2020
LOAD FORECAST

2020 Load Forecast

Traverse Electric Cooperative

PREPARED BY: BASIN ELECTRIC POWER COOPERATIVE

2020 Load Forecast

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1. Introduction

1.1. Purpose

The purpose of the 2020 Load Forecast is to develop an energy and demand load forecast for the period of 2019 through 2050 for Traverse Electric Cooperative. The load forecast is used for a variety of purposes such as work plans, financial forecasts, service cost studies, rate studies, transmission studies, loan applications, integrated resource plans, and equity development plans. This load forecast and those of other distribution cooperatives serve as building blocks for the Basin Electric Power Cooperative (Basin Electric) Load Forecast, and are an integral part of the planning process. The consumer-owner load forecasts are an important factor in Traverse Electric Cooperative's future plans and decisions.

1.2. Procedures

This load forecast is prepared in accordance with the Rural Utilities Service (RUS) general guidelines and the procedures specified in the 2020 Load Forecast Work Plan approved by the Basin Electric Board of Directors. The load forecast process represents a joint effort by the distribution cooperatives, the generation and transmission cooperatives (G&T's), and Basin Electric. To assure all segments of the cooperative structure are involved in the load forecast process, a steering committee was established consisting of representatives from the distribution cooperatives, the G&T's, and Basin Electric.

The Load Forecast Technical Committee established the project schedule and procedures used in preparing the 2020 Load Forecast. Attendance and participation at the committee meeting provided a forum for the cooperatives to exchange ideas and discuss problems.

1.3. Scope

The 2020 Load Forecast is a total load forecast for the period of 2019 through 2050. Individual consumer and energy forecasts are prepared for each consumer classification within the service territory. Econometric models are developed to project consumers and energy sales of the residential classification and, where applicable, small commercial, large commercial, oil, and coal related commercial classifications. For consumer classifications where econometric models are not used, a judgmental forecast is prepared by the distribution cooperative. These judgmental forecasts consider past trends and future expectations. They also reflect the experience and knowledge the cooperative has of its service territory.

To determine the projected annual energy, the total projected requirements of each consumer classification are increased to include the cooperative's own use and transmission losses. The projected annual energy requirements are converted to monthly energy and demand forecasts using historical and anticipated monthly energy patterns and load factors.

2. Load Forecast Process

2.1. Econometric Models

Econometric models are used for the majority of the member systems to forecast residential sales. In most instances, two econometric models are developed for each cooperative. The first model relates the number of historical residential consumers to factors that have been shown to influence their numbers in the past. The second model is developed for the average annual usage per residential consumer. Multiplying the forecasts of these two models developed the total residential energy forecast.

The small commercial modeling and other smaller consumer sectors are developed using econometric or trending models. In some cases they may also be judgmental forecasts or a combination of the three. The econometric models are based on regression analysis. Regression analysis is a statistical technique used to identify a relationship between an observed event and other measured events that can be shown to be related. These are known as the dependent and the independent variables, respectively.

Independent variables must be applicable to the members' service territory and be of importance to the local economy. This is the first step to ensure that the model will accurately explain the historical trends. This gives the confidence that the same factors that have influenced previous trends will accurately reflect future expectations.

The next step to determine if the model is acceptable is the combination of statistical results of the model. The model statistics include the R-squared, adjusted R-squared, and basic statistical information. The R-squared indicates the amount of variation of the dependent variable explained by the independent variables. To show the impact of changes in the number of independent variables used in a model, an adjusted R-squared is used, so the explained variation can be compared with the same dependent variable and different numbers of independent variables.

The statistical significance of the explanatory variables used in the model is measured by a t-statistic. A t-statistic (ignoring negative signs) of at least 2.0 would be required for a 95 percent level of confidence and 1.5 for a 90 percent level of confidence, depending upon the number of observations and variables used in the model.

When residuals are not randomly distributed, a Cochrane-Orcutt transformation (AR term) can be computed to develop an equation that does have randomly distributed residuals. After the variables are transformed by adjusting the equation according to the value of the AR term, a new equation is developed.

The combination of the variables selected, model statistics and the forecasted results all are considered together determine the validity of the forecast.

To develop the 2020 Load Forecast, the econometric software package MetrixND was used. Itron Energy Forecasting Group (Itron) has developed, tested, and refined MetrixND for more than 15 years, providing a proven track record in the real world of energy forecasting.

MetrixND uses powerful forecasting techniques, such as neural networks, multivariate regression, ARIMA, and exponential smoothing to forecast annual and monthly sales and long-term demand patterns. It also allows

rapid computations of G&T totals and power supply shares after the total forecast loads have been developed for the Class C cooperative memberships. The implementation of the MetrixND product allows the forecasts to be updated quickly with the most up to date information possible. This rapid forecast development tool allows Basin Electric and its members too quickly and accurately model changes in macroeconomic and microeconomic conditions to be reflected in the final results.

2.2. Energy Efficiency & Conservation

Basin Electric is committed to providing the lowest cost electricity available to its member systems. To ensure their consumers use this resource as efficiently as possible, there have been numerous campaigns to enable the consumer to make informed decisions on where to invest their money in order to receive the best reward and increase their energy efficiency. The Energy Independence and Security Act of 2007 outlines several improvements that can be implemented to ultimately save the consumers money. New standards were established for a number of appliances including dishwashers, clothes washers, and dehumidifiers. By far, the new lighting standards will have the most significant impact on residential electricity usage. The econometric modeling process does an excellent job of capturing the efficiency trends as more efficient products are introduced and begin to be used by consumers.

Basin Electric has utilized the regional average lighting saturation to determine the savings potential for the lighting sector. The data used to compile the indices was obtained from Itron. Itron develops spreadsheets used to assist companies that use a statistically adjusted end-use forecasting method. The data outlines the typical household appliance usage for nine census regions across the United States. Basin Electric is using this data to determine the lighting savings across our service territory.

2.3. Demand Side Management

Demand side management (DSM) can also have an effect on loads. DSM is the process of managing the consumption of energy to optimize available and planned generation resources. According to the U.S. Department of Energy, DSM refers to "actions taken on the customer's side of the meter to change the amount or timing of energy consumption." Basin Electric and the membership have DSM programs which offer a variety of measures that can reduce energy consumption and consumer energy expenses. DSM strategies have the goal of maximizing end-use efficiency to avoid or postpone the construction of new generating plants. Members operate their own DSM programs to manage their peak conditions, which in turn reduces their billed demand component. This historical demand component, including the effects of DSM, is used to model future electrical demand; furthermore, the model will assume this DSM scheme will be utilized in the same capacity in a future period.

2.4. Sources for Explanatory Variables

A load forecast is to be as objective as possible. To that end, Basin Electric evaluates and utilizes various credible sources to remove subjectivity and bias from historical and forecasted results providing more objectivity and professionalism to the load forecast. Explanatory variables have a significant impact on the resulting load forecasts.

Explanatory variables can come in a variety of forms such as national, state, or county level economic and demographic series, and local weather data. There are very specific production variables, drilling plans, and other production related variables used when dealing with agriculture, energy related, or other commercial loads.

The following is a list of the sources of the major external historical and projected explanatory variables used in the forecasting system:

- **National Oceanic and Atmospheric Administration (NOAA) –** Local area weather data
- **Woods and Poole Economics (W&P) –** County level economic and demographic data
- **IHS Global Insight (IHS Global) –** Microeconomic data (county, metro, and state) and macroeconomic data
- **IHS Cambridge Energy Research Associates (IHS CERA)** - Natural gas and oil pricing
- **U.S. Department of Commerce**, **Bureau of Economic Analysis (BEA)**, - Historical micro demographic and employment data
- **United States Census Bureau (Census)** - Local area census data
- **United States Department of Agriculture (USDA)** - Agricultural production and demographic data
- **Food and Agricultural Policy Research Institute (FAPRI)** - Agricultural production and demographic data
- **United States Department of Energy/Energy Information Agency (DOE/EIA)** - Energy expenditure and usage data

2.5. Explanatory Variables

Historical agricultural production and price data was obtained from the USDA and forecasted data was obtained from the FAPRI 2018 U.S. baseline as well as the USDA baseline agricultural projections. FAPRI is recognized for its expertise in agriculture analysis and forecasting. They also provide forecasts to the USDA and Congressional committees for policy considerations.

The FAPRI baseline projection used is a result of a three-step process. It begins with macroeconomic assumptions for the U.S. developed by IHS Global. The assumptions are used to develop a FAPRI preliminary baseline, which is then distributed to a group of reviewers. The reviewers critique and comment on the validity of the assumptions and the baseline projection. After receiving comments, the baseline projection is revised and finalized. Forecast data is also obtained from the 2018 USDA baseline forecast and averaged with the FAPRI data to create a consensus forecast for agricultural data.

The FAPRI and the USDA historical and projected data are used for forecasting some of the residential service areas where farming and ranching have a big influence.

The 2020 Load Forecast uses three inflation indexes to deflate historical data and to project future inflation. These indexes or deflators use the base 2018 equals 100. Those three indexes include:

- Producer Price Index (PPI) (all commodities): This index is used to deflate crude oil prices. Real 2018 dollar crude oil prices are used as a variable in the oil related models and forecasts and also in

residential models in oil producing areas. The forecast for the PPI is obtained from the Energy Information Administration's 2019 Annual Energy Outlook (AEO).

- Gross Domestic Product - Implicit Price Deflator (GDP-IPD): This index is used to deflate all agricultural monetary data from FAPRI to real 2018 dollars. The forecast is obtained from the Congressional Budget Office.
- Personal Consumptions Expenditures - Implicit Price Deflator (PCE-IPD): This implicit price deflator is used to deflate all non-FAPRI monetary data other than that covered by GDP-IPD and PPI to real 2018 dollars. This includes such data as electricity prices, alternative fuels, personal income and earnings. Also, it is used to convert current prime interest rates to real prime interest rates. This index is also obtained from the Congressional Budget Office.

All weather data is obtained from the NOAA or other supplemental sources. This information is received for first-order stations, as well as all cooperative stations within the geographic region. Forecasts for weather data are assumed to be the simple average of 2004-2018 values.

Historical alternative fuel prices are obtained on a state level from the DOE's, State Energy Data 2017 Price, Consumption and Expenditures Data (SEDS). Basin Electric uses DOE projections of regional price forecasts to develop projections of alternative fuel prices. This ratio is used to determine the viability of using electricity for home heating against all other fuels available in the service territory of the cooperative.

W&P is used as sources for the economic and demographic historical and forecasted county data. IHS Global is used for county, metro, state and national economic data.

IHS CERA is used for natural gas and oil prices for the energy related loads. Wood Mackenzie, IHS, and DOE data are also used in the energy related sectors.

3. Cooperative Narrative

2020 LOAD FORECAST
TRAVERSE ELECTRIC COOPERATIVE, INC.
SERVICE TERRITORY NARRATIVE

LOCATION AND SERVICE AREA

Headquarters: The headquarters of Traverse Electric Cooperative, Inc. is located in west central Minnesota in the city of Wheaton.

Service Area: The Cooperative serves all of Traverse County (1070 consumers – 2018), a portion of western Big Stone County (417 consumers – 2018), Stevens County (82 consumers – 2018), Grant County (194 consumers – 2018), and a portion of southern Wilkin County (206 consumers – 2018) in Minnesota. It also serves the north half of Roberts County (1024 consumers – 2018) in South Dakota and a few farms in the eastern portion of Marshall County (18 consumers – 2018) in South Dakota. We also serve 34 farms on the North Dakota border. Traverse Electric Cooperative, Inc. (MN 84 Traverse Electric) is a member of East River Electric Power Cooperative, Inc. (So. Dak. 42 Minnehaha) and receives all of its power requirements from this power cooperative.

Traverse Electric doesn't serve any non-act beneficiary loads.

The service area of Traverse Electric Cooperative, Inc. is rural in nature and farming is the most contributing factor to the economy of the area. The Cooperative is located in the Red River Valley and the terrain lends itself to large farms. The major crops are corn, soybeans, small grain and sugar beets. The Cooperative doesn't serve any towns. We are under the territorial protection law of the Minnesota Public Service Commission and the South Dakota Public Service Commission, so we don't anticipate any changes in our territory. The Cooperative doesn't anticipate any abnormal growth as a result of farm loads, seasonal loads, trailer development, residential development or apartments.

GEOGRAPHY

Topography and Geology: At the present time we do not have any geological surveys of MN 84 service territory. Even without the geological surveys the areas where irrigation may develop and where the aquifers can be anticipated, are as follows.

The water resources in MN 84 service territory consist of surface and ground water. The ground water in the area should consist primarily of the Dakota and the Red River aquifers. The Dakota aquifer probably underlies most of MN 84 service territory. The water is anticipated to be unsuitable for irrigation due to the specific conductors and salinity content.

Natural Features: The Red River aquifer follows the Red River of the North Bois DeSioux River and its tributaries. The aquifer can be found on either side of Lake Traverse. The water should be suitable for irrigation. The aquifer's greatest thickness and best possibility for irrigation should be near Lake Traverse, the Red River of the North Bois DeSioux and the tributaries. The majority of irrigation that develops in MN 84 service territory should develop from this aquifer.

