2021 MISO Energy and Peak Demand Forecasting for System Planning

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This report provides the eighth 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 this year. Thus, all projections in the 2021 report are on a gross basis.

Econometric models are developed biennially for each state to project annual retail sales of electricity. The 2021 report uses the same state econometric models as were used in the 2020 report. Forecasts of metered load at the LRZ level were developed by allocating the portion of each state's sales to the appropriate LRZ and adjusting for distribution system losses, 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 IHS Markit (formerly IHS Global Insight) 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 (2022-2041) (%)

STATE	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
CAGR	1.21	0.59	1.23	1.52	1.76	0.83	0.72	0.82	1.30	0.91	1.55	0.87	2.21	1.74	0.98

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.

[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.

Table ES-2. LRZ Metered Load CAGR (2022-2041) (%)

LRZ	1	2	3	4	5	6	7	8	9	10
Gross	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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 (2022-2041) (%)

MISO-System	Gross
Energy	1.02
July Peak Demand	1.01

[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

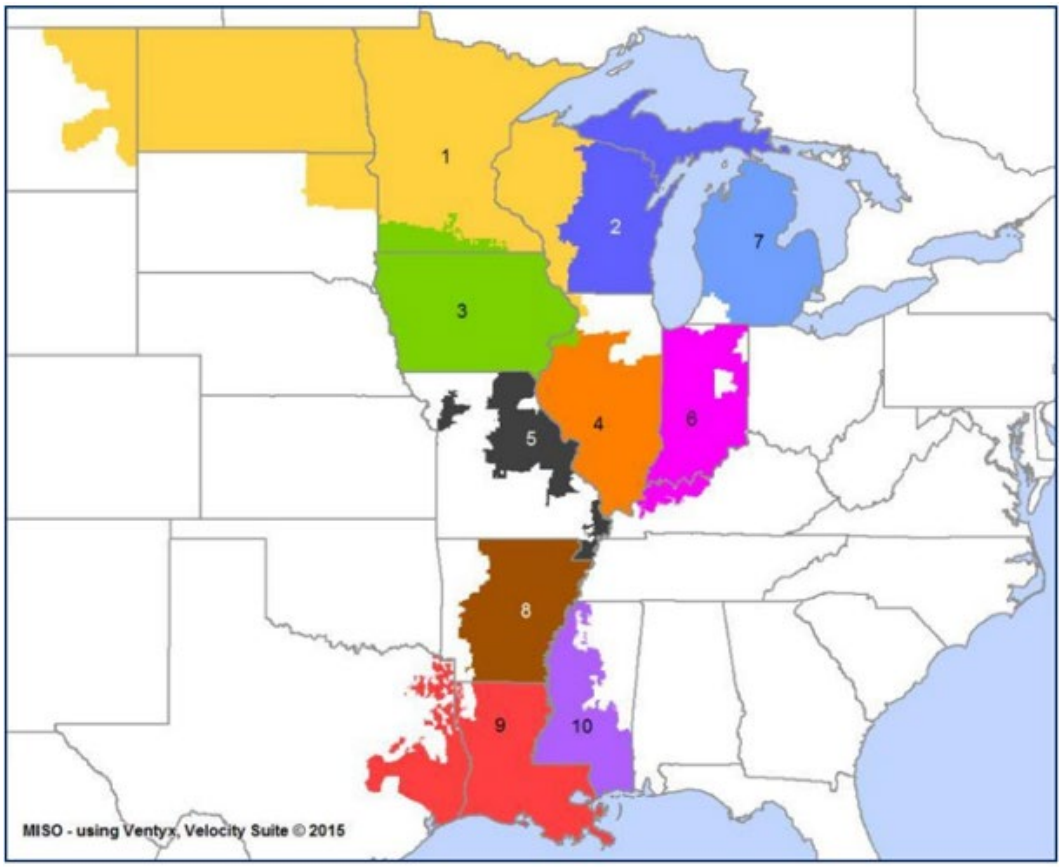
INTRODUCTION

This report represents the eighth 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 third 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 are developed biennially for each state to project annual retail sales of electricity. The 2021 report uses the same state econometric models as were used in the 2020 report. Forecasts of metered load at the LRZ level were developed by allocating the portion of each state's sales to the appropriate LRZ and adjusting for distribution system losses, 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 2020 and the weather-normalized LRZ metered load for the year 2020 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.

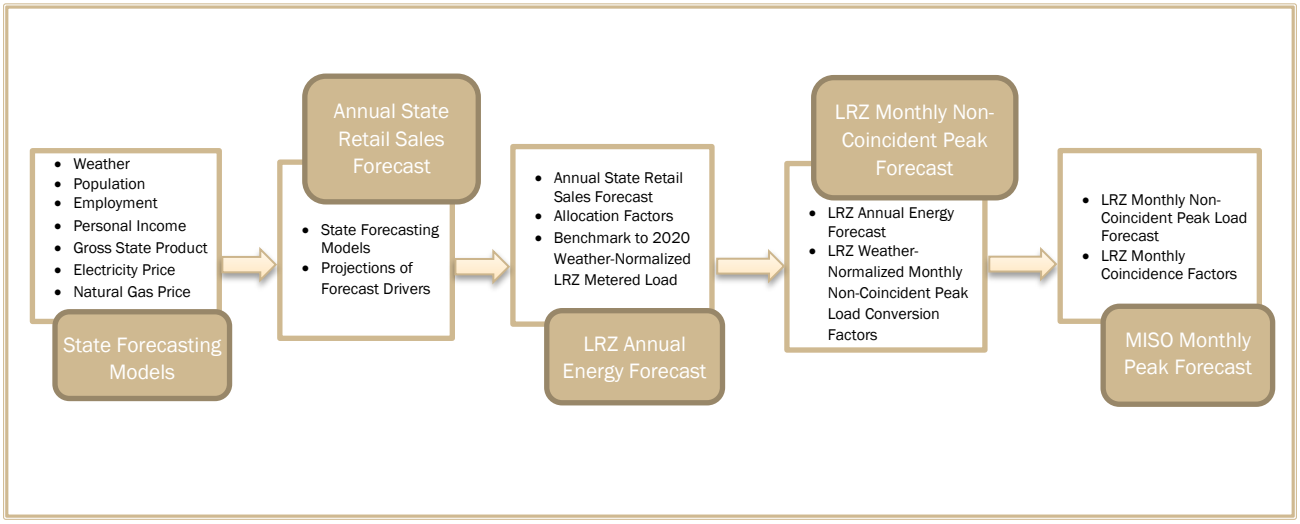
FORECASTING METHODOLOGY

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 built in the 2020 forecast were used for each state to forecast retail sales for a 20-year period, namely 2022 to 2041. 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. For the 2021 forecast, econometric models from the 2020 forecast were used.

CONVERSION OF RETAIL SALES TO METERED LOAD AND BENCHMARKING TO 2020 LEVELS

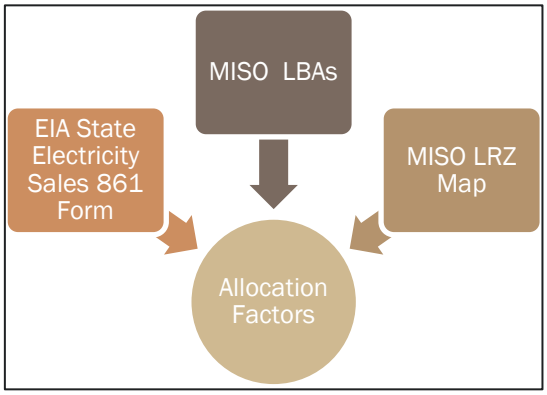
The state-level forecasts represent annual (calendar year) retail sales (electricity usage at the customer locations). This is driven by data availability, since statewide historical sales are available from the U.S. Department of Energy's Energy Information Administration (EIA). Since 2020 state electricity 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 2020 (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 2020.

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.

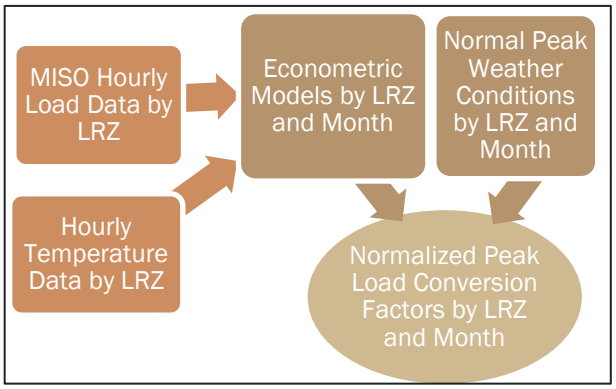
Figure 3: Structure and Logic Diagram for Allocation Factors



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 IHS Markit (formerly IHS Global Insight) 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 IHS Markit. 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. State models for the 2021 forecast were based on those estimated in the 2020 forecast. Therefore, historical data used for state models were not updated this year.

Table 1: Data Sources

Data	Content	Historical Data Source	Data Used in Projection
Electricity sales	GWhs, annual retail electricity sales by state, 1990-2018	EIA	N/A
Electricity prices	Cents/KWh, 2012$, 1990-2018	EIA*	SUFG projection based on EIA data
Natural gas prices	Dollars/Mcf, 2012$, 1990-2018	EIA*	SUFG projection based on EIA data
Real personal income	Thousands, 2012$, 1990-2018	BEA*	IHS Markit
Population	Number of people, 1990-2018	Census Bureau	IHS Markit
Manufacturing & non-manufacturing employment	Number of jobs, 1990-2018	BLS	IHS Markit
Non-farm employment	Number of jobs, 1990-2018	BLS	IHS Markit
Gross state product	Millions, 2012$, 1990-2018	IHS Markit	IHS Markit
Cooling degree days (CDDs)	Summations of monthly cooling degree days, base 65°F, 1970-2018	NOAA	NOAA 30-year normal
Heating degree days (HDDs)	Summations of monthly heating degree days, base 65°F, 1970-2018	NOAA	NOAA 30-year normal
Hourly Temperature	Historical hourly temperature of selected weather stations, 1997-2020	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.*

FORECASTING METHODOLOGY

COVID-19

A year ago, there was considerable uncertainty surrounding the impacts of the COVID-19 pandemic on the economy and the demand for electricity, especially in the short term. In general, economic projections from IHS Markit collected in 2021 are at a higher level than those collected in 2020.

Compound annual growth rates are provided for the various projections in this report. These rates are determined by the first and last values in the data and lack detail on the overall trajectory. As compared to the 2020 report, the period for the growth rates start one year later, which saw higher than normal growth in electricity demand due to the recovery from the pandemic-related economic downturn. It should be noted that due to higher starting points, some of the projections in this report may show slightly lower compound annual growth rates than those reported in the 2020 forecast, despite the forecast levels being similar, or in some instances higher, throughout the forecast period.

STATE-BY-STATE RESULTS

ARKANSAS

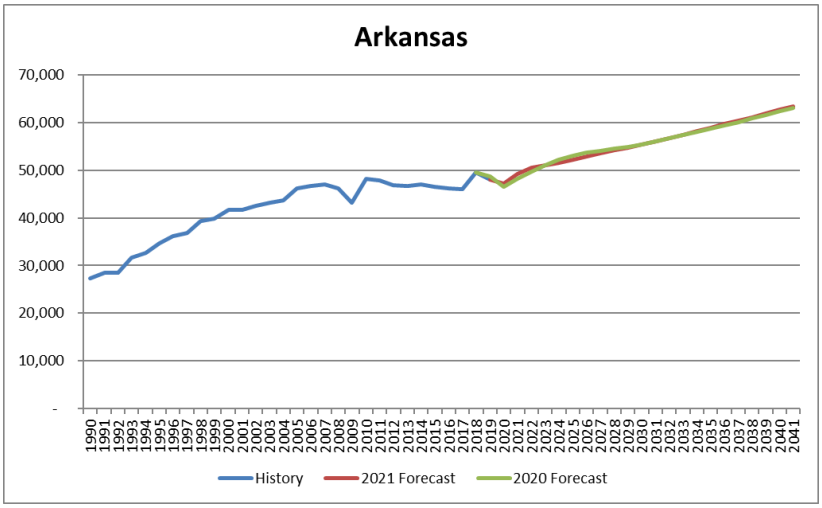
The Arkansas state econometric model uses real electricity and natural gas prices, real GSP, CDDs, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 2.

Table 2: Arkansas Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.09	0.50	1.75

Arkansas annual electricity sales are projected to grow at 1.21% in this forecast, which is slightly lower than the 1.36% growth rate projected in the 2020 forecast. Figure 5 shows Arkansas sales projection for the 2020 and 2021 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 2015 to 2019, 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
72.51%	27.49%

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 2022-2041 (%)

LRZ	Annual Energy[8]
LRZ8	1.21

[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

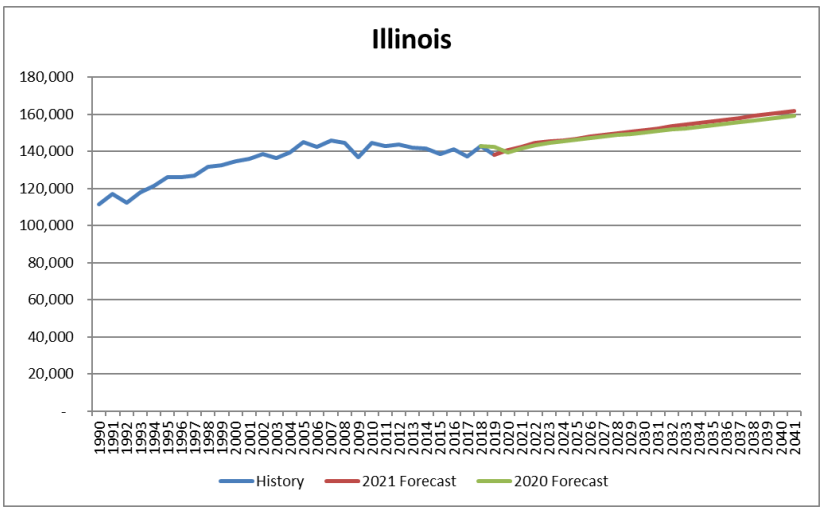
The Illinois state econometric model uses real electricity and natural gas prices, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 5.

Table 5: Illinois Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.59	0.50	1.55

Illinois annual electricity sales are projected to grow at 0.59% in this forecast, which is the same as the growth rate projected in the 2020 forecast. Figure 6 shows Illinois sales projection for the 2020 and 2021 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 2015 to 2019, 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%	1.46%	33.07%	65.47%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ3	1.48
LRZ4	0.59

STATE BY STATE RESULTS

INDIANA

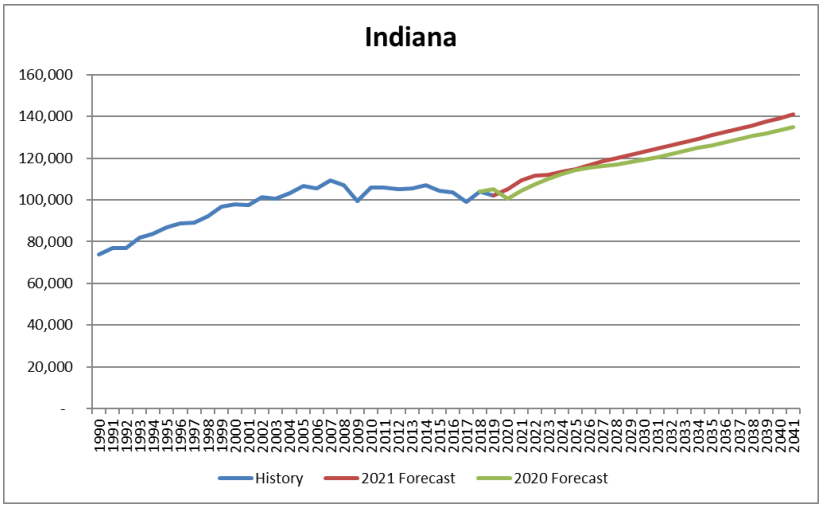
The Indiana state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 8.

Table 8: Indiana Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real GSP
-0.61	1.72

Indiana annual electricity sales are projected to grow at 1.23% in this forecast, which is slightly lower than the 1.30% growth rate projected in the 2020 forecast. Figure 7 shows Indiana sales projections for the 2020 and 2021 forecasts. The 2021 forecast lies slightly above the 2020 forecast due to a higher 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 2015 to 2019, 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
50.60%	49.40%

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. 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 2022-2041 (%)

LRZ	Annual Energy
LRZ6	1.46

STATE BY STATE RESULTS

IOWA

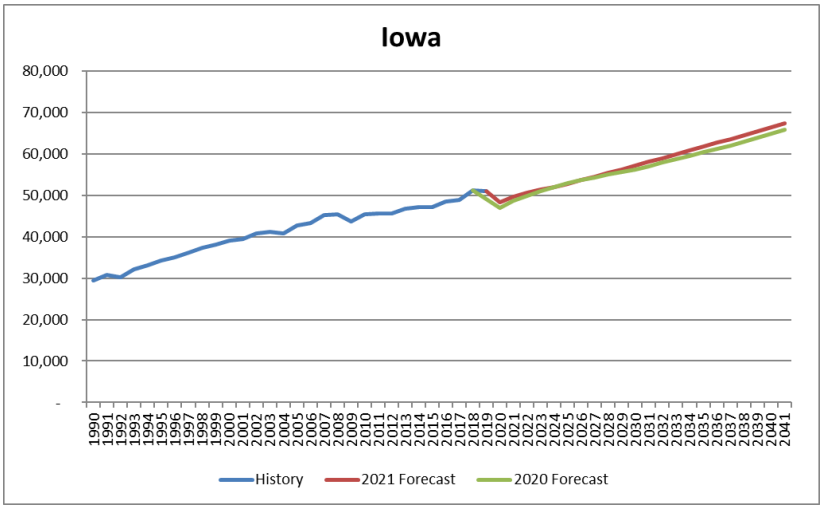
The Iowa state econometric model uses real electricity price, real GSP, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 11.

Table 11: Iowa Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real GSP
-0.69	1.99

Iowa annual electricity sales are projected to grow at 1.52% in this forecast, which is the same as the growth rate projected in the 2020 forecast. Figure 8 shows sales projection for the 2020 and 2021 forecasts. The 2021 forecast lies slightly above the 2020 forecast due to a higher starting point.

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 2015 to 2019, 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%	90.96%	7.23%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ3	1.48

STATE BY STATE RESULTS

KENTUCKY

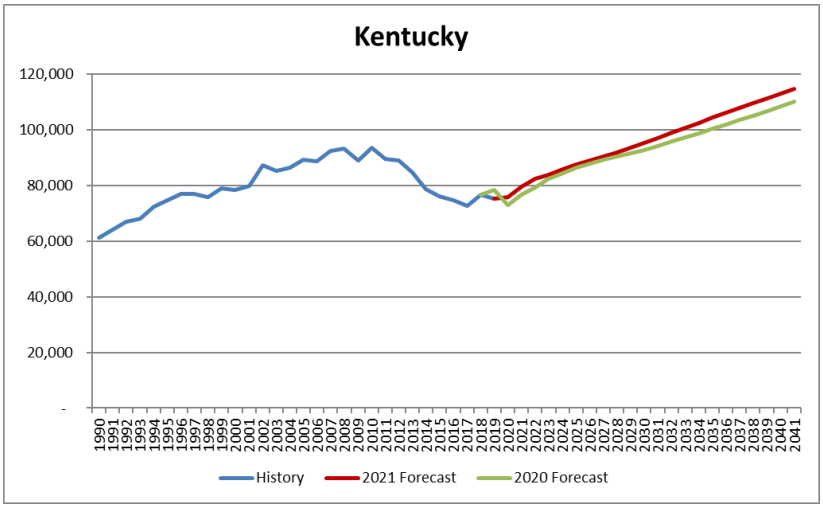
The Kentucky state econometric model uses real electricity and natural gas prices, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 14.

Table 14: Kentucky Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.51	0.63	1.78

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 1.76% in this forecast, which is slightly lower than the 1.84% growth rate projected in the 2020 forecast. Figure 9 shows Kentucky sales projection for the 2020 and 2021 forecasts. Although having a lower growth rate, the 2021 forecast lies slightly above the 2020 forecast due to a higher starting point.

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 2015 to 2019, 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
50.60%	49.40%

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 rate for Indiana and Kentucky's LRZ is shown in Table 16.

Table 16: Indiana and Kentucky LRZ Forecast CAGR for the Period of 2022-2041 (%)

LRZ	Annual Energy
LRZ6	1.46

STATE BY STATE RESULTS

LOUISIANA

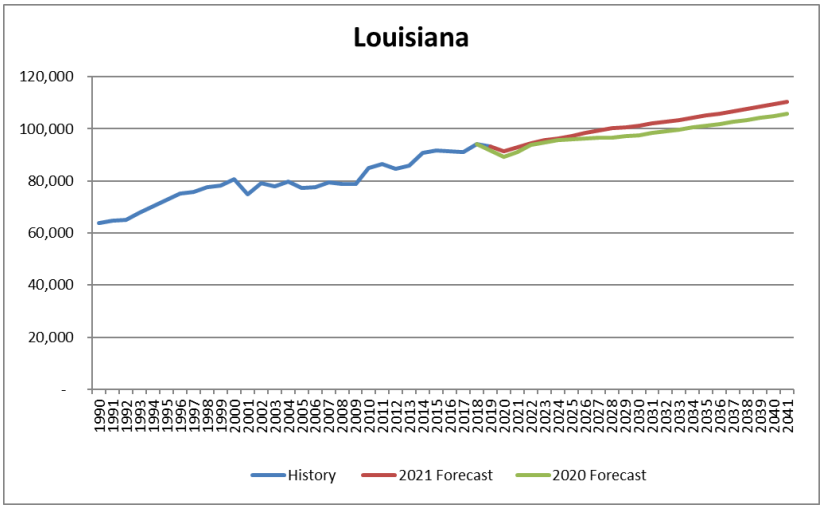
The Louisiana state econometric model uses real electricity and natural gas prices, real GSP excluding the mining sector, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 17.

