2021-2030 Electric Customer and Sales Forecasts

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MidAmerican ENERGY

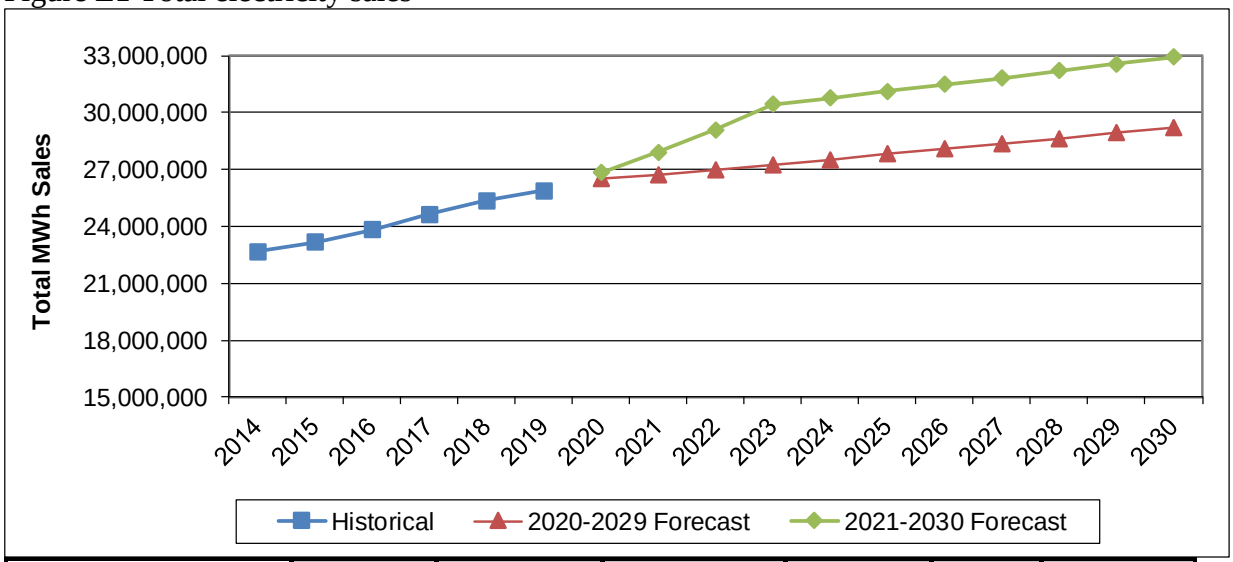
EXECUTIVE SUMMARY

Iowa population growth has been considered as a proxy for the gas customer growth due to the fact that a majority of MidAmerican's retail customers reside in Iowa. The gas customer growth is primarily driven by population, which is in turn driven by the economic factors such as gross state product. According to the Census Bureau and IHS Markit, Inc., the Iowa population grew by 0.20% in 2019 versus 0.29% during the last five years and is expected to grow by 0.23% in 2020 and 0.31% in the next five years. The economy, as measured by real gross state product, grew by 0.5% in 2019 and grew by an average of 0.9% in the last five years. It is expected to grow by 1.0% in 2020 and increase by an annual average of 1.6% in the next five years. The economic forecast underlying the natural gas volumes and customer forecast was made in January 2020.

The residential electric customer count is expected to increase 0.95% annually for the next ten years, which is higher than the growth rate of 0.87% during the last five years. The customer numbers in the industrial and public authority classes will experience the annual growth of 0.33% and -0.03%, respectively. For the commercial class, the forecasted customer growth rate is 0.70% annually.

The current forecast projects total electric sales to grow by 2.32% annually for the next ten years, less than last year's projection of 1.12%. In last five years, the weather normalized electric sales have grown 2.70%.

Figure E1 Total electricity sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	2.70%	2.84%	2.03%			
2021-2030 Forecast				3.62%	3.98%	2.32%
2020-2029 Forecast				2.35%	1.42%	1.12%

Energy Efficiency Impacts

Energy efficiency impacts as promoted through company demand-side management (DSM) programs have been accounted for in the electric sales forecast. National level DSM is also implicitly included in MEC's electric MWh sales results. The regression models have incorporated the impacts of energy efficiency program MWh savings since 2000. No out-of-model adjustments were made to the forecast due to energy efficiency impacts.

The concept behind embedded energy efficiency savings is that as DSM programs mature, the impact and momentum of past programs is already captured in the observed historical kWh sales series.

Customer forecasts

As compared to the 2020-2029 forecasts, the 2021-2030 customer forecasts decreased the ten year annual growth rates in the industrial and public authority classes while increasing it in the residential and commercial classes. The fastest customer growth is projected to occur in the residential class at 0.95% while the slowest customer growth is expected in the public authority class at -0.03%. Figure E2 shows the comparison of historical, 2021-2030 forecast and 2020-2029 forecast average annual customers for the residential, commercial, industrial and public authority classes. The tables associated with these figures compare the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

In the residential class, the 2021-2030 forecast increased the ten year growth rate to 0.95% from 0.87% in the 2020-2029 forecast. This is quite close to the last five year's historical growth rate of 0.97%. In this class, South Dakota is projected to be the fastest growing jurisdiction at 1.44% while Illinois is the slowest growing at 0.17%. Iowa is growing at 1.04%.

In the commercial class, the 2021-2030 forecast increased the ten year growth rate to 0.70% from 0.67% in the 2020-2029 forecast. The current growth rate is less than the historical five year growth rate of 1.90%. In this class, South Dakota is projected to be the fastest growing jurisdiction at 1.14% while Illinois is the slowest growing at 0.39%. Iowa is growing at 0.73%.

In the industrial class, the 2021-2030 forecast decreased the ten year growth rate to 0.33% from 1.02% in the 2020-2029 forecast. The growth rate during the last five years was 1.22%. In this class, Illinois is projected to be the fastest growing jurisdiction at 1.35% while South Dakota increases at a 0.11% rate. Iowa is projected to grow at 0.31%.

In the public authority class, the 2021-2030 forecast increased the ten year growth rate to -0.03% from -0.13% in the 2020-2029 forecast. The historical five year growth rate was 0.24% for this class. In this class, South Dakota is projected to be the fastest growing jurisdiction at 0.25% while Iowa shows shows a decline at -0.03%.

In the street lighting class, the current forecast assumed that the customer numbers, using the most recent monthly data, are to remain constant, as has been done in past forecasts.

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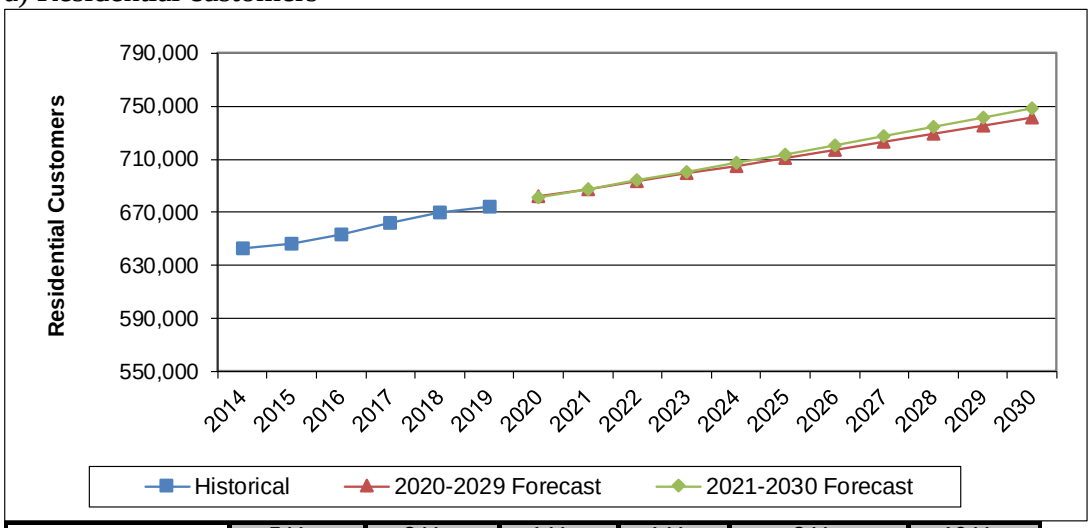
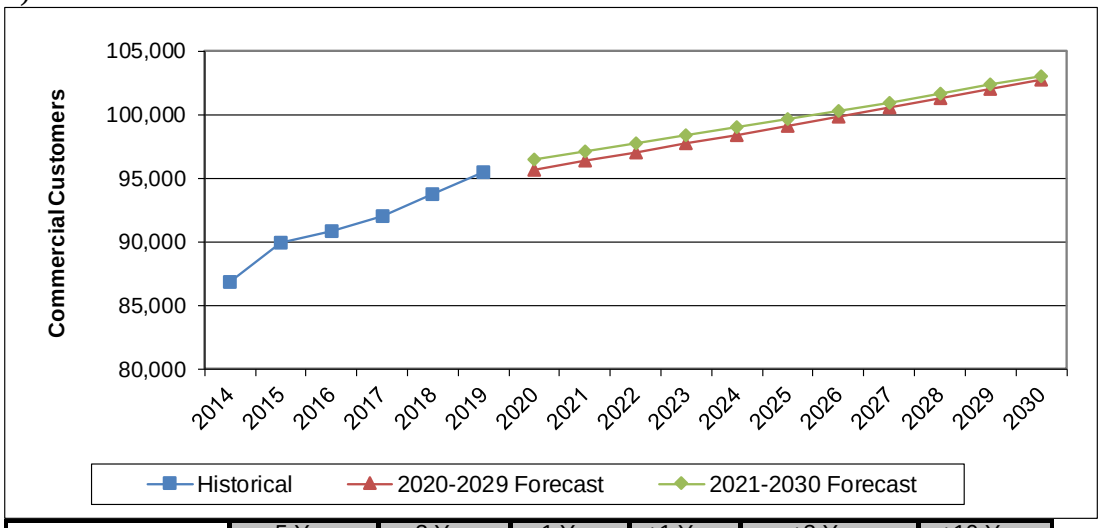
Figure E2 Customer forecasts for a) residential, b) commercial, c) industrial and d) public authority classes. Each graph shows the historical, 2021-2030 forecast and 2021-2030 forecast average customers. The tables compare the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

a) Residential customers



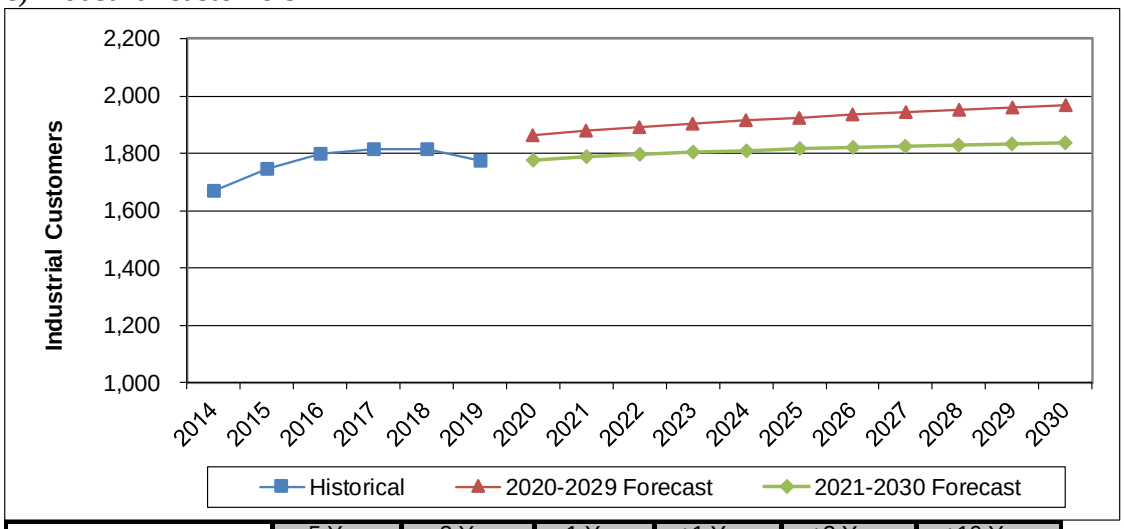
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.97%	1.08%	0.76%			
2021-2030 Forecast				0.95%	0.95%	0.95%
2020-2029 Forecast				1.09%	0.93%	0.87%