CLIMATE

Climate and Weather: The May-August precipitation for MN 84 service territory ranges from 12.87 inches in the west to about 12.34 inches in the east. The annual precipitation average for MN 84 service territory is approximately 22.29 inches.

POPULATION

The service area total population was evaluated as a variable for this model as the historical data indicates the number of residential consumers has been influenced by the population. This variable addresses change in the number of consumers. Historical and projected population data was obtained from W&P.

ECONOMY

The Cooperative's total kWh sales has maintained a slight increased throughout the years.

Year	Total Consumers	Total kWh sold
2012	2,835	70,117,710
2013	2,909	85,239,318
2014	2,936	91,652,526
2015	2,970	92,838,832
2016	2,999	92,027,564
2017	3,017	98,198,173
2018	3,056	109,574,832

This classification includes all electricity sold for residential or domestic use such as farm and nonfarm consumers living in rural areas. Although this group of consumers has grown since 2012, the average kWh sold per consumer has also increased.

Year	Farm & Residential	Seasonal	Total Consumers	Total KWH Sales
2012	2,314	414	2,728	46,204,551
2013	2,380	410	2,790	56,208,444
2014	2,405	411	2,816	57,450,199
2015	2,440	406	2,846	51,699,958
2016	2,470	408	2,878	51,242,859
2017	2,486	409	2,895	53,174,431
2018	2,514	415	2,929	57,539,882

TRANSPORTATION FACILITIES

MEMBERSHIP (CONSUMER CLASSIFICATIONS)

Rate classification consist of:

- General Service
- Seasonal Service
- Small Commercial (Transformer sizes 50,75 and 100 kva)
- Multi-Phase Service & Large Single Phase (Over 100 kva and under 500 kva - Single Phase)
- Large Commercial (Over 500 kva and under 1,000 kva)
- Large Commercial (1,000 kva and over)
- Irrigation
- Interruptible Heat, Heat Storage & Special Electric Heat
- 5/7 Interruptible
- Railroad

POWER SUPPLY

LOAD MANAGEMENT

In 2019 or load management program consisted of the controlling of air conditioning, duel fuel, electric heat and hot water heaters. Total number of accounts listed under the program is 1,229.

HISTORICAL DEVELOPMENTS

SEASONAL:

The number of consumers in this classification has shown small growth over the last five years. We have an existing RV Park that will be expanding by the end of 2019 and will be adding an additional 88 slots for RV's.

IRRIGATION:

We have only 12 consumers that irrigate. There is very little potential for more because of limited water supplies of good quality water. The usage is projected to remain the same, but their use is so weather sensitive that future estimations are difficult to determine.

SMALL COMMERCIAL:

Small commercial consumers were projected judgmentally by the Cooperative. In 2018, Traverse Electric reported the average number of small commercial consumers to be 6. We project a decrease in this class of consumers.

LARGE COMMERCIAL UNDER 1000 KVA

This group of users whose business has a load greater than 50 KVA and less than 1000 KVA has increased only when our existing farm accounts have enlarged and had to be placed on our large commercial rate. Consumers in this group include large hog operations, large grain dryer accounts, grain elevators, etc.

LARGE COMMERCIAL OVER 1000 KVA

Traverse Electric has 5 consumers within this classification, they consist of Marshall Dairy, Dollymount Dairy, Campbell Dairy, Kinder Morgan and Wheaton-Dumont Elevator.

*In 2020 North Ottawa Dairy will be an addition to this rate.

GROWTH POTENTIAL

NEW LARGE LOADS:

Riverview Dairy is building a facility named North Ottawa Dairy located in North Ottawa Township in Traverse County, Four miles North of the Wendell Substation in 2020. The new facility will house 11,500 head of cattle and a projected load of 1.8 MW.

4. Service Territory Characteristics

Facts relating to Traverse Electric Cooperative's service territory are included in the following tables and graphs to provide general information on their local economy and to support the load forecast. The information includes general characteristics, End Use Survey results, demographic and economic data, and agricultural statistics of the cooperative service territory.

This data is used in the load forecast process to define the economic and demographic structure of the local economy. Periodic historical data is included since this data provides past trends of the local economy. The data provides extensive information that relates both directly and indirectly to the modeling and forecasting process.

The tables and graphs outline the general characteristics of Traverse Electric Cooperative's service area, reviewing the local economy, population, reported nonfarm employment along with various economic farm data pertaining to the service area, End Use Survey information containing appliance, and air conditioning saturations.

Traverse Electric Cooperative

General Characterization

Total Consumers

RUS Form 7	*2005*	*2010*	*2015*	*2018*
Total Consumers	2,725	2,781	2,945	3,029

Residential Consumers

RUS Form 7	*2005*		*2010*		*2015*		*2018*	
Rural Residential	2,187	83%	2,244	84%	2,416	86%	2,492	86%
Seasonal Residential	443	17%	433	16%	409	14%	413	14%
Residential Consumers	2,630	100%	2,677	100%	2,825	100%	2,905	100%

Residential Account Types

End Use Survey	*2001*	*2005*	*2009*	*2013*
Farm Residential & Operation	60%	59%	58%	53%
Farm Operation Only	1%	3%	2%	4%
Rural Residential Only	37%	35%	37%	38%
Residential in City or Subdivision	1%	1%	1%	1%
Other	1%	2%	2%	5%
Total Residential Account Types	**100%**	**100%**	**100%**	**100%**

Primary Residential Heating Systems

End Use Survey	*2001*	*2005*	*2009*	*2013*
Electric	27%	36%	46%	47%
Propane	25%	29%	35%	38%
Fuel Oil	22%	18%	10%	12%
Natural Gas	1%	0%	4%	0%
Other	25%	17%	5%	3%
Total Primary Heating Systems	**100%**	**100%**	**100%**	**100%**

Alternative Fuel Ratio

End Use Survey	*2001*	*2005*	*2009*	*2013*
Propane	55%	60%	75%	75%
Fuel Oil	45%	40%	20%	25%
Natural Gas	0%	0%	5%	0%

Counties Served

Major Counties	*USDA Economic Type*	*Other Counties Served*
Roberts, SD	***Farm***	***Big Stone***
Traverse	***Farm***	***Grant***
		Marshall, SD
		Richland, ND
		Stevens
		Wilkin

Traverse Electric Cooperative

Economic / Demographic Structure

Major County Employment

BEA	2003	2008	2013	2018 W&P Est.
Total Employment	7,278	7,724	7,725	8,018
Farm Employment	1,397	1,293	1,397	1,344

Major County Population & Number of Households

Woods & Poole	2003	2008	2013	2018 W&P Est.
Total Population	6,437	13,511	5,757	5,516
Total Households	2,792	2,622	2,629	2,638
Total Pop. 65 & Over	1,719	1,589	1,481	1,499

Residents per Household Over 65 Years Old

End Use Survey	1997	2001	2005	2009
One Per Residence	15%	15%	14%	13%
Two Per Residence	17%	21%	21%	23%

County Poverty Statistics

Persons in Poverty	2000 Census		2010 Census		2017 Est.	
Roberts, SD	2,175	22%	2,034	20%	1,763	18%
Traverse	483	12%	455	13%	416	13%

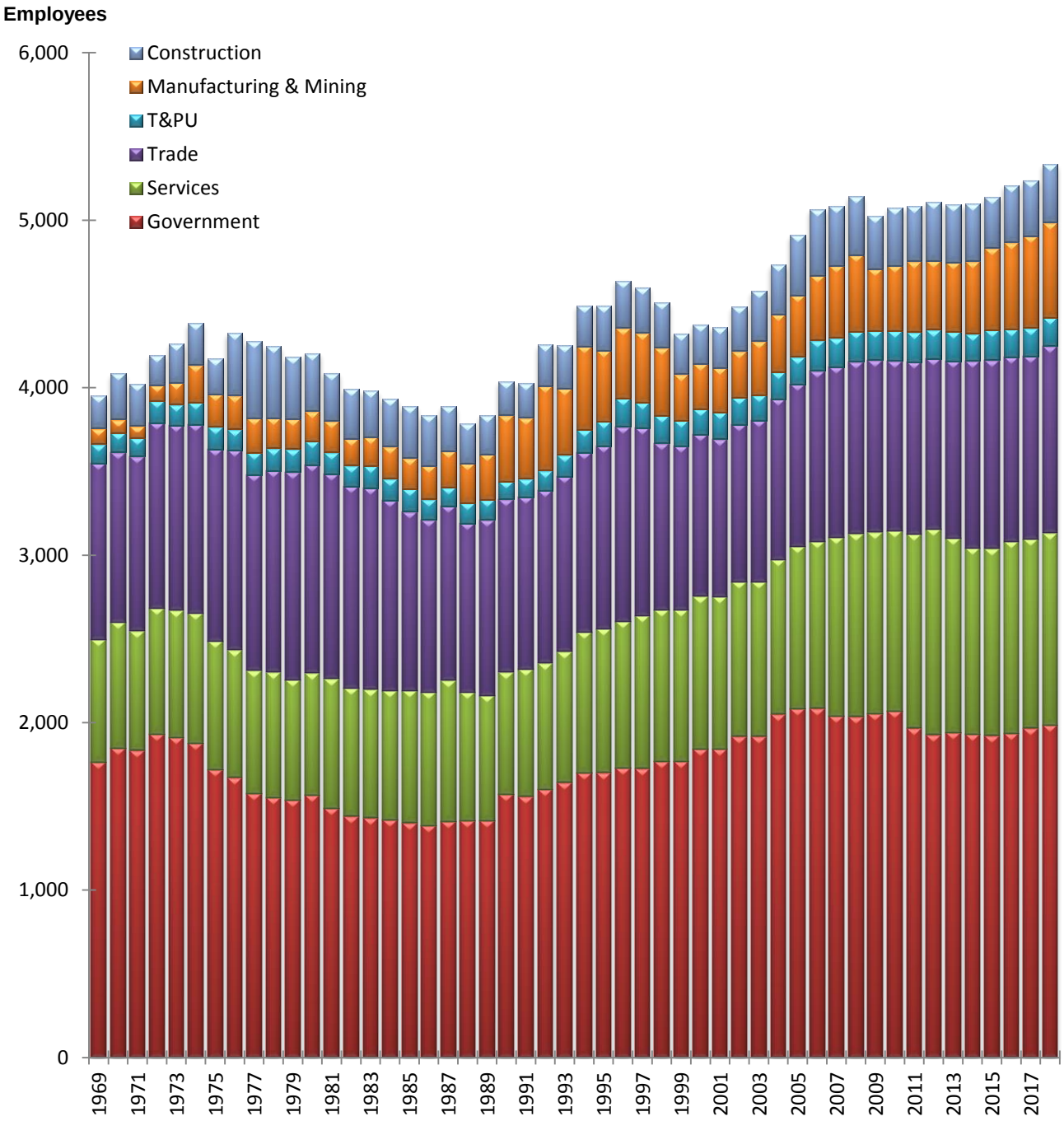
2007 - 2017 Employment Analysis

Counties	Growth Rate	Fastest Growing 2007-2017	Largest In 2017
Roberts, SD	0.23%	Professional, scientific, and technical services 2.84% Manufacturing 2.76% Wholesale trade 1.68%	State and local 23.78% Farm employment 14.75% Retail trade 9.36%
Traverse	0.05%	Educational services 5.54% Health care and social assistance 3.17% Wholesale trade 2.74%	Farm employment 22.22% State and local 14.66% Retail trade 9.94%

Traverse Electric Cooperative

Major Nonfarm Employment Sectors

Roberts, SD and Traverse Counties



Government: Includes federal civilian, military, state and local.
Services: Includes a variety of services for individuals, businesses, and government as well as agricultural services, forestry, fishing, finance, insurance, and real estate services.
Trade: Includes wholesale and retail trade.
T&PU: Includes transportation and public utility.

