

WAPA IRP

Cooperative Filing

for the cities of:

**Beresford, South Dakota
Brookings, South Dakota
Flandreau, South Dakota
Fort Pierre, South Dakota
Hillsboro, North Dakota
Pierre, South Dakota
Vermillion, South Dakota
Watertown, South Dakota
Winner, South Dakota
Valley City, North Dakota**

September 1, 2019

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I. MRES Resource Planning

A. *Overview*

Missouri River Energy Services (MRES) is a member-based joint-action agency, headquartered in Sioux Falls, South Dakota, with 61 member municipalities in the states of Iowa, Minnesota, North Dakota, and South Dakota. Of its 61 members, 58 are S-1 customers, each of whom receives hydroelectric preference power from the Western Area Power Administration (WAPA). These members purchase power from MRES to meet their needs over and above their WAPA allocations. In 2017 all MRES S-1 members took action to extend the S-1 agreements to 2057.

All of the MRES S-1 members receive hydroelectric preference allocations from WAPA and have purchase power agreements with WAPA to deliver power and energy from those allocations. The member cities purchase all supplemental power from MRES. Because of this contractual arrangement, all the supply-side resource planning is conducted by MRES on behalf of its members.

Conversely, the member cities own and operate their own distribution systems and perform all interfacing with the retail customer. Thus the member cities have the lead responsibility for demand-side and customer efficiency programs with assistance being available from MRES.

This document describes the overall process of coordinating the supply-side and demand-side planning into a cohesive, least-cost integrated resource plan.

B. *Resource Plan Goals*

MRES endeavored to meet the requirements of the applicable state statutes and WAPA standards for integrated resource plans. In the analysis of the scenarios for the capacity expansion modeling, MRES balanced the needs of the members with that of the environment. MRES is committed to maintaining the reliability of power supply, while providing predictability and reasonableness of rates for residential, commercial, and industrial customers. At the same time, MRES is also committed to expansion of its renewable resources and taking an active role in conservation measures. In the analysis of various scenarios, environmental concerns such as emissions were evaluated and also balanced with such considerations as the need for firm base load power and stabilization of energy costs. The analysis of the various scenarios in the context of these goals resulted in a choice of resource mix that is environmentally responsible, cost-effective, and balanced.

More specifically, the resource planning goals of MRES are to:

Study Goal 1: Maintain the Adequacy and Reliability of Power Supply.

To meet this goal, load projections were developed for MRES power supply members, including the amounts required for SPP and MISO planning reserves. The focus of this study goal was to determine the lowest-cost, reliable plan which

optimizes the amount of resources, while meeting capacity requirements. It necessitates the evaluation of a variety of options, including baseload, natural gas combined cycle (NGCC), integrated gasification combined cycle (IGCC), combustion turbine (CT) units, wind turbines, and solar units for the MRES resource mix.

Study Goal 2: Keep Members' Wholesale Rates Competitive.

The primary objective of this goal is to minimize the overall long-term power supply costs to MRES member communities. Capacity expansion modeling was utilized to determine the least-cost resource mix (both demand-side and supply-side) under a number of different scenarios. The analysis examined these resource combinations over the 2019 through 2040 timeframe.

Study Goal 3: Minimize Adverse Socioeconomic and Environmental Effects.

The referenced cases all applied Minnesota Public Utilities Commission-approved environmental externality prices and considered expected costs for mercury and SO₂ allowances when computing the least-cost plan. Various CO₂ emission cost values were explored. Those externalities and emission cost values were calculated using all MRES firm load, not just the Minnesota portion of the MRES loads. Several of the cases and scenarios specifically considered renewable resources, using wind for renewable energy for the purpose of meeting this study goal.

Another specific criterion of this goal was the inclusion of resources to meet the renewable resource objectives established by the MRES board. MRES is committed to achieving the Minnesota RES, supplying 20 percent by 2020, and 25 percent by 2025. MRES presently meets the renewable energy goals for its Minnesota load and has resources in place to meet it for the next several years. MRES also has adequate resources to supply at least 10 percent of its load in the other states with renewable resources.

A major component of minimizing environmental impacts is to fully implement conservation and DSM. As described earlier, MRES commissioned Morgan Marketing Partners to perform a DSM potential study, the results of which were incorporated into this resource plan. MRES is undertaking efforts to implement cost-effective DSM measures throughout its membership. In addition, MRES is assisting its Minnesota members with meeting the CIP (Conservation Improvement Program) requirement, which includes DSM amounts in addition to what was found feasible by Morgan Marketing Partners.

Study Goal 4: Enhance the Ability of MRES to Respond to Changes and to Limit Risks.

In meeting this goal, the resource plan discusses and analyzes several of the potential risks MRES could face. These risks, along with several other significant risks related to resource planning, were addressed with several sensitivity analyses.