b) Commercial customers



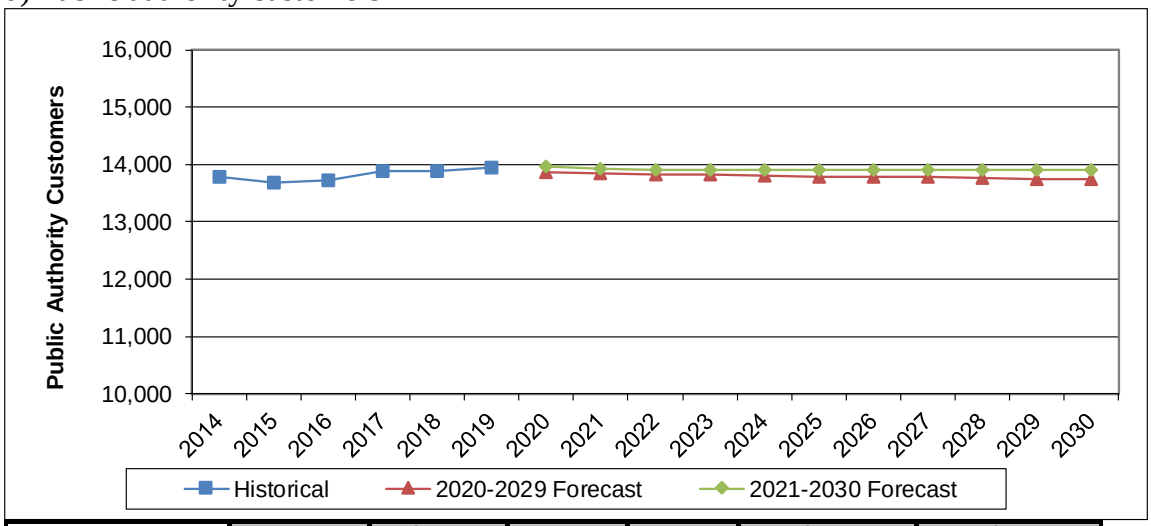
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	1.90%	1.65%	1.83%			
2021-2030 Forecast				1.07%	0.80%	0.70%
2020-2029 Forecast				0.26%	0.56%	0.67%

c) Industrial customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	1.22%	-0.46%	-2.23%			
2021-2030 Forecast				0.19%	0.43%	0.33%
2020-2029 Forecast				5.14%	2.20%	1.02%

d) Public authority customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.24%	0.52%	0.32%			
2021-2030 Forecast				0.26%	-0.06%	-0.03%
2020-2029 Forecast				-0.52%	-0.25%	-0.13%

Sales forecasts

The 2021-2030 electric sales forecasts decreased the ten year annual growth rates in the residential class, while increasing it in the residential and industrial classes. The industrial class is the fastest growing class at 3.78% annually over the next ten years. The increased industrial sales growth is due to higher sales growth assumptions for the ICR class through 2023. The slowest growing class is forecasted to be the street lighting class at -0.75%. Figure E3 shows the comparison of historical, 2020-2029 forecast and 2021-2030 sales forecasts for the residential, commercial, industrial and public authority classes. The tables associated with these figures compare the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

In the residential class, the 2021-2030 forecast decreased the ten year sales growth rate to 0.34% from 0.51% in the 2020-2029 forecast. This new ten year growth rate number is slightly higher than the last five year growth rate of 0.29%. In this class, the fastest growth is expected to be in South Dakota, while the slowest growth is projected to be in Illinois.

In the commercial class, the 2021-2030 forecast increased the ten year sales growth rate to 0.42% from 0.37% in the 2020-2029 forecast. The historical five year growth rate is 0.58%. The fastest growth in this class is expected to be in Illinois, while the slowest growth is projected to be in South Dakota.

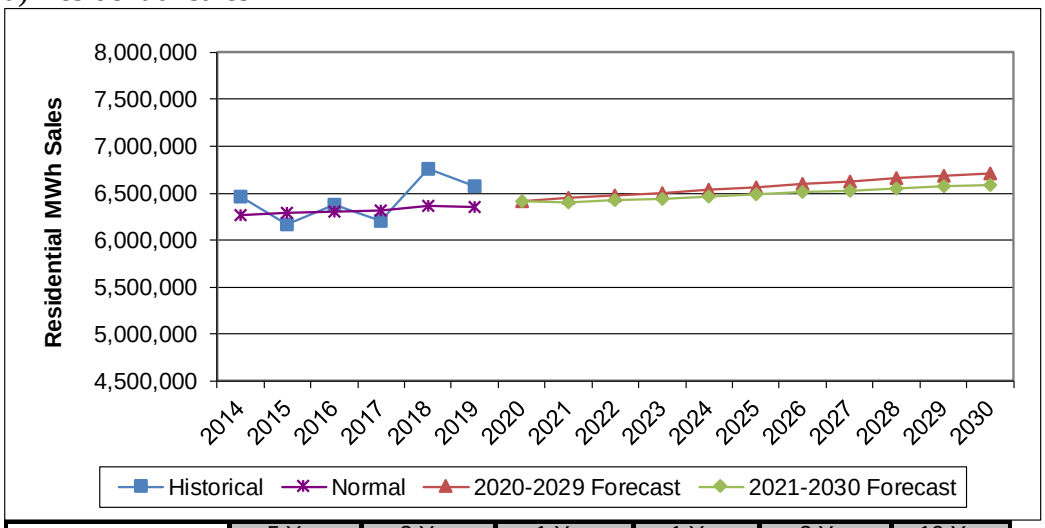
In the industrial class, the 2021-2030 forecast decreased the ten year sales growth rate to 3.78% from 1.71% in the 2020-2029 forecast. The growth rate over the last five years is 5.03%. In this class, the fastest growth is expected to be in Iowa with 3.92%, while Illinois is growing at a rate of 0.70%.

In the public authority class, the 2021-2030 forecast increased the ten year sales growth rate to -0.23% from -0.24% in the 2020-2029 forecast. The growth rate over the last five years was -0.04%. The fastest growth in this class is expected to be in Illinois, while the slowest growth is projected to be in Iowa.

Street lighting sales are decreasing over the forecast period due to the implementation of the LED lighting replacement program in the state of Iowa.

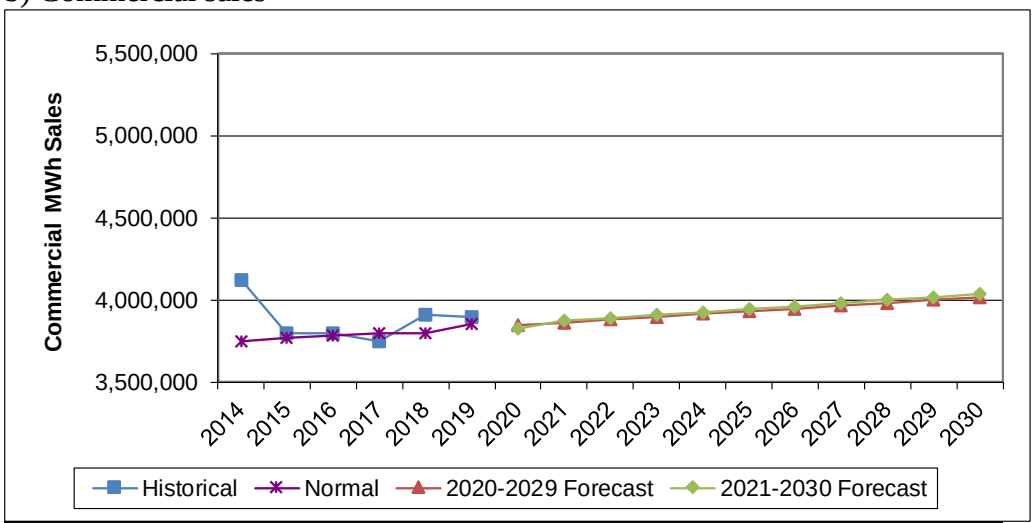
Figure E3 Billed sales forecasts for a) residential, b) commercial, c) industrial and d) public authority classes. Each graph shows the historical, 2020-2029 forecast and 2021-2030 forecast annual sales. The tables compare the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

a) Residential sales



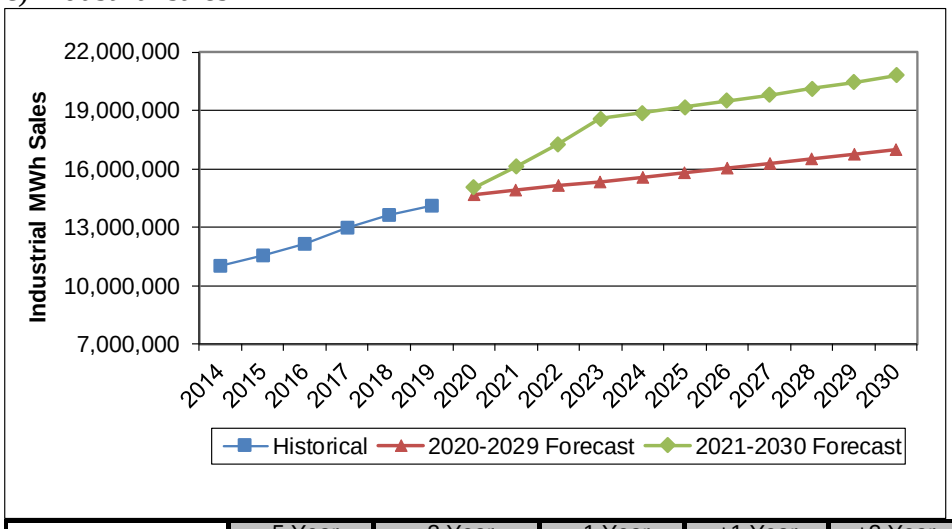
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.33%	1.03%	-2.78%			
2021-2030 Forecast	0.29%	0.29%	-0.11%	1.05%	0.38%	0.34%
2020-2029 Forecast				1.05%	0.65%	0.51%

b) Commercial sales



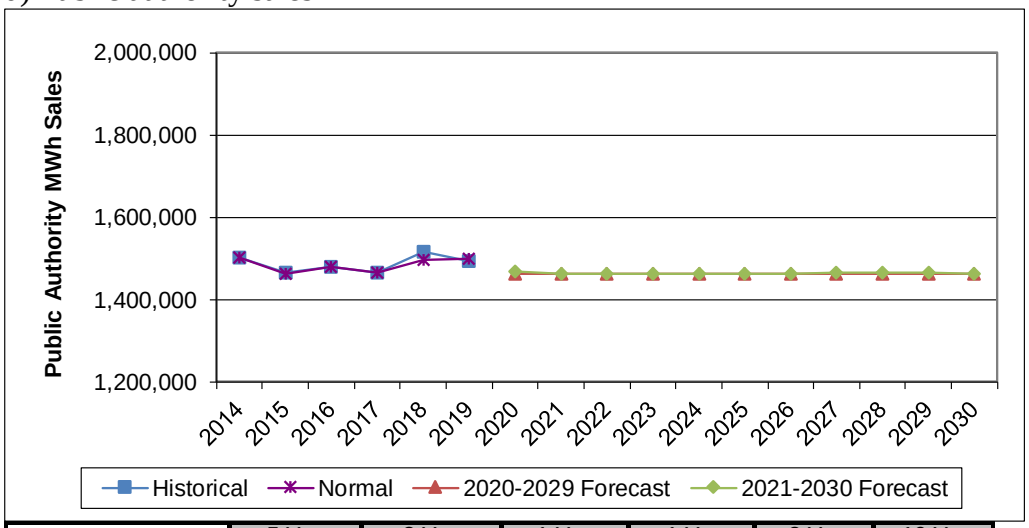
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-1.10%	0.89%	-0.34%			
2021-2030 Forecast	0.58%	0.60%	1.55%	-0.86%	0.30%	0.42%
2020-2029 Forecast				-0.21%	0.22%	0.37%

c) Industrial sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	5.03%	5.15%	3.48%			
2021-2030 Forecast				6.61%	6.93%	3.78%
2020-2029 Forecast				4.08%	2.31%	1.71%

d) Public authority sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-0.10%	0.36%	-1.35%			
2021-2030 Forecast	-0.04%	0.45%	0.07%	-2.04%	-0.79%	-0.23%
2020-2029 Forecast				-2.33%	-0.78%	-0.24%

I. METHODOLOGY

The 2021-2030 electric customer and sales forecasts were produced using econometric models on a monthly basis and are carried out in three steps using a bottom-up approach:

Step 1: The customer numbers were forecasted directly by state, by revenue class:

- Residential
- Commercial
- Industrial
- Public authority.