Source: Woods & Poole Data

Traverse Electric Cooperative

Census of Agriculture - Statistics

Roberts, SD and Traverse Counties

General Statistics

Census of Agriculture	*2002*	*2007*	*2012*	*2017*
Total farm numbers	1,388	1,366	1,334	1,193
Average size (acres)	697	676	736	824
Total irrigated farms	20	20	8	25
Cattle & calves sold (farms)	435	396	344	274
Cattle & calves sold (head)	40,033	43,242	33,789	34,243
Hogs & pigs sold (farms)	55	42	19	29
Hogs & Pigs sold (head)	68,708	214,855	35,093	95,234
Wheat farms	511	373	244	166
Wheat harvested (bu)	4,740,297	2,703,056	1,945,323	1,454,042
Corn farms	542	574	557	567
Corn harvested (bu)	25,037,142	31,485,847	43,589,444	52,207,731
Soybean farms	709	661	599	592
Soybeans harvested (bu)	11,369,396	9,113,477	12,201,439	16,003,572
Barley harvested (bu)	282,024	61,406	10,740	37,412
Oats harvested (bu)	183,914	183,914	27,335	-
Sunflowers harvested (lbs)	473,880	3,511,887	4,823,009	675,000

Average Age of Farm Operators

Census of Agriculture	*2002*	*2007*	*2012*	*2017*
Roberts, SD	55	57	56	57
Traverse	53	57	58	57

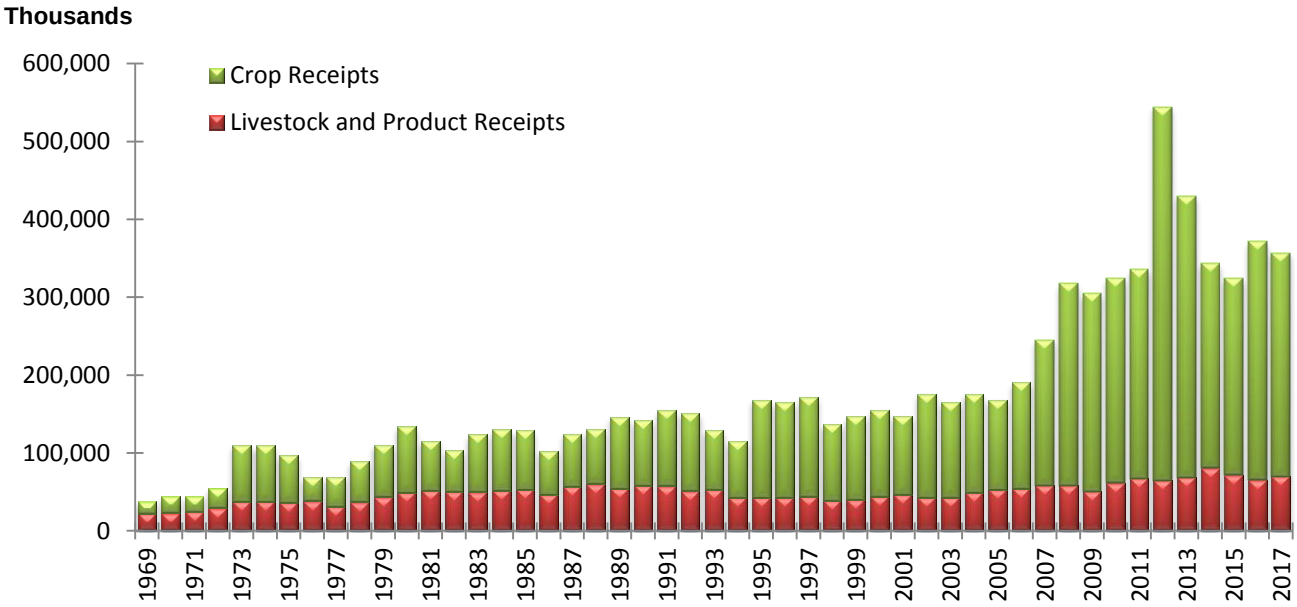
*Farm Operators Principal Occupation Other Than Farming**

Census of Agriculture	*2002*	*2007*	*2012*	*2017*
Roberts, SD	31%	41%	48%	50%
Traverse	40%	39%	42%	16%

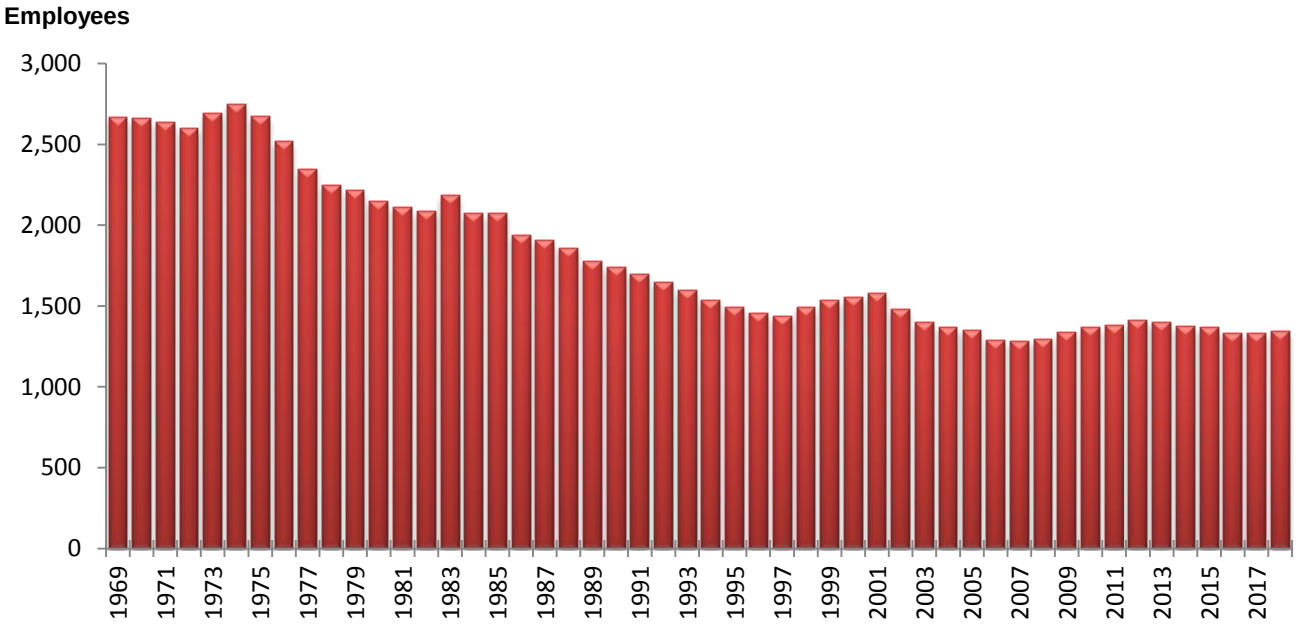
*50% or more of operators work time

Traverse Electric Cooperative

Farm Cash Receipts (Current $'s)
Roberts, SD and Traverse Counties



Total Farm Employment
Roberts, SD and Traverse Counties



Source: Bureau of Economic Analysis, U.S. Department of Commerce

Traverse Electric Cooperative

Other End Use Survey Information

Appliance Saturation	***2001***	***2005***	***2009***	***2013***
Electric range	84%	86%	81%	92%
Gas range	14%	10%	17%	23%
Electric dryer	92%	90%	87%	95%
Gas dryer	4%	4%	6%	6%
Electric water heater	89%	88%	79%	95%
Natural gas water heater	0%	1%	4%	0%
Propane water heater	8%	8%	14%	4%
Refrigerator	98%	94%	89%	97%
Freezer	89%	85%	86%	95%
TV	98%	95%	90%	98%
Air exchanger	6%	9%	14%	30%
Hot tub or spa	6%	5%	9%	15%

Air Conditioning	***2001***	***2005***	***2009***	***2013***
Central Air	40%	39%	42%	45%
Electric Air to Air Heat Pump	15%	18%	17%	19%
Electric Ground Source Heat Pump	2%	2%	3%	3%
Window or Wall Unit	35%	32%	24%	23%
Other	1%	1%	2%	7%
None	7%	8%	5%	2%

Traverse Electric Cooperative

End Use Survey - Agriculture Statistics

Major Types Farm, Ranch or Other Operations

End Use Survey		*1997*	*2001*	*2005*	*2009*
Grain Farm		47%	3%	13%	8%
Percentage of grain farms:	Wheat			23%	18%
	Corn			50%	74%
	Soybean			15%	6%
	Flax			8%	
	Other			2%	34%
Livestock Ranching		38%	15%	53%	3%
Percentage ranch livestock:	Cattle			12%	15%
	Sheep			11%	67%
	Horses			1%	6%
	Other			1%	20%
Livestock Feedlot		12%	17%	3%	0%
Percentage feedlot livestock:	Cattle			1%	1%
	Sheep			48%	
	Hogs		65%	72%	2%
	Other			80%	50%
Dairy		0%	15%	89%	65%
Poultry, Eggs			21%	2%	85%

Grain Dryer Saturation

End Use Survey	*1997*	*2001*	*2005*	*2009*
Propane or Natural Gas	97%	10%	70%	16%
Aeration & Natural Air	15%	37%	9%	27%
Low Temp Electric	23%	10%	16%	36%
High Temp Electric	73%	15%	1%	2%

Livestock Electric Equipment

End Use Survey	*1997*	*2001*	*2005*	*2009*
Stock tank heater	1%	39%	1%	34%
Stock water system	25%	2%	26%	3%

5. Load Forecast Development

In order to obtain a total sales projection, individual forecasts are prepared for each consumer classification and then added together. This section includes the following sales forecasts:

Residential Consumers	Forecast of the number of residential consumers
Residential Energy	Forecast of the energy usage per residential consumer and calculation of residential energy sales
Small Commercial	Forecast of the number of small commercial consumers and the total energy sales
Large Commercial	Forecast of the number of large commercial consumers and the total energy sales
Irrigation & Other Sectors	The following sectors are included where applicable: forecast of the number of consumers and energy sales for irrigation, public street and highway sales, other sales to public authorities, sales for resale to others or RUS, and pumping stations sales

5.1. Residential Consumers Forecast

An econometric model was used to develop a forecast for the number of residential consumers. The model developed takes into consideration the historical factors that statistically, demographically, and economically influenced Traverse Electric Cooperative's number of residential consumers and assumes the projected number of consumers will be determined by the same factors.

Factors considered and evaluated included county populations, national agricultural production, county household statistics, state land values, and county employment.

Residential Consumers Model Variable Discussion

Several demographic and economic variables were evaluated and the appropriate indicators were chosen for their historical and statistical significance to determine a satisfactory model that represents the historical trends for Traverse Electric Cooperative's residential consumers. The variables that were evaluated include, but are not limited to, the following listing below:

Total Population

The service area total population was evaluated as a variable for this model as the historical data indicates the number of residential consumers has been influenced by the population. This variable addresses change in the number of consumers. Historical and projected population data was obtained from W&P.

Total Employment

The total employment variable was evaluated for this model as the historical data indicates Traverse Electric Cooperative's number of residential has been influenced by total employment. This is believed to occur since employment opportunities are a primary consideration when individuals decide to remain in an area or relocate from another area. Total employment is indicative of the farm and nonfarm economies, and its relation to Traverse Electric Cooperative's number of residential consumers' energy usage per residential consumer.

Total employment consists of persons self-employed and employed by others in farming operations, as well as in nonfarm industries such as the service, retail trade, manufacturing, and government industries. Historical and projected total employment data was obtained from the W&P.

Household Income

The total income of a group of people living under one roof and sharing facilities was evaluated for this model as the historical data indicates Traverse Electric Cooperative's number of residential has been influenced by household income.

Historical Data was deflated using the PCE-IPD to remove the effects of inflation on this variable.

National Agricultural Commodity Production and Price

The End Use Survey data indicates that Traverse Electric Cooperative's consumers were engaged in farming operations. Production levels enhance the ability and need to invest in electrical-consuming equipment for grain drying and handling purposes. In addition, when production increases, income levels of the consumers are also affected. The End Use Survey data was used to determine the appropriate commodity and/or pricing

to use in the consumer model. Commodities and pricing that were available to determine the appropriate indicators were: national beef, corn, soybean, pork, turkey, and broiler production and average pricing, along with national egg production.

These factors along with local population and sector level employment may have been used to determine an appropriate model to predict the future number of residential consumers. Other applicable economic, demographic or agricultural factors may have been used to model and forecast consumers.

5.2. Residential Energy Use per Consumer Forecast

An econometric model was also used to develop a forecast for the residential energy use per consumer. The model developed takes into consideration the historical factors that statistically, demographically, and economically influenced Traverse Electric Cooperative's energy use per residential consumer and assumes the projected usage per consumer will be determined by the same factors.

Examples of factors that were considered and evaluated include electricity prices, alternative fuel prices, national agricultural products, county household statistics, county employment, per capita income, and weather variables.

Residential Energy use per Consumer Model Variable Discussion

Several variables were evaluated and the appropriate indicators were chosen for their historical and statistical significance to determine a satisfactory model that represents the historical trends for Traverse Electric Cooperative's energy use per residential consumer. The variables that were evaluated include, but are not limited to, the following listing below.

Electricity/Alternative Fuel Price Ratio

This variable addresses the competition between electricity and alternative fuels. This competition occurs in space heating, water heating, cooking, clothes drying, and grain drying. The future price of these alternative fuels and how they compare with Traverse Electric Cooperative 's electricity price will affect electrical consumption. Traverse Electric Cooperative's End Use Survey indicates that propane, fuel oil, and natural gas may be electricity's major competitors. An electricity/alternative fuel price ratio based on the percentage of consumers who use these fuels was selected for the model development.

Heating and Cooling Degree Days

Weather patterns have a significant effect on energy requirements due to energy uses such as heating, air conditioning, and grain drying. Heating and cooling degree days are the summation of heating or cooling degree days for the calendar year. One heating degree day is accumulated for each degree the daily mean temperature is below 65 degrees Fahrenheit. One cooling degree day is accumulated for each degree the daily mean temperature is above 65 degrees Fahrenheit.

The historical heating and cooling degree day weather data was obtained from the NOAA. Future years were assumed to equal the previous 15 year average values for each weather station.

These factors along with local population and sector level employment may have been used to determine an appropriate model to predict the future energy usage per residential consumer. Other applicable economic, demographic or agricultural factors may have been used to model and forecast energy usage per consumer.