C. *Load Forecasting*

The MRES load forecasts are based upon a short-term forecast blended into a long-term econometric forecast. Each forecast predicts the aggregate total usage for each member city for each month of the forecast horizon. By subtracting the allocated amounts of WAPA demand and energy, the monthly MRES demand and energy sales to each member is obtained.

The following steps were followed to develop a load forecast for each member municipality.

i. Develop Long-Term Forecast

This includes updating the historical files for monthly energy usage and all of the independent variables, forecasting values for independent (explanatory) variables, generating long-term energy models for each member, including any spot load adjustments; and selecting a final long-term energy model for each member.

Annual data for variables believed to be useful in predicting total energy were input into a software package called MetrixND® and regression models were constructed for each city. The city total energy was the dependent variable for each model. Possible independent variables included county census data for the county in which the city is located, weather data from the nearest weather station, national economic statistics, and alternate fuel prices for the region. A number of possible models were tested for each city, and certain criteria were scrutinized in order to find a model that was statistically sound and provided a reasonable expected growth rate. Models were selected primarily based on adjusted R-square, Mean Absolute Percentage Error (MAPE), T-statistics, and Durbin-Watson statistics. The long-term forecast was based on a regression analysis of annual historical data from 1980 through 2016 and created annual energy forecasts through 2040.

ii. Develop Short-Term Forecast

Independent of the long-term modeling process, the short-term forecasts were generated using a multiple regression analysis. For the last five years of the analysis, monthly city total energy was the dependent variable for each model.

The primary independent variables included monthly cooling, heating, and total degree days for the weather station representing the city. The logarithmic transformations of the degree days could also be selected as independent variables. At least one weather variable was used in each model. Additionally, no more than two weather variables could be included per model.

Both the one-month and twelve-month lagged energy variables were included in some models, if necessary, to achieve acceptable statistical results. The logarithmic transformations of one-month and twelve-month lags were made available as independent variables. Only one lag variable or transformation thereof could be included per model.

A linear trend variable and the logarithmic transformation of the linear trend were included in some models, if necessary, to achieve acceptable statistical results. Any long-term growth (or negative growth) realized by the cities should be accounted for by including a trend component. A maximum of one trend or transformation of a trend variable was allowed per model.

Monthly binary variables were used to account for the monthly variation in energy sales. Binary variables take the value of one or zero depending upon a condition occurring or not occurring. There were 11 binary variables, with the first binary variable, d1, being equal to 1 for January, and the other ten binary variables being equal to 0 in January. The second binary variable, d2 is equal to 1 for February, and the other ten binary variables being equal to 0 for February, and so on. It is mandatory in regression modeling that one month does not have a binary variable, in order that some base level is set, and subsequent months are either an addition or a subtraction to that base level. Subsequently, the constant is the 12th binary variable. In this case, December was the month not represented by a binary variable. All 11 monthly binary variables were forced into each regression model.

iii. Blend Short-Term and Long-Term Forecasts

The short-term forecasts were used for each member through the remainder of the current year and one additional year. After that year, each member's annual growth rates from the long-term forecasts were used to extend the forecasted energy into a long-term "blended" base forecast that extends to the year 2040.

iv. Calculate MRES vs. WAPA Loads

Once the forecasted values were obtained, the forecasts for each member were processed by a calculation that splits the energy and demand between WAPA and MRES. The amount of energy and demand that a member receives from WAPA is called the Contract Rate of Delivery (CROD), and is based on a formula specified in the WAPA firm power contracts of each member.

Under the Fixed CROD method, each city is assigned a monthly allocation of demand and a monthly allocation of energy from WAPA. Any amount of demand or energy exceeding that monthly allocation is provided by MRES. The allocations are the same from year to year for each city, although they vary each month within the year. Also, the allocations were reduced by approximately 4% in January 2001 to allow WAPA to create new allocations for certain new customers and Native American loads, and were reduced again by 0.25% in January 2006 to create new allocations for additional WAPA customers. One percent reductions in WAPA allocations are expected in January 2031 and are included in the calculations done for this filing.

Once the WAPA allocations are subtracted from the city loads, the remainder is the amount that MRES supplies to each city.

The load factors of the WAPA allocations do not change from year to year and are different from the load factors of the cities. Because MRES serves the portion of each city's load not supplied by WAPA, the MRES sales also have a different load factor than each city's total load.

v. *Calculate MRES Generation Requirements*

MRES must also plan to supply reserve capacity for the control areas in which it operates. Currently, MRES is operating in two areas; Southwest Power Pool (SPP), and Midwest Independent System Operators (MISO).