Table 17: Louisiana Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP Excluding Mining Sector
-0.10	0.47	1.75%

Louisiana annual electricity sales are projected to grow at 0.83% in this forecast, which is higher than the 0.74% growth rate projected in the 2020 forecast. Figure 10 shows Louisiana sales projections for the 2020 and 2021 forecasts.

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



Most of Louisiana's loads are in LRZ 9. The Louisiana annual energy forecast was allocated to LRZ 9 based on the historical average of the load fractions for the period of 2015 to 2019, 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
92.76%	7.24%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ9	1.04

STATE BY STATE RESULTS

MICHIGAN

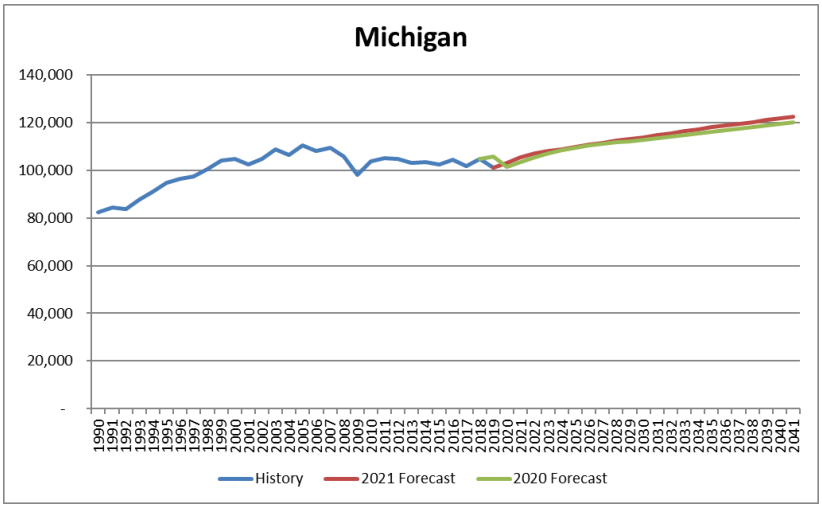
The Michigan state econometric model uses real electricity and natural gas prices, real GSP, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 20.

Table 20: Michigan Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.59	0.51	1.42

Michigan annual electricity sales are projected to grow at 0.72% in this forecast, which is close to the 0.77% growth rate projected in the 2020 forecast. Figure 11 shows sales projections for the 2020 and 2021 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 2015 to 2019, 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%	4.44%	91.55%	3.87%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ2	0.96
LRZ7	0.72

STATE BY STATE RESULTS

MINNESOTA

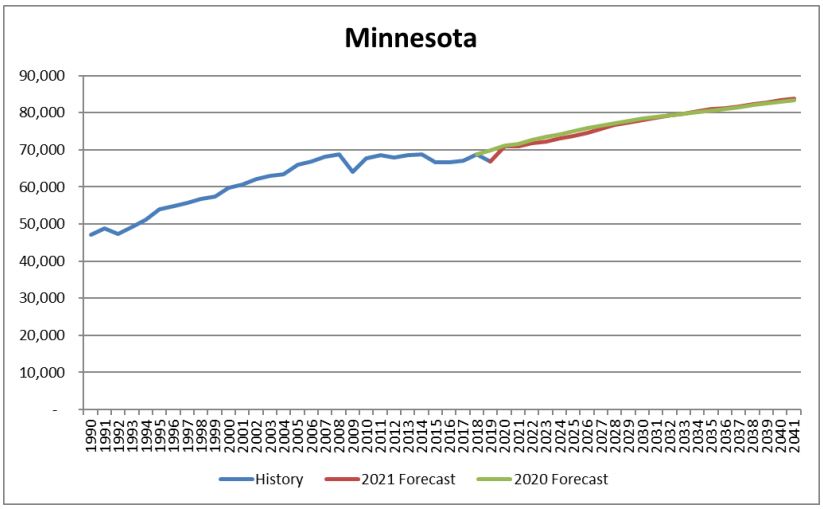
The Minnesota state econometric model uses real electricity price, population, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 23.

Table 23: Minnesota Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Population
-0.69	0.39

Minnesota annual electricity sales are projected to grow at 0.82% in this forecast, which is close to the 0.78% growth rate projected in the 2020 forecast. Figure 12 shows electricity sales projection for the 2020 and 2021 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 2019, as shown in Table 24. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Minnesota's allocation factor in LRZ3 dropped dramatically from previous years in 2016 because the Interstate Power and Light Company stopped selling power to Minnesota beginning in 2016. Therefore, the future allocation factor is held constant at the average of the load fractions of 2016 to 2019 to reflect the recent situation.

Table 24: Minnesota Allocation Factors

LRZ1	LRZ3	Non-MISO
97.76%	0.95%	1.29%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ3	1.48

STATE BY STATE RESULTS

MISSISSIPPI

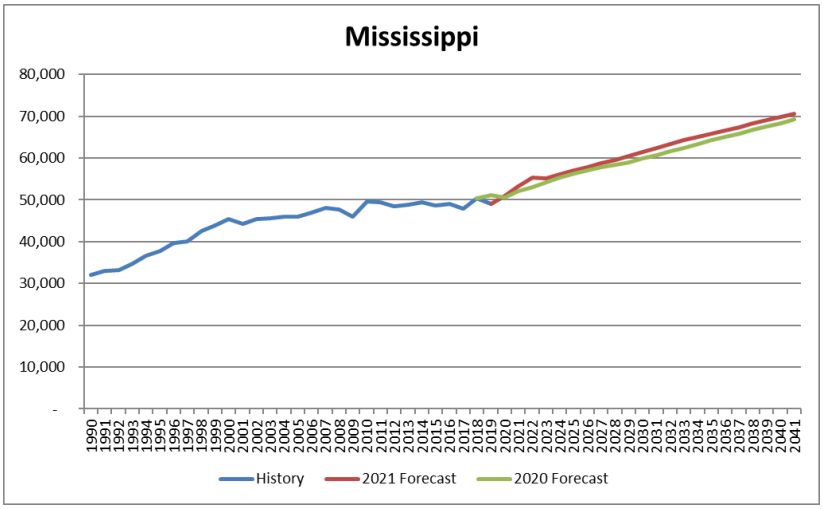
The Mississippi state econometric model uses real electricity price, real personal income, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 26.

Table 26: Mississippi Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Personal Income	Real GSP
-0.50	1.66	1.72

Mississippi annual electricity sales are projected to grow at 1.30%% in this forecast, which is lower than the 1.44% growth rate projected in the 2020 forecast. Figure 13 shows sales projections for the 2020 and 2021 forecasts. The 2021 forecast lies slightly higher than the 2020 forecast due to a higher starting point.

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 2015 to 2019, 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
44.54%	55.46%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ10	1.30

STATE BY STATE RESULTS

MISSOURI

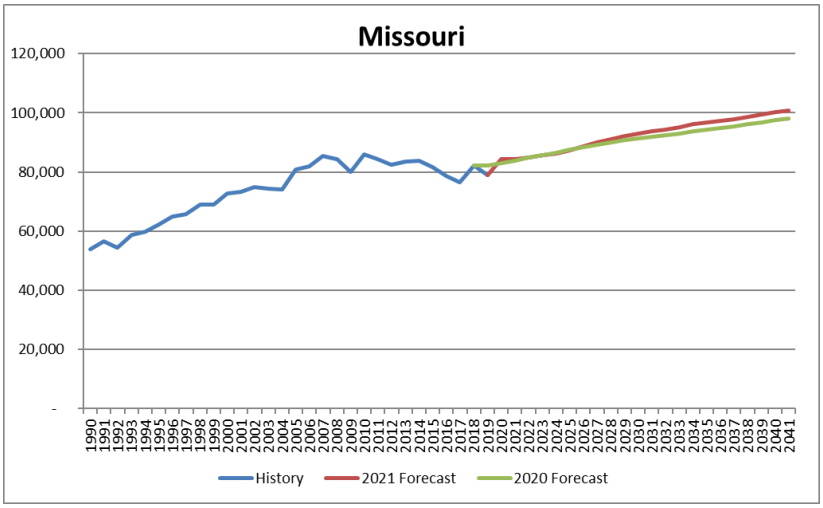
The Missouri state econometric model uses real electricity price, population, and CDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 29.

Table 29: Missouri Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Population
-0.68	0.28

Missouri annual electricity sales are projected to grow at 0.91% in this forecast, which is higher than the 0.80% growth rate projected in the 2020 forecast. Figure 14 shows sales projections for the 2020 and 2021 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 IHS Markit, the non-MISO region is projected to grow faster than the MISO region. Therefore, the allocation factor for LRZ 5 is reduced from 46.17% in 2020 to 41.27% in 2041. 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 46.17% in 2020 to 41.27% in 2041	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 2022-2041 (%)

LRZ	Annual Energy
LRZ5	0.36
LRZ8	1.21

STATE BY STATE RESULTS

MONTANA

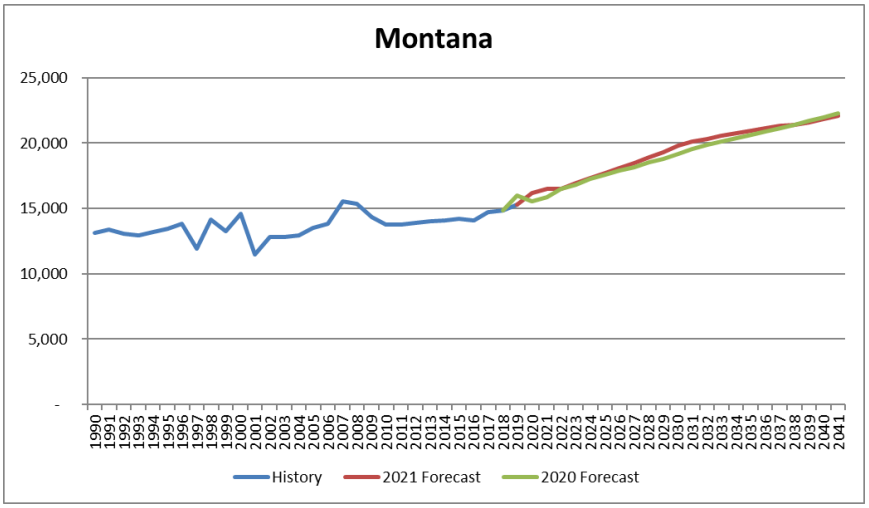
The Montana state econometric model uses real electricity and natural gas prices, real personal income per capita, manufacturing employment, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 32.

Table 32: Montana Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real Income/Population	Manufacturing Employment
-0.16	0.80	1.67	-0.71

Montana annual electricity sales are projected to grow at 1.55% in this forecast, which is lower than the 1.72% growth rate projected in the 2020 forecast. Figure 15 shows sales projections for the 2020 and 2021 forecasts.

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



A small portion of Montana's loads is located in LRZ 1, with the remainder outside MISO. Per the request of MISO staff and due to concerns over providing utility-specific information in states that only have a single MISO utility, the load fractions of Montana and North Dakota are combined (MT+ND). The MT+ND forecasts were allocated to LRZ1 based on the historical average of the load fractions of the period of 2015 to 2019, 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
33.15%	66.85%

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 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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95

STATE BY STATE RESULTS

NORTH DAKOTA

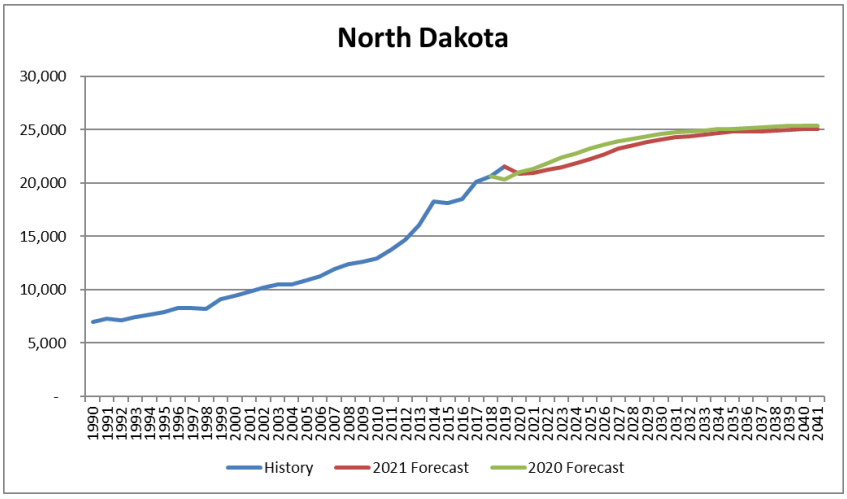
The North Dakota state econometric model uses real electricity price, population, and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 35.

Table 35: North Dakota Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Population
-0.71	0.17

North Dakota annual electricity sales are projected to grow at 0.87% in this forecast, which is lower than the 0.92% growth rate projected in the 2020 forecast. Figure 16 shows sales projection for the 2020 and 2021 forecasts.

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 2015 to 2019, 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
33.15%	66.85%

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 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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95

STATE BY STATE RESULTS

SOUTH DAKOTA

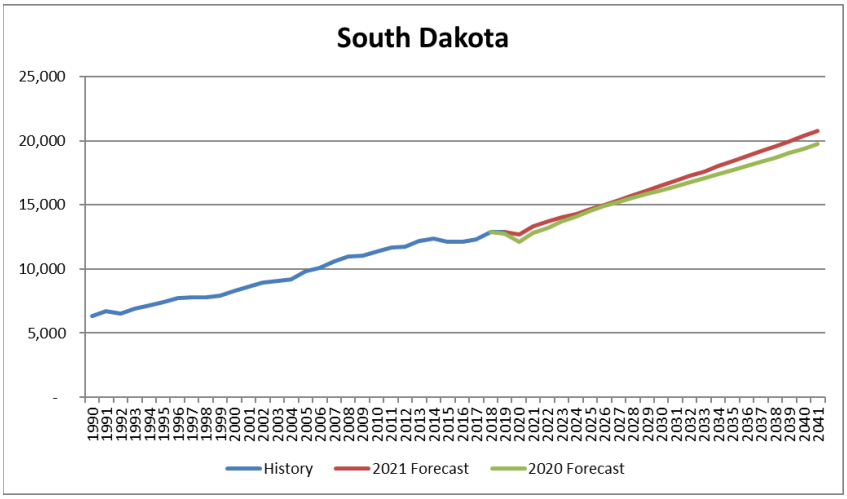
The South Dakota state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 38.

Table 38: South Dakota Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real GSP
-0.69	2.06

South Dakota electricity sales are projected to grow at 2.21% in this forecast, which is the same as the 2.21% growth rate projected in the 2020 forecast. Figure 17 shows the sales projections for the 2020 and 2021 forecasts. Despite having identical growth rates, the 2021 forecast is noticeably higher than the 2020 forecast due to a higher starting point.

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 2015-2019, as shown in Table 39. See Appendix B for more information on historical load fractions and the process of developing allocation factors.

Table 39: South Dakota Allocation Factors

LRZ1	LRZ3	Non-MISO
23.80%	1.85%	74.35%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ3	1.48

STATE BY STATE RESULTS

TEXAS

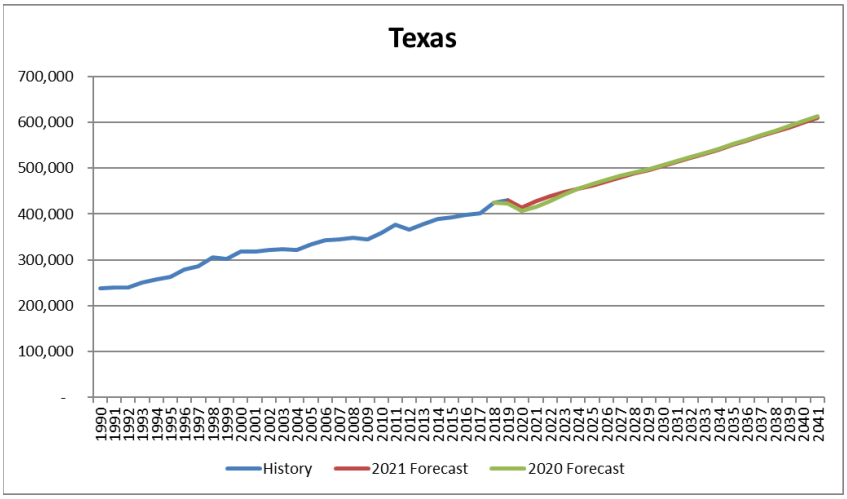
The Texas state econometric model uses real electricity price, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 41.

Table 41: Texas Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real GSP
-0.10	2.67

Texas annual electricity sales are projected to grow at 1.74% in this forecast, which is lower than the 1.98% growth rate projected in the 2020 forecast. Figure 18 shows sales projections for the 2020 and 2021 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 2015-2019, 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
0.0053%	5.45%	94.54%

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 2022-2041 (%)

LRZ	Annual Energy
LRZ8	1.21
LRZ9	1.04

STATE BY STATE RESULTS

WISCONSIN

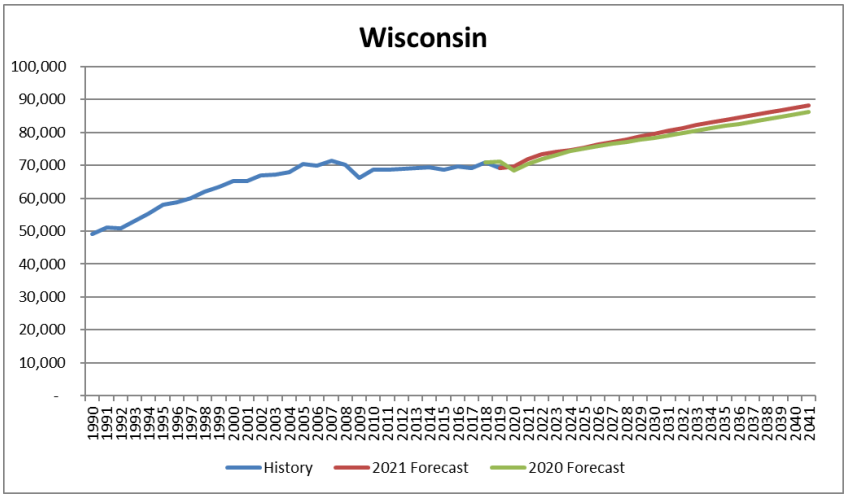
The Wisconsin state econometric model uses real electricity and natural gas prices, real GSP, CDDs and HDDs as explanatory variables. Appendix A provides data sources and the model specification. The growth rates for the drivers are provided in Table 44.

Table 44: Wisconsin Explanatory Variable CAGR for the Period of 2022-2041 (%)

Real Electricity Price	Real Natural Gas Price	Real GSP
-0.60	0.43	1.67

Wisconsin annual electricity sales are projected to grow at 0.98% in this forecast, which is very close to the 1.02% growth rate projected in the 2020 forecast. Figure 19 shows sales projections for the 2020 and 2021 forecasts. Despite having nearly identical growth rates, the 2021 forecast is noticeably higher than the 2020 forecast due to a higher starting point.

