,116	21,935
2030	94,144	66,018	53,939	47,564	35,657	96,890	92,067	40,881	107,465	22,086
2031	94,677	66,632	54,694	47,552	35,593	98,084	92,554	41,318	107,851	22,280
2032	95,066	67,206	55,543	47,494	35,500	99,152	93,067	41,778	108,366	22,471
2033	95,409	67,781	56,434	47,461	35,412	100,345	93,557	42,238	109,055	22,645
2034	95,778	68,286	57,294	47,378	35,332	101,525	94,051	42,691	109,985	22,818
2035	96,266	68,817	58,137	47,332	35,280	102,765	94,466	43,197	110,615	22,998
2036	96,740	69,379	58,942	47,279	35,243	104,083	94,894	43,704	111,386	23,182
2037	97,189	70,035	59,815	47,199	35,226	105,493	95,366	44,265	112,471	23,388
2038	97,612	70,684	60,750	47,152	35,212	107,068	95,862	44,875	113,485	23,592
2039	98,099	71,337	61,694	47,085	35,182	108,616	96,300	45,497	114,880	23,794
2040	98,622	72,000	62,712	47,019	35,148	110,196	96,765	46,129	116,014	23,993
2041	99,034	72,616	63,690	46,929	35,130	111,690	97,184	46,720	117,180	24,159
2042	99,502	73,265	64,689	46,860	35,114	113,149	97,631	47,315	118,297	24,334
Compound Annual Growth Rates (%)										
2023-2027	0.39	0.86	1.54	-0.42	-0.15	1.34	0.23	1.02	0.72	0.95
2023-2032	0.48	0.88	1.47	-0.26	-0.16	1.25	0.31	1.06	0.57	0.83
2023-2042	0.47	0.87	1.50	-0.19	-0.13	1.29	0.40	1.16	0.73	0.82

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
2021	15,976	11,564	9,167	9,560	7,262	15,446	18,176	7,503	19,716	4,368
2022	15,729	11,448	8,863	9,461	7,296	15,450	17,848	7,469	19,197	4,299
2023	15,835	11,517	9,006	9,509	7,337	15,474	18,138	7,495	18,546	4,330
2024	15,983	11,601	9,142	9,519	7,342	15,613	18,283	7,546	18,610	4,386
2025	16,000	11,691	9,272	9,428	7,327	15,888	18,308	7,602	18,662	4,424
2026	16,040	11,806	9,430	9,381	7,318	16,134	18,313	7,707	18,898	4,461
2027	16,081	11,918	9,574	9,350	7,293	16,319	18,307	7,806	19,087	4,497
2028	16,191	12,027	9,706	9,332	7,277	16,527	18,342	7,905	19,220	4,530
2029	16,292	12,136	9,838	9,322	7,268	16,727	18,424	7,986	19,286	4,555
2030	16,378	12,241	9,970	9,301	7,267	16,917	18,455	8,068	19,349	4,586
2031	16,471	12,355	10,109	9,299	7,254	17,126	18,552	8,154	19,418	4,626
2032	16,539	12,462	10,266	9,287	7,235	17,312	18,655	8,245	19,511	4,666
2033	16,598	12,568	10,431	9,281	7,217	17,521	18,753	8,335	19,635	4,702
2034	16,663	12,662	10,590	9,265	7,201	17,727	18,852	8,425	19,803	4,738
2035	16,748	12,760	10,746	9,256	7,190	17,943	18,936	8,525	19,916	4,776
2036	16,830	12,864	10,895	9,245	7,182	18,173	19,021	8,625	20,055	4,814
2037	16,908	12,986	11,056	9,230	7,179	18,420	19,116	8,735	20,250	4,857
2038	16,982	13,106	11,229	9,221	7,176	18,695	19,215	8,856	20,433	4,899
2039	17,066	13,227	11,403	9,208	7,170	18,965	19,303	8,979	20,684	4,941
2040	17,157	13,350	11,591	9,195	7,163	19,241	19,396	9,103	20,888	4,982
2041	17,229	13,465	11,772	9,177	7,159	19,502	19,480	9,220	21,098	5,017
2042	17,310	13,585	11,957	9,164	7,156	19,756	19,570	9,337	21,299	5,053
Compound Annual Growth Rates (%)										
2023-2027	0.39	0.86	1.54	-0.42	-0.15	1.34	0.23	1.02	0.72	0.95
2023-2032	0.48	0.88	1.47	-0.26	-0.16	1.25	0.31	1.06	0.57	0.83
2023-2042	0.47	0.87	1.50	-0.19	-0.13	1.29	0.40	1.16	0.73	0.82