Industrial kWh sales were forecast directly, by state, to arrive at a total industrial class kWh sales forecast. The industrial sales were forecast in two groups: Non-ICR customers and ICR customers. Iowa is the only state that currently has customers on the ICR rate. The street lighting forecasts were forecast using trending. In this class, as in prior forecasts, the current customer numbers were assumed to remain constant throughout the forecast period. An LED lighting replacement program currently being implemented in Iowa caused the street lighting MWh sales forecast to decline over the forecast period.

Step 2: For residential, commercial and public authority, econometric models were built to forecast kWh per customer. This was done for each state: Iowa, Illinois and South Dakota. The resulting kWh per customer forecasts were multiplied by the appropriate customer forecasts to arrive at a kWh sales forecast. For industrial, the kWh per customer values for each revenue class was calculated using customer and sales forecasts, and employed to check the presence of any discontinuity between the historical and forecasted values.

Step 3: The projected customers and sales numbers were modeled using data specific to the area being forecast. Economic data for the state of Iowa, the Des Moines, IA metropolitan statistical area, the Quad Cities' metropolitan statistical area and the appropriate county level data in Iowa and South Dakota were used in building the models for the different regions.

I.1 Economic and demographic variables

Some variables, such as customer numbers, price, sales, revenue class, jurisdiction, etc., were obtained internally from the company database while other data, such as economic, demographic and weather, were received from external sources.

The economic and demographic data for the models were obtained from the IHS Markit, Inc. database. The economic and demographic data forecast was performed by IHS Markit, Inc. in January 2020, the most recent forecast available. The list of variables considered for the electric sales and customer forecasts is shown in Table 1. For MEC's Illinois service territory, economic and demographic variables specific to the Quad Cities metropolitan area were used in the forecasting process. The Quad Cities area encompasses MEC's Illinois service territory. For MEC's Iowa-South service territory, economic and demographic variables specific to the Des Moines metropolitan area were used in the forecasting process. For MEC's Iowa-North and South Dakota service territories, county level data were considered.

Table 1: List of economic and demographic variables considered for the 2021-2030 forecasts

	State of Iowa Data
1	Population (Thous.)
2	Households, Family and Non-Family (Thous.)
3	Housing Starts, Total Private (SAAR)
4	Housing Starts, Private Single-Family (Thousands, SAAR)
5	Housing Starts, Private Multi-Family (Thousands, SAAR)
6	Real Gross State Product (Millions 2005$)
7	Real Per Capita Personal Income (Thous., 2005$)
8	Employment (NAICS), Total Nonfarm (Thous.)
9	Industrial Production Index Total (2007 = 100)
10	Non-Manufacturing Real Gross State Product (Millions 2005$)
11	Real GSP, State and Local Government (Millions 2005$)
12	Employment (NAICS), State & Local Government (Thous.)
	Quad Cities MSA Data
13	Real Gross Metropolitan Product (Millions 2005$)
14	Real Gross Metropolitan Product, Government, State & Local (Millions 2005$)
15	Households, Family and Non-Family (Thous.)
16	Employment (NAICS), Total Nonfarm (Thous.)
17	Employment (NAICS), State & Local Government (Thous.)
	Des Moines MSA Data
18	Real Gross Metropolitan Product (Millions 2005$)
19	Real Gross Metropolitan Product, Government, State & Local (Millions 2005$)
20	Households, Family and Non-Family (Thous.)
21	Employment (NAICS), Total Nonfarm (Thous.)
22	Employment (NAICS), State & Local Government (Thous.)
	County Level Data for Iowa and South Dakota
23	Employment, Total Nonfarm
24	Households, Total
25	Population
26	Real Gross County Product
27	Real Per Capita Personal Income

I.2 Weather variables

The weather variables used in the present forecast are:

Current month and previous month cooling degree days (CDD)
Current month and previous month heating degree days (HDD)

The forecast also contains a variable in which cooling degree days are interacted with a time trend and a variable in which heating degree days are interacted with a time trend. These variables measure the extent to which the relationship between degree days and electric sales changes over time.

The weather data was obtained from the NOAA (National Oceanic and Atmospheric Administration) and are based on 65 degrees Fahrenheit. The values of weather variables were calculated through a weighting scheme based on the readings from five weather stations:

Weather Stations of Interest	
Des Moines	WSFO_AP
Sioux City	WSO_AP
Waterloo	WSO_AP
Moline	WSO_AP
Omaha	Eppley_Field

The present energy forecasts are based on billed data. This means that the sales numbers reflect, in part, the weather conditions from the previous month as well as the weather conditions for the current month, depending on the meter read date. To take this into account, both current month and previous month degree days are used in the modeling process. The forecasts used actual weather values for the historical period and normal weather values for the forecast period. In the 2021-2030 forecast, normal weather was defined as the MEC system load-weighted average monthly degree days from 1990-2019.

To compare the growth rates the historical sales figures were "weather normalized" using average (normal) weather values. The normalization process consists of three steps. First, the historic predicted numbers were obtained from a regression model using the actual weather values. Second, the sales were re-calculated using average weather results.[1] Third, the difference between them, which defines the weather impact, was subtracted from the corresponding actual sales to arrive the normalized sales. In mathematical terms, the weather normalization can be written as follows:

$$NormalizedSales = ActualSales - [PredictedSales_{ActualWeather} - PredictedSales_{NormalWeather}]$$

[1] The same equation obtained in the first step was used.

I.3 Modeling

The econometric forecasting method used in this study assumes that the relationship between the dependent and independent variables is linear (additive) and defined as follows[2]:

$$y = r + \alpha X + \beta Y + \gamma Z$$

where X, Y and Z are the variables, α, β and γ are the coefficients and r is the constant.

The forecasts were prepared using MetrixND software, version 4.7, developed by Itron, Inc. The forecasts typically involve finding a mathematical relationship between the dependent and independent variables. The steps taken in this forecast were as follows: The historical numbers since 2000 and the forecast numbers for economic variables until 2048 were obtained. These values were then exported into MetrixND and the analysis was carried out.

The primary criterion in selecting the variables was the relevance to the dependent variable being forecasted. Other considerations were the sign (the direction of change) and impact (the magnitude of elasticity coefficients) of variables on the forecasted dependent variable. Some of the statistical parameters important to the econometric model are:

Adjusted R-Square: It indicates the fraction of total variation explained by the independent variables in the regression. Its value ranges between 0 and 1, 1 being a perfect fit.

$$R^2 = \frac{ExplainedVariation}{TotalVariation}$$

Adjusted R^2 takes into account the number of variables (k) with a constant sample size (n) as this leads to a decrease in the degree of freedom (n-k). Thus, adjusted R^2 is more conservative.

$$\text{Adjusted } R^2 = 1 - (1 - R^2)\left(\frac{n-1}{n-k}\right)$$

F-Statistics (Probability): This is an alternative measure of goodness of the fit. F-statistics number indicates the probability that the estimated regression fit is purely accidental. This number is preferred to be as low as possible as compared to a critical number of 5%.

[2] Appendix 1

Mean Absolute Percentage Error (MAPE): MAPE defines the magnitude of errors in the model. It is the average of absolute values of the residual error percentages measured at each data point. The lower the MAPE number the better the model is considered to be.

Durbin-Watson Statistic: It tests the hypothesis that the errors from a model do not exhibit first order autocorrelation. In the absence of autocorrelation, the statistic has a value of 2. While it varies between 0 and 4, a value above 2 indicates negative autocorrelation, while a value below 2 indicates positive autocorrelation.

Test parameters for statistical significance

The t-statistics and P-values show the statistical significance of independent variables in 95% confidence interval (or 5% significance level). Most of the explanatory variables presented in this document are within the 95% confidence interval based on the t-statistics and P-values[3].

To evaluate the reasonableness of the model, the residual patterns and model fit statistics were studied. The residuals indicate the difference between the predicted and actual values. Any pattern associated with residuals suggests a missing variable(s). The residuals were studied through the autocorrelation factor and partial autocorrelation diagrams.

[3] Appendix 3

II. 2021-2030 FORECASTS

II.1 Customer forecasts

II.1a Methodology

The customer forecasts in general were straight-forward and involved fewer variables. Customers were modeled by state and by class. A sampling of variables included in the state of Iowa customer models is listed below. Information about other states' models is available upon request.

- Residential: weighted variable consisting of number of households and members per household, monthly binary variables, binary variable for August 2014, binary variable for December 2016 and ARMA (Autoregressive-Moving Average) errors
  Commercial: Real per capita personal income multiplied by a time trend, total number of households, monthly binary variables, binary variables for August 2014, December 2014, March 2015, April 2015 and March 2016 and ARMA errors
  Industrials: Non-farm employment, monthly binary variables, binary variables for August 2014, December 2014 and March 2016 and ARMA errors
  Public authority: State and local government employment, monthly binary variables, binary variable for August 2014 and ARMA errors.

II.1b Customer forecast results

The monthly customer numbers were forecasted at an aggregate level for each revenue class. The system and jurisdiction level of forecasts were determined through an allocation. The annual historical data and 10-year forecast values are summarized in Table 3[4].

Table 3: Summary of the historical and forecast average annual customer numbers in different classes

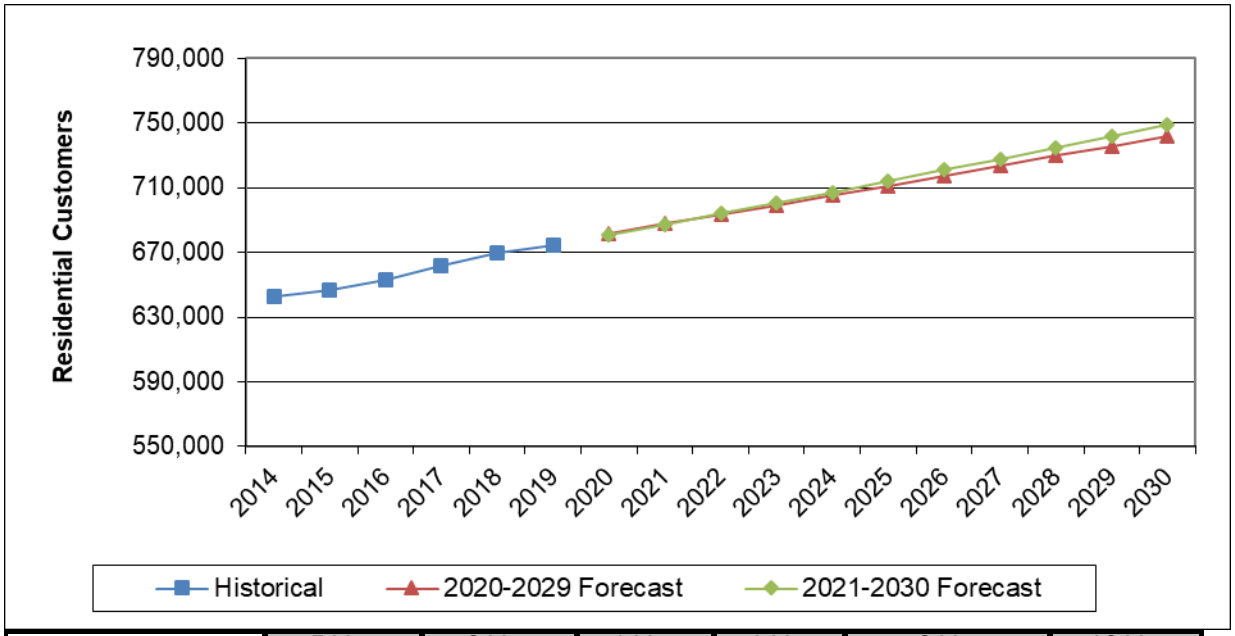
	Residential	Commercial	Industrial	Public Authority	Street Lighting	Total
2014	642,668	86,875	1,668	13,777	488	745,476
2015	646,431	89,967	1,748	13,692	486	752,324
2016	653,194	90,875	1,797	13,725	486	760,077
2017	661,688	92,055	1,816	13,889	484	769,932
2018	669,499	93,730	1,813	13,895	487	779,425
2019	674,579	95,447	1,773	13,940	487	786,226
2020	681,004	96,465	1,776	13,976	487	793,707
2021	687,407	97,107	1,786	13,928	487	800,716
2022	693,956	97,751	1,796	13,916	487	807,906
2023	700,449	98,396	1,803	13,910	487	815,044
2024	707,185	99,041	1,809	13,906	487	822,428
2025	713,859	99,687	1,815	13,906	487	829,754
2026	720,785	100,334	1,821	13,907	487	837,333
2027	727,736	100,982	1,825	13,906	487	844,936
2028	734,824	101,662	1,829	13,905	487	852,707
2029	741,746	102,350	1,832	13,903	487	860,319
2030	748,693	103,040	1,836	13,904	487	867,960

[4] Annual values were calculated as the average of 12-months in a given year.