MISO rules specify that adequate capacity be designated to meet forecasted loads plus losses and a Planning Reserve Margin (PRM). The load forecast previously described in this document is reduced by a diversity factor since our loads are not expected to peak at the same time as the MISO peak. These values are then scaled up for losses (losses vary depending on the area), and a 7.9% PRM is applied. The resulting values represent the total load requirement that MRES is responsible for serving.

In measuring the capacity that accrues towards the requirement, the utility first defines each unit's Installed Capability (ICAP) based on annual tests. MISO then discounts the ICAP value to account for historical or typical forced outage rates to obtain the Unforced Capability (UCAP) rating. Only the smaller UCAP amount may accrue towards meeting the capacity requirement.

A utility designates how much of each unit it wishes to designate for the planning year, by converting some or all of each unit's UCAP rating to Planning Resource Credits (PRC). Each PRC is equivalent to 1 MW of UCAP.

In this resource plan, MRES is designating as PRC all of its accredited generating resources that are in the MISO market area. Since that amount is inadequate to meet the total capacity required, MRES has also entered into several capacity purchase contracts, which greatly reduces the MISO capacity deficit. Any projected shortage not covered by generating units or capacity contracts is covered by purchasing PRCs in the annual auction conducted by MISO.

SPP employs a similar method as MISO, with a few key differences. The load forecast previously described in this document is reduced by the historic MRES diversity factor of 2.5%, then scaled up by 4% to include losses. A PRM of 12% is then applied. Units are not derated in SPP as they are in MISO. MRES has excess capacity in the SPP area, and has entered into several capacity sale contracts, using that revenue to offset the expense of capacity purchases in MISO. SPP does not currently provide a market for the auction of capacity credits.

D. *Generation Resources*

MRES, either directly or through its contracts with Western Minnesota, has the following generation capacity:

- Laramie River Station (LRS): 280 MW
- Exira Station: 140 MW
- Point Beach Nuclear Plant: 42.5 MW under contract with Wisconsin Public Power Inc. through 2030, with reduced amounts through 2033.
- Watertown Peaking Plant (WPP): 50 MW
- Municipal Capacity: 148.5 MW
- Red Rock Hydro Project: Expected to be operational 2021 at 36.5 MW
- Each S-1 member city receives a monthly allocation of WAPA demand and energy, totaling approximately 318 MW during the summer season

In addition to the accredited capacity, MRES has limited unaccredited capacity, as identified in the Resource Plan. MRES continues to receive the output from wind projects located in Worthington, Moorhead, Marshall, and Odin, Minnesota; Rugby, North Dakota; and Hancock County Iowa totaling over 83 MW. MRES also installed a 1 MW solar facility in Pierre, SD.

E. MRES Resource Planning Development

This section includes a summary of the capacity expansion study process. Included is a description of the resource options considered in the resource planning combinations, a summary of the risks to be studied in the scenario analysis, and a summary of the generation and transmission resource planning results.

i. Modeling Method

MRES utilizes ABB Capacity Expansion[®] capacity expansion software in the development of the resource plan. This methodology allows base load and peaking resources to compete with renewable energy resources, conservation, and energy efficiency in developing the resource plan that minimizes costs. Once the optimal resource mix was identified and the Base Case was developed, several scenarios were analyzed to determine the financial risk associated with unexpected events.

ii. Needs for Additional Capacity and Energy

No thermal units are planned to be installed until 2022, however MRES is currently capacity deficit in MISO and we will continue to make capacity purchases to meet reserve requirements. In addition to future thermal additions our capacity expansion modeling also assumes approximately 85.7 MW of DSM by 2040, and 80 MW of newly installed wind turbines.

iii. Resource Options Considered

Many different resource options were considered for the capacity expansion modeling, but only a subset of the options were chosen for detailed study after considering their relative costs and availability. When selecting potential resources for detailed study, consideration was given to several factors:

- Geographic Diversity – It is desirable for MRES resources to be located across a broad geographic area. This minimizes the chance for a single transmission outage to significantly impact the ability to serve MRES loads.
- Reliability – MRES prefers to add resources that are of a proven technology. This minimizes the severity of unexpected forced outages.
- Dispatchability – With the exception of future wind resources, it is assumed that all future generation should be dispatchable. This is essential for MRES to be able to meet its demand on peak days.
- Other risk factors – Other factors affecting the operation of any future resources were considered, such as the price and availability of fuel.