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
2021	13,562	9,098	7,333	7,584	5,843	13,908	12,760	6,317	17,276	3,579
2022	13,352	9,007	7,090	7,506	5,871	13,912	12,530	6,288	16,821	3,522
2023	13,442	9,061	7,205	7,544	5,904	13,934	12,733	6,310	16,251	3,548
2024	13,568	9,127	7,313	7,552	5,907	14,059	12,835	6,353	16,307	3,594
2025	13,582	9,198	7,418	7,479	5,895	14,306	12,853	6,400	16,352	3,625
2026	13,616	9,289	7,544	7,442	5,888	14,527	12,856	6,488	16,559	3,655
2027	13,651	9,376	7,659	7,417	5,868	14,695	12,852	6,572	16,725	3,684
2028	13,744	9,462	7,764	7,403	5,855	14,882	12,876	6,655	16,842	3,712
2029	13,830	9,548	7,870	7,395	5,848	15,061	12,934	6,724	16,899	3,732
2030	13,903	9,631	7,976	7,379	5,847	15,233	12,955	6,792	16,954	3,758
2031	13,982	9,721	8,087	7,377	5,837	15,421	13,024	6,865	17,015	3,791
2032	14,039	9,804	8,213	7,368	5,821	15,589	13,096	6,941	17,096	3,823
2033	14,090	9,888	8,344	7,363	5,807	15,776	13,165	7,017	17,205	3,853
2034	14,145	9,962	8,472	7,350	5,794	15,962	13,235	7,093	17,352	3,882
2035	14,217	10,039	8,596	7,343	5,785	16,157	13,293	7,177	17,451	3,913
2036	14,287	10,121	8,715	7,335	5,779	16,364	13,353	7,261	17,573	3,944
2037	14,353	10,217	8,844	7,322	5,776	16,586	13,420	7,354	17,744	3,979
2038	14,415	10,312	8,983	7,315	5,774	16,833	13,490	7,456	17,904	4,014
2039	14,487	10,407	9,122	7,305	5,769	17,077	13,551	7,559	18,124	4,048
2040	14,565	10,504	9,273	7,294	5,764	17,325	13,617	7,664	18,303	4,082
2041	14,625	10,594	9,417	7,280	5,760	17,560	13,676	7,762	18,487	4,111
2042	14,694	10,688	9,565	7,270	5,758	17,790	13,739	7,861	18,663	4,140
Compound Annual Growth Rates (%)										
2023-2027	0.39	0.86	1.54	-0.42	-0.15	1.34	0.23	1.02	0.72	0.95
2023-2032	0.48	0.88	1.47	-0.26	-0.16	1.25	0.31	1.06	0.57	0.83
2023-2042	0.47	0.87	1.50	-0.19	-0.13	1.29	0.40	1.16	0.73	0.82

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Energy
2021	636,008
2022	626,982
2023	627,440
2024	631,953
2025	635,152
2026	640,025
2027	644,117
2028	648,648
2029	652,891
2030	656,709
2031	661,236
2032	665,642
2033	670,336
2034	675,137
2035	679,873
2036	684,830
2037	690,445
2038	696,292
2039	702,483
2040	708,598
2041	714,331
2042	720,157
Compound Annual Growth Rates (%)	
2023-2027	0.66
2023-2032	0.66
2023-2042	0.73

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Summer CP	MISO Winter CP
2021	114,077	93,866
2022	112,480	92,563
2023	112,612	92,612
2024	113,413	93,274
2025	113,970	93,753
2026	114,822	94,482
2027	115,536	95,094
2028	116,328	95,767
2029	117,077	96,394
2030	117,748	96,962
2031	118,550	97,631
2032	119,331	98,282
2033	120,162	98,976
2034	121,009	99,686
2035	121,846	100,388
2036	122,721	101,124
2037	123,712	101,957
2038	124,746	102,826
2039	125,836	103,747
2040	126,914	104,655
2041	127,925	105,507
2042	128,953	106,372
Compound Annual Growth Rates (%)		
2023-2027	0.64	0.66
2023-2032	0.65	0.66
2023-2042	0.72	0.73