Residential customer forecasts

Figure 2 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast customer numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 2 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast average residential customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.97%	1.08%	0.76%			
2021-2030 Forecast				0.95%	0.95%	0.95%
2020-2029 Forecast				1.09%	0.93%	0.87%

The aggregate customer numbers shown in Fig. 2 have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 4. See Appendix 3 for the data tables.

Table 4: Growth rates of the residential customers

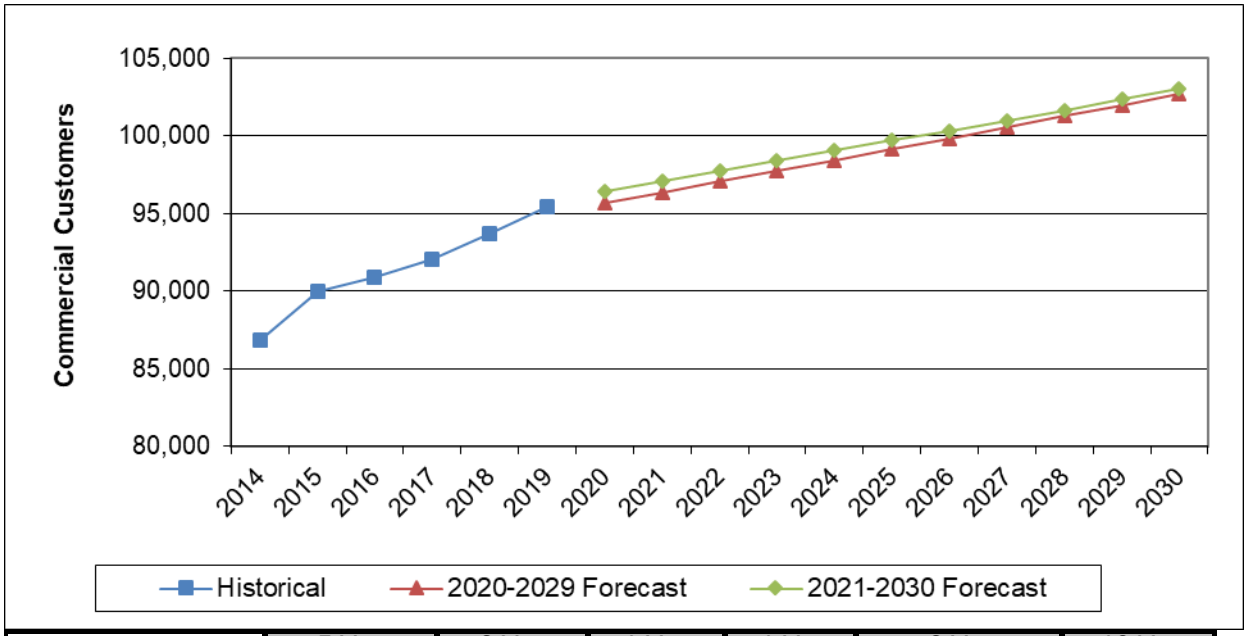
Area	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	1.16%	1.24%	0.86%	1.04%	1.04%	1.04%
IL	-0.52%	-0.19%	-0.08%	0.22%	0.18%	0.17%
SD	2.10%	1.70%	1.03%	1.15%	1.36%	1.44%
MEC	0.97%	1.08%	0.76%	0.95%	0.95%	0.95%

The biggest growth expected in South Dakota, and the smallest growth predicted in Illinois.

Commercial customer forecasts

Figure 3 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast customer numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 3 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast average commercial customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	1.90%	1.65%	1.83%			
2021-2030 Forecast				1.07%	0.80%	0.70%
2020-2029 Forecast				0.26%	0.56%	0.67%

The aggregate customer numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 5. See Appendix 4 for the data tables.

Table 5: Growth rates of the commercial customers

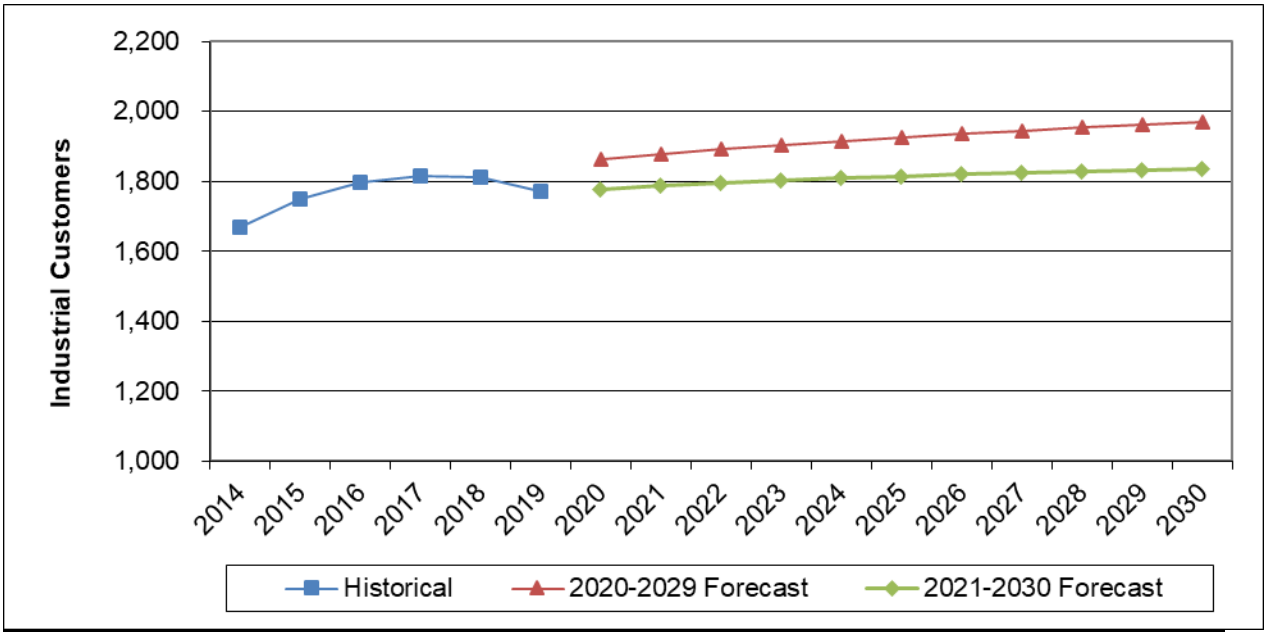
Area	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	1.59%	1.59%	1.86%	1.11%	0.84%	0.73%
IL	4.77%	2.10%	1.56%	0.66%	0.46%	0.39%
SD	2.26%	2.43%	2.32%	0.96%	0.99%	1.14%
MEC	1.90%	1.65%	1.83%	1.07%	0.80%	0.70%

The highest growth expected in South Dakota and the lowest growth predicted in Illinois.

Industrial customer forecasts

Figure 4 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 4 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast average industrial customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	1.22%	-0.46%	-2.23%			
2021-2030 Forecast				0.19%	0.43%	0.33%
2020-2029 Forecast				5.14%	2.20%	1.02%

The aggregate customer numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 6. See Appendix 5 for the data tables.

Table 6: Growth rates of the industrial customers

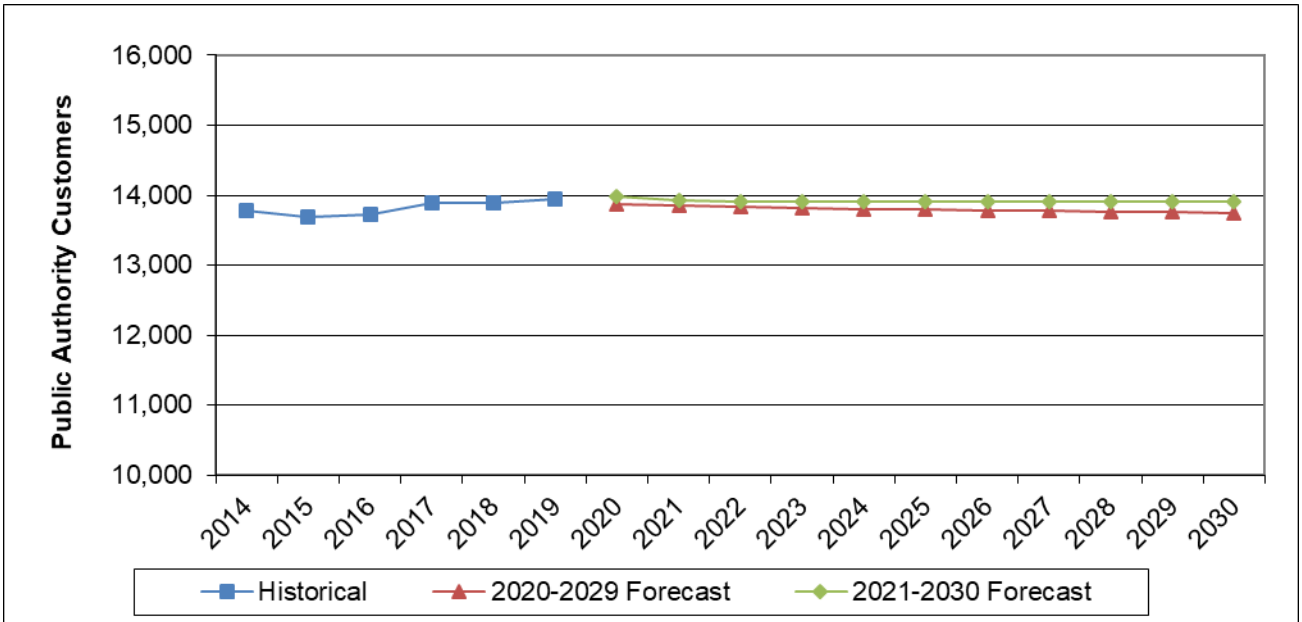
Area	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	2.01%	-0.34%	-2.42%	0.11%	0.39%	0.31%
IL	-16.44%	-6.01%	5.22%	4.10%	2.40%	1.35%
SD	0.61%	1.42%	-0.75%	-0.02%	0.03%	0.11%
MEC	1.22%	-0.46%	-2.23%	0.19%	0.43%	0.33%

The highest growth is expected in Illinois while South Dakota is growing the least.

Public authority customer forecasts

Figure 5 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast customer numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 5 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast average public authority customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.24%	0.52%	0.32%			
2021-2030 Forecast				0.26%	-0.06%	-0.03%
2020-2029 Forecast				-0.52%	-0.25%	-0.13%

The aggregate customer numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 7. See Appendix 6 for the data tables.