5.3. Forecasted Total Residential Energy

The total residential energy forecast was developed using the above two models: The consumer model and the energy per consumer model. Total residential energy consumption was developed by multiplying the number of residential consumer results by the residential energy per consumer results.

5.4. Small Commercial

The Small Commercial classification consists of commercial accounts that are 1,000 kVA or less. This section addresses the econometric models that forecast the small commercial consumers and energy use. The models developed took into consideration the historical factors that statistically, demographically, and economically influenced Traverse Electric Cooperative's number of small commercial consumers and small commercial energy use.

It has been observed that there is a strong positive relationship between the number of residential consumers and small commercial consumers and energy use. This can be explained by the fact that for the small commercial businesses such as retail and services businesses depend on these people as their consumers. Residential consumers appear to be a good index of buying power.

Forecasted results were reviewed by the member to determine if the result meets their expectations. If the model results did not produce acceptable results, Traverse Electric Cooperative prepared a judgmental forecast for the small commercial sector.

5.5. Large Commercial

The Large Commercial classification consists of commercial accounts that are 1,000 kVA or larger. Forecasted results were also reviewed by the member to determine if the forecast met the local expectations. If the forecast did not produce the desired results, the member prepared a judgmental forecast for the large commercial sector.

The large commercial sector was generally modeled using national economic variables. This is indicative of local contribution to the national economy. Real gross domestic product may have been used for the large commercial consumer model. The following is a brief description of this variable.

Real Gross Domestic Product

Real Gross Domestic Product (GDP) is what is made in the United States. It is total output (production) of goods and services by consumers, businesses, or governments. It includes consumer goods (personal consumption expenditures (PCE) durables + nondurables + services) + investment goods (residential structures + nonresidential structures + capital equipment + inventory investment) + government purchases of goods and services + exports - imports (since they were counted already when sold as consumer goods etc.). This is measured indirectly off of final products. Since this is a real variable, inflationary effects have been removed from this calculation.

This factor along with local population and sector level employment may have been used to determine an appropriate model to predict the future Large Commercial consumers and energy usage. Other applicable economic, demographic or agricultural factors may have been used to model and forecast consumers and energy.

5.6. Irrigation

Irrigation sales have fluctuated during the historical period due to the weather, the state of the farm economy, and government programs. Traverse Electric Cooperative prepared a judgmental forecast for the projected irrigation consumers and associated energy sales.

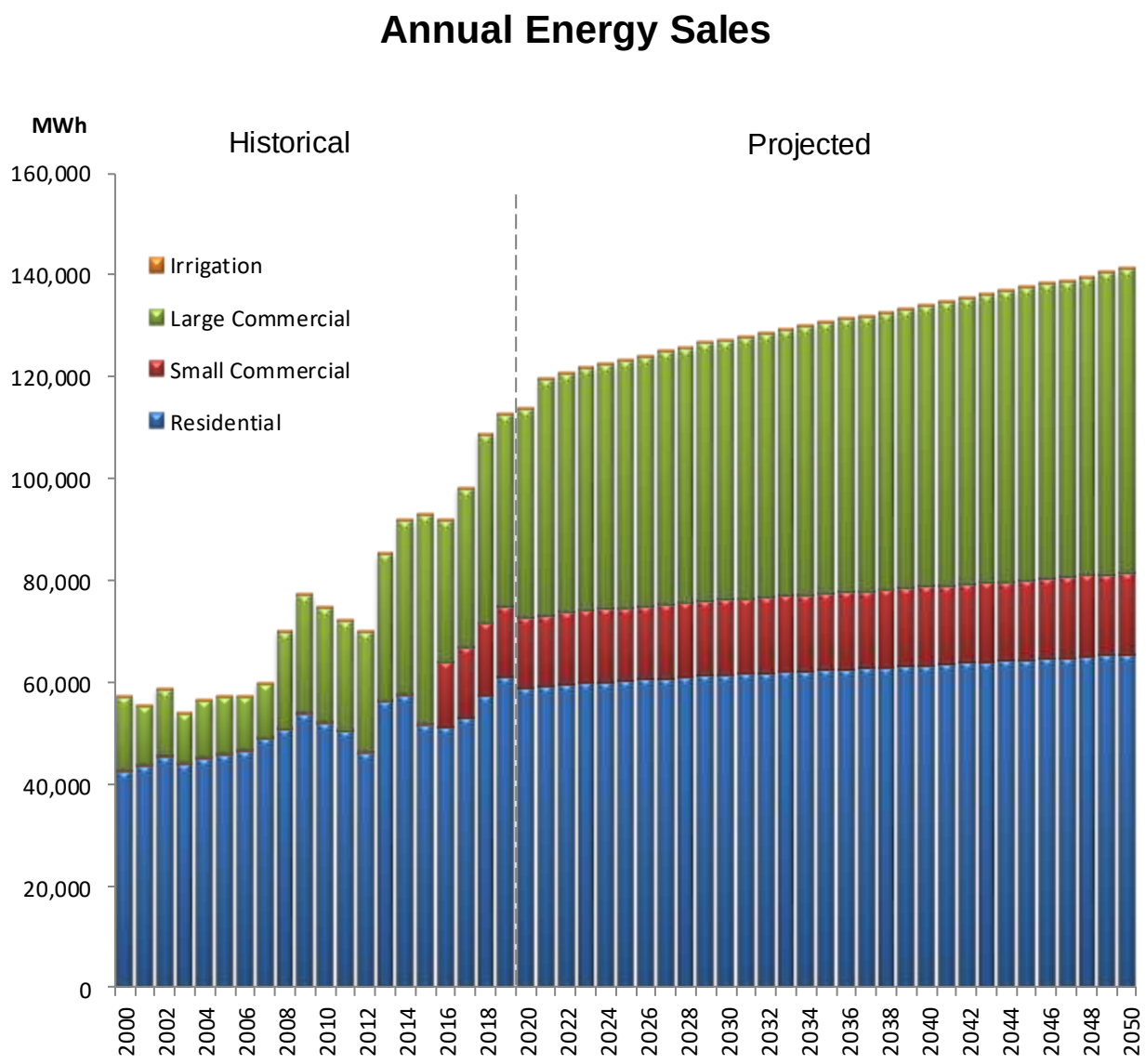
5.7. Other Sectors

The sales in this category account for a small percentage of Traverse Electric Cooperative's total annual sales, and mainly include the kWh sales from street light usage across the Electric service territory.

6. Load Forecast Details

6.1. Annual Energy Sales

Traverse Electric Cooperative's historical and projected annual energy sales by consumer classification are shown in the following graph and table:



Traverse Electric Cooperative

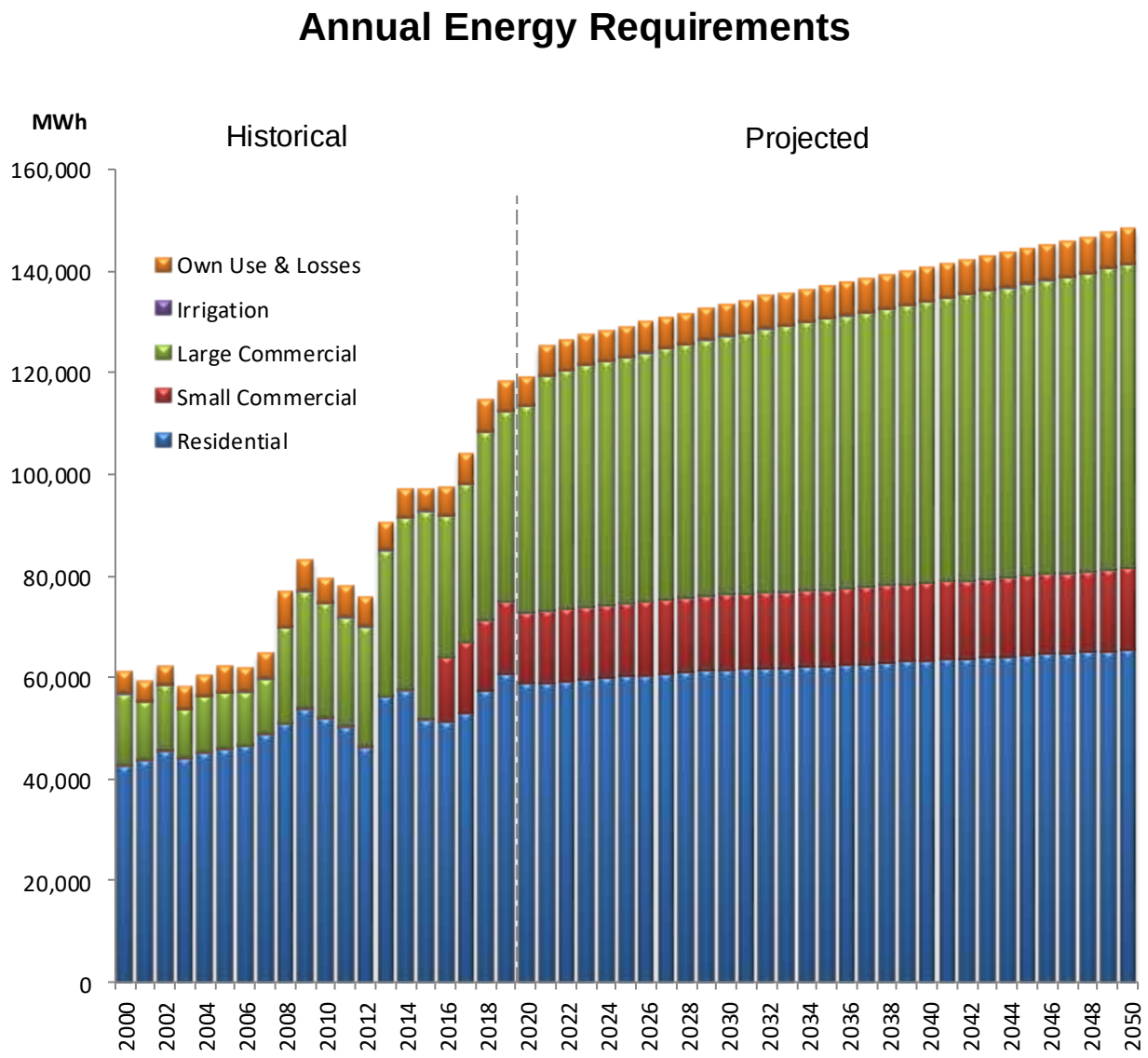
System Energy Sales by Consumer Classification (MWh)

	Year	Total Residential	Small Commercial	Large Commercial	Irrigation	Total Sales
Historical	2000	42,471	342	14,045	108	56,966
	2001	43,479	406	11,356	183	55,424
	2002	45,339	471	12,823	115	58,748
	2003	43,949	399	9,370	152	53,870
	2004	44,921	357	10,977	194	56,449
	2005	45,777	369	10,987	70	57,203
	2006	46,385	265	10,472	233	57,355
	2007	48,831	292	10,567	186	59,876
	2008	50,715	243	18,972	181	70,111
	2009	53,858	306	22,855	157	77,176
	2010	52,010	203	22,365	99	74,677
	2011	50,308	135	21,447	116	72,006
	2012	46,205	110	23,538	265	70,118
	2013	56,208	232	28,570	229	85,239
	2014	57,450	262	33,798	142	91,652
	2015	51,700	185	40,736	218	92,839
	2016	51,243	12,741	27,823	220	92,027
	2017	53,174	13,835	31,029	160	98,198
	2018	57,540	14,003	36,934	98	108,575
Projected	2019	60,894	14,094	37,420	92	112,500
	2020	58,848	13,981	40,580	92	113,501
	2021	59,114	14,099	46,195	92	119,500
	2022	59,486	14,222	46,826	92	120,626
	2023	59,794	14,345	47,457	92	121,688
	2024	60,078	14,332	47,878	92	122,380
	2025	60,254	14,457	48,298	92	123,101
	2026	60,517	14,446	48,929	92	123,984
	2027	60,807	14,572	49,350	92	124,821
	2028	61,121	14,562	49,771	92	125,546
	2029	61,423	14,690	50,402	92	126,607
	2030	61,541	14,818	50,823	92	127,274
	2031	61,709	14,810	51,243	92	127,854
	2032	61,841	14,939	51,875	92	128,747
	2033	61,992	14,931	52,295	92	129,310
	2034	62,179	15,062	52,716	92	130,049
	2035	62,369	15,055	53,137	92	130,653
	2036	62,523	15,186	53,557	92	131,358
	2037	62,741	15,180	53,978	92	131,991
	2038	62,952	15,312	54,399	92	132,755
	2039	63,159	15,306	54,820	92	133,377
	2040	63,377	15,439	55,240	92	134,148
	2041	63,591	15,434	55,661	92	134,778
	2042	63,819	15,430	56,082	92	135,423
	2043	64,031	15,563	56,503	92	136,189
	2044	64,251	15,559	56,923	92	136,825
	2045	64,448	15,692	57,344	92	137,576
	2046	64,644	15,826	57,765	92	138,327
	2047	64,862	15,823	58,186	92	138,963
	2048	65,052	15,957	58,606	92	139,707
	2049	65,265	15,954	59,237	92	140,548
	2050	65,451	16,089	59,658	92	141,290

Historical Average Compound Growth Rates:	2000-2018	3.65%	2014-2018	4.33%
Projected Average Compound Growth Rates:	2019-2050	0.74%	2019-2023	1.98%