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 2015-2019, 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
17.01%	82.99%	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 2022-2041 (%)

LRZ	Annual Energy
LRZ1	0.95
LRZ2	0.96

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
2020	90,153	60,275	47,752	48,012	36,256	87,124	92,596	36,703	108,593	20,625
2021	90,829	62,148	49,105	48,511	36,156	90,818	94,766	38,335	110,792	21,544
2022	91,897	63,325	49,993	49,296	36,248	93,455	96,165	39,272	112,778	22,334
2023	92,770	63,921	50,642	49,544	36,276	94,250	97,074	39,672	114,322	22,293
2024	93,866	64,498	51,297	49,814	36,372	95,872	97,730	40,157	115,379	22,666
2025	94,872	65,144	52,070	50,112	36,550	97,306	98,654	40,645	116,844	23,041
2026	96,190	65,831	52,844	50,427	36,923	98,812	99,503	41,127	118,328	23,390
2027	97,734	66,525	53,674	50,755	37,324	100,441	100,263	41,640	119,776	23,726
2028	99,051	67,231	54,562	51,049	37,577	101,944	100,988	42,145	120,851	24,071
2029	100,112	67,941	55,392	51,356	37,775	103,468	101,677	42,636	121,878	24,440
2030	101,213	68,674	56,231	51,692	37,963	105,069	102,397	43,129	122,938	24,836
2031	102,219	69,390	57,094	52,015	38,072	106,611	103,131	43,623	124,042	25,232
2032	102,953	70,076	57,952	52,313	38,140	108,188	103,815	44,148	125,079	25,633
2033	103,786	70,800	58,812	52,638	38,280	109,850	104,619	44,708	126,262	25,981
2034	104,777	71,503	59,705	52,985	38,446	111,489	105,388	45,269	127,698	26,303
2035	105,655	72,181	60,676	53,315	38,482	113,180	106,126	45,863	129,063	26,639
2036	106,152	72,821	61,584	53,623	38,436	114,775	106,806	46,419	130,286	26,949
2037	106,790	73,454	62,397	53,921	38,479	116,370	107,484	46,982	131,561	27,259
2038	107,554	74,078	63,264	54,220	38,573	118,025	108,146	47,568	132,956	27,569
2039	108,355	74,712	64,168	54,516	38,655	119,668	108,788	48,152	134,380	27,895
2040	109,136	75,358	65,118	54,825	38,719	121,392	109,484	48,785	135,856	28,229
2041	109,884	75,979	66,039	55,115	38,777	123,031	110,127	49,362	137,252	28,553
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	15,678	11,184	8,843	9,339	7,366	15,297	18,754	7,180	19,147	4,223
2021	15,795	11,532	9,094	9,436	7,345	15,946	19,194	7,499	19,535	4,411
2022	15,981	11,750	9,258	9,588	7,364	16,409	19,477	7,683	19,885	4,573
2023	16,133	11,861	9,378	9,637	7,370	16,549	19,661	7,761	20,157	4,565
2024	16,323	11,968	9,499	9,689	7,389	16,833	19,794	7,856	20,343	4,641
2025	16,498	12,087	9,643	9,747	7,426	17,085	19,981	7,951	20,602	4,718
2026	16,727	12,215	9,786	9,808	7,501	17,350	20,153	8,046	20,863	4,790
2027	16,996	12,344	9,940	9,872	7,583	17,636	20,307	8,146	21,119	4,858
2028	17,225	12,475	10,104	9,929	7,634	17,900	20,454	8,245	21,308	4,929
2029	17,410	12,607	10,258	9,989	7,674	18,167	20,594	8,341	21,489	5,004
2030	17,601	12,743	10,413	10,054	7,713	18,448	20,739	8,437	21,676	5,086
2031	17,776	12,875	10,573	10,117	7,735	18,719	20,888	8,534	21,871	5,167
2032	17,904	13,003	10,732	10,175	7,749	18,996	21,027	8,637	22,054	5,249
2033	18,048	13,137	10,891	10,238	7,777	19,288	21,190	8,746	22,262	5,320
2034	18,221	13,267	11,057	10,306	7,811	19,576	21,345	8,856	22,516	5,386
2035	18,373	13,393	11,236	10,370	7,818	19,872	21,495	8,972	22,756	5,455
2036	18,460	13,512	11,405	10,430	7,809	20,152	21,632	9,081	22,972	5,518
2037	18,571	13,629	11,555	10,488	7,818	20,433	21,770	9,191	23,197	5,582
2038	18,704	13,745	11,716	10,546	7,837	20,723	21,904	9,306	23,443	5,645
2039	18,843	13,863	11,883	10,604	7,853	21,012	22,034	9,420	23,694	5,712
2040	18,979	13,983	12,059	10,664	7,866	21,314	22,175	9,544	23,954	5,780
2041	19,109	14,098	12,230	10,720	7,878	21,602	22,305	9,657	24,200	5,847
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

[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 0.95% for the period of 2022-2041, which is very close to the rate projected in the 2020 forecast (0.93% for the period of 2021-2040). Figure 20 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Despite having identical growth rates, the 2021 forecast is noticeably lower than the 2020 forecast due to a lower starting point. Figure 21 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 20: Gross LRZ 1 Energy (GWh)

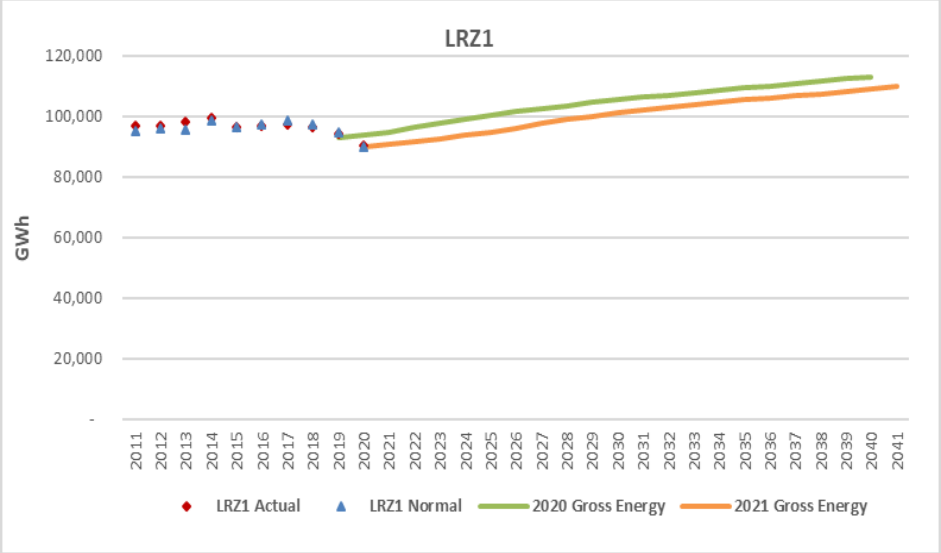
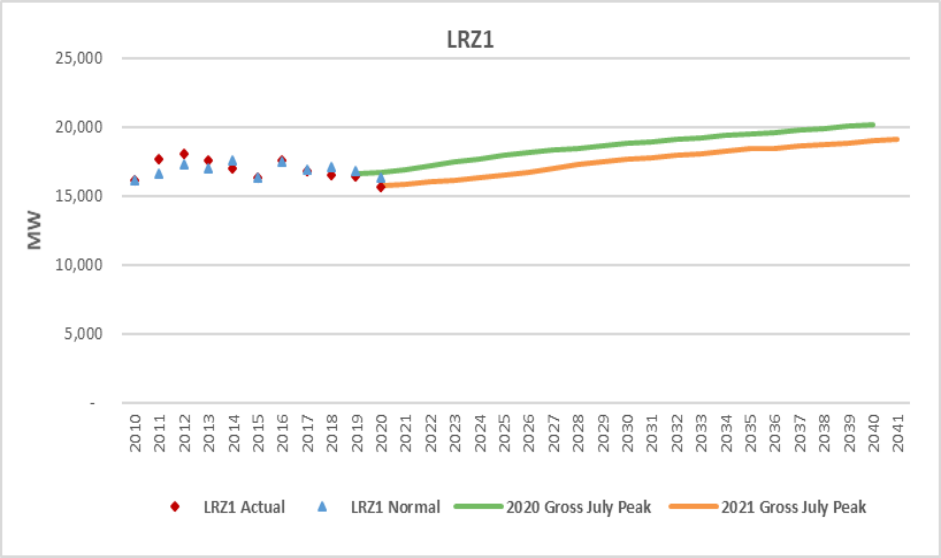


Figure 21: Gross LRZ 1 July Non-Coincident Peak Demand (MW)



LRZ 2

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

Annual gross energy is projected to grow at a CAGR of 0.96% for the period of 2022-2041. This is close to the rate projected in the 2020 forecast (1.00% for the period of 2021-2040). Figure 22 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 23 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 22: Gross LRZ 2 Energy (GWh)

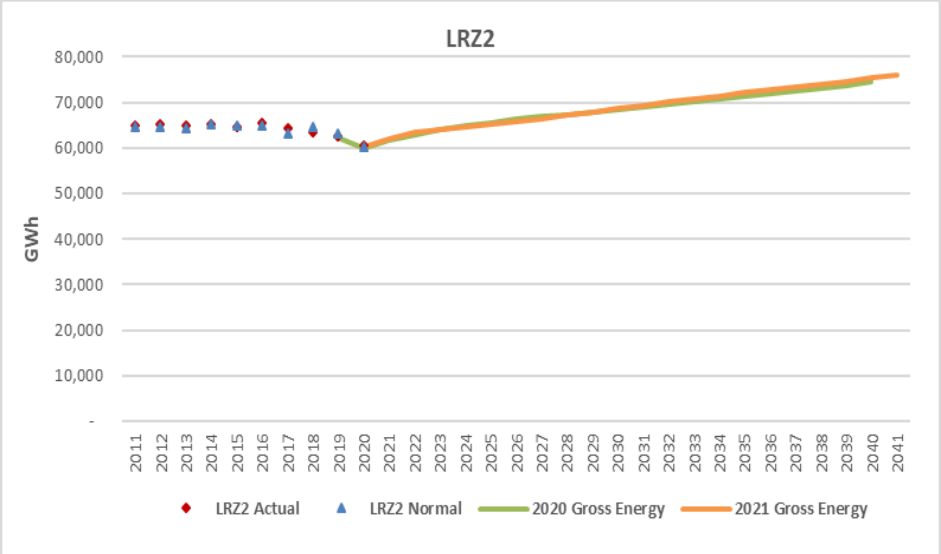
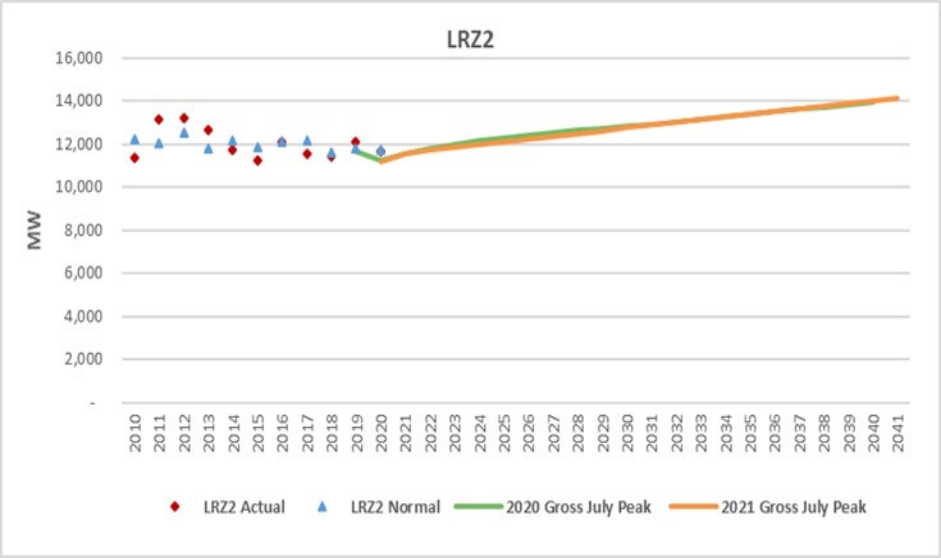


Figure 23: Gross LRZ 2 July Non-Coincident Peak Demand (MW)



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 1.48% for the period of 2022- 2041, which is the same as the rate projected in the 2020 forecast (1.48% for the period of 2021-2040). Figure 24 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 25 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 24: Gross LRZ 3 Energy (GWh)

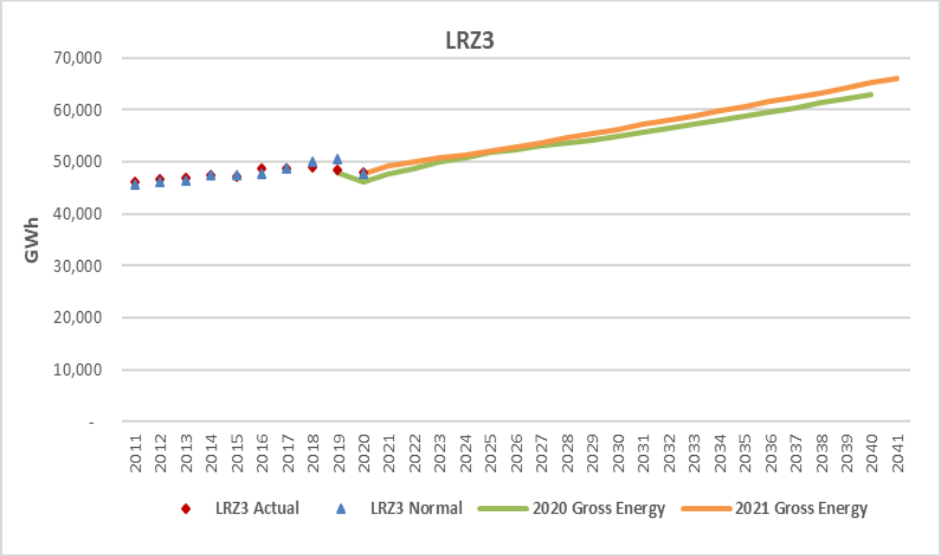
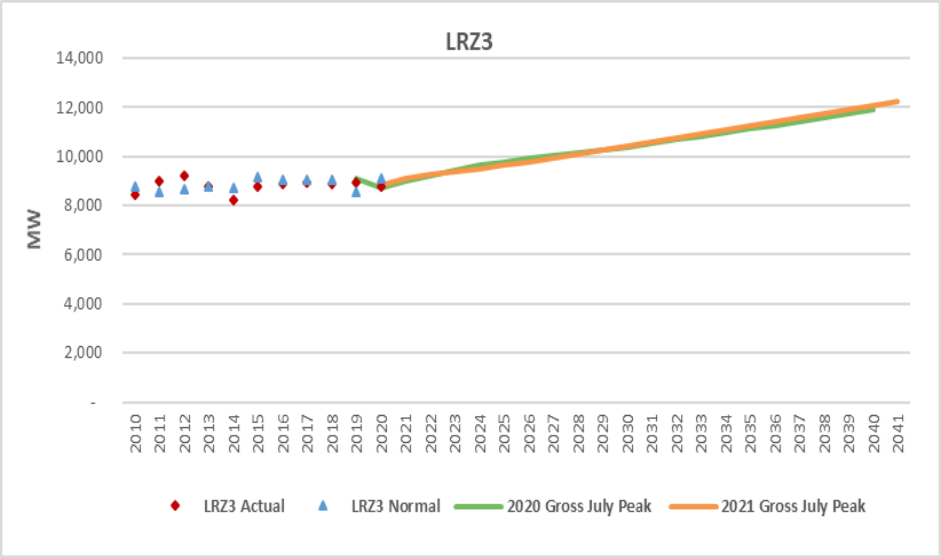


Figure 25: Gross LRZ 3 July Non-Coincident Peak Demand (MW)



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 0.59% for the period of 2022-2041, which is the same as the rate projected in the 2020 forecast (0.59% for the period of 2021-2040). However, the gross energy forecast for the 2021 forecast lies below that of the 2020 forecast because it starts at a lower point. Figure 26 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 27 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 26: Gross LRZ 4 Energy (GWh)

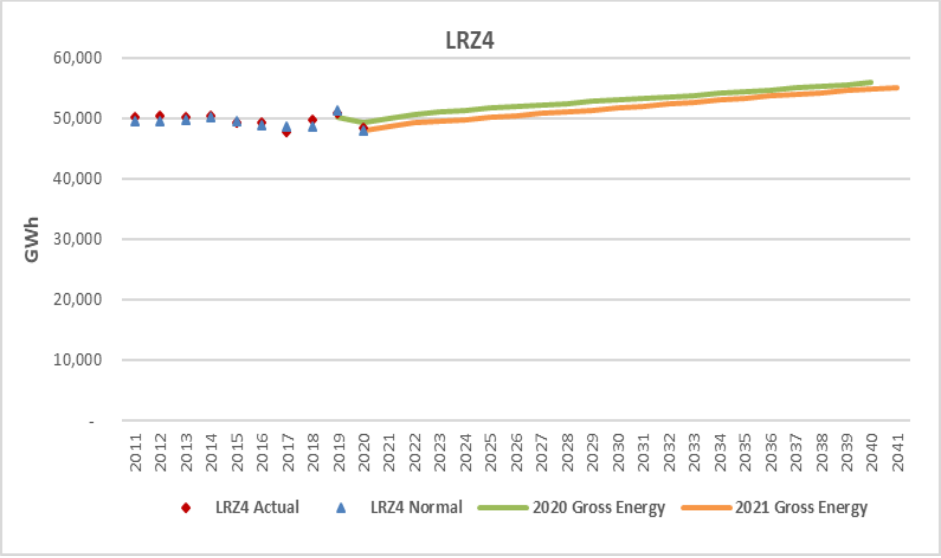
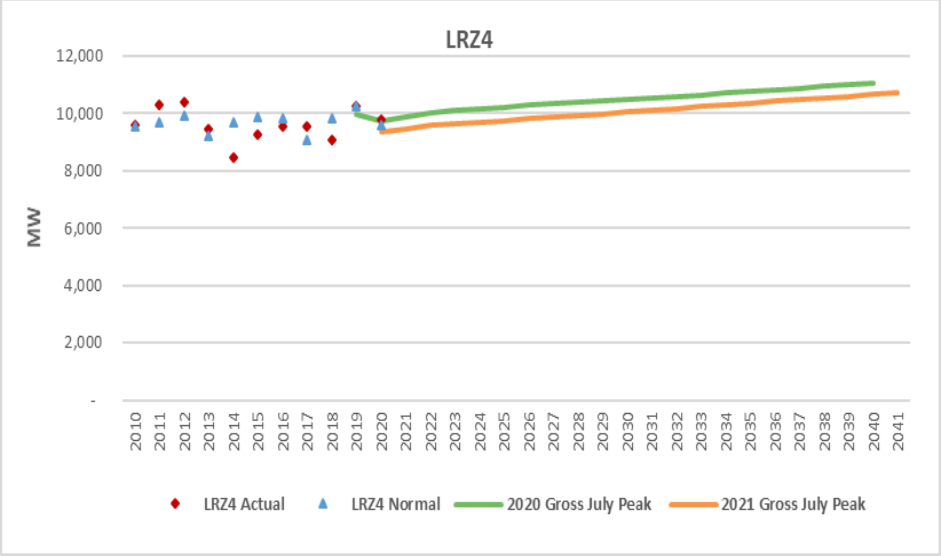


Figure 27: Gross LRZ 4 July Non-Coincident Peak Demand (MW)



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 0.36% for the period of 2022-2041. This is higher than the rate projected in the 2020 forecast (0.26% for the period of 2021-2040). However, the 2021 forecast lies below the 2020 forecast in the short run due to a lower starting point. Figure 28 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 29 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 28: Gross LRZ 5 Energy (GWh)

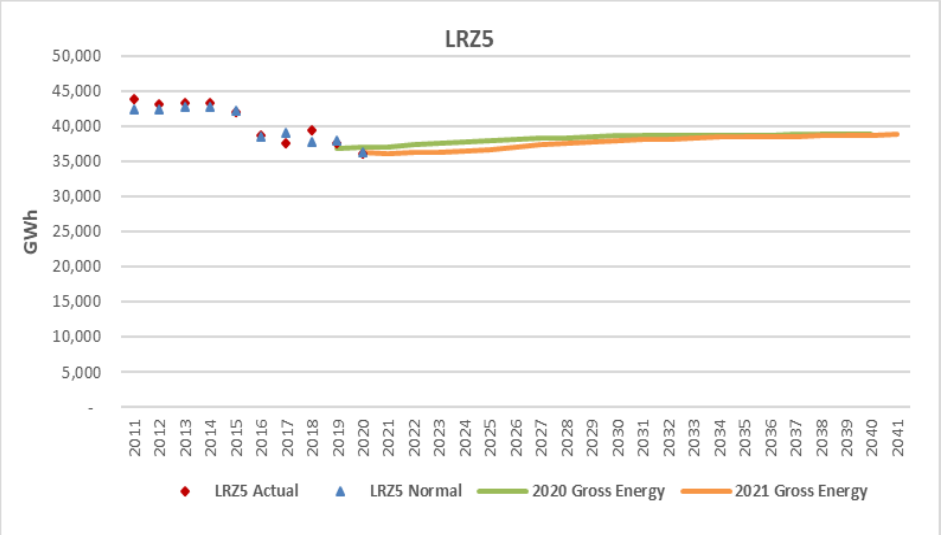
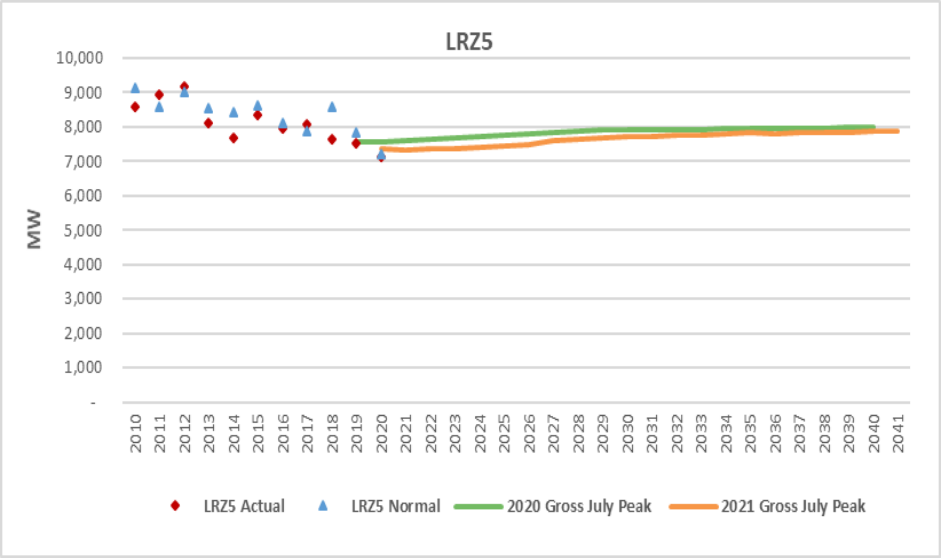


Figure 29: Gross LRZ 5 July Non-Coincident Peak Demand (MW)



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 1.46% for the period of 2022-2041. This is slightly lower than the rate projected in the 2020 forecast (1.54% for the period of 2021-2040. Figure 30 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 31 provides gross July non-coincident peak forecasts for the2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 30: Gross LRZ 6 Energy (GWh)