Table 7: Growth rates of the public authority customers

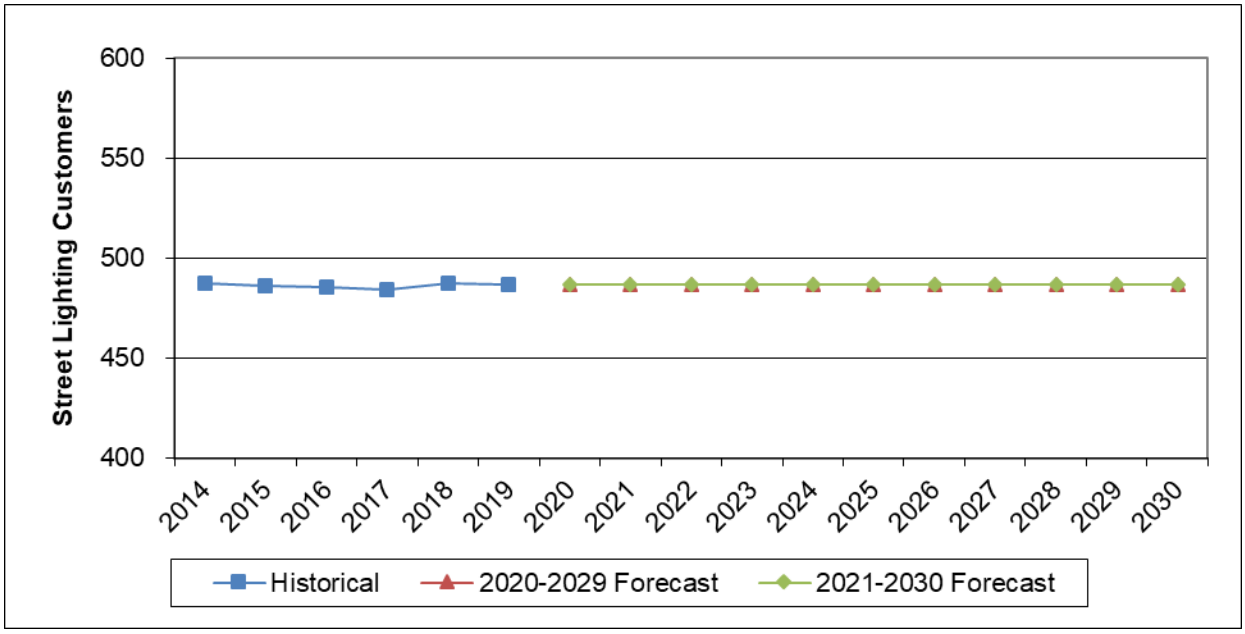
Area	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	0.21%	0.23%	0.25%	0.45%	-0.04%	-0.03%
IL	0.44%	3.36%	0.85%	-1.46%	-0.24%	-0.03%
SD	0.20%	-0.82%	1.02%	0.46%	0.36%	0.25%
MEC	0.24%	0.52%	0.32%	0.26%	-0.06%	-0.03%

The highest growth is expected in South Dakota while the lowest growth is predicted in Iowa.

Street lighting customer forecasts

As in the 2020-2029 forecasts, the present study assumed no change in the customer numbers of this class. Based on this assumption, Figure 5 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast customer numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates. The plots of customers in different regions are shown in Appendix 14.

Fig. 6 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast average street lighting customers



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-0.03%	0.10%	-0.03%			
2021-2030 Forecast				0.00%	0.00%	0.00%
2020-2029 Forecast				0.00%	0.00%	0.00%

The aggregate customer numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 8. See Appendix 7 for the data tables.

Table 8: Growth rates of the street lighting customers

Area	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	-0.04%	-0.04%	-0.04%	0.00%	0.00%	0.00%
IL	0.08%	1.56%	0.00%	0.00%	0.00%	0.00%
SD	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MEC	-0.03%	0.10%	-0.03%	0.00%	0.00%	0.00%

II.2 Sales forecasts

II.2a Methodology

The energy forecasts are more complicated and involve more variables than do the customer forecasts. For residential and commercial, sales are determined by multiplying customers by use per customer. For industrial and public authority, sales are modeled directly. For street lighting, sales are forecast using trending. There is a sampling of variables used in the industrial sales models below:

> Industrial: Weighted variable consisting of real gross state product and total industrial production index, cooling degree days (current month), billing days, trend interacted with heating degree day variable, binary for August 2014, monthly binaries and ARMA errors

Better statistics were obtained for the customer models than sales models. The reason is that there is more uncertainty in the sales forecasts due to the presence of multiple drivers and their possible interactions. For example, a relatively small change in the historical usage pattern of a large industrial customer could have big impact on the total energy usage in this class. Similarly, the changes in billing cycle could have significant effect on the billed sales.

II.2b Sales forecast results

The monthly billed sales numbers were forecasted at an aggregate level for each revenue class. The annual historical data and 10-year forecast values are summarized in Table 10[5].

Table 10: Summary of the historical and forecast annual billed sales of different revenue classes (MWh)

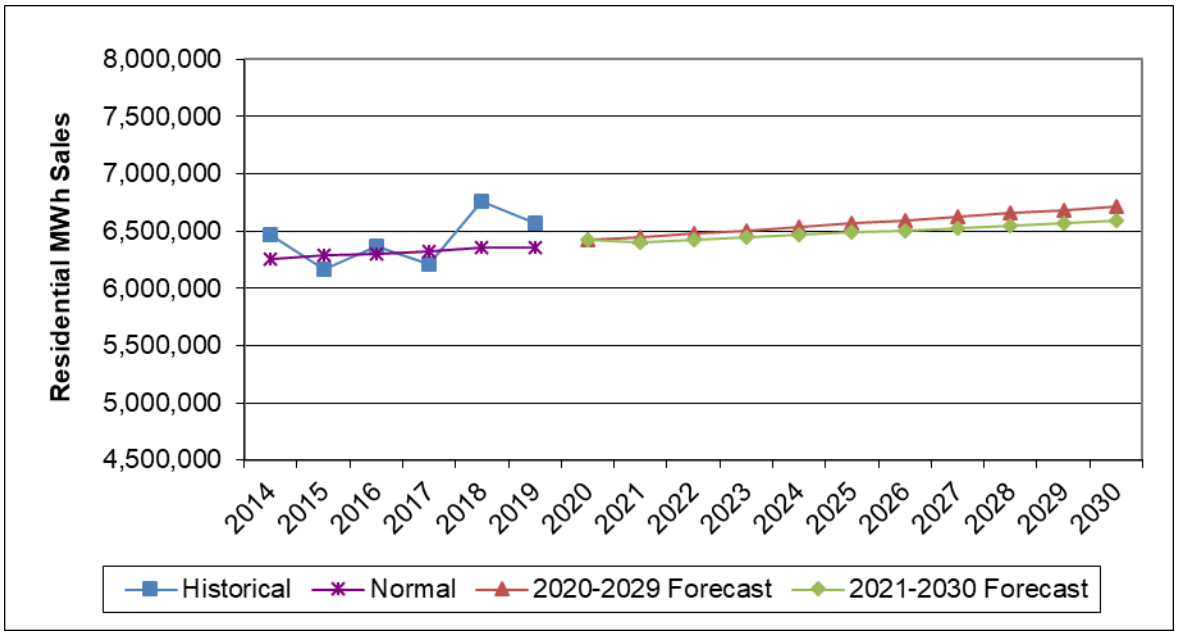
	Residential	Commercial	Industrial	Public Authority	Street Lighting	Total
2014	6,464,413	4,120,005	11,050,000	1,502,434	97,512	23,234,364
2015	6,168,951	3,798,561	11,537,818	1,464,324	95,491	23,065,144
2016	6,370,934	3,796,125	12,152,000	1,479,072	89,651	23,887,782
2017	6,204,202	3,747,855	12,976,947	1,465,110	80,811	24,474,925
2018	6,758,096	3,911,621	13,651,000	1,515,541	66,802	25,903,060
2019	6,570,252	3,898,476	14,126,000	1,495,132	54,332	26,144,192
2020	6,418,698	3,822,839	15,060,092	1,468,347	55,084	26,825,060
2021	6,404,860	3,872,608	16,107,379	1,464,189	54,443	27,903,479
2022	6,425,336	3,890,755	17,272,178	1,463,585	53,339	29,105,194
2023	6,444,179	3,908,819	18,576,303	1,463,646	52,262	30,445,209
2024	6,465,172	3,926,830	18,873,558	1,463,848	51,213	30,780,622
2025	6,484,798	3,944,823	19,177,842	1,463,923	50,190	31,121,577
2026	6,506,349	3,962,796	19,489,303	1,464,161	50,236	31,472,844
2027	6,527,504	3,980,720	19,807,537	1,464,480	50,281	31,830,520
2028	6,549,383	3,999,800	20,131,858	1,464,459	50,326	32,195,826
2029	6,569,249	4,019,084	20,463,225	1,464,284	50,371	32,566,214
2030	6,588,715	4,038,390	20,801,574	1,464,106	50,417	32,943,202

[5] Annual values were calculated as the sum of 12-months in a given year.

Residential sales forecasts

Figure 7 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast sales numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 7 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast annual residential billed sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	0.33%	1.03%	-2.78%			
2021-2030 Forecast	0.29%	0.29%	-0.11%	1.05%	0.38%	0.34%
2020-2029 Forecast				1.05%	0.65%	0.51%

The aggregate sales numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates sales numbers in these jurisdictions are summarized in Table 12. See Appendix 8 for the data tables.

Table 12: Growth rates of the residential sales

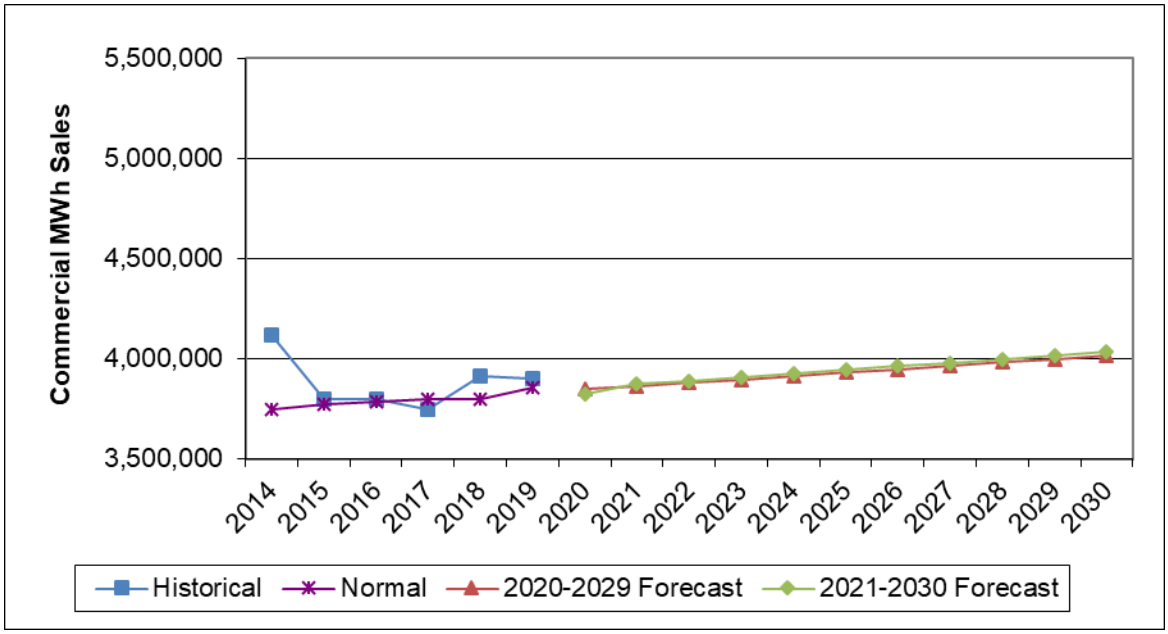
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	0.45%	0.43%	0.01%	1.11%	0.46%	0.41%
IL	-1.14%	-1.06%	-0.90%	-0.10%	-0.50%	-0.46%
SD	1.06%	1.73%	-3.34%	8.06%	2.67%	1.48%
MEC_Total	0.29%	0.29%	-0.11%	1.05%	0.38%	0.34%

The highest growth is expected in South Dakota while the lowest growth is predicted in Illinois.