6.2. Annual Energy Requirements

Traverse Electric Cooperative's historical and projected annual total system energy requirements by consumer classification, which includes Traverse Electric Cooperative's own use and losses, are shown in the following graph and table:



Traverse Electric Cooperative

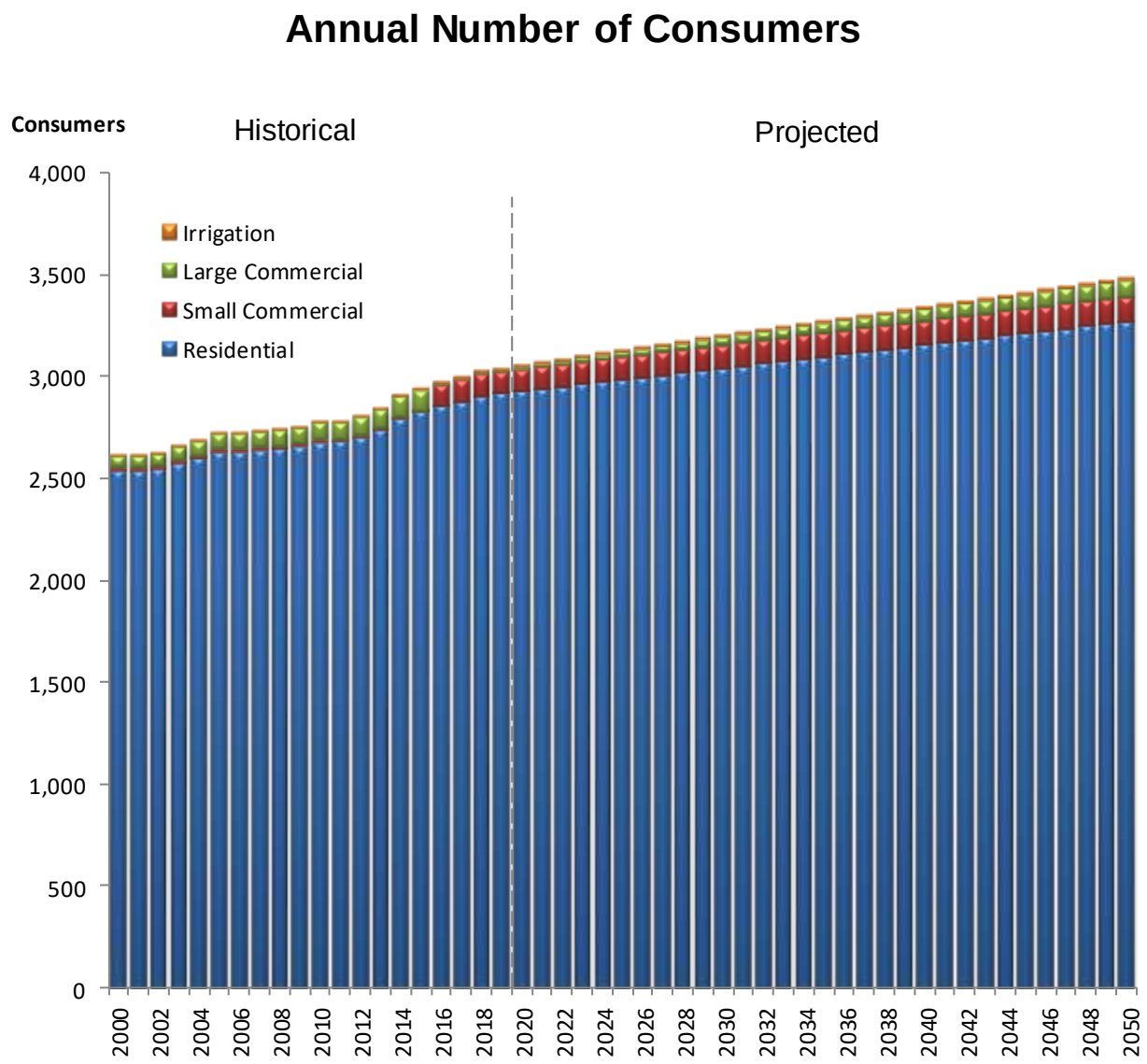
System Energy Requirements by Consumer Classification (MWh)

	Year	Total Residential	Small Commercial	Large Commercial	Irrigation	Total Sales	Own Use & Losses	Total Energy Requirements
Historical	2000	42,471	342	14,045	108	56,966	4,133	61,099
	2001	43,479	406	11,356	183	55,424	3,756	59,180
	2002	45,339	471	12,823	115	58,748	3,372	62,120
	2003	43,949	399	9,370	152	53,870	4,200	58,070
	2004	44,921	357	10,977	194	56,449	3,917	60,366
	2005	45,777	369	10,987	70	57,203	5,068	62,271
	2006	46,385	265	10,472	233	57,355	4,409	61,764
	2007	48,831	292	10,567	186	59,876	4,878	64,754
	2008	50,715	243	18,972	181	70,111	6,697	76,808
	2009	53,858	306	22,855	157	77,176	5,773	82,949
	2010	52,010	203	22,365	99	74,677	4,753	79,430
	2011	50,308	135	21,447	116	72,006	5,961	77,967
	2012	46,205	110	23,538	265	70,118	5,629	75,747
	2013	56,208	232	28,570	229	85,239	5,246	90,485
	2014	57,450	262	33,798	142	91,652	5,517	97,169
	2015	51,700	185	40,736	218	92,839	4,079	96,918
	2016	51,243	12,741	27,823	220	92,027	5,380	97,407
	2017	53,174	13,835	31,029	160	98,198	5,849	104,047
	2018	57,540	14,003	36,934	98	108,575	6,110	114,685
Projected	2019	60,894	14,094	37,420	92	112,500	5,758	118,258
	2020	58,848	13,981	40,580	92	113,501	5,635	119,136
	2021	59,114	14,099	46,195	92	119,500	5,696	125,196
	2022	59,486	14,222	46,826	92	120,626	5,764	126,390
	2023	59,794	14,345	47,457	92	121,688	5,828	127,516
	2024	60,078	14,332	47,878	92	122,380	5,870	128,250
	2025	60,254	14,457	48,298	92	123,101	5,914	129,015
	2026	60,517	14,446	48,929	92	123,984	5,967	129,951
	2027	60,807	14,572	49,350	92	124,821	6,018	130,839
	2028	61,121	14,562	49,771	92	125,546	6,062	131,608
	2029	61,423	14,690	50,402	92	126,607	6,126	132,733
	2030	61,541	14,818	50,823	92	127,274	6,166	133,440
	2031	61,709	14,810	51,243	92	127,854	6,202	134,056
	2032	61,841	14,939	51,875	92	128,747	6,256	135,003
	2033	61,992	14,931	52,295	92	129,310	6,290	135,600
	2034	62,179	15,062	52,716	92	130,049	6,334	136,383
	2035	62,369	15,055	53,137	92	130,653	6,371	137,024
	2036	62,523	15,186	53,557	92	131,358	6,414	137,772
	2037	62,741	15,180	53,978	92	131,991	6,452	138,443
	2038	62,952	15,312	54,399	92	132,755	6,498	139,253
	2039	63,159	15,306	54,820	92	133,377	6,536	139,913
	2040	63,377	15,439	55,240	92	134,148	6,583	140,731
	2041	63,591	15,434	55,661	92	134,778	6,621	141,399
	2042	63,819	15,430	56,082	92	135,423	6,660	142,083
	2043	64,031	15,563	56,503	92	136,189	6,706	142,895
	2044	64,251	15,559	56,923	92	136,825	6,745	143,570
	2045	64,448	15,692	57,344	92	137,576	6,790	144,366
	2046	64,644	15,826	57,765	92	138,327	6,836	145,163
	2047	64,862	15,823	58,186	92	138,963	6,874	145,837
	2048	65,052	15,957	58,606	92	139,707	6,919	146,626
	2049	65,265	15,954	59,237	92	140,548	6,970	147,518
	2050	65,451	16,089	59,658	92	141,290	7,015	148,305

Historical Average Compound Growth Rates:	2000-2018	3.56%	2014-2018	4.23%
Projected Average Compound Growth Rates:	2019-2050	0.73%	2019-2023	1.90%

6.3. Annual Number of Consumers

Traverse Electric Cooperative's historical and projected annual energy sales by consumer classification are shown in the following graph and table:



Traverse Electric Cooperative

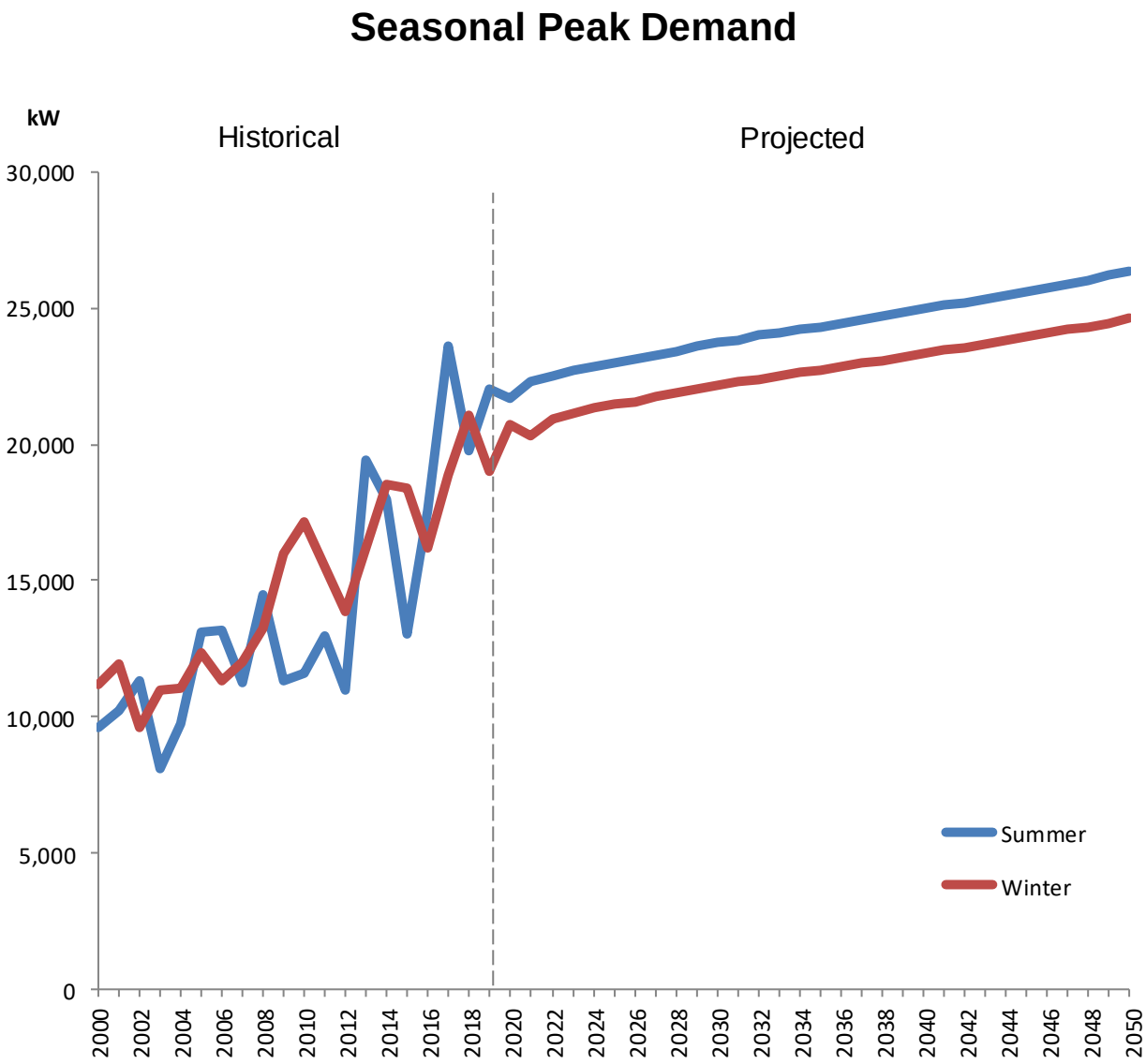
Number of Consumers by Consumer Classification