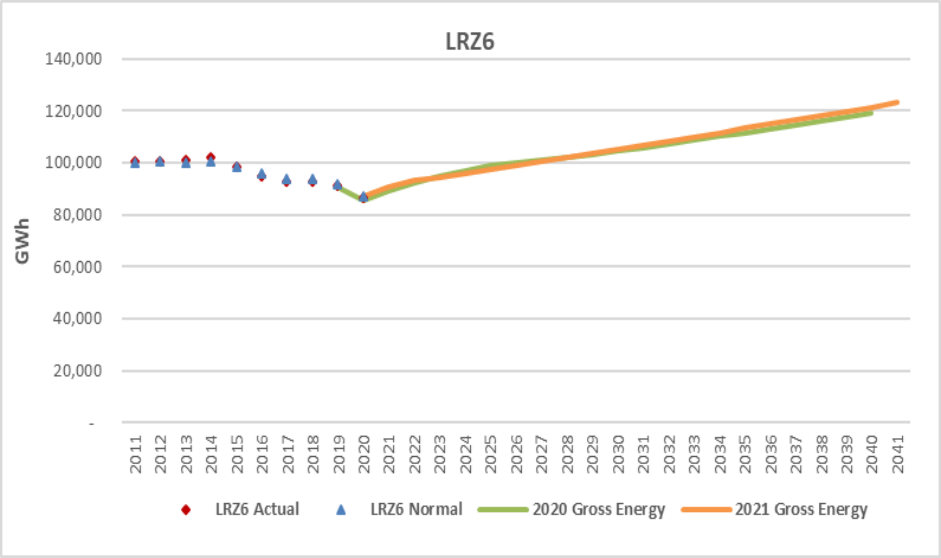
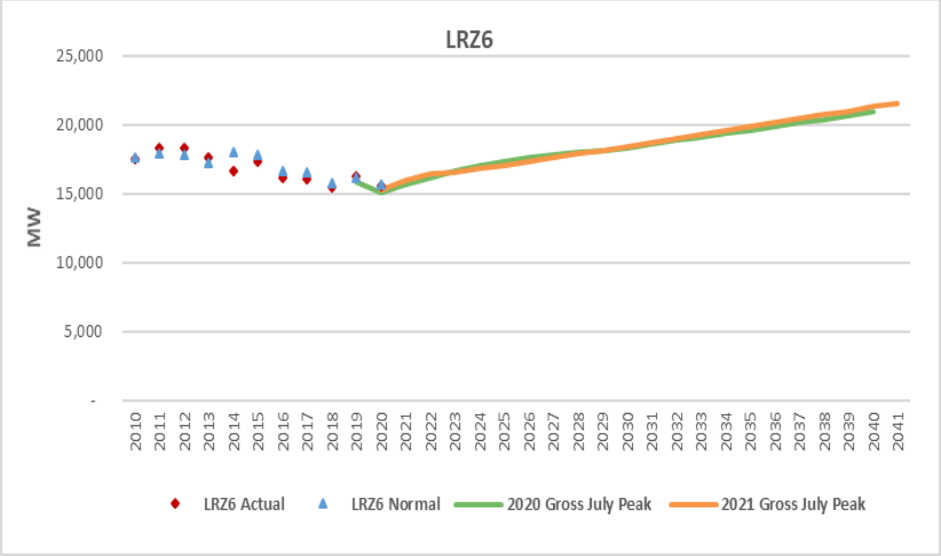


Figure 31: Gross LRZ 6 July Non-Coincident Peak Demand (MW)



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 0.72% for the period of 2022-2041. This is close to the rate projected in the 2020 forecast (0.77% for the period of 2021-2040). Figure 32 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 33 provides gross non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 32: Gross LRZ 7 Energy (GWh)

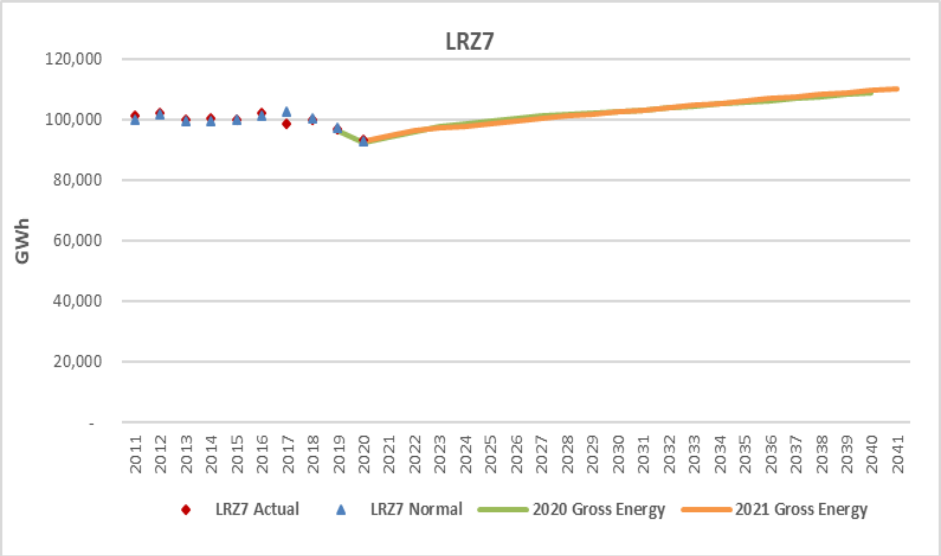
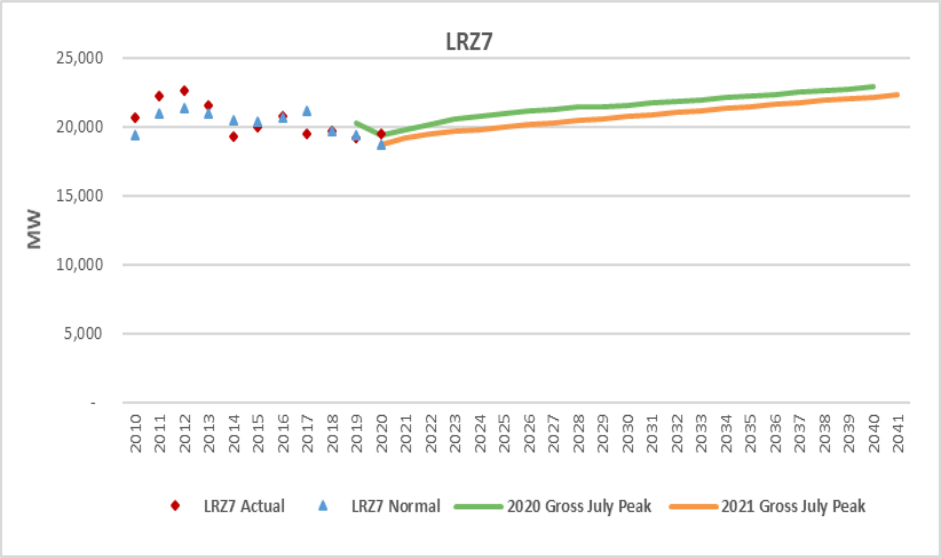


Figure 33: Gross LRZ 7 July Non-Coincident Peak Demand (MW)



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 1.21% for the period of 2022-2041, which is lower than the rate projected in the 2020 forecast (1.36% for the period of 2021-2040). However, the 2021 forecast lies above the 2020 forecast due to a higher starting point. Figure 34 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 35 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 34: Gross LRZ 8 Energy (GWh)

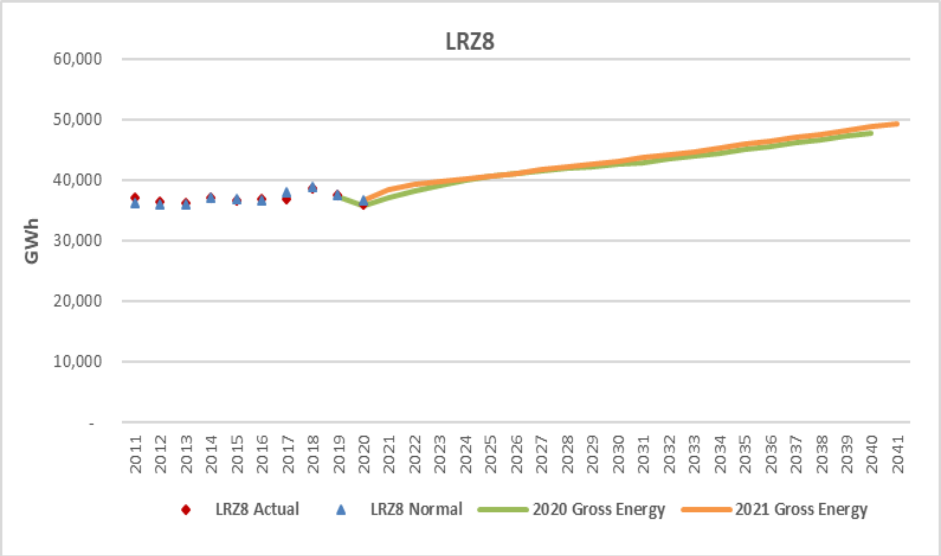
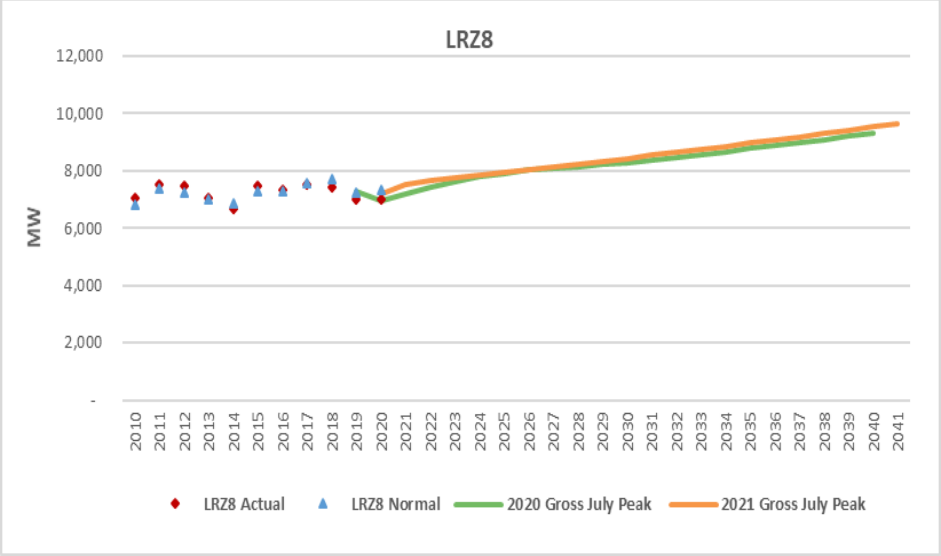


Figure 35: Gross LRZ 8 July Non-Coincident Peak Demand (MW)



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 1.04% for the period of 2022-2041. This rate is very close to the rate projected in the 2020 forecast (1.03% for the period of 2021-2040). Figure 36 shows annual gross energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 37 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 36: Gross LRZ 9 Energy (GWh)

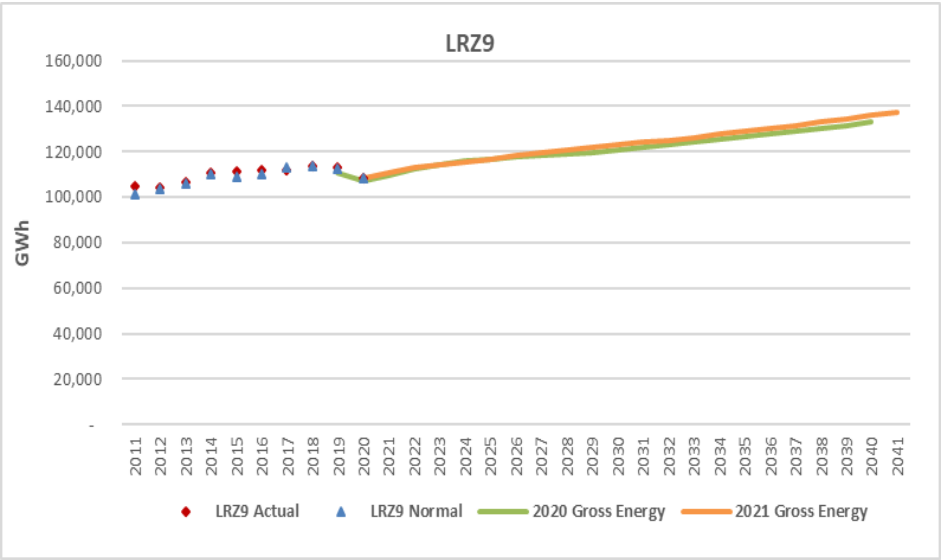
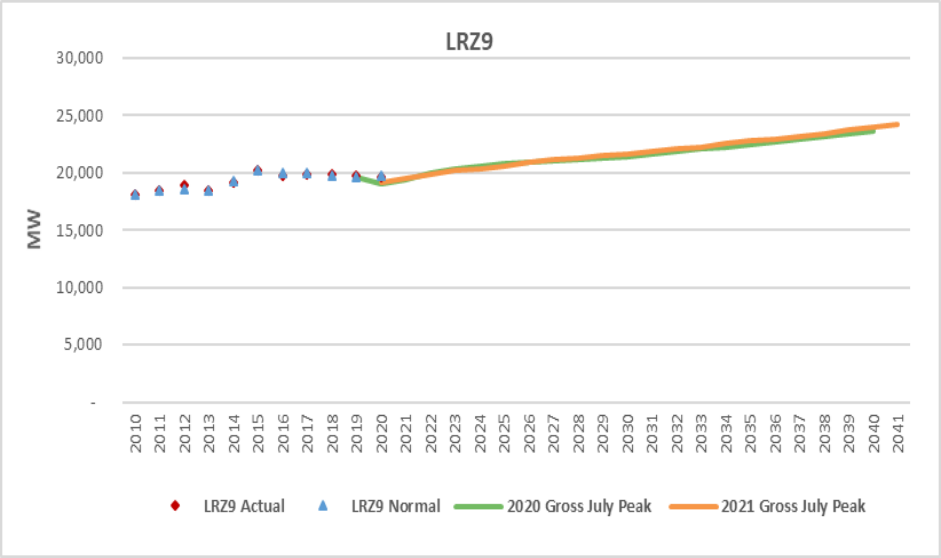


Figure 37: Gross LRZ 9 July Non-Coincident Peak Demand (MW)

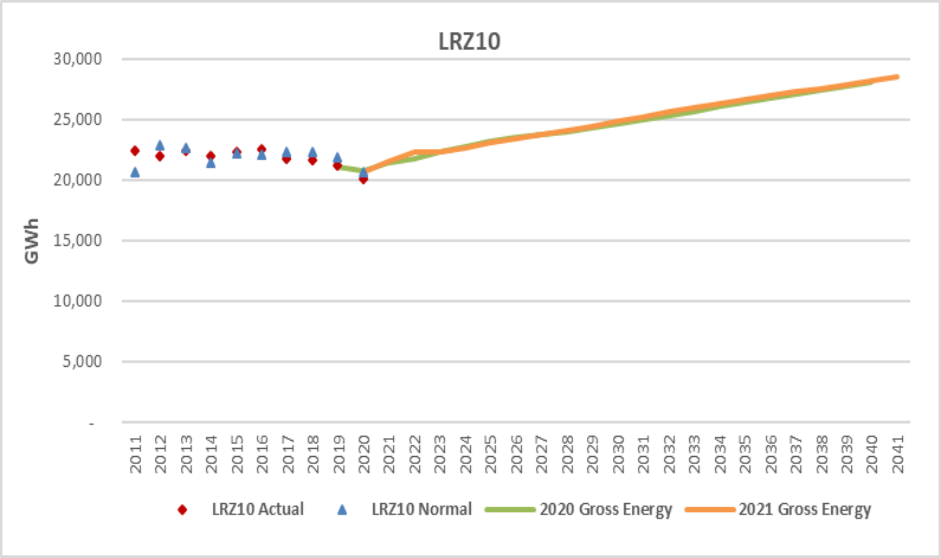


LRZ 10

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.

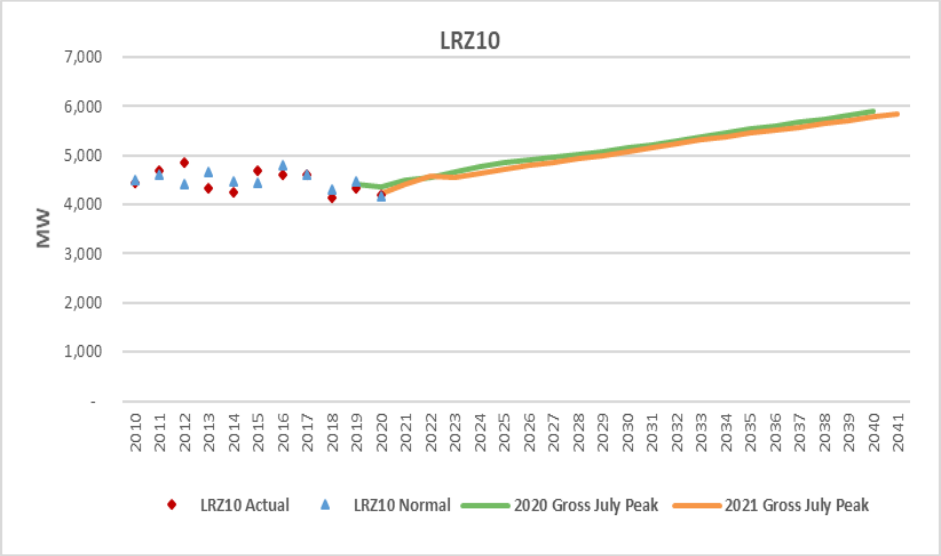
Annual gross energy is projected to grow at a CAGR of 1.30% for the period of 2022-2041. This growth rate is lower than that in the 2020 forecast (1.44% for the period of 2021-2040), Figure 38 shows annual energy forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical energy levels. Figure 39 provides gross July non-coincident peak forecasts for the 2020 and 2021 forecasts along with actual and weather-normalized historical July peaks.

Figure 38: Gross LRZ 10 Energy (GWh)



LRZ FORECASTS

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



MISO FORECASTS

MISO FORECASTS

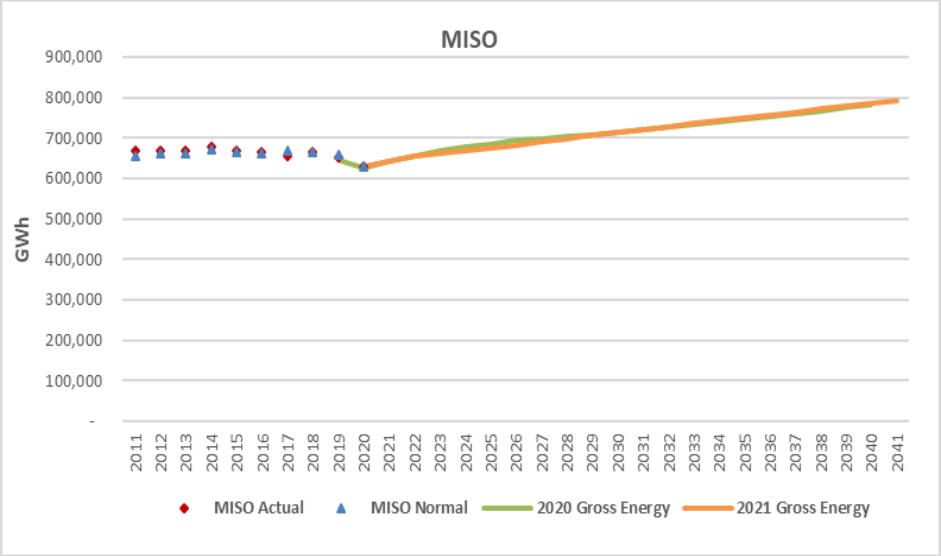
MISO ANNUAL ENERGY FORECAST

The MISO annual energy forecast is obtained by summing the individual LRZ metered load forecasts. Table 49 and Figure 40 provide the MISO-level energy forecast. Please note the forecasts are for the specified calendar year, not the MISO planning year. The compound annual growth rate for the period of 2022-2041 is 1.02%, which is very close to that in the 2020 forecast (1.04% for the period of 2021-2040).