Commercial sales forecasts

Figure 8 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast sales numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 8 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast annual commercial billed sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-1.10%	0.89%	-0.34%			
2021-2030 Forecast	0.58%	0.60%	1.55%	-0.86%	0.30%	0.42%
2020-2029 Forecast				-0.21%	0.22%	0.37%

The aggregate sales numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of sales numbers in these jurisdictions are summarized in Table 13. See Appendix 9 for the data tables.

Table 13: Growth rates of the commercial sales

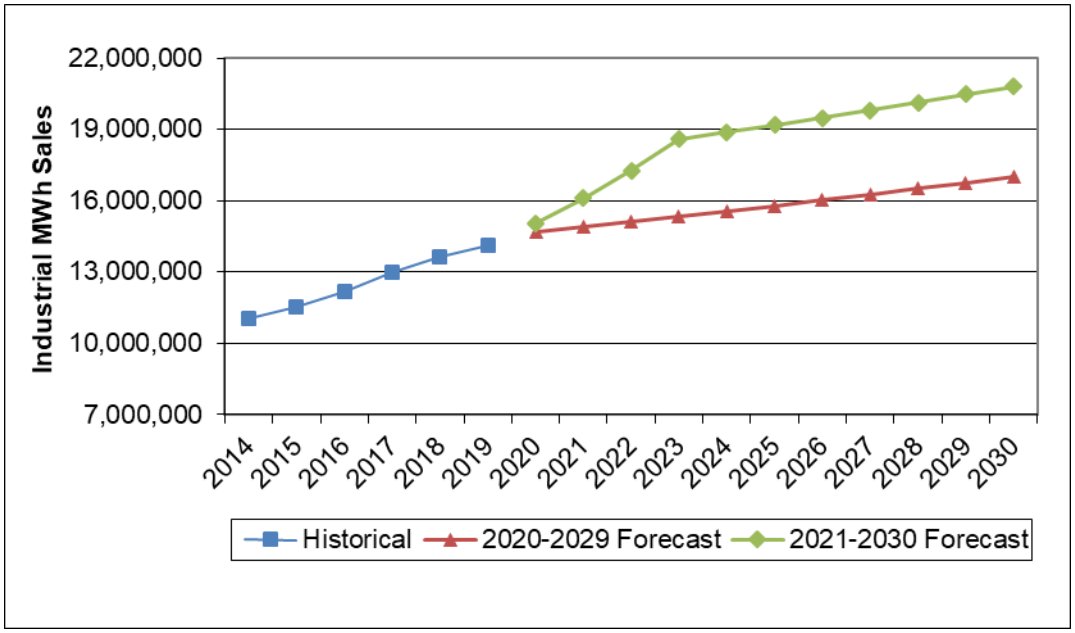
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	0.23%	0.73%	2.00%	-2.40%	-0.15%	0.31%
IL	2.79%	-0.82%	-2.07%	11.32%	3.78%	1.20%
SD	6.75%	7.09%	6.81%	-8.93%	-2.73%	-0.12%
MEC_Total	0.58%	0.60%	1.55%	-0.86%	0.30%	0.42%

The highest growth area in this class is Illinois, while the lowest growth area is South Dakota.

Industrial sales forecasts

Figure 9 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast sales numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 9 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast annual industrial billed sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	5.03%	5.15%	3.48%			
2021-2030 Forecast				6.61%	6.93%	3.78%
2020-2029 Forecast				4.08%	2.31%	1.71%

The aggregate sales numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of sales numbers in these jurisdictions are summarized in Table 12. See Appendix 10 for the data tables.

Table 14: Growth rates of the industrial sales

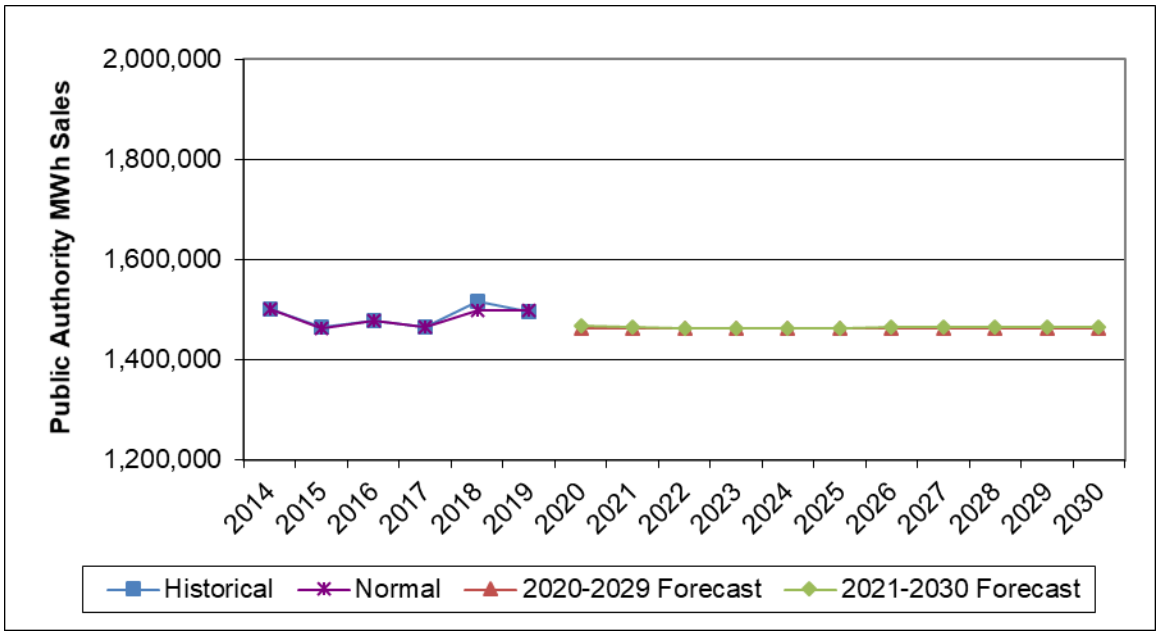
	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	5.48%	5.50%	3.72%	6.82%	7.22%	3.92%
IL	-1.88%	-0.79%	-1.02%	3.44%	1.48%	0.70%
SD	0.73%	1.09%	1.06%	0.67%	1.29%	1.36%
MEC_Total	5.03%	5.15%	3.48%	6.61%	6.93%	3.78%

The biggest growth area is Iowa while the smallest growth area is Illinois.

Public authority sales forecasts

Figure 10 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast sales numbers. Note that these are aggregate numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 10 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast annual public authority billed sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-0.10%	0.36%	-1.35%			
2021-2030 Forecast	-0.04%	0.45%	0.07%	-2.04%	-0.79%	-0.23%
2020-2029 Forecast				-2.33%	-0.78%	-0.24%

The aggregate sales numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of sales numbers in these jurisdictions are summarized in Table 15. See Appendix 11 for the data tables.

Table 15: Growth rates of the public authority sales

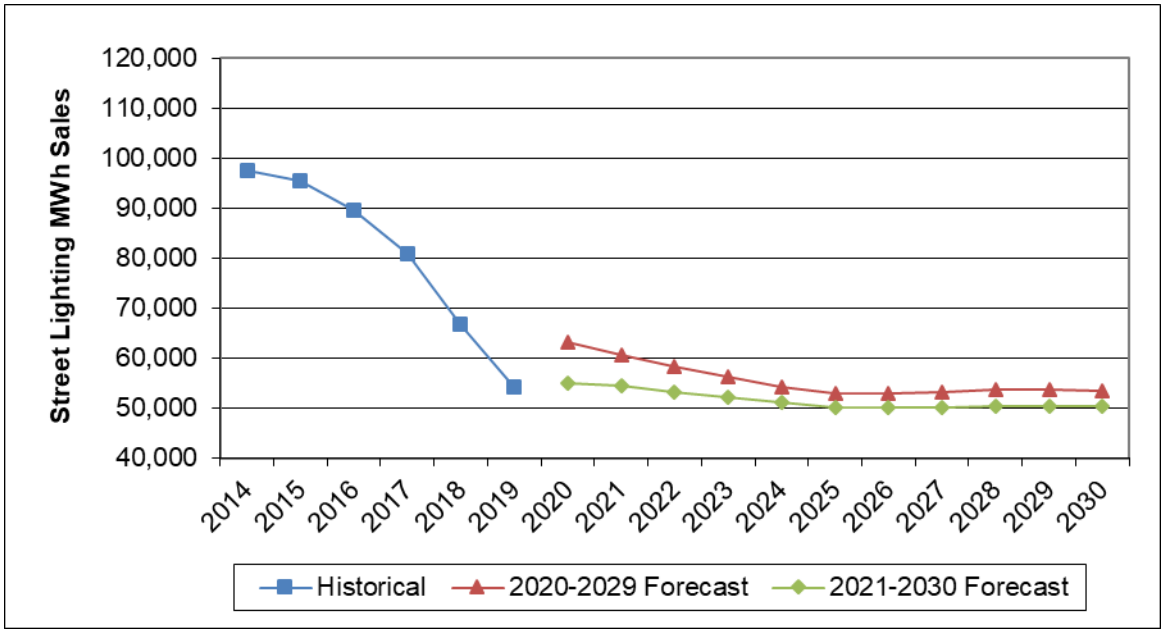
IA	0.09%	0.56%	0.14%	-3.11%	-1.16%	-0.34%
IL	-1.18%	-0.50%	-0.46%	6.47%	2.01%	0.56%
SD	2.83%	3.25%	-0.79%	-2.82%	0.01%	0.51%
MEC_Total	-0.04%	0.45%	0.07%	-2.04%	-0.79%	-0.23%

The highest growth area is Illinois while the smallest growth area is Iowa.

Street lighting sales forecasts

In this class, trending based on historical data was used. Sales will decline throughout the forecast period due to the implementation of an LED replacement program currently underway in the state of Iowa. Figure 11 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast sales numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 11 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast annual street lighting billed sales



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-11.04%	-15.37%	-18.67%			
2021-2030 Forecast				1.38%	-0.61%	-0.75%
2020-2029 Forecast				16.22%	2.46%	-0.13%

The aggregate customer numbers have been forecast for the Iowa, Illinois and South Dakota jurisdictions. The growth rates of customer numbers in these jurisdictions are summarized in Table 16. See Appendix 12 for the data tables.

Table 16: Growth rates of the street lighting sales

	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
IA	-10.99%	-15.86%	-15.00%	-3.65%	-2.89%	-1.59%
IL	-11.77%	-12.19%	-37.80%	36.54%	12.84%	3.73%
SD	-2.14%	-3.73%	-9.97%	3.92%	3.12%	0.96%
MEC_Total	-11.04%	-15.37%	-18.67%	1.38%	-0.61%	-0.75%

II.3 Usage per customer (UPC) forecasts

For the residential, commercial and public authority classes, kWh per customer values was forecast using econometric models. For the industrial and street lighting classes, the kWh per customer forecast values were calculated using the forecast sales and customer numbers data.