	Year	Total Residential	Small Commercial	Large Commercial	Irrigation	Total Consumers
Historical	2000	2,536	15	56	10	2,617
	2001	2,536	16	59	9	2,620
	2002	2,545	15	62	9	2,631
	2003	2,575	15	67	9	2,666
	2004	2,598	15	70	9	2,692
	2005	2,630	14	72	10	2,726
	2006	2,630	13	72	10	2,725
	2007	2,639	13	73	9	2,734
	2008	2,647	11	79	9	2,746
	2009	2,658	11	82	9	2,760
	2010	2,677	10	85	9	2,781
	2011	2,678	9	85	9	2,781
	2012	2,704	8	86	9	2,807
	2013	2,736	8	92	10	2,846
	2014	2,790	8	101	11	2,910
	2015	2,825	7	102	11	2,945
	2016	2,856	104	3	12	2,975
	2017	2,878	105	4	12	2,999
	2018	2,905	105	7	12	3,029
Projected	2019	2,916	106	10	12	3,044
	2020	2,928	106	13	12	3,059
	2021	2,939	107	16	12	3,074
	2022	2,950	108	19	12	3,089
	2023	2,962	109	22	12	3,105
	2024	2,973	109	24	12	3,118
	2025	2,984	110	26	13	3,133
	2026	2,996	110	29	13	3,148
	2027	3,007	111	31	13	3,162
	2028	3,019	111	33	13	3,176
	2029	3,030	112	36	13	3,191
	2030	3,041	113	38	13	3,205
	2031	3,053	113	40	13	3,219
	2032	3,064	114	43	13	3,234
	2033	3,075	114	45	13	3,247
	2034	3,087	115	47	13	3,262
	2035	3,098	115	49	13	3,275
	2036	3,109	116	51	13	3,289
	2037	3,121	116	53	13	3,303
	2038	3,132	117	55	13	3,317
	2039	3,144	117	57	14	3,332
	2040	3,155	118	59	14	3,346
	2041	3,166	118	61	14	3,359
	2042	3,178	118	63	14	3,373
	2043	3,189	119	65	14	3,387
	2044	3,201	119	67	14	3,401
	2045	3,212	120	69	14	3,415
	2046	3,223	121	71	14	3,429
	2047	3,235	121	73	14	3,443
	2048	3,246	122	75	14	3,457
	2049	3,258	122	78	14	3,472
	2050	3,269	123	80	14	3,486

Historical Average Compound Growth Rates:	2000-2018	0.82%	2014-2018	1.01%
Projected Average Compound Growth Rates:	2019-2050	0.44%	2019-2023	0.50%

6.4. Annual and Seasonal Demand, Annual Energy and Load Factors

Traverse Electric Cooperative's historical and projected annual and seasonal peaks, along with annual energy and load factors, is shown in the following graph and tables:



Traverse Electric Cooperative

Seasonal Peak Demand (kW)

	Winter Seasonal Peak			Summer Seasonal Peak		
	Year	Peak Demand	Percent Change	Year	Peak Demand	Percent Change
Historical	1999-2000	11,147	-6.06			
	2000-2001	11,961	7.30	2000	9,617	-4.73
	2001-2002	9,584	-19.87	2001	10,227	6.34
	2002-2003	10,945	14.20	2002	11,298	10.47
	2003-2004	11,012	0.61	2003	8,110	-28.22
	2004-2005	12,316	11.84	2004	9,733	20.01
	2005-2006	11,310	-8.17	2005	13,093	34.52
	2006-2007	11,991	6.02	2006	13,196	0.79
	2007-2008	13,260	10.58	2007	11,224	-14.94
	2008-2009	15,950	20.29	2008	14,501	29.20
	2009-2010	17,177	7.69	2009	11,300	-22.07
	2010-2011	15,483	-9.86	2010	11,569	2.38
	2011-2012	13,861	-10.48	2011	12,928	11.75
	2012-2013	16,200	16.87	2012	10,991	-14.98
	2013-2014	18,500	14.20	2013	19,426	76.74
	2014-2015	18,382	-0.64	2014	17,975	-7.47
	2015-2016	16,190	-11.92	2015	13,002	-27.67
	2016-2017	18,878	16.60	2016	17,547	34.96
	2017-2018	21,085	11.69	2017	23,632	34.68
				2018	19,788	-16.27
	2018-2019	18,991	-9.93	2019	22,037	11.37
	2019-2020	20,722	9.12	2020	21,703	-1.52
	2020-2021	20,338	-1.86	2021	22,314	2.82
	2021-2022	20,936	2.94	2022	22,525	0.95
	2022-2023	21,136	0.96	2023	22,726	0.89
	2023-2024	21,328	0.91	2024	22,854	0.57
	2024-2025	21,451	0.58	2025	22,978	0.54
	2025-2026	21,566	0.54	2026	23,140	0.70
	2026-2027	21,720	0.71	2027	23,295	0.67
	2027-2028	21,867	0.68	2028	23,429	0.58
	2028-2029	21,995	0.58	2029	23,635	0.88
	2029-2030	22,192	0.89	2030	23,741	0.45
Projected	2030-2031	22,290	0.44	2031	23,833	0.39
	2031-2032	22,375	0.38	2032	23,992	0.67
	2032-2033	22,524	0.67	2033	24,085	0.39
	2033-2034	22,611	0.39	2034	24,216	0.54
	2034-2035	22,735	0.55	2035	24,322	0.44
	2035-2036	22,834	0.44	2036	24,451	0.53
	2036-2037	22,956	0.53	2037	24,565	0.47
	2037-2038	23,065	0.47	2038	24,708	0.58
	2038-2039	23,201	0.59	2039	24,823	0.46
	2039-2040	23,309	0.47	2040	24,970	0.60
	2040-2041	23,451	0.61	2041	25,089	0.48
	2041-2042	23,564	0.48	2042	25,210	0.48
	2042-2043	23,680	0.49	2043	25,357	0.58
	2043-2044	23,820	0.59	2044	25,477	0.47
	2044-2045	23,934	0.48	2045	25,620	0.56
	2045-2046	24,071	0.57	2046	25,763	0.56
	2046-2047	24,208	0.57	2047	25,882	0.46
	2047-2048	24,321	0.47	2048	26,024	0.55
	2048-2049	24,457	0.56	2049	26,186	0.62
	2049-2050	24,611	0.63	2050	26,327	0.54

Average Compound Growth Rates:		
Historical **Winter** Demand:	2000-2018	3.60%
Projected **Winter** Demand:	2019-2050	0.84%
Historical **Summer** Demand:	2000-2018	4.09%
Projected **Summer** Demand:	2019-2050	0.58%

Traverse Electric Cooperative

Annual System Energy Requirements

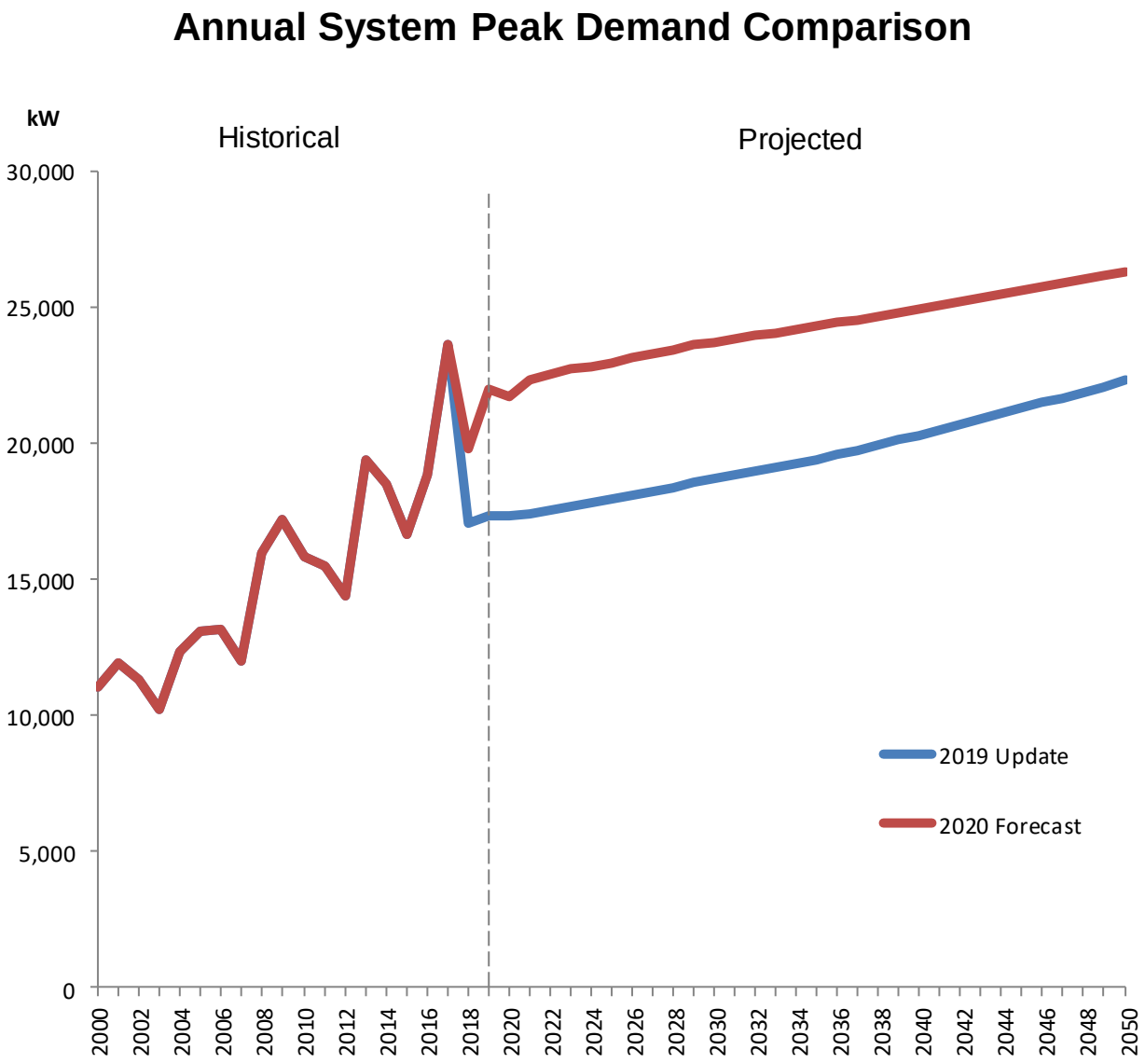
Peak Demand, Energy and Load Factors

	Year	Annual Peak (kW)	Percent Change	Annual Energy (MWh)	Percent Change	Annual Load Factor Percent
Historical	2000	11,065	-6.75	61,099	0.57	63.03
	2001	11,961	8.10	59,180	-3.14	56.48
	2002	11,298	-5.54	62,121	4.97	62.77
	2003	10,248	-9.29	58,071	-6.52	64.69
	2004	12,316	20.18	60,366	3.95	55.95
	2005	13,093	6.31	62,269	3.15	54.29
	2006	13,196	0.79	61,761	-0.82	53.43
	2007	11,991	-9.13	64,756	4.85	61.65
	2008	15,950	33.02	76,808	18.61	54.97
	2009	17,177	7.69	82,950	8.00	55.13
	2010	15,820	-7.90	79,429	-4.24	57.32
	2011	15,483	-2.13	77,967	-1.84	57.48
	2012	14,392	-7.05	75,748	-2.85	60.08
	2013	19,426	34.98	90,486	19.46	53.17
	2014	18,500	-4.77	97,170	7.39	59.96
	2015	16,639	-10.06	96,918	-0.26	66.49
	2016	18,878	13.46	97,408	0.51	58.90
	2017	23,632	25.18	104,048	6.82	50.26
	2018	19,788	-16.27	114,685	10.22	66.16
Projected	2019	22,037	11.37	118,258	3.12	61.26
	2020	21,703	-1.52	119,137	0.74	62.67
	2021	22,314	2.82	125,194	5.08	64.05
	2022	22,525	0.95	126,390	0.96	64.05
	2023	22,726	0.89	127,516	0.89	64.05
	2024	22,854	0.57	128,250	0.58	64.06
	2025	22,978	0.54	129,018	0.60	64.10
	2026	23,140	0.70	129,952	0.72	64.11
	2027	23,295	0.67	130,840	0.68	64.12
	2028	23,429	0.58	131,608	0.59	64.12
	2029	23,635	0.88	132,734	0.86	64.11
	2030	23,741	0.45	133,441	0.53	64.16
	2031	23,833	0.39	134,055	0.46	64.21
	2032	23,992	0.67	135,003	0.71	64.24
	2033	24,085	0.39	135,600	0.44	64.27
	2034	24,216	0.54	136,383	0.58	64.29
	2035	24,322	0.44	137,026	0.47	64.31
	2036	24,451	0.53	137,773	0.55	64.32
	2037	24,565	0.47	138,444	0.49	64.33
	2038	24,708	0.58	139,254	0.59	64.34
	2039	24,823	0.46	139,912	0.47	64.34
	2040	24,970	0.60	140,729	0.58	64.34
	2041	25,089	0.48	141,400	0.48	64.34
	2042	25,210	0.48	142,083	0.48	64.34
	2043	25,357	0.58	142,894	0.57	64.33
	2044	25,477	0.47	143,570	0.47	64.33
	2045	25,620	0.56	144,367	0.56	64.33
	2046	25,763	0.56	145,164	0.55	64.32
	2047	25,882	0.46	145,837	0.46	64.32
	2048	26,024	0.55	146,626	0.54	64.32
	2049	26,186	0.62	147,518	0.61	64.31
	2050	26,327	0.54	148,303	0.53	64.31

Average Compound Growth Rates:		
Historical Demand:	2000-2018	3.28%
Projected Demand:	2019-2050	0.58%
Historical Energy:	2000-2018	3.56%
Projected Energy:	2019-2050	0.73%

6.5. 2019 Update vs. 2020 Load Forecast Comparisons

Traverse Electric Cooperative's annual system peak demand comparisons from the 2019 update and 2020 Load Forecasts are shown in the following graph and table:



Traverse Electric Cooperative

Annual System Peak Demand Comparison (kW)

	2020 Forecast			Difference	2019 Update		
	Year	Annual Demand	Percent Change	2020 Forecast - 2019 Update	Year	Annual Demand	Percent Change
Historical	2000	11,065	-6.75	0	2000	11,065	-6.75
	2001	11,961	8.10	0	2001	11,961	8.10
	2002	11,298	-5.54	0	2002	11,298	-5.54
	2003	10,248	-9.29	0	2003	10,248	-9.29
	2004	12,316	20.18	0	2004	12,316	20.18
	2005	13,093	6.31	0	2005	13,093	6.31
	2006	13,196	0.79	0	2006	13,196	0.79
	2007	11,991	-9.13	0	2007	11,991	-9.13
	2008	15,950	33.02	0	2008	15,950	33.02
	2009	17,177	7.69	0	2009	17,177	7.69
	2010	15,820	-7.90	0	2010	15,820	-7.90
	2011	15,483	-2.13	0	2011	15,483	-2.13
	2012	14,392	-7.05	0	2012	14,392	-7.05
	2013	19,426	34.98	0	2013	19,426	34.98
	2014	18,500	-4.77	0	2014	18,500	-4.77
	2015	16,639	-10.06	0	2015	16,639	-10.06
	2016	18,878	13.46	0	2016	18,878	13.46
	2017	23,632	25.18	0	2017	23,632	25.18
	2018	19,788	-16.27	2,702	2018	17,086	-27.70
Projected	2019	22,037	11.37	4,678	2019	17,359	1.60
	2020	21,703	-1.52	4,381	2020	17,322	-0.21
	2021	22,314	2.82	4,914	2021	17,400	0.45
	2022	22,525	0.95	4,953	2022	17,572	0.99
	2023	22,726	0.89	5,017	2023	17,709	0.78
	2024	22,854	0.57	4,999	2024	17,855	0.83
	2025	22,978	0.54	5,015	2025	17,963	0.60
	2026	23,140	0.70	5,037	2026	18,103	0.78
	2027	23,295	0.67	5,047	2027	18,248	0.80
	2028	23,429	0.58	5,027	2028	18,402	0.84
	2029	23,635	0.88	5,075	2029	18,560	0.86
	2030	23,741	0.45	5,054	2030	18,687	0.69
	2031	23,833	0.39	5,008	2031	18,825	0.74
	2032	23,992	0.67	5,028	2032	18,964	0.74
	2033	24,085	0.39	4,970	2033	19,116	0.80
	2034	24,216	0.54	4,945	2034	19,271	0.81
	2035	24,322	0.44	4,890	2035	19,432	0.83
	2036	24,451	0.53	4,852	2036	19,598	0.86
	2037	24,565	0.47	4,789	2037	19,776	0.91
	2038	24,708	0.58	4,756	2038	19,952	0.89
	2039	24,823	0.46	4,689	2039	20,134	0.91
	2040	24,970	0.60	4,648	2040	20,322	0.94
	2041	25,089	0.48	4,575	2041	20,514	0.94
	2042	25,210	0.48	4,506	2042	20,704	0.93
	2043	25,357	0.58	4,460	2043	20,897	0.93
	2044	25,477	0.47	4,383	2044	21,094	0.94
	2045	25,620	0.56	4,328	2045	21,292	0.94
	2046	25,763	0.56	4,272	2046	21,491	0.94
	2047	25,882	0.46	4,187	2047	21,695	0.95
	2048	26,024	0.55	4,128	2048	21,896	0.93
	2049	26,186	0.62	4,081	2049	22,105	0.95
	2050	26,327	0.54	4,010	2050	22,317	0.96

Average Compound Growth Rates:

Historical 2019 Update:	2000-2017	4.56%
Projected 2019 Update:	2018-2050	0.84%
Historical 2020 Forecast:	2000-2018	3.28%
Projected 2020 Forecast:	2019-2050	0.58%

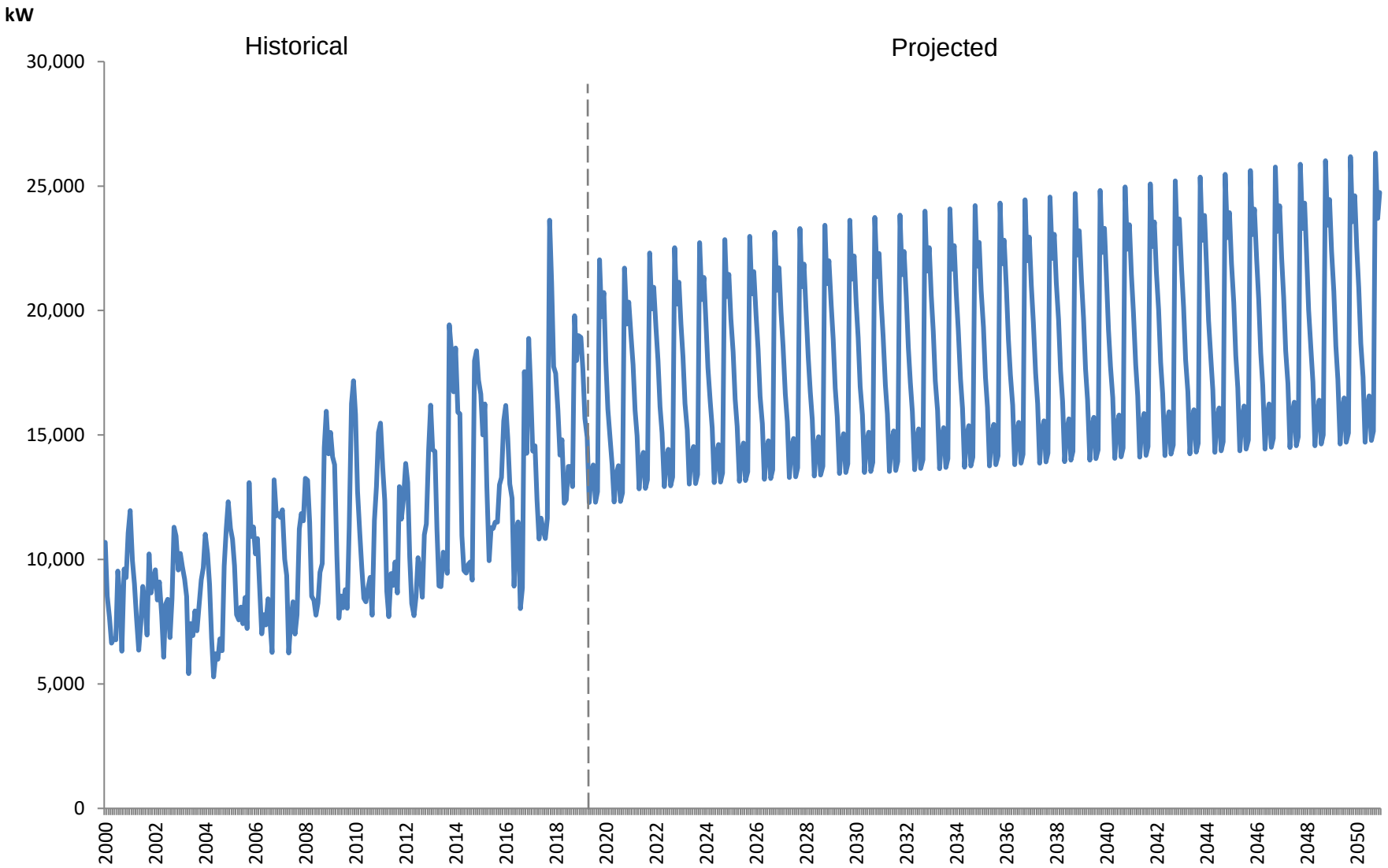
7. System Requirements

Monthly System Demand and Energy Requirements

Projected annual energy requirements are converted to monthly energy and demand forecasts using historical and anticipated monthly energy patterns and load factors. Historical weather patterns are used for determining what affected previous monthly energy and load factor distributions. For each of these, an econometric model using historical per unit patterns and load factors were developed based on actual weather patterns. These patterns were then evaluated for the best fit and applied to forecast projections to allocate annual forecasts to monthly values as well as the load factors used to determine monthly demand purchases. This section contains all monthly demand and energy purchases determined by historical monthly energy and demand patterns and are based on 15 year average weather variables.