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

Year	MISO Energy without EE Adjustments
2020	628,090
2021	643,003
2022	654,764
2023	660,764
2024	667,650
2025	675,239
2026	683,374
2027	691,858
2028	699,468
2029	706,675
2030	714,142
2031	721,429
2032	728,297
2033	735,735
2034	743,563
2035	751,179
2036	757,849
2037	764,698
2038	771,954
2039	779,289
2040	786,902
2041	794,118
Compound Annual Growth Rates (%)	
2022-2026	1.07
2022-2031	1.08
2022-2041	1.02

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 2020 timeframe. Table 50 lists the average monthly coincidence factors estimated using the actual zonal monthly coincidence factors from 2010 to 2020. 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	0.9730	0.9802	0.9736	0.9504	0.9556	0.9537	0.9319	0.9602	0.9405	0.9334	0.9692	0.9789
2	0.9613	0.9830	0.9750	0.9692	0.9709	0.9875	0.9856	0.9739	0.9875	0.9621	0.9684	0.9765
3	0.9837	0.9824	0.9847	0.9430	0.9557	0.9548	0.9576	0.9826	0.9688	0.9690	0.9713	0.9787
4	0.9795	0.9863	0.9976	0.9723	0.9695	0.9453	0.9854	0.9667	0.9684	0.9872	0.9771	0.9745
5	0.9900	0.9763	0.9731	0.9489	0.9502	0.9474	0.9907	0.9595	0.9692	0.9740	0.9783	0.9716
6	0.9803	0.9787	0.9864	0.9607	0.9751	0.9841	0.9857	0.9682	0.9789	0.9777	0.9705	0.9818
7	0.9507	0.9705	0.9832	0.9502	0.9669	0.9831	0.9624	0.9720	0.9707	0.9642	0.9700	0.9688
8	0.9718	0.9789	0.9296	0.9574	0.9311	0.9632	0.9419	0.9267	0.9581	0.9667	0.9695	0.9724
9	0.9404	0.9344	0.8982	0.9257	0.9692	0.9501	0.9537	0.9329	0.9419	0.9540	0.9547	0.9403
10	0.9708	0.9497	0.9197	0.9396	0.9574	0.9366	0.9308	0.9173	0.9631	0.9652	0.9681	0.9382

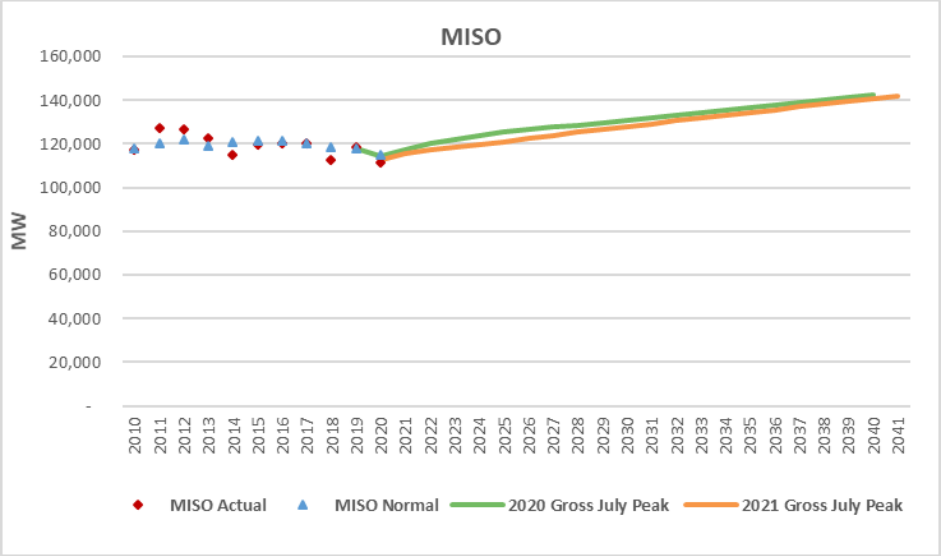
[10] MISO system monthly peak demand forecasts for each one of the twelve months are displayed in Appendix C.

MISO FORECASTS

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

Year	MISO July CP without EE Adjustments
2020	112,686
2021	115,361
2022	117,462
2023	118,521
2024	119,738
2025	121,086
2026	122,529
2027	124,029
2028	125,377
2029	126,656
2030	127,982
2031	129,275
2032	130,496
2033	131,819
2034	133,206
2035	134,555
2036	135,739
2037	136,954
2038	138,239
2039	139,537
2040	140,885
2041	142,162
Compound Annual Growth Rates (%)	
2022-2026	1.06
2022-2031	1.07
2022-2041	1.01

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



MISO FORECASTS

MISO SYSTEM HIGH AND LOW FORECASTS

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

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

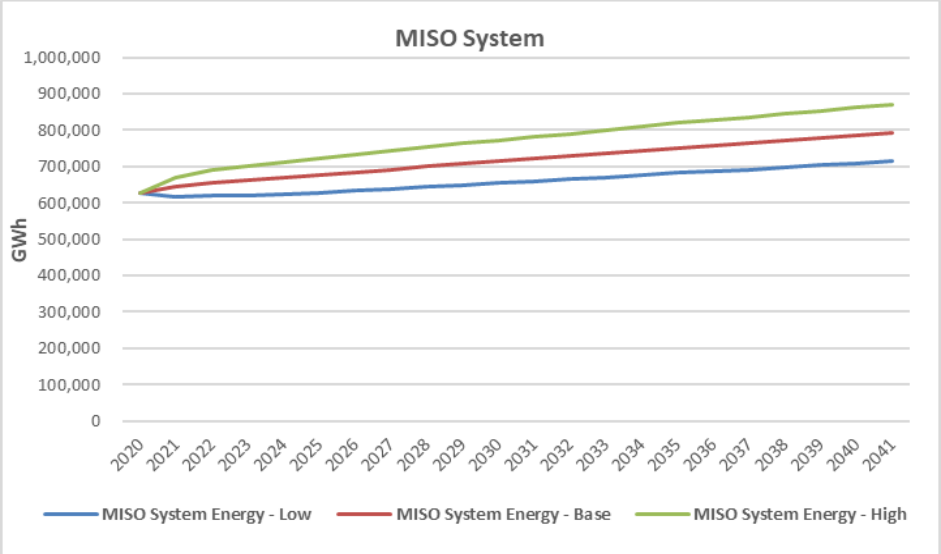


Table 52: Gross MISO System CAGRs for Alternate Forecasts (2022-2041)

	BASE	HIGH	LOW
Energy	1.02	1.24	0.77
July Peak	1.01	1.23	0.76

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)*	IHS Markit
Population	POPULATION	Census Bureau	IHS Markit
Manufacturing employment	MANUFACTURING_EMP	U.S. Bureau of Labor Statistics (BLS)	IHS Markit
Non-manufacturing employment	NON_MANUFACTURING_EMP	BLS	IHS Markit
Non-farm employment	NON_FARM_EMP	BLS	IHS Markit
Gross state product	REAL_GSP	IHS Markit	IHS Markit
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 (2022-2041). 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 IHS Markit, 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 2022-2041 (%)

Variables	AR	IL	IN	IA	KY	LA	MI	MN	MS	MO	MT	ND	SD	TX	WI
REAL_ELECTRICITY_PRICE	-0.09	-0.59	-0.61	-0.69	-0.51	-0.10	-0.59	-0.69	-0.50	-0.68	-0.16	-0.71	-0.69	-0.10	-0.60
REAL_NATURAL_GAS_PRICE	0.50	0.50			0.63	0.47	0.51				0.80				0.43
REAL_INCOME									1.66						
POPULATION								0.39		0.28		0.17			
REAL_INCOME/POPULATION											1.67				
REAL_GSP	1.75	1.55	1.72	1.99	1.78	1.75*	1.42		1.72				2.06	2.67	1.67
MANUFACTURING_EMP											-0.71				

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

Table 55 provides state-level forecasts. The retail sales by state for the year 2020 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" 2020 values (as well as 2021 values) to provide continuity between the historical data and the forecast period (2022 to 2041).

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	104,217	51,214	76,611	94,186	104,869	68,729
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	47,155	140,765	105,350	48,332	75,774	91,440	102,990	70,978
2021	49,252	142,226	109,375	49,756	79,430	92,894	105,403	71,041
2022	50,457	144,530	111,758	50,663	82,530	94,369	106,959	71,778
2023	50,972	145,255	112,090	51,341	83,850	95,559	107,970	72,291
2024	51,594	146,048	113,426	52,022	85,885	96,199	108,700	73,029
2025	52,221	146,920	114,866	52,830	87,427	97,329	109,728	73,669
2026	52,839	147,845	116,464	53,634	88,960	98,427	110,672	74,602
2027	53,498	148,806	118,359	54,495	90,452	99,478	111,517	75,772
2028	54,148	149,669	119,935	55,424	92,000	100,115	112,323	76,684
2029	54,777	150,569	121,447	56,291	93,656	100,699	113,089	77,395
2030	55,411	151,553	123,021	57,167	95,411	101,315	113,890	78,099
2031	56,045	152,499	124,488	58,070	97,150	101,988	114,707	78,779
2032	56,720	153,374	125,990	58,970	98,926	102,585	115,468	79,243
2033	57,439	154,327	127,639	59,871	100,731	103,305	116,362	79,782
2034	58,160	155,345	129,252	60,804	102,526	104,276	117,218	80,479
2035	58,923	156,312	130,957	61,823	104,336	105,145	118,038	81,093
2036	59,638	157,214	132,558	62,779	106,051	105,889	118,794	81,340
2037	60,361	158,089	134,146	63,632	107,780	106,697	119,549	81,740
2038	61,114	158,966	135,821	64,541	109,546	107,638	120,284	82,283
2039	61,864	159,833	137,520	65,490	111,262	108,597	120,998	82,830
2040	62,677	160,739	139,249	66,487	113,116	109,569	121,773	83,347
2041	63,418	161,589	140,890	67,456	114,882	110,458	122,488	83,841
Compound Annual Growth Rates (%)								
2022-2026	1.16	0.57	1.04	1.43	1.89	1.06	0.86	0.97
2022-2031	1.17	0.60	1.21	1.53	1.83	0.87	0.78	1.04
2022-2041	1.21	0.59	1.23	1.52	1.76	0.83	0.72	0.82

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	82,058	14,839	20,670	12,866	424,528	70,965
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	51,040	84,282	16,211	20,900	12,677	413,315	69,739
2021	53,312	84,419	16,500	20,936	13,340	428,443	71,948
2022	55,269	84,980	16,477	21,247	13,696	439,356	73,334
2023	55,167	85,557	16,931	21,519	14,000	447,118	74,025
2024	56,088	86,332	17,350	21,892	14,309	455,393	74,705
2025	57,018	87,288	17,733	22,232	14,645	462,719	75,457
2026	57,881	88,665	18,120	22,685	14,988	470,951	76,264
2027	58,712	90,066	18,449	23,204	15,371	479,343	77,086
2028	59,566	91,136	18,930	23,576	15,754	487,976	77,923
2029	60,478	92,053	19,283	23,838	16,124	496,671	78,770
2030	61,460	92,959	19,795	24,079	16,494	505,404	79,642
2031	62,439	93,714	20,114	24,291	16,860	513,987	80,491
2032	63,431	94,377	20,302	24,387	17,240	522,630	81,308
2033	64,292	95,230	20,544	24,512	17,615	531,820	82,163
2034	65,090	96,162	20,776	24,700	18,007	541,336	82,995
2035	65,921	96,767	20,924	24,842	18,416	551,302	83,797
2036	66,689	97,205	21,130	24,808	18,804	560,815	84,556
2037	67,455	97,864	21,305	24,841	19,167	570,199	85,306
2038	68,223	98,648	21,409	24,922	19,554	579,473	86,046
2039	69,030	99,418	21,615	24,992	19,947	588,972	86,799
2040	69,855	100,146	21,847	25,039	20,365	599,205	87,565
2041	70,659	100,858	22,088	25,065	20,761	609,373	88,301
Compound Annual Growth Rates (%)							
2022-2026	1.16	1.07	2.40	1.65	2.28	1.75	0.98
2022-2031	1.36	1.09	2.24	1.50	2.34	1.76	1.04
2022-2041	1.30	0.91	1.55	0.87	2.21	1.74	0.98

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: 1996 2018
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	9175.428232	5885.5369	1.558979	0.1374	
@MOVAV(REAL_ELECTRICITY_PRICE,5)	-949.2965449	411.82454	-2.3051	0.0340	-0.1463
REAL_NATURAL_GAS_PRICE	210.5495199	93.057682	2.26257	0.0370	0.0317
REAL_GSP	0.263127085	0.0189523	13.883627	0.0000	0.6222
CDD	4.361568075	0.5482492	7.9554481	0.0000	0.1810
HDD	1.745671254	0.3763663	4.6382245	0.0002	0.1353

R-squared	0.981724	Mean dependent var	44300.97
Adjusted R-squared	0.976349	S.D. dependent var	3663.702
S.E. of regression	563.4357	Durbin-Watson stat	2.030339
F-statistic	182.6391		
Prob(F-statistic)	0.000000		

Illinois

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1994 2018
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	87958.12937	14436.8593	6.092608339	7.38E-06	
REAL_ELECTRICITY_PRICE	-1782.222325	754.6265794	-2.36172747	0.02901973	-0.1097
REAL_NATURAL_GAS_PRICE(-1)	975.5932126	236.3759751	4.127294292	0.000572909	0.0492
REAL_GSP	0.053691924	0.011369178	4.722586062	0.000148176	0.2897
CDD	8.801855213	2.690340819	3.271650621	0.004013494	0.0647
HDD	2.168136225	1.141015711	1.900180869	0.072693393	0.0927

R-squared	0.911954	Mean dependent var	137542.9
Adjusted R-squared	0.888784	S.D. dependent var	6764.046
S.E. of regression	2255.745	Durbin-Watson stat	1.604195
F-statistic	39.3593		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Indiana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2018
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	58063.5	6409.484	9.058997	0.0000	
REAL_ELECTRICITY_PRICE(-2)	-3708.585	511.4302	-7.251401	0.0000	-0.3103
REAL_GSP	0.193515	0.013522	14.31101	0.0000	0.6045
CDD	6.531537	1.892264	3.451705	0.0028	0.0695
HDD	1.85289	0.828924	2.235296	0.0383	0.0993

R-squared	0.942613	Mean dependent var	101785.1
Adjusted R-squared	0.92986	S.D. dependent var	5739.765
S.E. of regression	1520.117	Durbin-Watson stat	1.000275
F-statistic	73.91463		
Prob(F-statistic)	0.000000		

Iowa

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1992 2018
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	19536.74	4412.336	4.427753	0.0002	
REAL_ELECTRICITY_PRICE(-2)	-814.9002	354.1533	-2.300982	0.0308	-0.1301
REAL_GSP	0.193978	0.011956	16.22485	0.0000	0.6517
CDD	2.678881	1.126979	2.377046	0.0262	0.0596

R-squared	0.979548	Mean dependent var	41652.37
Adjusted R-squared	0.97688	S.D. dependent var	5646.7
S.E. of regression	858.5948	Durbin-Watson stat	1.163298
F-statistic	367.1898		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Kentucky

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1993 2018
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	-5632.235	7616.205	-0.739507	0.4682	
REAL_ELECTRICITY_PRICE(-2)	-1129.374	591.3995	-1.909664	0.0706	-0.1023
@MOVAV(REAL_NATURAL_GAS_PRICE,4)	1015.258	237.9197	4.267229	0.0004	0.0702
REAL_GSP	0.378484	0.028365	13.34344	0.0000	0.7966
CDD	3.43803	1.921725	1.789034	0.0888	0.0552
HDD	5.20034	1.167146	4.455602	0.0002	0.2702

R-squared	0.950737	Mean dependent var	84561.27
Adjusted R-squared	0.938421	S.D. dependent var	7135.08
S.E. of regression	1770.584	Durbin-Watson stat	1.269981
F-statistic	77.19604		
Prob(F-statistic)	0.000000		

Louisiana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1990 2018
Included observations: 29

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	60201.91	8685.56	6.931263	0.0000	
REAL_ELECTRICITY_PRICE(-2)	-3123.384	438.7459	-7.118889	0.0000	-0.2367
REAL_NATURAL_GAS_PRICE	-1281.255	230.0796	-5.568745	0.0000	-0.0491
REAL_GSP_EXCLUDING_MINING	0.184557	0.027165	6.793913	0.0000	0.4347
CDD	4.270529	2.235425	1.910389	0.0686	0.1604
HDD	3.281614	1.824638	1.798501	0.0852	0.0611

R-squared	0.951646	Mean dependent var	79192.67
Adjusted R-squared	0.941135	S.D. dependent var	8293.298
S.E. of regression	2012.136	Durbin-Watson stat	1.826739
F-statistic	90.5323		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Michigan

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2018
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	66586.61	9172.828	7.259114	0.0000	
REAL_ELECTRICITY_PRICE	-1262.884	457.7407	-2.758951	0.0129	-0.1255
REAL_NATURAL_GAS_PRICE	780.4264	159.8892	4.881045	0.0001	0.0490
REAL_GSP	0.090931	0.015129	6.010244	0.0000	0.4080
CDD	5.00789	1.994776	2.510502	0.0218	0.0399

R-squared	0.852911	Mean dependent var	103948.2
Adjusted R-squared	0.820224	S.D. dependent var	3591.473
S.E. of regression	1522.784	Durbin-Watson stat	1.430725
F-statistic	26.09364		
Prob(F-statistic)	0		

Minnesota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2018
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	-28548.55	7763.656	-3.677205	0.0017	
REAL_ELECTRICITY_PRICE(-1)	-3005.205	689.5553	-4.358179	0.0004	-0.4206
POPULATION	0.020031	0.001963	10.20654	0.0000	1.6354
CDD	6.92102	2.480399	2.790284	0.0121	0.0750
HDD	1.188752	0.499778	2.378561	0.0287	0.1447

R-squared	0.927908	Mean dependent var	64275.17
Adjusted R-squared	0.911887	S.D. dependent var	4632.262
S.E. of regression	1375.031	Durbin-Watson stat	1.461719
F-statistic	57.92007		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Mississippi

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2018
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	13087.33	3247.546	4.029914	0.0010	
@MOVAV(REAL_ELECTRICITY_PRICE,3)	-1515.821	413.5917	-3.665017	0.0021	-0.2533
REAL_INCOME(-1)	0.00019	4.91E-05	3.876198	0.0013	0.3841
REAL_GSP	0.173925	0.074457	2.335906	0.0328	0.3550
CDD	3.459462	0.701872	4.928909	0.0002	0.1703
HDD	2.065104	0.514654	4.012606	0.0010	0.1055

R-squared	0.954639	Mean dependent var	46797.94
Adjusted R-squared	0.940463	S.D. dependent var	2568.369
S.E. of regression	626.6869	Durbin-Watson stat	1.427198
F-statistic	67.34448		
Prob(F-statistic)	0.000000		

Missouri

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 2001 2018
Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	-75842.12	23668.94	-3.204288	0.0064	
@MOVAV(REAL_ELECTRICITY_PRICE,2)	-5106.725	1010.415	-5.054089	0.0002	-0.5748
POPULATION	0.031931	0.004961	6.435893	0.0000	2.3840
CDD	5.50729	2.376036	2.317848	0.0361	0.1070

R-squared	0.788332	Mean dependent var	80443.21
Adjusted R-squared	0.742974	S.D. dependent var	4197.05
S.E. of regression	2127.807	Durbin-Watson stat	1.368756
F-statistic	17.38042		
Prob(F-statistic)	0.000054		

APPENDIX A STATE MODELS

Montana

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1996 2018
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	3009.955	3121.303	0.964326	0.3492	
REAL_ELECTRICITY_PRICE	-1580.638	218.236	-7.24279	0.0000	-0.8610
@MOVAV(REAL_NATURAL_GAS_PRICE,4)	351.7457	51.94441	6.77158	0.0000	0.1583
REAL_INCOME/POPULATION	300.4576	26.31436	11.41801	0.0000	0.8801
MANUFACTURING_EMPLOYMENT	0.198096	0.063467	3.121268	0.0066	0.2737
CDD	1.680454	0.70104	2.397088	0.0291	0.0567
HDD	0.657676	0.2138	3.076127	0.0072	0.3402

R-squared	0.915473	Mean dependent var	13814.58
Adjusted R-squared	0.883776	S.D. dependent var	970.776
S.E. of regression	330.9535	Durbin-Watson stat	2.363533
F-statistic	28.8816		
Prob(F-statistic)	0.000000		

North Dakota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1998 2018
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	-43888.98	3214.933	-13.6516	0.0000	
REAL_ELECTRICITY_PRICE(-1)	-1515.244	425.9569	-3.557271	0.0024	-0.6029
POPULATION	0.096435	0.00497	19.40152	0.0000	3.5462
HDD	0.349212	0.242099	1.442431	0.1674	0.2213

R-squared	0.978008	Mean dependent var	13330.96
Adjusted R-squared	0.974127	S.D. dependent var	3841.785
S.E. of regression	617.9512	Akaike info criterion	15.86034
F-statistic	252.0048	Durbin-Watson stat	1.581511
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

South Dakota

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 2002 2018
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	-1721.57	977.6485	-1.760929	0.1037	
REAL_ELECTRICITY_PRICE(-2)	-189.9656	93.23572	-2.037477	0.0643	-0.1388
REAL_GSP	0.289755	0.011068	26.18055	0.0000	1.0470
CDD	0.442588	0.261426	1.692979	0.1162	0.0295
HDD	0.316424	0.080945	3.909139	0.0021	0.2077

R-squared	0.988149	Mean dependent var	11084.17
Adjusted R-squared	0.984198	S.D. dependent var	1264.877
S.E. of regression	159.002	Durbin-Watson stat	2.081119
F-statistic	250.1343		
Prob(F-statistic)	0.000000		

Texas

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1998 2018
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	94213.14	14889.61	6.327443	0.0000	
REAL_ELECTRICITY_PRICE(-3)	-1931.279	760.4655	-2.539601	0.0219	-0.0383
REAL_GSP	0.138842	0.003558	39.02543	0.0000	0.5602
CDD	22.25848	4.210426	5.286514	0.0001	0.1958
HDD	16.75234	3.715117	4.509236	0.0004	0.0851

R-squared	0.99207	Mean dependent var	352690.5
Adjusted R-squared	0.990088	S.D. dependent var	35257.23
S.E. of regression	3510.253	Durbin-Watson stat	2.108497
F-statistic	500.417		
Prob(F-statistic)	0.000000		

APPENDIX A STATE MODELS

Wisconsin

Dependent Variable: ELECTRICITY_SALES
Method: Least Squares
Sample: 1997 2018
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Elasticity at 2018 (weather at means)
C	28630.96	2515.176	11.38328	0.0000	
@MOVAV(REAL_ELECTRICITY_PRICE,5)	-607.648	247.0299	-2.459816	0.0257	-0.0867
REAL_NATURAL_GAS_PRICE	442.9261	62.36026	7.102699	0.0000	0.0367
REAL_GSP	0.119904	0.010168	11.79178	0.0000	0.5096
CDD	5.084512	1.03838	4.896583	0.0002	0.0458
HDD	0.891959	0.304309	2.931095	0.0098	0.0921