II.3a State of Iowa UPC forecast model variables:

Residential model – Weighted variable consisting of real per capita personal income and non-farm employment, heating degree days (current and lagged), cooling degree days (current month), hours of light, monthly billing days, monthly binaries, binary for August 2014 and ARMA errors

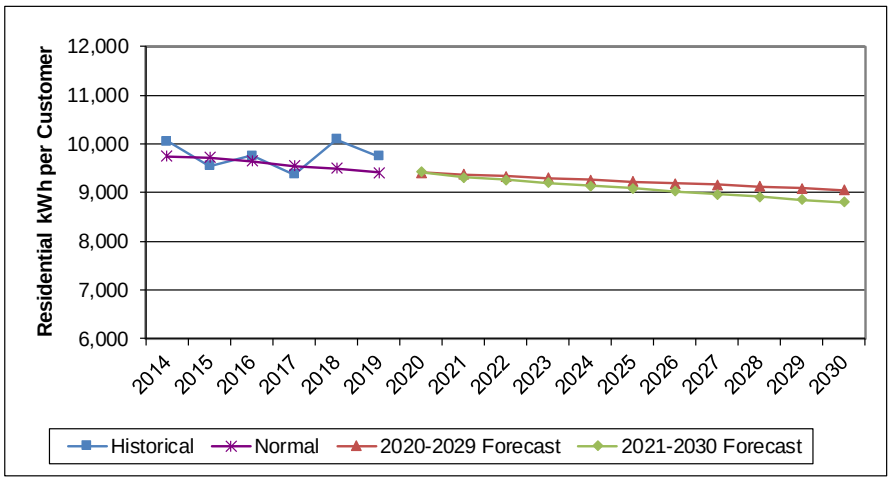
Commercial model – Weighted economic variable made up of members per household and the total industrial production index, monthly billing days, heating degree days (current and lagged), cooling degree days (current month), monthly binaries, binary variable for August 2014, and ARMA errors

Public Authority model – Weighted variable consisting of members per household and state and local government employment, heating degree days (current and lagged), cooling degree days (current month), monthly billing days, hours of light, binary for winter storm in December 2012, monthly binaries, binary variable for August 2014 and ARMA errors

Residential forecast

Figure 12 shows the comparison of historical, normalized, 2020-2029 forecast and 2021-2030 forecast kWh per customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 12 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast residential kWh per customer

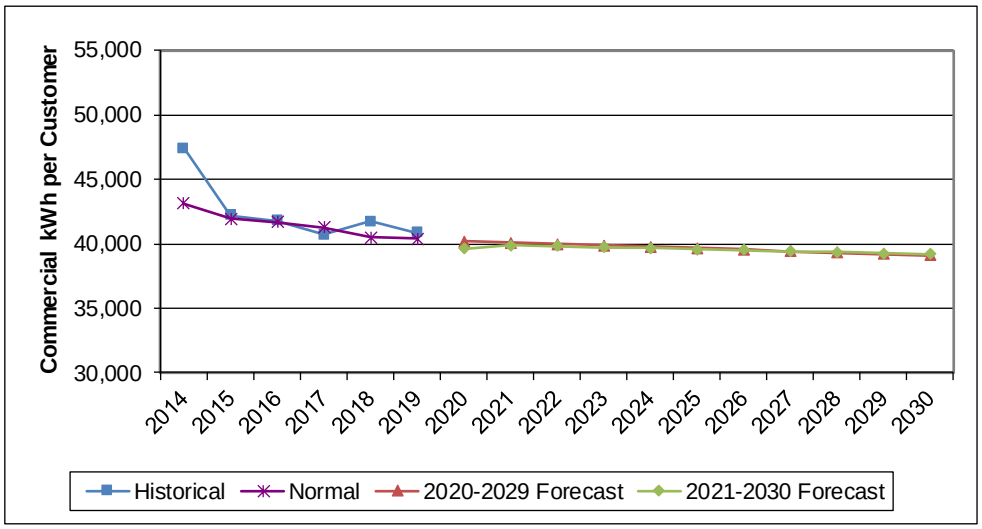


	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-0.64%	-0.05%	-3.51%			
2021-2030 Forecast	-0.68%	-0.78%	-0.86%	0.10%	-0.56%	-0.61%
2020-2029 Forecast				-0.04%	-0.28%	-0.36%

Commercial forecast

Figure 13 shows the comparison of historical, normalized, 2020-2029 forecast and 2021-2030 forecast kWh per customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 13 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast commercial kWh per customer

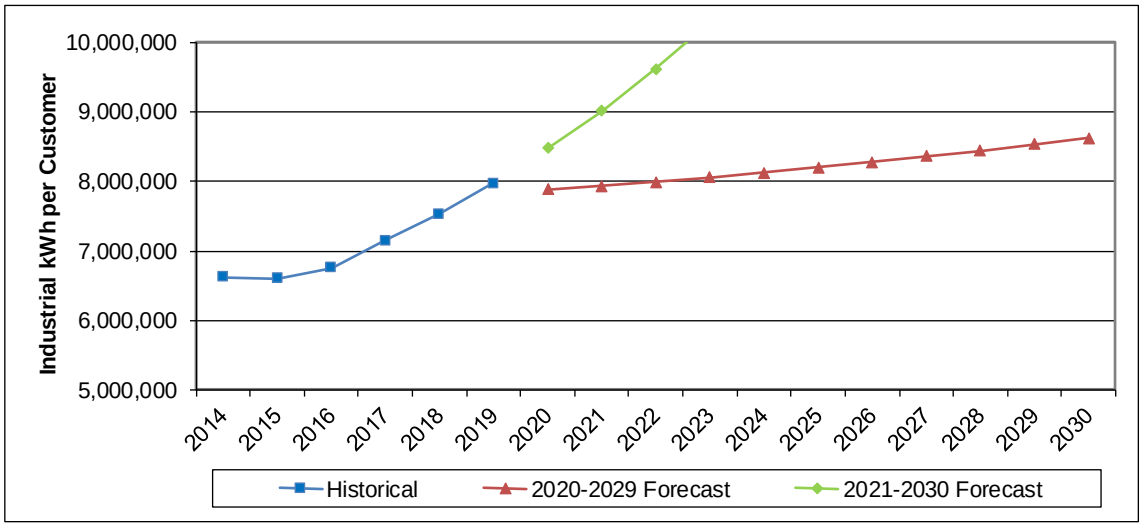


	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-2.94%	-0.75%	-2.13%			
2021-2030 Forecast	-1.30%	-1.03%	-0.27%	-1.91%	-0.49%	-0.28%
2020-2029 Forecast				-0.46%	-0.34%	-0.30%

Industrial forecast

Figure 14 shows the comparison of historical, 2020-2029 forecast and 2021-2030 forecast kWh per customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 14 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast industrial kWh per customer

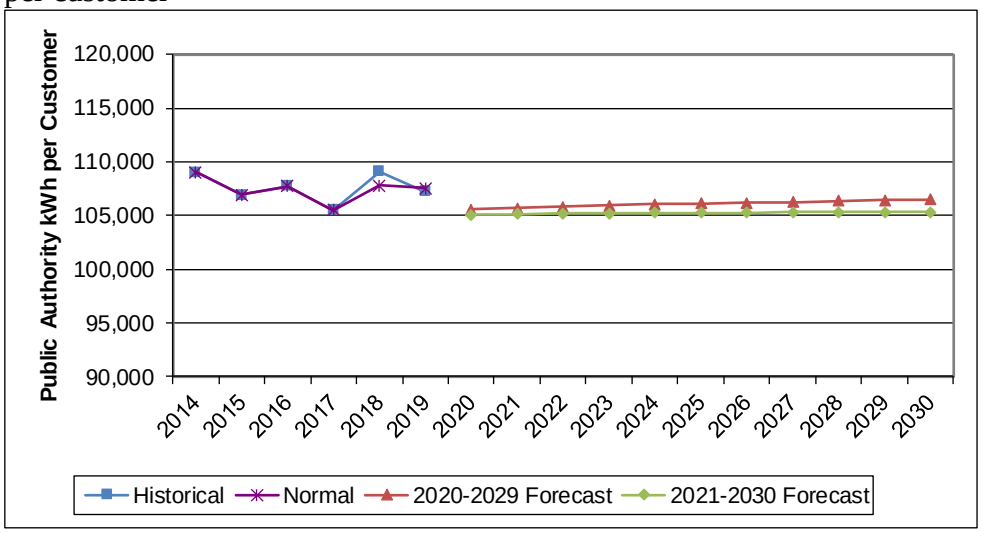


	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	3.77%	5.64%	5.84%			
2021-2030 Forecast				6.41%	6.47%	3.43%
2020-2029 Forecast				-1.00%	0.11%	0.69%

Public authority forecast

Figure 15 shows the comparison of historical, normalized, 2020-2029 forecast and 2021-2030 forecast kWh per customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Fig. 15 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast public authority kWh per customer

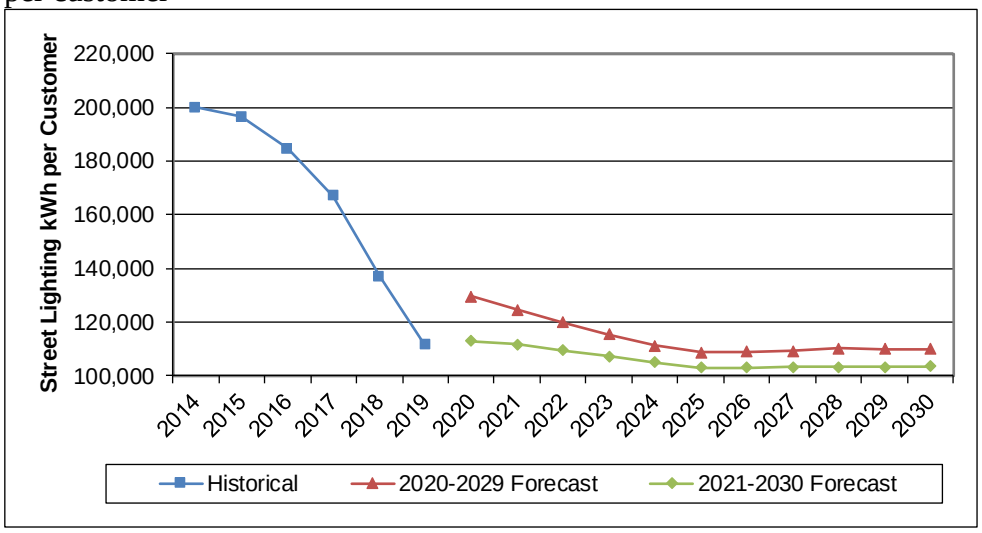


	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-0.33%	-0.16%	-1.66%			
2021-2030 Forecast	-0.27%	-0.07%	-0.25%	-2.30%	-0.74%	-0.21%
2020-2029 Forecast				-1.82%	-0.53%	-0.10%

Street lighting forecast

Figure 16 shows the comparison of historical, normalized, 2020-2029 forecast and 2021-2030 forecast kWh per customer numbers. The table associated with this figure compares the -5 year, -3 year, -1 year, +1 year, +3 year and +10 year growth rates.

Figure 16 Comparison of historical, 2020-2029 forecast and 2021-2030 forecast street lighting kWh per customer



	-5 Year	-3 Year	-1 Year	+1 Year	+3 Year	+10 Year
Historical	-11.01%	-15.46%	-18.64%			
2021-2030 Forecast				1.38%	-0.61%	-0.75%
2020-2029 Forecast				16.22%	2.46%	-0.13%

APPENDIX
Appendix 1: Additive regression model (linear)

If the relationship between the dependent and independent variables is truly linear[6], the multiple regression equation has the form of:

$$y = r + \alpha X + \beta Y + \gamma Z$$

where X, Y and Z are the variables, α, β and γ are the coefficients and r is the constant.

$$Elasticity = Slope\frac{X}{y} = \alpha\frac{X}{y} = \frac{dy}{dX}\frac{X}{y} = \frac{\%\,Change\text{in } y}{\%\,Change\text{in } X}$$

$$Slope = \alpha = \frac{dy}{dX}$$

In this model, the coefficients α, β and γ, are the slopes, not the elasticity values. The slope only shows the change in demand in response to "one-unit" change in a given independent variable, assuming that all others independent variables are held constant. Thus, the elasticity (the ratio of % change in the dependent variable to % change in the independent variable) in this model is calculated as the slope coefficient multiplied by the ratio of independent variable to dependent variable.

[6] Occasionally, it may be necessary to transform the actual data to arrive a linear relationship, as in the case of logarithmic transformation.

Appendix 2: Statistical significance tests

In multiple regressions, the initial assumption (Null Hypothesis) is that the independent variables have zero coefficients. The goal is to prove that this is not the case (Alternative Hypothesis).