Traverse Electric Cooperative

Demand Purchases



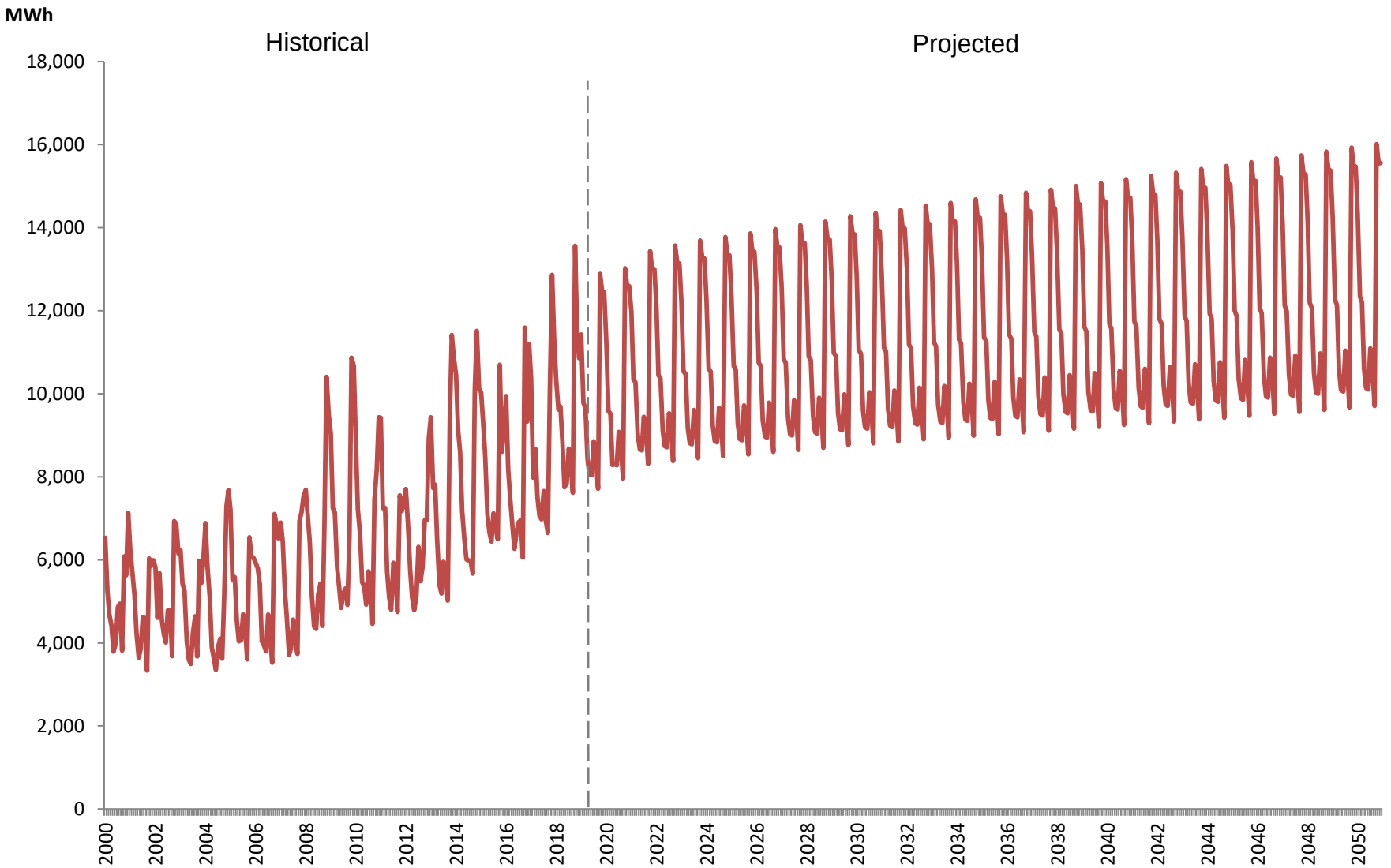
Traverse Electric Cooperative

Demand Purchases (kW)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Historical	2000	10,687	8,534	7,664	6,643	6,808	6,769	9,532	8,460	6,319	9,617	9,271	11,065	101,369
	2001	11,961	9,953	9,023	7,673	6,352	7,384	8,920	8,345	6,964	10,227	8,658	9,168	104,628
	2002	9,584	8,369	9,101	7,776	6,076	8,204	8,398	6,858	8,408	11,298	10,945	9,580	104,597
	2003	10,248	9,720	9,212	8,512	5,409	7,427	6,946	7,934	7,134	8,110	9,182	9,665	99,499
	2004	11,012	10,235	8,992	6,850	5,282	6,214	5,989	6,807	6,339	9,733	11,197	12,316	100,966
	2005	11,249	10,807	9,749	7,780	7,575	8,091	7,422	8,469	7,225	13,093	10,919	11,310	113,689
	2006	10,222	10,843	9,010	7,010	7,778	7,368	8,420	7,466	6,268	13,196	11,750	11,845	111,176
	2007	11,688	11,991	10,015	9,353	6,241	7,636	8,299	7,001	7,783	11,224	11,839	11,546	114,616
	2008	13,260	13,185	11,503	8,523	8,360	7,760	8,246	9,484	9,838	14,501	15,950	14,248	134,858
	2009	15,107	14,126	13,810	10,182	7,639	8,533	8,057	8,787	8,037	11,300	16,257	17,177	139,012
	2010	15,820	12,740	11,048	9,643	8,444	8,302	8,873	9,277	7,759	11,569	12,922	15,100	131,497
	2011	15,483	13,677	12,358	8,720	7,707	9,435	8,962	9,904	8,654	12,928	11,621	12,404	131,853
	2012	13,861	13,088	10,088	8,225	7,738	8,506	10,072	9,436	8,486	10,991	11,431	14,392	126,314
	2013	16,200	14,410	14,345	11,222	8,942	8,910	10,295	10,026	9,442	19,426	18,301	16,732	158,251
	2014	18,500	15,916	15,858	10,952	9,554	9,456	9,794	9,900	9,174	17,975	18,382	17,196	162,657
	2015	16,639	15,000	16,245	12,918	9,948	11,280	11,245	11,501	11,503	13,002	13,294	15,567	158,142
	2016	16,190	14,882	13,032	12,461	8,923	11,179	11,514	8,031	8,857	17,547	14,264	18,878	155,758
	2017	16,827	14,352	14,570	12,395	10,823	11,660	11,141	10,844	11,655	23,632	21,085	17,750	176,734
	2018	17,473	15,997	14,194	14,814	12,258	12,389	13,740	13,738	12,925	19,788	17,986	18,991	184,293
Projected	2019	18,924	17,625	15,659	14,910	12,286	13,475	13,797	12,301	12,727	22,037	19,749	20,722	194,213
	2020	17,947	16,045	14,849	13,798	12,313	13,426	13,766	12,325	12,669	21,703	19,460	20,338	188,640
	2021	19,118	17,830	15,991	14,960	12,832	13,971	14,306	12,851	13,205	22,314	20,069	20,936	198,382
	2022	19,297	17,992	16,134	15,086	12,931	14,083	14,426	12,953	13,309	22,525	20,260	21,136	200,133
	2023	19,468	18,146	16,271	15,206	13,027	14,190	14,540	13,051	13,408	22,726	20,442	21,328	201,803
	2024	19,577	17,708	16,358	15,283	13,088	14,259	14,613	13,114	13,471	22,854	20,559	21,451	202,335
	2025	19,678	18,334	16,437	15,351	13,142	14,320	14,681	13,171	13,527	22,978	20,669	21,566	203,855
	2026	19,814	18,456	16,546	15,446	13,218	14,405	14,773	13,249	13,606	23,140	20,816	21,720	205,189
	2027	19,946	18,575	16,651	15,538	13,291	14,488	14,861	13,324	13,682	23,295	20,957	21,867	206,474
	2028	20,059	18,126	16,741	15,618	13,354	14,559	14,937	13,389	13,747	23,429	21,078	21,995	207,032
	2029	20,235	18,837	16,883	15,744	13,453	14,669	15,054	13,489	13,851	23,635	21,265	22,192	209,307
	2030	20,321	18,911	16,949	15,799	13,497	14,721	15,112	13,537	13,896	23,741	21,360	22,290	210,135
	2031	20,393	18,974	17,005	15,846	13,535	14,764	15,161	13,578	13,935	23,833	21,441	22,375	210,839
	2032	20,525	18,526	17,109	15,936	13,607	14,846	15,250	13,653	14,009	23,992	21,584	22,524	211,562
	2033	20,601	19,159	17,168	15,987	13,647	14,892	15,301	13,696	14,051	24,085	21,667	22,611	212,865
	2034	20,710	19,256	17,254	16,062	13,706	14,960	15,374	13,758	14,113	24,216	21,785	22,735	213,930
	2035	20,798	19,334	17,323	16,121	13,753	15,014	15,433	13,808	14,162	24,322	21,880	22,834	214,783
	2036	20,906	18,853	17,409	16,196	13,813	15,081	15,505	13,869	14,223	24,451	21,996	22,956	215,258
	2037	21,002	19,517	17,486	16,263	13,866	15,140	15,569	13,924	14,278	24,565	22,100	23,065	216,776
	2038	21,123	19,626	17,582	16,348	13,933	15,216	15,651	13,993	14,349	24,708	22,229	23,201	217,960
	2039	21,220	19,713	17,659	16,416	13,987	15,276	15,715	14,048	14,404	24,823	22,333	23,309	218,905
	2040	21,346	19,237	17,761	16,506	14,058	15,356	15,800	14,121	14,478	24,970	22,467	23,451	219,551
	2041	21,447	19,919	17,841	16,577	14,115	15,419	15,867	14,179	14,537	25,089	22,575	23,564	221,129
	2042	21,550	20,012	17,924	16,650	14,172	15,484	15,936	14,237	14,597	25,210	22,685	23,680	222,137
	2043	21,675	20,125	18,024	16,738	14,243	15,563	16,020	14,309	14,670	25,357	22,818	23,820	223,363
	2044	21,777	19,613	18,106	16,810	14,300	15,626	16,088	14,367	14,729	25,477	22,927	23,934	223,753
	2045	21,899	20,328	18,204	16,897	14,369	15,703	16,170	14,437	14,801	25,620	23,057	24,071	225,556
	2046	22,021	20,439	18,302	16,984	14,438	15,780	16,252	14,507	14,872	25,763	23,187	24,208	226,753
	2047	22,123	20,530	18,383	17,055	14,494	15,844	16,320	14,565	14,931	25,882	23,295	24,321	227,743
	2048	22,244	20,021	18,480	17,141	14,562	15,920	16,401	14,635	15,002	26,024	23,424	24,457	228,309
	2049	22,382	20,765	18,591	17,239	14,640	16,007	16,493	14,714	15,083	26,186	23,571	24,611	230,280
	2050	22,502	20,873	18,687	17,324	14,708	16,082	16,574	14,783	15,153	26,327	23,699	24,746	231,456

Traverse Electric Cooperative

Energy Purchases



Traverse Electric Cooperative

Energy Purchases (MWh)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Historical	2000	6,531	5,240	4,661	4,417	3,790	3,990	4,862	4,946	3,813	6,084	5,629	7,136	61,099
	2001	6,181	5,675	5,151	4,232	3,642	3,872	4,615	4,602	3,336	6,033	5,850	5,991	59,180
	2002	5,821	4,606	5,683	4,565	4,214	4,012	4,784	4,798	3,679	6,935	6,872	6,152	62,121
	2003	6,238	5,431	5,257	4,025	3,597	3,495	4,226	4,640	3,674	5,982	5,443	6,063	58,071
	2004	6,884	5,826	5,086	3,888	3,635	3,350	3,900	4,099	3,619	5,101	7,295	7,683	60,366
	2005	7,204	5,526	5,587	4,536	4,037	4,072	4,689	4,350	3,599	6,542	6,076	6,051	62,269
	2006	5,934	5,798	5,420	4,041	3,945	3,798	4,687	4,127	3,525	7,102	6,868	6,516	61,761
	2007	6,897	6,432	5,275	4,606	3,710	3,888	4,562	4,052	3,735	6,939	7,139	7,521	64,756
	2008	7,689	7,038	6,417	5,139	4,391	4,336	5,163	5,432	4,408	6,896	10,409	9,490	76,808
	2009	9,043	7,242	7,145	5,827	5,346	4,844	5,176	5,310	4,914	6,559	10,868	10,676	82,950
	2010	8,896	7,228	6,608	5,465	5,377	4,923	5,723	5,672	4,459	7,463	8,181	9,434	79,429
	2011	9,422	7,243	7,250	5,709	5,090	4,798	5,929	5,674	4,746	7,556	7,179	7,371	77,967
	2012	7,704	6,813	5,771	5,089	4,790	5,126	6,312	5,486	5,813	6,959	6,956	8,929	75,748
	2013	9,432	7,730	7,812	6,474	5,400	5,191	5,953	5,813	5,021	9,374	11,417	10,869	90,486
	2014	10,448	9,118	8,588	7,174	6,476	6,008	5,986	5,981	5,670	10,097	11,516	10,108	97,170
	2015	10,043	9,311	8,523	7,097	6,655	6,439	7,122	6,760	6,498	10,696	8,598	9,176	96,918
	2016	9,947	8,211	7,486	6,814	6,264	6,658	6,910	6,950	6,057	11,590	9,333	11,188	97,408
	2017	10,355	7,982	8,674	7,505	7,059	6,976	7,655	6,948	6,647	10,026	12,863	11,358	104,048
	2018	10,344	9,620	9,693	8,829	7,751	7,848	8,682	8,366	7,618	13,564	11,511	10,859	114,685
Projected	2019	11,428	9,781	9,661	8,434	8,053	8,041	8,858	8,492	7,710	12,888	12,455	12,457	118,258
	2020	11,203	9,579	9,525	8,283	8,307	8,277	9,079	8,721	7,955	13,022	12,593	12,593	119,137
	2021	11,977	10,338	10,279	9,023	8,666	8,636	9,446	9,084	8,310	13,432	13,001	13,002	125,194
	2022	12,098	10,441	10,379	9,105	8,742	8,712	9,532	9,165	8,383	13,566	13,133	13,134	126,390
	2023	12,212	10,539	10,472	9,183	8,814	8,783	9,612	9,242	8,451	13,692	13,257	13,259	127,516
	2024	12,287	10,602	10,533	9,234	8,861	8,830	9,664	9,292	8,495	13,774	13,338	13,340	128,250
	2025	12,365	10,669	10,597	9,287	8,910	8,879	9,719	9,344	8,542	13,859	13,422	13,425	129,018
	2026	12,460	10,750	10,674	9,352	8,969	8,938	9,786	9,407	8,599	13,964	13,525	13,528	129,952
	2027	12,550	10,827	10,748	9,413	9,026	8,995	9,849	9,467	8,652	14,063	13,623	13,627	130,840
	2028	12,628	10,893	10,812	9,467	9,075	9,043	9,904	9,519	8,699	14,149	13,707	13,712	131,608
	2029	12,742	10,991	10,905	9,545	9,147	9,115	9,984	9,596	8,767	14,275	13,831	13,836	132,734
	2030	12,814	11,052	10,964	9,593	9,192	9,160	10,035	9,644	8,810	14,354	13,909	13,914	133,441
	2031	12,876	11,105	11,015	9,636	9,231	9,199	10,078	9,685	8,847	14,423	13,977	13,983	134,055
	2032	12,972	11,187	11,094	9,702	9,292	9,259	10,146	9,750	8,904	14,529	14,081	14,087	135,003
	2033	13,033	11,239	11,143	9,743	9,330	9,297	10,189	9,790	8,941	14,595	14,147	14,153	135,600
	2034	13,112	11,307	11,208	9,797	9,380	9,347	10,245	9,843	8,988	14,683	14,233	14,240	136,383
	2035	13,177	11,363	11,262	9,842	9,421	9,388	10,290	9,887	9,027	14,755	14,303	14,311	137,026
	2036	13,253	11,428	11,324	9,893	9,468	9,435	10,344	9,938	9,072	14,838	14,386	14,394	137,773
	2037	13,321	11,486	11,379	9,940	9,511	9,478	10,392	9,983	9,113	14,913	14,460	14,468	138,444
	2038	13,403	11,556	11,447	9,996	9,563	9,529	10,449	10,038	9,162	15,004	14,549	14,558	139,254
	2039	13,470	11,613	11,501	10,041	9,605	9,571	10,496	10,083	9,202	15,078	14,621	14,631	139,912
	2040	13,553	11,684	11,569	10,098	9,657	9,623	10,555	10,138	9,251	15,169	14,711	14,721	140,729
	2041	13,621	11,742	11,625	10,144	9,700	9,666	10,602	10,184	9,292	15,244	14,785	14,795	141,400
	2042	13,691	11,801	11,682	10,192	9,743	9,709	10,651	10,230	9,333	15,320	14,860	14,871	142,083
	2043	13,773	11,871	11,749	10,248	9,795	9,761	10,709	10,285	9,382	15,411	14,949	14,961	142,894
	2044	13,841	11,930	11,805	10,295	9,838	9,804	10,757	10,331	9,423	15,487	15,024	15,035	143,570
	2045	13,922	11,999	11,871	10,350	9,889	9,854	10,814	10,385	9,472	15,576	15,111	15,124	144,367
	2046	14,003	12,068	11,937	10,405	9,940	9,905	10,871	10,439	9,520	15,665	15,199	15,212	145,164
	2047	14,072	12,126	11,993	10,451	9,983	9,948	10,919	10,485	9,561	15,740	15,273	15,286	145,837
	2048	14,152	12,195	12,059	10,506	10,033	9,998	10,975	10,538	9,608	15,828	15,360	15,374	146,626
	2049	14,242	12,272	12,133	10,568	10,090	10,055	11,039	10,599	9,662	15,928	15,458	15,472	147,518
	2050	14,322	12,340	12,198	10,622	10,140	10,104	11,095	10,652	9,710	16,016	15,545	15,559	148,303