R-squared	0.975427	Mean dependent var	67701.49
Adjusted R-squared	0.967749	S.D. dependent var	2917.732
S.E. of regression	523.9864	Durbin-Watson stat	2.298585
F-statistic	127.0267		
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 2019 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 2009-2019. 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), 2009-2019

State	2019 MISO Sales (MWhs)	2019 Non-MISO Sales (MWhs)	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
AR	34,812,064	13,005,328	70.03%	70.57%	70.39%	70.52%	70.45%	72.23%	72.30%	71.94%	72.52%	72.99%	72.80%
IA	46,570,347	3,657,043	92.03%	92.92%	93.04%	93.22%	92.92%	93.05%	92.92%	92.85%	92.67%	92.69%	92.72%
IL	46,678,787	90,112,495	33.95%	34.55%	34.80%	33.91%	34.59%	34.84%	34.83%	34.45%	34.46%	34.80%	34.12%
IN+KY	89,436,121	86,265,161	47.37%	47.49%	48.49%	48.78%	49.94%	51.95%	51.86%	50.89%	50.29%	50.43%	50.90%
LA	85,885,059	6,688,133	91.82%	91.77%	91.74%	92.06%	92.20%	92.67%	92.66%	92.75%	92.88%	92.73%	92.78%
MI	96,672,834	3,808,004	95.28%	96.01%	96.16%	96.21%	96.10%	96.08%	96.09%	96.11%	96.12%	96.13%	96.21%
MN	65,252,880	877,231	98.66%	98.73%	98.73%	98.84%	98.75%	98.77%	98.76%	98.72%	98.73%	98.71%	98.67%
MO	36,046,098	41,437,004	48.83%	49.55%	49.35%	50.22%	49.40%	49.06%	48.98%	46.98%	46.64%	46.26%	46.52%
MS	21,589,452	27,222,155	45.58%	45.89%	45.24%	44.78%	44.73%	44.56%	45.06%	44.71%	44.30%	44.40%	44.23%
ND+MT	11,470,717	25,003,756	36.03%	37.35%	37.90%	36.76%	37.46%	36.30%	35.14%	34.48%	32.89%	33.16%	31.45%
SD	3,252,643	9,395,928	26.48%	26.87%	26.07%	26.02%	25.32%	25.26%	25.57%	25.85%	25.63%	25.49%	25.72%
TX	22,648,677	404,797,713	5.53%	5.66%	5.46%	5.99%	5.74%	5.60%	5.47%	5.45%	5.35%	5.42%	5.30%
WI	68,267,687	0	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 2019)

LRZ	AR	IA	IL	IN+KY	LA	MI	MN	MO	MS	ND+MT	SD	TX	WI
1		1.79%	0.0002%			0.14%	97.17%			35.23%	24.01%		16.88%
2						4.73%							83.12%
3		91.03%	1.44%				1.56%				1.83%		
4			33.04%										
5								48.26%					
6				49.71%									
7						91.18%							
8	71.52%							0.02%				0.01%	
9					92.37%							5.56%	
10									44.86%				
Non-MISO	**28.48%**	**7.18%**	**65.52%**	**50.29%**	**7.63%**	**3.95%**	**1.27%**	**51.72%**	**55.14%**	**64.77%**	**74.16%**	**94.43%**	**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 2009-2019 and the eleven-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
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%
	IL	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.0002%	0.00%
	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%
	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%
	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%
	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%
	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%
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%
	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%
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%
	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%
	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%
	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%
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%
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%
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%
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%
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%
	MO	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
	TX	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
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%
	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%
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%

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 (2015-2019)	Constant at 1.81%
	IL	Historical average (2015-2019)	Constant at 0.0002%
	MI	Historical average (2015-2019)	Constant at 0.14%
	MN	Historical average (2016-2019)	Constant at 97.76%
	ND+MT	Historical average (2015-2019)	Constant at 33.15%
	SD	Historical average (2015-2019)	Constant at 23.80%
	WI	Historical average (2015-2019)	Constant at 17.01%
2	MI	Historical average (2015-2019)	Constant at 4.44%
	WI	Historical average (2015-2019)	Constant at 82.99%
3	IA	Historical average (2015-2019)	Constant at 90.96%
	IL	Historical average (2015-2019)	Constant at 1.46%
	MN	Historical average (2016-2019)	Constant at 0.95%[12]
	SD	Historical average (2015-2019)	Constant at 1.85%
4	IL	Historical average (2015-2019)	Constant at 33.07%
5	MO	St. Louis vs. state growth Decrease over time	Reduced from 46.17% in 2020 to 41.27% in 2041[13]
6	IN+KY	Historical average (2015-2019)	Constant at 50.60%
7	MI	Historical average (2015-2019)	Constant at 91.55%
8	AR	Historical average (2015-2019)	Constant at 72.51%
	MO	Historical average (2015-2019)	Constant at 0.02%
	TX	Historical average (2015-2019)	Constant at 0.0053%
9	LA	Historical average (2015-2019)	Constant at 92.76%
	TX	Historical average (2015-2019)	Constant at 5.45%
10	MS	Historical average (2015-2019)	Constant at 44.54%

[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 46.17% in 2020 to 41.27% in 2041.

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 eleven years of hourly load observations of LRZ-level loads from January 1, 2010 to December 31, 2020. Actual hourly weather data from 1997 to 2020 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 eleven years of zonal hourly load records from 2010 to 2020. 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 2020, 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	0.6564	90.3	80.5	77.7	16
LRZ2	0.6152	88.2	78.1	77.8	16
LRZ3	0.6164	94.8	83.5	80.2	16
LRZ4	0.5869	92.7	82.6	80.2	16
LRZ5	0.5619	95.1	87.2	85.2	16
LRZ6	0.6502	91.1	81.7	79.9	14
LRZ7	0.5636	90.6	79.3	77.9	15
LRZ8	0.5835	97.2	84.9	84.2	14
LRZ9	0.6474	91.2	84.2	84.3	16
LRZ10	0.5575	93.6	84.4	82.8	16

APPENDIX C PEAK DEMAND

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

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

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

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

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

	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	13,332	8,779	7,064	7,460	6,279	13,717	13,098	6,131	17,144	3,559
2021	13,432	9,052	7,265	7,538	6,262	14,299	13,405	6,403	17,491	3,718
2022	13,590	9,223	7,396	7,660	6,278	14,714	13,603	6,560	17,804	3,854
2023	13,719	9,310	7,492	7,698	6,283	14,839	13,732	6,626	18,048	3,847
2024	13,881	9,394	7,589	7,740	6,300	15,094	13,824	6,707	18,215	3,911
2025	14,030	9,488	7,703	7,786	6,330	15,320	13,955	6,789	18,446	3,976
2026	14,224	9,588	7,818	7,835	6,395	15,557	14,075	6,869	18,680	4,036
2027	14,453	9,689	7,941	7,886	6,464	15,814	14,183	6,955	18,909	4,094
2028	14,648	9,792	8,072	7,932	6,508	16,050	14,285	7,040	19,079	4,154
2029	14,804	9,895	8,195	7,980	6,543	16,290	14,383	7,121	19,241	4,217
2030	14,967	10,002	8,319	8,032	6,575	16,542	14,485	7,204	19,408	4,286
2031	15,116	10,106	8,447	8,082	6,594	16,785	14,588	7,286	19,583	4,354
2032	15,225	10,206	8,573	8,128	6,606	17,033	14,685	7,374	19,746	4,423
2033	15,348	10,312	8,701	8,179	6,630	17,295	14,799	7,467	19,933	4,483
2034	15,494	10,414	8,833	8,233	6,659	17,553	14,908	7,561	20,160	4,539
2035	15,624	10,513	8,976	8,284	6,665	17,819	15,012	7,660	20,375	4,597
2036	15,698	10,606	9,111	8,332	6,657	18,070	15,108	7,753	20,568	4,650
2037	15,792	10,698	9,231	8,378	6,665	18,322	15,204	7,847	20,770	4,704
2038	15,905	10,789	9,359	8,425	6,681	18,582	15,298	7,945	20,990	4,757
2039	16,023	10,881	9,493	8,471	6,695	18,841	15,389	8,043	21,215	4,814
2040	16,139	10,976	9,634	8,519	6,706	19,112	15,487	8,149	21,448	4,871
2041	16,250	11,066	9,770	8,564	6,716	19,370	15,578	8,245	21,668	4,927
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	13,129	8,352	6,707	6,863	5,782	13,239	12,504	5,470	14,967	3,145
2021	13,228	8,611	6,897	6,935	5,766	13,800	12,797	5,713	15,270	3,285
2022	13,383	8,774	7,022	7,047	5,781	14,201	12,986	5,852	15,544	3,405
2023	13,510	8,857	7,113	7,082	5,785	14,322	13,109	5,912	15,757	3,399
2024	13,670	8,937	7,205	7,121	5,800	14,568	13,198	5,984	15,903	3,456
2025	13,817	9,026	7,314	7,164	5,829	14,786	13,322	6,057	16,104	3,513
2026	14,008	9,121	7,422	7,209	5,888	15,015	13,437	6,129	16,309	3,566
2027	14,233	9,218	7,539	7,256	5,952	15,263	13,540	6,205	16,509	3,618
2028	14,425	9,315	7,664	7,298	5,992	15,491	13,638	6,281	16,657	3,670
2029	14,580	9,414	7,780	7,341	6,024	15,723	13,731	6,354	16,798	3,726
2030	14,740	9,515	7,898	7,390	6,054	15,966	13,828	6,427	16,944	3,787
2031	14,887	9,614	8,019	7,436	6,071	16,200	13,927	6,501	17,097	3,847
2032	14,993	9,710	8,140	7,478	6,082	16,440	14,019	6,579	17,240	3,908
2033	15,115	9,810	8,261	7,525	6,105	16,692	14,128	6,662	17,403	3,961
2034	15,259	9,907	8,386	7,574	6,131	16,941	14,232	6,746	17,601	4,011
2035	15,387	10,001	8,523	7,622	6,137	17,198	14,331	6,835	17,789	4,062
2036	15,459	10,090	8,650	7,666	6,129	17,441	14,423	6,917	17,957	4,109
2037	15,552	10,178	8,764	7,708	6,136	17,683	14,515	7,001	18,133	4,156
2038	15,663	10,264	8,886	7,751	6,151	17,935	14,604	7,089	18,325	4,204
2039	15,780	10,352	9,013	7,793	6,165	18,184	14,691	7,176	18,521	4,253
2040	15,894	10,441	9,146	7,837	6,175	18,446	14,785	7,270	18,725	4,304
2041	16,003	10,527	9,276	7,879	6,184	18,695	14,872	7,356	18,917	4,354
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	12,153	7,960	6,254	6,439	4,943	12,173	12,044	4,905	14,396	2,675
2021	12,244	8,207	6,431	6,506	4,930	12,690	12,326	5,123	14,688	2,794
2022	12,388	8,363	6,547	6,612	4,942	13,058	12,508	5,248	14,951	2,897
2023	12,506	8,441	6,632	6,645	4,946	13,169	12,626	5,301	15,156	2,892
2024	12,653	8,518	6,718	6,681	4,959	13,396	12,712	5,366	15,296	2,940
2025	12,789	8,603	6,819	6,721	4,983	13,596	12,832	5,431	15,490	2,989
2026	12,967	8,694	6,920	6,763	5,034	13,806	12,942	5,496	15,687	3,034
2027	13,175	8,785	7,029	6,807	5,089	14,034	13,041	5,564	15,879	3,077
2028	13,352	8,878	7,146	6,847	5,123	14,244	13,135	5,632	16,021	3,122
2029	13,495	8,972	7,254	6,888	5,150	14,457	13,225	5,697	16,158	3,170
2030	13,644	9,069	7,364	6,933	5,176	14,681	13,319	5,763	16,298	3,221
2031	13,779	9,164	7,477	6,976	5,191	14,896	13,414	5,829	16,444	3,273
2032	13,878	9,254	7,589	7,016	5,200	15,116	13,503	5,899	16,582	3,325
2033	13,991	9,350	7,702	7,060	5,219	15,349	13,608	5,974	16,739	3,370
2034	14,124	9,443	7,819	7,106	5,242	15,578	13,708	6,049	16,929	3,412
2035	14,243	9,532	7,946	7,151	5,247	15,814	13,804	6,129	17,110	3,455
2036	14,310	9,617	8,065	7,192	5,241	16,037	13,892	6,203	17,272	3,495
2037	14,396	9,700	8,172	7,232	5,246	16,260	13,980	6,278	17,441	3,536
2038	14,499	9,783	8,285	7,272	5,259	16,491	14,066	6,357	17,626	3,576
2039	14,607	9,866	8,404	7,312	5,270	16,720	14,150	6,435	17,815	3,618
2040	14,712	9,952	8,528	7,353	5,279	16,961	14,240	6,519	18,011	3,661
2041	14,813	10,034	8,649	7,392	5,287	17,190	14,324	6,596	18,196	3,703
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	10,891	7,476	5,836	5,928	4,641	10,738	11,129	4,353	14,644	2,633
2021	10,973	7,708	6,001	5,990	4,628	11,193	11,390	4,547	14,941	2,750
2022	11,102	7,854	6,110	6,087	4,640	11,518	11,558	4,658	15,209	2,851
2023	11,207	7,928	6,189	6,118	4,644	11,616	11,667	4,705	15,417	2,846
2024	11,339	7,999	6,269	6,151	4,656	11,816	11,746	4,763	15,559	2,894
2025	11,461	8,079	6,364	6,188	4,679	11,993	11,857	4,821	15,757	2,942
2026	11,620	8,165	6,458	6,227	4,726	12,179	11,959	4,878	15,957	2,986
2027	11,807	8,251	6,560	6,267	4,778	12,380	12,051	4,939	16,152	3,029
2028	11,966	8,338	6,668	6,303	4,810	12,565	12,138	4,999	16,297	3,073
2029	12,094	8,426	6,770	6,341	4,836	12,753	12,220	5,057	16,436	3,120
2030	12,227	8,517	6,872	6,383	4,860	12,950	12,307	5,115	16,579	3,171
2031	12,349	8,606	6,978	6,423	4,873	13,140	12,395	5,174	16,728	3,221
2032	12,437	8,691	7,083	6,459	4,882	13,334	12,477	5,236	16,868	3,272
2033	12,538	8,781	7,188	6,500	4,900	13,539	12,574	5,303	17,027	3,317
2034	12,658	8,868	7,297	6,542	4,921	13,741	12,667	5,369	17,221	3,358
2035	12,764	8,952	7,416	6,583	4,926	13,950	12,755	5,440	17,405	3,401
2036	12,824	9,031	7,527	6,621	4,920	14,146	12,837	5,506	17,570	3,441
2037	12,901	9,110	7,626	6,658	4,926	14,343	12,919	5,572	17,742	3,480
2038	12,993	9,187	7,732	6,695	4,938	14,547	12,998	5,642	17,930	3,520
2039	13,090	9,266	7,842	6,731	4,948	14,749	13,075	5,711	18,122	3,561
2040	13,184	9,346	7,958	6,770	4,956	14,962	13,159	5,786	18,321	3,604
2041	13,274	9,423	8,071	6,805	4,964	15,164	13,236	5,855	18,509	3,645
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	12,195	8,687	6,885	7,216	5,641	12,884	14,498	5,408	16,995	3,540
2021	12,287	8,957	7,080	7,291	5,625	13,431	14,838	5,648	17,339	3,697
2022	12,431	9,126	7,208	7,409	5,640	13,821	15,057	5,786	17,650	3,833
2023	12,549	9,212	7,302	7,446	5,644	13,938	15,199	5,845	17,892	3,826
2024	12,698	9,295	7,396	7,487	5,659	14,178	15,302	5,917	18,057	3,890
2025	12,834	9,388	7,508	7,532	5,687	14,390	15,447	5,989	18,287	3,954
2026	13,012	9,487	7,619	7,579	5,745	14,613	15,580	6,060	18,519	4,014
2027	13,221	9,587	7,739	7,629	5,807	14,854	15,698	6,135	18,746	4,072
2028	13,399	9,689	7,867	7,673	5,846	15,076	15,812	6,210	18,914	4,131
2029	13,542	9,792	7,987	7,719	5,877	15,301	15,920	6,282	19,075	4,194
2030	13,691	9,897	8,108	7,769	5,906	15,538	16,033	6,355	19,240	4,262
2031	13,827	10,000	8,232	7,818	5,923	15,766	16,147	6,427	19,413	4,330
2032	13,927	10,099	8,356	7,863	5,934	15,999	16,255	6,505	19,575	4,399
2033	14,039	10,203	8,480	7,912	5,956	16,245	16,381	6,587	19,761	4,459
2034	14,173	10,305	8,609	7,964	5,981	16,487	16,501	6,670	19,985	4,514
2035	14,292	10,403	8,749	8,013	5,987	16,737	16,616	6,757	20,199	4,572
2036	14,359	10,495	8,880	8,060	5,980	16,973	16,723	6,839	20,390	4,625
2037	14,446	10,586	8,997	8,104	5,987	17,209	16,829	6,922	20,590	4,678
2038	14,549	10,676	9,122	8,149	6,001	17,454	16,933	7,009	20,808	4,731
2039	14,657	10,767	9,252	8,194	6,014	17,697	17,033	7,095	21,031	4,787
2040	14,763	10,860	9,389	8,240	6,024	17,952	17,142	7,188	21,262	4,845
2041	14,864	10,950	9,522	8,284	6,033	18,194	17,243	7,273	21,480	4,900
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	14,227	10,253	8,256	8,664	6,879	14,314	17,237	6,662	18,662	4,047
2021	14,334	10,571	8,490	8,754	6,860	14,921	17,640	6,958	19,040	4,227
2022	14,502	10,772	8,643	8,896	6,878	15,354	17,901	7,128	19,382	4,382
2023	14,640	10,873	8,755	8,941	6,883	15,485	18,070	7,201	19,647	4,374
2024	14,813	10,971	8,869	8,990	6,901	15,751	18,192	7,289	19,829	4,447
2025	14,972	11,081	9,002	9,043	6,935	15,987	18,364	7,377	20,080	4,521
2026	15,180	11,198	9,136	9,100	7,006	16,234	18,522	7,465	20,335	4,589
2027	15,424	11,316	9,280	9,159	7,082	16,502	18,664	7,558	20,584	4,655
2028	15,631	11,436	9,433	9,213	7,130	16,749	18,799	7,650	20,769	4,723
2029	15,799	11,557	9,577	9,268	7,168	16,999	18,927	7,739	20,946	4,795
2030	15,973	11,682	9,722	9,329	7,203	17,262	19,061	7,828	21,128	4,873
2031	16,131	11,803	9,871	9,387	7,224	17,516	19,198	7,918	21,317	4,950
2032	16,247	11,920	10,019	9,441	7,237	17,775	19,325	8,013	21,496	5,029
2033	16,379	12,043	10,168	9,499	7,263	18,048	19,475	8,115	21,699	5,097
2034	16,535	12,163	10,322	9,562	7,295	18,317	19,618	8,217	21,946	5,161
2035	16,674	12,278	10,490	9,622	7,302	18,595	19,755	8,324	22,180	5,227
2036	16,752	12,387	10,647	9,677	7,293	18,857	19,882	8,425	22,390	5,287
2037	16,853	12,495	10,788	9,731	7,301	19,119	20,008	8,528	22,610	5,348
2038	16,973	12,601	10,938	9,785	7,319	19,391	20,131	8,634	22,849	5,409
2039	17,100	12,709	11,094	9,838	7,335	19,661	20,250	8,740	23,094	5,473
2040	17,223	12,819	11,258	9,894	7,347	19,944	20,380	8,855	23,348	5,538
2041	17,341	12,924	11,417	9,946	7,358	20,213	20,500	8,960	23,588	5,602
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	15,678	11,184	8,843	9,339	7,366	15,297	18,754	7,180	19,147	4,223
2021	15,795	11,532	9,094	9,436	7,345	15,946	19,194	7,499	19,535	4,411
2022	15,981	11,750	9,258	9,588	7,364	16,409	19,477	7,683	19,885	4,573
2023	16,133	11,861	9,378	9,637	7,370	16,549	19,661	7,761	20,157	4,565
2024	16,323	11,968	9,499	9,689	7,389	16,833	19,794	7,856	20,343	4,641
2025	16,498	12,087	9,643	9,747	7,426	17,085	19,981	7,951	20,602	4,718
2026	16,727	12,215	9,786	9,808	7,501	17,350	20,153	8,046	20,863	4,790
2027	16,996	12,344	9,940	9,872	7,583	17,636	20,307	8,146	21,119	4,858
2028	17,225	12,475	10,104	9,929	7,634	17,900	20,454	8,245	21,308	4,929
2029	17,410	12,607	10,258	9,989	7,674	18,167	20,594	8,341	21,489	5,004
2030	17,601	12,743	10,413	10,054	7,713	18,448	20,739	8,437	21,676	5,086
2031	17,776	12,875	10,573	10,117	7,735	18,719	20,888	8,534	21,871	5,167
2032	17,904	13,003	10,732	10,175	7,749	18,996	21,027	8,637	22,054	5,249
2033	18,048	13,137	10,891	10,238	7,777	19,288	21,190	8,746	22,262	5,320
2034	18,221	13,267	11,057	10,306	7,811	19,576	21,345	8,856	22,516	5,386
2035	18,373	13,393	11,236	10,370	7,818	19,872	21,495	8,972	22,756	5,455
2036	18,460	13,512	11,405	10,430	7,809	20,152	21,632	9,081	22,972	5,518
2037	18,571	13,629	11,555	10,488	7,818	20,433	21,770	9,191	23,197	5,582
2038	18,704	13,745	11,716	10,546	7,837	20,723	21,904	9,306	23,443	5,645
2039	18,843	13,863	11,883	10,604	7,853	21,012	22,034	9,420	23,694	5,712
2040	18,979	13,983	12,059	10,664	7,866	21,314	22,175	9,544	23,954	5,780
2041	19,109	14,098	12,230	10,720	7,878	21,602	22,305	9,657	24,200	5,847
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	15,066	10,906	8,393	8,960	7,128	14,921	17,905	7,129	19,626	4,302
2021	15,179	11,245	8,631	9,053	7,108	15,554	18,324	7,446	20,024	4,493
2022	15,358	11,458	8,787	9,200	7,126	16,006	18,595	7,628	20,383	4,658
2023	15,504	11,566	8,901	9,246	7,132	16,142	18,770	7,706	20,662	4,650
2024	15,687	11,670	9,016	9,296	7,151	16,420	18,897	7,800	20,853	4,727
2025	15,855	11,787	9,152	9,352	7,186	16,665	19,076	7,895	21,118	4,806
2026	16,075	11,911	9,288	9,411	7,259	16,923	19,240	7,989	21,386	4,878
2027	16,333	12,037	9,434	9,472	7,338	17,202	19,387	8,088	21,648	4,948
2028	16,553	12,164	9,590	9,527	7,388	17,460	19,527	8,186	21,842	5,020
2029	16,731	12,293	9,736	9,584	7,427	17,721	19,660	8,282	22,028	5,097
2030	16,915	12,426	9,883	9,647	7,464	17,995	19,800	8,377	22,219	5,180
2031	17,083	12,555	10,035	9,707	7,485	18,259	19,942	8,473	22,419	5,262
2032	17,206	12,679	10,185	9,763	7,498	18,529	20,074	8,575	22,606	5,346
2033	17,345	12,810	10,337	9,823	7,526	18,814	20,229	8,684	22,820	5,419
2034	17,510	12,937	10,494	9,888	7,558	19,094	20,378	8,793	23,079	5,486
2035	17,657	13,060	10,664	9,950	7,566	19,384	20,521	8,909	23,326	5,556
2036	17,740	13,176	10,824	10,007	7,557	19,657	20,652	9,017	23,547	5,621
2037	17,847	13,290	10,967	10,063	7,565	19,930	20,783	9,126	23,778	5,685
2038	17,974	13,403	11,119	10,119	7,584	20,214	20,911	9,240	24,030	5,750
2039	18,108	13,518	11,278	10,174	7,600	20,495	21,035	9,353	24,287	5,818
2040	18,239	13,635	11,445	10,232	7,612	20,790	21,170	9,476	24,554	5,888
2041	18,364	13,747	11,607	10,286	7,624	21,071	21,294	9,588	24,806	5,955
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	13,869	10,132	8,213	8,749	6,715	14,612	17,621	6,641	18,215	4,045
2021	13,973	10,447	8,446	8,839	6,697	15,231	18,034	6,936	18,584	4,225
2022	14,137	10,645	8,599	8,983	6,714	15,674	18,300	7,106	18,917	4,381
2023	14,271	10,745	8,710	9,028	6,719	15,807	18,473	7,178	19,176	4,372
2024	14,440	10,842	8,823	9,077	6,737	16,079	18,598	7,266	19,353	4,446
2025	14,595	10,951	8,956	9,131	6,770	16,319	18,774	7,354	19,599	4,519
2026	14,797	11,066	9,089	9,189	6,839	16,572	18,935	7,442	19,848	4,588
2027	15,035	11,183	9,232	9,248	6,913	16,845	19,080	7,534	20,091	4,653
2028	15,237	11,302	9,385	9,302	6,960	17,097	19,218	7,626	20,271	4,721
2029	15,401	11,421	9,527	9,358	6,997	17,353	19,349	7,715	20,443	4,793
2030	15,570	11,544	9,672	9,419	7,031	17,621	19,486	7,804	20,621	4,871
2031	15,725	11,665	9,820	9,478	7,051	17,880	19,626	7,893	20,806	4,949
2032	15,838	11,780	9,968	9,532	7,064	18,144	19,756	7,988	20,980	5,028
2033	15,966	11,902	10,116	9,591	7,090	18,423	19,909	8,090	21,178	5,096
2034	16,118	12,020	10,269	9,655	7,121	18,698	20,055	8,191	21,419	5,159
2035	16,253	12,134	10,436	9,715	7,127	18,982	20,195	8,299	21,648	5,225
2036	16,330	12,241	10,593	9,771	7,119	19,249	20,325	8,399	21,853	5,286
2037	16,428	12,348	10,732	9,825	7,127	19,517	20,454	8,501	22,067	5,346
2038	16,545	12,453	10,882	9,880	7,144	19,794	20,580	8,607	22,301	5,407
2039	16,669	12,559	11,037	9,934	7,160	20,070	20,702	8,713	22,540	5,471
2040	16,789	12,668	11,200	9,990	7,171	20,359	20,834	8,827	22,788	5,537
2041	16,904	12,772	11,359	10,043	7,182	20,634	20,957	8,932	23,022	5,600
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	11,371	7,941	6,244	6,133	4,916	11,432	11,996	5,268	16,479	3,216
2021	11,456	8,188	6,421	6,197	4,903	11,917	12,277	5,503	16,812	3,359
2022	11,591	8,343	6,537	6,297	4,915	12,263	12,458	5,637	17,114	3,482
2023	11,701	8,422	6,622	6,329	4,919	12,368	12,576	5,695	17,348	3,476
2024	11,839	8,498	6,708	6,363	4,932	12,580	12,661	5,764	17,508	3,534
2025	11,966	8,583	6,809	6,401	4,956	12,769	12,781	5,834	17,731	3,593
2026	12,133	8,673	6,910	6,442	5,007	12,966	12,891	5,903	17,956	3,647
2027	12,327	8,765	7,019	6,484	5,061	13,180	12,989	5,977	18,176	3,699
2028	12,494	8,858	7,135	6,521	5,095	13,377	13,083	6,050	18,339	3,753
2029	12,627	8,951	7,243	6,560	5,122	13,577	13,172	6,120	18,495	3,811
2030	12,766	9,048	7,353	6,603	5,148	13,787	13,266	6,191	18,655	3,872
2031	12,893	9,142	7,466	6,645	5,163	13,990	13,361	6,262	18,823	3,934
2032	12,986	9,233	7,578	6,683	5,172	14,197	13,450	6,337	18,980	3,997
2033	13,091	9,328	7,691	6,724	5,191	14,414	13,554	6,417	19,160	4,051
2034	13,216	9,421	7,808	6,769	5,213	14,630	13,653	6,498	19,378	4,101
2035	13,326	9,510	7,935	6,811	5,218	14,851	13,749	6,583	19,585	4,153
2036	13,389	9,594	8,053	6,850	5,212	15,061	13,837	6,663	19,770	4,202
2037	13,470	9,678	8,160	6,888	5,218	15,270	13,925	6,744	19,964	4,250
2038	13,566	9,760	8,273	6,926	5,231	15,487	14,011	6,828	20,176	4,299
2039	13,667	9,843	8,391	6,964	5,242	15,703	14,094	6,912	20,392	4,349
2040	13,766	9,929	8,515	7,004	5,250	15,929	14,184	7,003	20,616	4,401
2041	13,860	10,010	8,636	7,041	5,258	16,144	14,267	7,085	20,827	4,452
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	12,492	8,092	6,450	6,460	4,855	11,489	12,275	4,752	14,340	2,844
2021	12,586	8,343	6,632	6,527	4,842	11,977	12,563	4,964	14,630	2,971
2022	12,734	8,501	6,752	6,632	4,854	12,324	12,748	5,085	14,893	3,080
2023	12,855	8,581	6,840	6,666	4,858	12,429	12,869	5,137	15,097	3,074
2024	13,007	8,659	6,928	6,702	4,871	12,643	12,956	5,200	15,236	3,125
2025	13,146	8,746	7,033	6,742	4,895	12,832	13,078	5,263	15,430	3,177
2026	13,329	8,838	7,137	6,784	4,945	13,031	13,191	5,325	15,626	3,225
2027	13,543	8,931	7,249	6,829	4,998	13,246	13,292	5,392	15,817	3,271
2028	13,725	9,026	7,369	6,868	5,032	13,444	13,388	5,457	15,959	3,319
2029	13,872	9,121	7,481	6,909	5,059	13,645	13,479	5,521	16,094	3,370
2030	14,025	9,220	7,595	6,955	5,084	13,856	13,574	5,584	16,234	3,425
2031	14,164	9,316	7,711	6,998	5,099	14,059	13,672	5,648	16,380	3,479
2032	14,266	9,408	7,827	7,038	5,108	14,267	13,762	5,716	16,517	3,534
2033	14,381	9,505	7,943	7,082	5,126	14,486	13,869	5,789	16,673	3,582
2034	14,518	9,599	8,064	7,129	5,149	14,703	13,971	5,862	16,863	3,627
2035	14,640	9,690	8,195	7,173	5,153	14,926	14,069	5,938	17,043	3,673
2036	14,709	9,776	8,318	7,214	5,147	15,136	14,159	6,010	17,205	3,716
2037	14,797	9,861	8,428	7,255	5,153	15,346	14,249	6,083	17,373	3,759
2038	14,903	9,945	8,545	7,295	5,166	15,565	14,336	6,159	17,557	3,801
2039	15,014	10,030	8,667	7,335	5,177	15,781	14,422	6,235	17,745	3,846
2040	15,123	10,117	8,795	7,376	5,185	16,009	14,514	6,317	17,940	3,892
2041	15,226	10,200	8,919	7,415	5,193	16,225	14,599	6,391	18,124	3,937
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	13,157	8,668	6,837	6,982	5,369	12,568	12,977	5,266	15,186	3,089
2021	13,256	8,937	7,030	7,054	5,354	13,101	13,281	5,500	15,493	3,227
2022	13,412	9,106	7,157	7,169	5,367	13,481	13,477	5,634	15,771	3,345
2023	13,539	9,192	7,250	7,205	5,372	13,596	13,604	5,692	15,987	3,339
2024	13,699	9,275	7,344	7,244	5,386	13,830	13,696	5,761	16,135	3,395
2025	13,846	9,368	7,455	7,287	5,412	14,037	13,826	5,831	16,339	3,451
2026	14,038	9,467	7,566	7,333	5,467	14,254	13,945	5,900	16,547	3,503
2027	14,264	9,566	7,684	7,381	5,527	14,489	14,051	5,974	16,750	3,554
2028	14,456	9,668	7,812	7,423	5,564	14,706	14,153	6,046	16,900	3,605
2029	14,611	9,770	7,930	7,468	5,594	14,925	14,249	6,117	17,044	3,661
2030	14,771	9,876	8,051	7,517	5,621	15,156	14,350	6,187	17,192	3,720
2031	14,918	9,978	8,174	7,564	5,637	15,379	14,453	6,258	17,346	3,779
2032	15,025	10,077	8,297	7,607	5,648	15,606	14,549	6,334	17,491	3,839
2033	15,147	10,181	8,420	7,655	5,668	15,846	14,662	6,414	17,657	3,891
2034	15,291	10,282	8,548	7,705	5,693	16,082	14,769	6,495	17,857	3,940
2035	15,420	10,380	8,687	7,753	5,698	16,326	14,873	6,580	18,048	3,990
2036	15,492	10,472	8,817	7,798	5,691	16,556	14,968	6,660	18,219	4,036
2037	15,585	10,563	8,933	7,841	5,698	16,787	15,063	6,740	18,398	4,083
2038	15,697	10,653	9,058	7,885	5,712	17,025	15,156	6,824	18,593	4,129
2039	15,814	10,744	9,187	7,928	5,724	17,262	15,246	6,908	18,792	4,178
2040	15,928	10,837	9,323	7,973	5,733	17,511	15,343	6,999	18,998	4,228
2041	16,037	10,926	9,455	8,015	5,742	17,747	15,434	7,082	19,193	4,277
Compound Annual Growth Rates (%)										
2022-2026	1.15	0.97	1.40	0.57	0.46	1.40	0.86	1.16	1.21	1.16
2022-2031	1.19	1.02	1.49	0.60	0.55	1.47	0.78	1.17	1.06	1.36
2022-2041	0.95	0.96	1.48	0.59	0.36	1.46	0.72	1.21	1.04	1.30