Null Hypothesis	H_0: coefficient for a variable = 0
Alternative Hypothesis	H_1: coefficient for a variable $\neq 0$

$$t = \frac{Coefficient - HypothesizedValue}{S\tan dardError} = \frac{\beta - 0}{S\tan dardError}$$

If calculated t value satisfies one of these two conditions,

$$t > t_{Critical} \qquad \text{or}$$

$$t < -t_{Critical}$$

the variable is said to be statistically significant. $t_{critical}$ has a value around ±2 depending of the number of sample used in the analysis.

The P-value (probability) also leads to a similar conclusion regarding the statistical significance of independent variables. Typically, P-values are reported at 5% significance level, i.e., 95% confidence interval. In this case, the P-values are required to be less than 5%. The smaller the P-value, the more confident one becomes about the significance of that variable. The relationships between t, $t_{critical}$ and P-value are shown in figure below.

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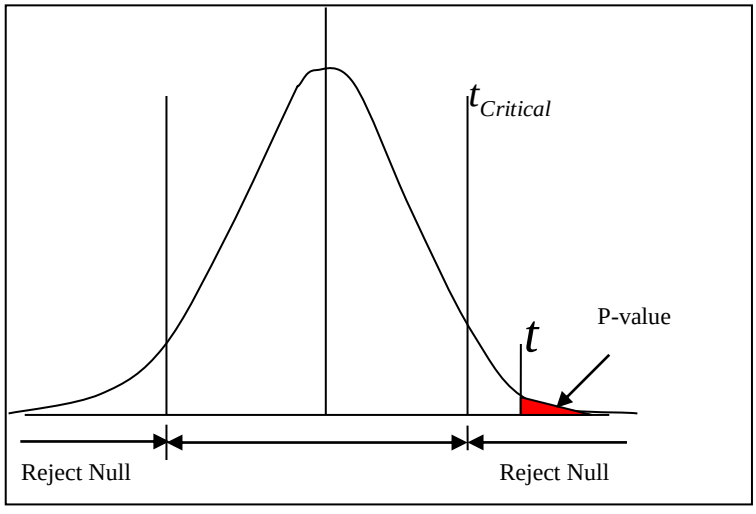

Appendix 3: Tables of residential customers

Figure A3.1 Table of average customers in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	563,119			75,812			3,737		
2015	568,142			74,455			3,834		
2016	574,953			74,298			3,942		
2017	583,485			74,159			4,044		
2018	591,461			73,933			4,104		
2019	596,559			73,873			4,147		
2020		603,655	602,775		73,976	74,035		4,284	4,194
2021		609,355	608,997		73,975	74,155		4,389	4,255
2022		615,055	615,364		73,971	74,275		4,497	4,317
2023		620,755	621,673		73,964	74,395		4,610	4,381
2024		626,455	628,223		73,958	74,515		4,731	4,447
2025		632,317	634,711		73,948	74,635		4,861	4,514
2026		638,317	641,448		73,936	74,755		4,996	4,582
2027		644,317	648,211		73,930	74,875		5,123	4,650
2028		650,317	655,111		73,925	74,995		5,247	4,719
2029		656,317	661,848		73,913	75,115		5,366	4,783
2030		662,372	668,611		73,900	75,235		5,486	4,847

Appendix 4: Tables of commercial customers

Figure A4.1 Table of average customers in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	78,379			7,765			731		
2015	80,221			8,998			748		
2016	80,905			9,209			760		
2017	81,894			9,401			760		
2018	83,279			9,653			799		
2019	84,827			9,803			817		
2020		84,850	85,772		10,021	9,867		821	825
2021		85,444	86,370		10,095	9,903		828	833
2022		86,042	86,970		10,169	9,939		838	842
2023		86,644	87,570		10,244	9,975		850	850
2024		87,250	88,170		10,320	10,011		864	859
2025		87,861	88,770		10,396	10,047		879	869
2026		88,476	89,370		10,472	10,083		895	880
2027		89,096	89,970		10,550	10,119		909	892
2028		89,719	90,603		10,628	10,155		923	904
2029		90,347	91,243		10,708	10,191		935	915
2030		90,980	91,887		10,788	10,227		948	926

Appendix 5: Tables of industrial customers

Figure A5.1 Table of average customers in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	1,548			99			22		
2015	1,671			56			22		
2016	1,728			49			21		
2017	1,755			39			22		
2018	1,752			38			22		
2019	1,710			40			22		
2020		1,802	1,712		39	42		23	22
2021		1,816	1,722		40	43		23	22
2022		1,829	1,730		40	43		23	22
2023		1,841	1,737		40	44		23	22
2024		1,851	1,743		41	44		23	22
2025		1,861	1,748		41	45		23	22
2026		1,870	1,753		41	45		23	22
2027		1,879	1,757		42	46		23	22
2028		1,888	1,761		42	46		24	22
2029		1,895	1,764		42	46		24	22
2030		1,903	1,767		42	46		24	22

Appendix 6: Tables of public authority customers

Figure A6.1 Table of average customers in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	12,254			1,392			131		
2015	12,256			1,302			134		
2016	12,301			1,288			136		
2017	12,384			1,371			133		
2018	12,354			1,410			131		
2019	12,385			1,422			133		
2020		12,308	12,441		1,425	1,402		134	133
2021		12,291	12,387		1,425	1,407		135	134
2022		12,274	12,370		1,425	1,412		135	134
2023		12,258	12,363		1,426	1,413		135	134
2024		12,243	12,359		1,426	1,413		136	135
2025		12,232	12,356		1,426	1,415		136	135
2026		12,223	12,355		1,426	1,417		136	135
2027		12,214	12,353		1,426	1,418		137	135
2028		12,202	12,351		1,426	1,419		137	136
2029		12,191	12,349		1,426	1,419		138	136
2030		12,179	12,346		1,426	1,422		138	136

Appendix 7: Tables of street lighting customers

Figure A7.1 Table of average customers in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	440			44			4		
2015	440			42			4		
2016	440			42			4		
2017	437			43			4		
2018	439			44			4		
2019	439			44			4		
2020		439	439		44	44		4	4
2021		439	439		44	44		4	4
2022		439	439		44	44		4	4
2023		439	439		44	44		4	4
2024		439	439		44	44		4	4
2025		439	439		44	44		4	4
2026		439	439		44	44		4	4
2027		439	439		44	44		4	4
2028		439	439		44	44		4	4
2029		439	439		44	44		4	4
2030		439	439		44	44		4	4

Appendix 8: Tables of residential sales

Figure A8.1 Table of annual billed MWh sales in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	5,555,266			655,434			49,300		
2015	5,594,431			639,637			50,932		
2016	5,608,701			638,937			49,362		
2017	5,647,193			617,812			54,996		
2018	5,680,776			624,464			53,760		
2019	5,681,174			618,862			51,965		
2020		5,750,021	5,744,269		611,342	618,273		57,392	56,155
2021		5,781,106	5,736,803		607,228	612,350		58,812	55,708
2022		5,811,851	5,759,433		603,630	609,661		60,277	56,243
2023		5,842,257	5,780,413		600,381	606,982		61,812	56,784
2024		5,872,327	5,803,514		597,099	604,313		63,452	57,346
2025		5,903,537	5,825,224		594,174	601,655		65,203	57,920
2026		5,935,725	5,848,841		591,425	599,006		67,030	58,501
2027		5,967,561	5,872,055		588,178	596,368		68,766	59,080
2028		5,999,047	5,895,996		584,729	593,740		70,446	59,647
2029		6,030,186	5,917,963		581,943	591,122		72,055	60,165
2030		6,061,487	5,939,541		579,170	588,514		73,700	60,660

Appendix 9: Tables of commercial sales

Figure A9.1 Table of annual billed MWh sales in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	3,318,759			395,923			32,318		
2015	3,278,098			458,556			34,346		
2016	3,284,739			465,786			36,475		
2017	3,285,480			471,828			39,693		
2018	3,291,019			464,039			41,942		
2019	3,356,793			454,411			44,796		
2020		3,336,903	3,276,192		469,471	505,852		41,626	40,795
2021		3,350,716	3,324,387		471,947	507,332		41,884	40,890
2022		3,364,417	3,341,623		474,401	507,903		42,346	41,230
2023		3,377,951	3,358,789		476,909	508,468		42,993	41,562
2024		3,391,461	3,375,884		479,416	509,027		43,737	41,919
2025		3,404,942	3,392,909		481,926	509,581		44,579	42,333
2026		3,418,417	3,409,865		484,455	510,128		45,480	42,804
2027		3,432,048	3,426,750		487,005	510,669		46,277	43,300
2028		3,445,978	3,444,796		489,584	511,205		46,819	43,798
2029		3,460,041	3,463,082		492,194	511,735		47,270	44,268
2030		3,474,162	3,481,399		494,818	512,258		47,725	44,733

Appendix 10: Tables of industrial sales

Figure A10.1 Table of annual billed MWh sales in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2 Fcs
2014	10,243,783			681,658			124,559		
2015	10,771,839			641,935			124,043		
2016	11,392,005			634,925			125,070		
2017	12,207,415			637,991			131,541		
2018	12,896,819			626,337			127,844		
2019	13,376,859			619,944			129,198		
2020		13,917,222	14,288,742		652,705	641,282		133,037	130,
2021		14,120,309	15,333,654		658,301	642,426		133,924	131,
2022		14,327,225	16,490,008		663,949	647,916		134,918	134,
2023		14,538,885	17,791,519		668,795	649,036		136,043	135,
2024		14,754,234	18,085,959		674,129	650,467		137,153	137,
2025		14,974,503	18,386,388		678,694	652,504		138,358	138,
2026		15,198,954	18,692,939		683,259	655,335		139,725	141,
2027		15,427,016	19,005,743		688,498	658,568		141,240	143,
2028		15,659,341	19,324,939		693,869	661,372		142,889	145,
2029		15,896,231	19,650,667		699,218	664,621		144,622	147,
2030		16,136,705	19,983,068		704,609	668,090		146,376	150,

Appendix 11: Tables of public authority sales

Figure A11.1 Table of annual billed MWh sales in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	1,318,367			177,044			6,589		
2015	1,293,398			163,711			6,891		
2016	1,302,724			169,394			6,883		
2017	1,294,025			163,501			7,473		
2018	1,322,712			167,652			7,637		
2019	1,324,550			166,874			7,576		
2020		1,292,188	1,283,314		164,400	177,670		7,412	7,363
2021		1,293,065	1,279,242		163,526	177,454		7,408	7,494
2022		1,293,925	1,278,843		162,656	177,163		7,419	7,579
2023		1,294,778	1,279,515		161,776	176,478		7,446	7,652
2024		1,295,629	1,280,375		160,894	175,739		7,477	7,734
2025		1,296,474	1,280,460		160,010	175,669		7,517	7,794
2026		1,297,304	1,280,605		159,132	175,734		7,564	7,822
2027		1,298,132	1,280,554		158,268	176,088		7,600	7,838
2028		1,299,004	1,280,218		157,411	176,340		7,584	7,901
2029		1,299,889	1,279,857		156,553	176,453		7,558	7,975
2030		1,300,775	1,279,480		155,700	176,568		7,531	8,057

Appendix 12: Tables of street lighting sales

Figure A12.1 Table of annual billed MWh sales in Iowa, Illinois and South Dakota

	Iowa			Illinois			South Dakota		
	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst	Historical	2020-2029 Fcst	2021-2030 Fcst
2014	84,498			12,595			419		
2015	84,943			10,129			419		
2016	79,280			9,949			422		
2017	69,906			10,487			417		
2018	55,555			10,829			418		
2019	47,220			6,735			376		
2020		53,025	45,496		9,704	9,197		415	391
2021		50,562	44,359		9,713	9,671		415	412
2022		48,306	43,250		9,723	9,676		416	413
2023		46,050	42,169		9,733	9,681		416	413
2024		44,003	41,114		9,743	9,686		417	413
2025		42,750	40,087		9,752	9,691		417	413
2026		42,918	40,127		9,762	9,696		417	413
2027		43,086	40,167		9,772	9,700		418	414
2028		43,464	40,207		9,782	9,705		418	414
2029		43,423	40,247		9,791	9,710		419	414
2030		43,381	40,287		9,801	9,715		419	414