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
2020	93,318	87,500	80,785	74,356	90,501	105,253	112,686	109,548	104,811	81,808	81,378	87,264
2021	95,540	89,581	82,704	76,117	92,664	107,767	115,361	112,152	107,326	83,774	83,299	89,333
2022	97,298	91,224	84,217	77,510	94,369	109,738	117,462	114,198	109,296	85,322	84,818	90,966
2023	98,176	92,047	84,983	78,221	95,230	110,734	118,521	115,232	110,282	86,106	85,592	91,794
2024	99,204	93,014	85,873	79,035	96,217	111,875	119,738	116,419	111,419	87,004	86,484	92,753
2025	100,333	94,070	86,847	79,933	97,311	113,140	121,086	117,733	112,679	88,000	87,465	93,805
2026	101,547	95,208	87,894	80,896	98,480	114,491	122,529	119,140	114,023	89,062	88,519	94,937
2027	102,814	96,398	88,988	81,900	99,693	115,896	124,029	120,602	115,418	90,167	89,620	96,118
2028	103,948	97,466	89,971	82,798	100,780	117,158	125,377	121,915	116,674	91,155	90,607	97,180
2029	105,023	98,478	90,902	83,649	101,813	118,355	126,656	123,161	117,868	92,094	91,541	98,184
2030	106,138	99,525	91,866	84,531	102,884	119,597	127,982	124,452	119,106	93,067	92,509	99,225
2031	107,223	100,545	92,806	85,392	103,930	120,808	129,275	125,712	120,314	94,018	93,453	100,239
2032	108,249	101,507	93,691	86,204	104,918	121,954	130,496	126,901	121,458	94,918	94,341	101,195
2033	109,358	102,547	94,650	87,083	105,989	123,194	131,819	128,189	122,696	95,891	95,303	102,229
2034	110,525	103,641	95,658	88,010	107,114	124,495	133,206	129,542	123,992	96,916	96,315	103,317
2035	111,659	104,704	96,638	88,910	108,209	125,761	134,555	130,856	125,254	97,914	97,300	104,375
2036	112,653	105,633	97,497	89,700	109,171	126,874	135,739	132,010	126,365	98,792	98,160	105,300
2037	113,674	106,589	98,378	90,511	110,159	128,015	136,954	133,195	127,503	99,693	99,044	106,250
2038	114,758	107,602	99,311	91,370	111,203	129,221	138,239	134,447	128,706	100,647	99,981	107,257
2039	115,853	108,626	100,255	92,239	112,259	130,441	139,537	135,713	129,921	101,611	100,928	108,275
2040	116,990	109,689	101,234	93,140	113,355	131,707	140,885	137,027	131,183	102,613	101,911	109,332
2041	118,067	110,696	102,162	93,995	114,395	132,906	142,162	138,273	132,379	103,562	102,842	110,333
Compound Annual Growth Rates (%)												
2022-2026	1.07	1.07	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.08	1.07	1.07
2022-2031	1.09	1.09	1.08	1.08	1.08	1.07	1.07	1.07	1.07	1.08	1.08	1.08
2022-2041	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.02	1.02	1.02

APPENDIX D HIGH AND LOW FORECASTS

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	104,217	51,214	76,611	94,186	104,869	68,729
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	48,432	142,890	108,113	49,611	78,372	96,168	107,187	71,245
2021	50,831	147,218	112,784	51,336	83,075	98,601	110,549	72,451
2022	52,283	150,248	117,368	52,769	87,541	104,567	112,923	73,480
2023	53,023	151,577	118,600	53,723	89,886	107,012	114,669	74,245
2024	53,850	152,881	120,717	54,639	92,289	108,580	116,051	75,202
2025	54,576	154,148	122,900	55,682	94,124	110,472	117,697	76,048
2026	55,266	155,429	125,182	56,702	95,882	112,202	119,225	77,167
2027	55,993	156,729	127,708	57,764	97,548	113,798	120,617	78,512
2028	56,692	157,887	129,911	58,894	99,253	114,955	121,953	79,597
2029	57,367	159,042	132,032	59,947	101,038	115,937	123,209	80,445
2030	58,047	160,311	134,222	61,013	102,914	116,982	124,477	81,310
2031	58,710	161,479	136,259	62,094	104,752	117,990	125,776	82,126
2032	59,414	162,553	138,327	63,187	106,625	118,919	126,992	82,737
2033	60,166	163,675	140,487	64,260	108,511	120,027	128,333	83,400
2034	60,911	164,911	142,661	65,384	110,375	121,346	129,604	84,215
2035	61,691	166,072	144,927	66,581	112,262	122,516	130,831	84,957
2036	62,421	167,118	147,050	67,703	114,050	123,554	132,000	85,322
2037	63,158	168,152	149,147	68,759	115,825	124,662	133,121	85,850
2038	63,927	169,163	151,335	69,871	117,664	125,922	134,278	86,516
2039	64,687	170,166	153,539	71,008	119,458	127,163	135,413	87,182
2040	65,519	171,192	155,815	72,185	121,396	128,379	136,531	87,817
2041	66,275	172,170	157,940	73,333	123,200	129,489	137,650	88,414
Compound Annual Growth Rates (%)								
2022-2026	1.40	0.85	1.62	1.81	2.30	1.78	1.37	1.23
2022-2031	1.30	0.80	1.67	1.82	2.01	1.35	1.20	1.24
2022-2041	1.26	0.72	1.57	1.75	1.81	1.13	1.05	0.98

APPENDIX D HIGH AND LOW FORECASTS

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	82,058	14,839	20,670	12,866	424,528	70,965
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	51,919	85,913	18,302	22,128	13,074	419,630	71,664
2021	55,076	87,543	19,124	23,034	13,809	436,304	74,321
2022	57,697	88,656	19,605	23,718	14,287	448,536	76,074
2023	57,913	89,700	20,561	24,314	14,646	459,901	77,106
2024	59,107	90,911	21,257	24,988	15,004	469,857	78,101
2025	60,260	92,255	21,882	25,599	15,373	478,742	79,107
2026	61,328	93,989	22,488	26,296	15,745	488,561	80,136
2027	62,336	95,725	23,016	27,069	16,158	498,347	81,152
2028	63,352	97,114	23,683	27,664	16,571	508,377	82,176
2029	64,418	98,340	24,209	28,145	16,953	518,338	83,181
2030	65,534	99,546	24,876	28,598	17,342	528,421	84,233
2031	66,643	100,585	25,347	28,997	17,725	538,442	85,208
2032	67,757	101,509	25,687	29,303	18,122	548,315	86,163
2033	68,728	102,606	26,074	29,620	18,507	558,769	87,145
2034	69,637	103,804	26,442	29,987	18,913	569,668	88,100
2035	70,570	104,665	26,707	30,310	19,334	580,938	89,013
2036	71,440	105,334	27,048	30,448	19,734	591,790	89,877
2037	72,308	106,239	27,340	30,649	20,108	602,566	90,724
2038	73,165	107,246	27,561	30,906	20,503	613,153	91,562
2039	74,065	108,235	27,872	31,160	20,907	624,005	92,428
2040	74,973	109,201	28,207	31,593	21,334	635,557	93,283
2041	75,860	110,137	28,550	31,549	21,739	647,145	94,104
Compound Annual Growth Rates (%)							
2022-2026	1.54	1.47	3.49	2.61	2.46	2.16	1.31
2022-2031	1.61	1.41	2.90	2.26	2.42	2.05	1.27
2022-2041	1.45	1.15	2.00	1.51	2.23	1.95	1.13

APPENDIX D HIGH AND LOW FORECASTS

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	90,153	60,275	47,752	48,012	36,256	87,124	92,596	36,703	108,593	20,625
2021	94,058	64,269	50,664	50,213	37,494	94,211	99,393	39,563	116,580	22,256
2022	95,752	65,776	52,055	51,247	37,816	98,565	101,527	40,693	122,852	23,316
2023	97,177	66,677	52,971	51,700	38,033	100,285	103,097	41,269	125,773	23,403
2024	98,713	67,532	53,854	52,145	38,301	102,459	104,340	41,912	127,794	23,885
2025	100,115	68,409	54,854	52,577	38,630	104,392	105,819	42,478	130,059	24,351
2026	101,786	69,299	55,835	53,014	39,140	106,335	107,193	43,015	132,224	24,783
2027	103,669	70,172	56,858	53,457	39,669	108,352	108,445	43,582	134,261	25,190
2028	105,308	71,050	57,940	53,852	40,041	110,232	109,646	44,126	135,900	25,601
2029	106,644	71,909	58,946	54,246	40,355	112,110	110,775	44,652	137,371	26,032
2030	108,038	72,805	59,967	54,679	40,653	114,066	111,915	45,181	138,907	26,482
2031	109,299	73,642	61,001	55,077	40,863	115,930	113,083	45,698	140,406	26,931
2032	110,306	74,459	62,041	55,444	41,022	117,826	114,177	46,246	141,822	27,381
2033	111,378	75,303	63,065	55,826	41,245	119,772	115,382	46,831	143,438	27,773
2034	112,599	76,123	64,139	56,248	41,501	121,714	116,525	47,411	145,277	28,141
2035	113,707	76,907	65,280	56,644	41,623	123,712	117,628	48,018	146,997	28,518
2036	114,428	77,649	66,345	57,001	41,650	125,593	118,679	48,587	148,569	28,869
2037	115,290	78,376	67,350	57,354	41,772	127,456	119,687	49,160	150,203	29,220
2038	116,276	79,097	68,408	57,698	41,935	129,393	120,727	49,759	151,969	29,566
2039	117,296	79,839	69,490	58,040	42,084	131,316	121,747	50,351	153,732	29,930
2040	118,354	80,571	70,609	58,390	42,220	133,343	122,753	50,998	155,510	30,297
2041	119,224	81,277	71,699	58,724	42,345	135,233	123,759	51,587	157,191	30,655
Compound Annual Growth Rates (%)										
2022-2026	1.54	1.31	1.77	0.85	0.86	1.92	1.37	1.40	1.85	1.54
2022-2031	1.48	1.26	1.78	0.80	0.86	1.82	1.20	1.30	1.50	1.61
2022-2041	1.16	1.12	1.70	0.72	0.60	1.68	1.05	1.26	1.31	1.45

APPENDIX D HIGH AND LOW FORECASTS

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	15,678	11,184	8,843	9,339	7,366	15,297	18,754	7,180	19,626	4,302
2021	16,357	11,925	9,382	9,767	7,617	16,542	20,131	7,740	21,070	4,642
2022	16,651	12,205	9,640	9,968	7,683	17,306	20,563	7,961	22,204	4,863
2023	16,899	12,372	9,810	10,056	7,727	17,608	20,881	8,073	22,731	4,881
2024	17,166	12,531	9,973	10,142	7,781	17,990	21,133	8,199	23,097	4,982
2025	17,410	12,693	10,158	10,227	7,848	18,329	21,433	8,310	23,506	5,079
2026	17,701	12,858	10,340	10,312	7,952	18,671	21,711	8,415	23,897	5,169
2027	18,028	13,020	10,529	10,398	8,059	19,025	21,964	8,526	24,265	5,254
2028	18,313	13,183	10,730	10,475	8,135	19,355	22,208	8,632	24,562	5,339
2029	18,545	13,343	10,916	10,551	8,199	19,685	22,436	8,735	24,828	5,429
2030	18,788	13,509	11,105	10,635	8,259	20,028	22,667	8,839	25,105	5,523
2031	19,007	13,664	11,296	10,713	8,302	20,355	22,904	8,940	25,376	5,617
2032	19,182	13,816	11,489	10,784	8,334	20,688	23,125	9,047	25,632	5,711
2033	19,369	13,973	11,679	10,859	8,380	21,030	23,369	9,161	25,924	5,793
2034	19,581	14,125	11,878	10,941	8,431	21,371	23,601	9,275	26,256	5,869
2035	19,774	14,270	12,089	11,018	8,456	21,722	23,824	9,394	26,567	5,948
2036	19,899	14,408	12,286	11,087	8,462	22,052	24,037	9,505	26,851	6,021
2037	20,049	14,543	12,472	11,156	8,487	22,379	24,241	9,617	27,147	6,094
2038	20,220	14,676	12,668	11,223	8,520	22,719	24,452	9,734	27,466	6,167
2039	20,398	14,814	12,869	11,289	8,550	23,057	24,659	9,850	27,784	6,242
2040	20,582	14,950	13,076	11,357	8,578	23,413	24,862	9,977	28,106	6,319
2041	20,733	15,081	13,278	11,422	8,603	23,745	25,066	10,092	28,410	6,394
Compound Annual Growth Rates (%)										
2022-2026	1.54	1.31	1.77	0.85	0.86	1.92	1.37	1.40	1.85	1.54
2022-2031	1.48	1.26	1.78	0.80	0.86	1.82	1.20	1.30	1.50	1.61
2022-2041	1.16	1.12	1.70	0.72	0.60	1.68	1.05	1.26	1.31	1.45

[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

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	13,332	8,779	7,064	7,460	6,279	13,717	13,098	6,131	17,144	3,559
2021	13,909	9,361	7,495	7,802	6,494	14,833	14,060	6,608	18,405	3,841
2022	14,160	9,580	7,701	7,963	6,550	15,518	14,362	6,797	19,395	4,023
2023	14,371	9,711	7,837	8,033	6,587	15,789	14,584	6,893	19,856	4,038
2024	14,598	9,836	7,967	8,102	6,634	16,131	14,759	7,001	20,175	4,122
2025	14,805	9,964	8,115	8,169	6,691	16,436	14,969	7,095	20,532	4,202
2026	15,052	10,093	8,260	8,237	6,779	16,742	15,163	7,185	20,874	4,277
2027	15,331	10,220	8,412	8,306	6,871	17,059	15,340	7,279	21,196	4,347
2028	15,573	10,348	8,572	8,368	6,935	17,355	15,510	7,370	21,455	4,418
2029	15,770	10,473	8,721	8,429	6,989	17,651	15,670	7,458	21,687	4,492
2030	15,977	10,604	8,872	8,496	7,041	17,959	15,831	7,547	21,929	4,570
2031	16,163	10,726	9,024	8,558	7,077	18,252	15,996	7,633	22,166	4,647
2032	16,312	10,845	9,178	8,615	7,105	18,551	16,151	7,724	22,389	4,725
2033	16,471	10,968	9,330	8,674	7,144	18,857	16,321	7,822	22,645	4,793
2034	16,651	11,087	9,489	8,740	7,188	19,163	16,483	7,919	22,935	4,856
2035	16,815	11,201	9,658	8,801	7,209	19,478	16,639	8,020	23,206	4,921
2036	16,921	11,309	9,815	8,857	7,214	19,774	16,788	8,115	23,455	4,982
2037	17,049	11,415	9,964	8,912	7,235	20,067	16,930	8,211	23,713	5,042
2038	17,195	11,520	10,120	8,965	7,263	20,372	17,077	8,311	23,991	5,102
2039	17,346	11,628	10,280	9,018	7,289	20,675	17,222	8,410	24,270	5,165
2040	17,502	11,735	10,446	9,073	7,312	20,994	17,364	8,518	24,550	5,228
2041	17,631	11,838	10,607	9,125	7,334	21,291	17,506	8,616	24,816	5,290
Compound Annual Growth Rates (%)										
2022-2026	1.54	1.31	1.77	0.85	0.86	1.92	1.37	1.40	1.85	1.54
2022-2031	1.48	1.26	1.78	0.80	0.86	1.82	1.20	1.30	1.50	1.61
2022-2041	1.16	1.12	1.70	0.72	0.60	1.68	1.05	1.26	1.31	1.45

[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

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

Year	MISO Energy
2020	628,090
2021	668,703
2022	689,598
2023	700,384
2024	710,936
2025	721,685
2026	732,625
2027	743,656
2028	753,695
2029	763,040
2030	772,695
2031	781,929
2032	790,723
2033	800,015
2034	809,678
2035	819,034
2036	827,370
2037	835,867
2038	844,828
2039	853,825
2040	863,045
2041	871,693
Compound Annual Growth Rates (%)	
2022-2026	1.52
2022-2031	1.41
2022-2041	1.24

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Summer[16] CP	MISO Winter[17] CP
2020	112,686	93,318
2021	119,969	99,341
2022	123,663	102,462
2023	125,569	104,051
2024	127,439	105,622
2025	129,350	107,217
2026	131,294	108,845
2027	133,249	110,487
2028	135,031	111,979
2029	136,693	113,370
2030	138,410	114,806
2031	140,052	116,178
2032	141,618	117,486
2033	143,272	118,867
2034	144,987	120,304
2035	146,647	121,694
2036	148,129	122,932
2037	149,638	124,196
2038	151,227	125,529
2039	152,822	126,868
2040	154,455	128,241
2041	155,990	129,528
Compound Annual Growth Rates (%)		
2022-2026	1.51	1.52
2022-2031	1.39	1.41
2022-2041	1.23	1.24

[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

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	104,217	51,214	76,611	94,186	104,869	68,729
2019	48,093	138,319	102,104	51,043	75,345	93,129	101,249	66,966
2020	45,886	138,633	102,588	47,065	73,165	85,509	98,780	70,712
2021	47,677	137,744	105,981	48,175	75,793	85,753	100,258	69,633
2022	48,622	139,400	106,139	48,553	77,491	82,518	101,002	70,085
2023	48,921	139,620	105,573	48,947	77,812	82,427	101,272	70,336
2024	49,338	139,976	106,128	49,383	79,464	81,998	101,344	70,851
2025	49,866	140,465	106,837	49,968	80,733	82,317	101,751	71,289
2026	50,412	141,100	107,775	50,553	82,066	82,674	102,109	72,029
2027	51,006	141,805	109,003	51,208	83,345	83,112	102,403	73,033
2028	51,603	142,413	109,965	51,943	84,746	83,200	102,695	73,765
2029	52,187	143,078	110,852	52,624	86,247	83,265	102,967	74,330
2030	52,786	143,867	111,862	53,317	87,879	83,465	103,278	74,895
2031	53,382	144,643	112,701	54,038	89,530	83,706	103,616	75,422
2032	54,029	145,351	113,664	54,749	91,227	83,951	103,927	75,756
2033	54,722	146,159	114,722	55,467	92,956	84,217	104,382	76,158
2034	55,415	147,035	115,812	56,213	94,673	84,886	104,825	76,720
2035	56,158	147,837	116,961	57,037	96,401	85,434	105,234	77,226
2036	56,857	148,608	118,059	57,810	98,050	85,830	105,584	77,341
2037	57,562	149,341	119,160	58,501	99,722	86,355	105,928	77,625
2038	58,295	150,090	120,335	59,217	101,403	87,005	106,283	78,040
2039	59,026	150,865	121,479	59,992	103,070	87,732	106,645	78,463
2040	59,829	151,658	122,692	60,796	104,869	88,437	106,999	78,875
2041	60,549	152,405	123,834	61,584	106,574	89,004	107,345	79,273
Compound Annual Growth Rates (%)								
2022-2026	0.91	0.30	0.38	1.01	1.44	0.05	0.27	0.69
2022-2031	1.04	0.41	0.67	1.20	1.62	0.16	0.28	0.82
2022-2041	1.16	0.47	0.81	1.26	1.69	0.40	0.32	0.65

APPENDIX D HIGH AND LOW FORECASTS

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	82,058	14,839	20,670	12,866	424,528	70,965
2019	48,951	78,858	15,321	21,559	12,869	429,343	69,158
2020	50,095	82,647	14,117	19,670	12,281	406,972	68,018
2021	51,481	81,285	13,872	18,834	12,876	420,578	69,830
2022	52,770	81,290	13,345	18,773	13,105	430,106	70,860
2023	52,351	81,388	13,291	18,730	13,353	434,336	71,241
2024	53,008	81,736	13,433	18,803	13,613	440,892	71,637
2025	53,700	82,308	13,580	18,867	13,914	446,603	72,163
2026	54,362	83,339	13,739	19,067	14,225	453,315	72,770
2027	55,009	84,403	13,877	19,346	14,584	460,297	73,414
2028	55,687	85,144	14,171	19,447	14,944	467,494	74,104
2029	56,442	85,754	14,356	19,540	15,295	474,796	74,809
2030	57,295	86,375	14,710	19,572	15,648	482,175	75,530
2031	58,145	86,843	14,869	19,581	15,992	489,455	76,261
2032	59,018	87,248	14,913	19,468	16,360	496,776	76,960
2033	59,770	87,843	15,014	19,407	16,722	504,651	77,703
2034	60,455	88,520	15,107	19,413	17,098	512,908	78,425
2035	61,170	88,883	15,127	19,383	17,499	521,526	79,120
2036	61,829	89,073	15,210	19,175	17,873	529,762	79,785
2037	62,506	89,498	15,272	19,015	18,224	537,625	80,441
2038	63,179	90,052	15,264	18,927	18,603	545,614	81,103
2039	63,904	90,593	15,348	18,834	18,985	553,767	81,747
2040	64,637	91,104	15,479	18,725	19,399	562,560	82,460
2041	65,354	91,584	15,607	18,574	19,783	571,479	83,115
Compound Annual Growth Rates (%)							
2022-2026	0.75	0.62	0.73	0.39	2.07	1.32	0.67
2022-2031	1.08	0.74	1.21	0.47	2.24	1.45	0.82
2022-2041	1.13	0.63	0.83	-0.06	2.19	1.51	0.84

APPENDIX D HIGH AND LOW FORECASTS

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	90,153	60,275	47,752	48,012	36,256	87,124	92,596	36,703	108,593	20,625
2021	87,642	60,231	47,553	46,982	34,814	87,436	90,140	37,109	103,657	20,804
2022	88,089	61,087	47,936	47,547	34,674	88,329	90,809	37,844	101,148	21,325
2023	88,407	61,404	48,311	47,622	34,508	88,211	91,052	38,077	101,296	21,155
2024	89,065	61,725	48,729	47,743	34,436	89,273	91,116	38,401	101,255	21,421
2025	89,684	62,164	49,288	47,910	34,465	90,224	91,482	38,813	101,869	21,700
2026	90,637	62,665	49,852	48,126	34,705	91,316	91,804	39,238	102,574	21,968
2027	91,862	63,193	50,485	48,367	34,977	92,522	92,069	39,700	103,370	22,229
2028	92,845	63,758	51,188	48,574	35,106	93,659	92,332	40,164	103,850	22,503
2029	93,640	64,335	51,841	48,801	35,190	94,808	92,576	40,619	104,314	22,808
2030	94,471	64,926	52,506	49,070	35,274	96,078	92,856	41,085	104,909	23,153
2031	95,202	65,526	53,196	49,335	35,280	97,277	93,160	41,549	105,536	23,497
2032	95,685	66,099	53,875	49,577	35,259	98,556	93,439	42,053	106,170	23,849
2033	96,270	66,714	54,563	49,852	35,311	99,897	93,848	42,592	106,854	24,153
2034	97,017	67,311	55,278	50,151	35,391	101,246	94,246	43,131	107,937	24,430
2035	97,682	67,885	56,066	50,424	35,346	102,630	94,615	43,709	108,926	24,719
2036	97,948	68,433	56,801	50,687	35,220	103,952	94,929	44,254	109,752	24,985
2037	98,366	68,973	57,460	50,937	35,190	105,286	95,238	44,803	110,678	25,259
2038	98,912	69,519	58,145	51,193	35,212	106,660	95,557	45,373	111,729	25,531
2039	99,490	70,050	58,886	51,457	35,224	108,012	95,883	45,942	112,861	25,824
2040	100,085	70,636	59,653	51,728	35,223	109,460	96,201	46,566	114,007	26,120
2041	100,638	71,175	60,405	51,982	35,212	110,830	96,512	47,127	115,032	26,410
Compound Annual Growth Rates (%)										
2022-2026	0.72	0.64	0.98	0.30	0.02	0.83	0.27	0.91	0.35	0.75
2022-2031	0.87	0.78	1.16	0.41	0.19	1.08	0.28	1.04	0.47	1.08
2022-2041	0.70	0.81	1.22	0.47	0.08	1.20	0.32	1.16	0.68	1.13

APPENDIX D HIGH AND LOW FORECASTS

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	15,678	11,184	8,843	9,339	7,366	15,297	18,754	7,180	19,626	4,302
2021	15,241	11,176	8,806	9,138	7,073	15,352	18,257	7,260	18,734	4,339
2022	15,319	11,335	8,877	9,248	7,045	15,509	18,392	7,403	18,281	4,448
2023	15,374	11,394	8,947	9,263	7,011	15,488	18,442	7,449	18,308	4,412
2024	15,488	11,453	9,024	9,286	6,996	15,675	18,455	7,512	18,300	4,468
2025	15,596	11,535	9,128	9,319	7,002	15,842	18,529	7,593	18,411	4,526
2026	15,762	11,628	9,232	9,361	7,051	16,034	18,594	7,676	18,539	4,582
2027	15,975	11,726	9,349	9,408	7,106	16,245	18,648	7,766	18,683	4,636
2028	16,146	11,830	9,479	9,448	7,132	16,445	18,701	7,857	18,769	4,693
2029	16,284	11,937	9,600	9,492	7,149	16,647	18,750	7,946	18,853	4,757
2030	16,429	12,047	9,723	9,545	7,166	16,870	18,807	8,037	18,961	4,829
2031	16,556	12,158	9,851	9,596	7,168	17,080	18,869	8,128	19,074	4,901
2032	16,640	12,265	9,977	9,643	7,163	17,305	18,925	8,227	19,188	4,974
2033	16,741	12,379	10,104	9,697	7,174	17,540	19,008	8,332	19,312	5,038
2034	16,871	12,490	10,237	9,755	7,190	17,777	19,089	8,438	19,508	5,095
2035	16,987	12,596	10,383	9,808	7,181	18,020	19,163	8,551	19,687	5,156
2036	17,033	12,698	10,519	9,859	7,155	18,252	19,227	8,657	19,836	5,211
2037	17,106	12,798	10,641	9,908	7,149	18,486	19,289	8,765	20,003	5,268
2038	17,201	12,899	10,768	9,957	7,154	18,728	19,354	8,876	20,193	5,325
2039	17,301	12,998	10,905	10,009	7,156	18,965	19,420	8,988	20,398	5,386
2040	17,405	13,107	11,047	10,061	7,156	19,219	19,485	9,110	20,605	5,448
2041	17,501	13,207	11,186	10,111	7,154	19,460	19,547	9,219	20,790	5,508
Compound Annual Growth Rates (%)										
2022-2026	0.72	0.64	0.98	0.30	0.02	0.83	0.27	0.91	0.35	0.75
2022-2031	0.87	0.78	1.16	0.41	0.19	1.08	0.28	1.04	0.47	1.08
2022-2041	0.70	0.81	1.22	0.47	0.08	1.20	0.32	1.16	0.68	1.13

APPENDIX D HIGH AND LOW FORECASTS

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

Year	LRZ1	LRZ2	LRZ3	LRZ4	LRZ5	LRZ6	LRZ7	LRZ8	LRZ9	LRZ10
2020	13,332	8,779	7,064	7,460	6,279	13,717	13,098	6,131	17,144	3,559
2021	12,960	8,772	7,035	7,300	6,030	13,766	12,751	6,198	16,364	3,590
2022	13,027	8,897	7,092	7,388	6,006	13,907	12,845	6,321	15,968	3,680
2023	13,074	8,943	7,147	7,399	5,977	13,888	12,880	6,360	15,992	3,651
2024	13,171	8,990	7,209	7,418	5,964	14,055	12,889	6,414	15,985	3,696
2025	13,262	9,054	7,292	7,444	5,969	14,205	12,941	6,483	16,082	3,745
2026	13,403	9,127	7,375	7,478	6,011	14,377	12,986	6,554	16,193	3,791
2027	13,585	9,204	7,469	7,515	6,058	14,567	13,024	6,631	16,319	3,836
2028	13,730	9,286	7,573	7,547	6,080	14,746	13,061	6,709	16,395	3,883
2029	13,847	9,370	7,669	7,583	6,095	14,927	13,095	6,785	16,468	3,936
2030	13,970	9,456	7,768	7,625	6,109	15,127	13,135	6,862	16,562	3,995
2031	14,078	9,544	7,870	7,666	6,110	15,315	13,178	6,940	16,661	4,055
2032	14,150	9,627	7,970	7,703	6,107	15,517	13,217	7,024	16,761	4,115
2033	14,236	9,717	8,072	7,746	6,116	15,728	13,275	7,114	16,869	4,168
2034	14,347	9,804	8,178	7,792	6,130	15,940	13,332	7,204	17,040	4,216
2035	14,445	9,887	8,294	7,835	6,122	16,158	13,384	7,301	17,196	4,266
2036	14,484	9,967	8,403	7,876	6,100	16,366	13,428	7,392	17,327	4,311
2037	14,546	10,046	8,501	7,915	6,095	16,576	13,472	7,483	17,473	4,359
2038	14,627	10,125	8,602	7,954	6,099	16,793	13,517	7,579	17,639	4,406
2039	14,712	10,203	8,712	7,995	6,101	17,006	13,563	7,674	17,817	4,456
2040	14,800	10,288	8,825	8,037	6,101	17,234	13,608	7,778	17,998	4,507
2041	14,882	10,366	8,936	8,077	6,099	17,449	13,652	7,872	18,160	4,557
Compound Annual Growth Rates (%)										
2022-2026	0.72	0.64	0.98	0.30	0.02	0.83	0.27	0.91	0.35	0.75
2022-2031	0.87	0.78	1.16	0.41	0.19	1.08	0.28	1.04	0.47	1.08
2022-2041	0.70	0.81	1.22	0.47	0.08	1.20	0.32	1.16	0.68	1.13

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Energy
2020	628,090
2021	616,367
2022	618,788
2023	620,043
2024	623,163
2025	627,600
2026	632,886
2027	638,776
2028	643,981
2029	648,931
2030	654,330
2031	659,558
2032	664,562
2033	670,053
2034	676,138
2035	682,003
2036	686,961
2037	692,190
2038	697,830
2039	703,628
2040	709,680
2041	715,323
Compound Annual Growth Rates (%)	
2022-2026	0.56
2022-2031	0.71
2022-2041	0.77

APPENDIX D HIGH AND LOW FORECASTS

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

Year	MISO Summer CP	MISO Winter CP
2020	112,686	93,318
2021	110,602	91,598
2022	111,077	91,962
2023	111,296	92,136
2024	111,844	92,605
2025	112,630	93,269
2026	113,565	94,063
2027	114,603	94,947
2028	115,522	95,727
2029	116,399	96,470
2030	117,355	97,280
2031	118,280	98,062
2032	119,168	98,814
2033	120,144	99,637
2034	121,220	100,548
2035	122,256	101,425
2036	123,134	102,167
2037	124,060	102,951
2038	125,056	103,798
2039	126,080	104,667
2040	127,149	105,575
2041	128,145	106,421
Compound Annual Growth Rates (%)		
2022-2026	0.56	0.57
2022-2031	0.70	0.72
2022-2041	0.76	0.77