After this screening process, purchase or build options were considered for these standard types of resources:

1. Base load: An Integrated Gasification Combined Cycle (IGCC)
2. Peaking: Natural Gas-fired Simple-Cycle Combustion Turbine (CT) units.
3. Peaking #2: Reciprocating Natural Gas-fired Combustion Turbine units.
4. Intermediate: Natural Gas-fired Combined Cycle (NGCC) units.
5. Renewable #1: 1000 kW Wind Turbines with a 35% assumed plant factor and 15% accreditation installed in 100 MW farm sizes.
6. Renewable #2: 1000 kW Solar Unites with a 20% assumed plant factor and 27% accreditation installed in 100 MW farm sizes.
7. DSM (Demand Side Management): 85.7 of DSM (coincident with the MRES peak) by 2040 was forced into all of the capacity expansion models.

iv. Future DSM Activities

As part of its ongoing efforts, MRES commissioned Morgan Marketing Partners to perform a DSM Potential Study. The final report for the study was completed in October 2014. This study determined (1) the Technical Potential (Identify measures that are technically feasible); (2) the Economic Potential (Identify measures that are cost-effective); and (3) the Market Potential (Identify level of uptake that can be expected based on a reasonable level of intervention in the market to overcome adoption barriers).

The Technical Potential estimates the amount of DSM that is technically feasible, ignoring any adoption barriers or economic factors. It considers the energy savings, demand savings, number of eligible units or buildings, technology saturation, technology penetration, and measure lifetime.

The Economic Potential reduces those estimates to account for any measures that would be infeasible due to economic or long payback considerations. Besides the factors used for the Technical Potential, it considers incremental cost, the retail values of energy, and the participant’s benefit-cost ratio for each measure.

Finally, the Market Potential further reduces the estimates to account for certain adoption barriers. It also considers a market barrier level (based on a diffusion curve for adoption of new technologies), free ridership levels, and a degradation of savings rate.

Once the DSM programs were screened through the above process, MRES staff used the results of the potential study to group the DSM programs into eleven DSM Portfolios. This step reduced the volume to a manageable number to be evaluated in this analysis. Similar programs were grouped together, with the resulting portfolios and the potential MW savings by 2040 listed below:

• Commercial & Industrial Compressed Air	7.0 MW
• Commercial & Industrial Low Load Factor	0.2 MW
• Commercial & Industrial High Load Factor	2.2 MW
• Commercial & Industrial HVAC	6.7 MW
• Commercial & Industrial Lighting	18.6 MW
• Commercial & Industrial Refrigeration	0.5 MW
• Commercial & Industrial Food Service	0.1 MW
• Residential Appliances	0.5 MW
• Residential HVAC	27.8 MW
• Residential Lighting	5.9 MW
• Direct Load Control	16.2 MW
TOTAL	85.7 MW

These portfolios were forced into the capacity expansion analysis. As a result, the model built less generating capacity, purchased less energy on the market, and generated less energy. The model also estimated the costs of administering the DSM programs, and providing incentives to customers.

v. *Renewable Energy Resources*

MRES has existing renewable energy resources and is planning renewable resource additions as an integral part of the resource planning process. The expansion of renewable resources in the MRES portfolio is important to meeting its mission to provide environmentally responsible energy and to make a good faith effort in meeting Minnesota’s Renewable Energy Standard (RES), North and South Dakota’s Renewable Energy Objectives (REO), and Iowa’s Alternative Energy Purchase (AEP). MRES continues to receive the output from wind projects located in Worthington, Moorhead, Marshall, and Odin, Minnesota; Hancock County, Iowa; and Rugby, North Dakota totaling over 83 MW. MRES has also installed a 1 MW solar facility in Pierre, SD. In addition to this existing generation, MRES plans to commission 36.5 MW at the Red Rock Hydro Project by 2021, and construct or contract an additional 80 MW of wind generation by

2037 to comply with the state requirements mentioned above. These future wind and hydro installations were forced into the model as a minimum, with the model being able to voluntarily add more if found to be economical.

vi. Emission Costing

MRES used the emission externality costs for SO₂, PM₁₀, CO, NO_x, and lead as approved by the Minnesota Public Utilities Commission (PUC) for each case for all new resources. Because all current and future fossil-fuel resources of MRES are located outside of Minnesota, the costs were based on the Minnesota environmental externality values as published by the Minnesota PUC for resources within 200 miles of the state, inflation adjusted. The published Minnesota CO₂ externality price was zero for such resources, but a CO₂ costs of \$21.50 and \$34 per ton were considered in several alternative scenarios.

F. Resource Planning Results

After accounting for all of the details listed above, Capacity Expansion software modeling indicated that the preferred expansion plan for MRES is 167.6 MW of Combustion Turbine (CT) in 2022 and another 83.8 MW CT unit in 2026. Also included in the model is 80 MW of wind for RES compliance and 85.7 MW of DSM by 2040. Multiple alternative scenarios were also evaluated to consider various effects, such as low or high load forecasts, or low or high natural gas prices.

G. Implementation

As a wholesale power supplier, it is the responsibility of MRES to provide all supplemental power supply to MRES S-1 member utilities. Prior to 2006, energy efficiency programs were the responsibility of each individual MRES member since MRES did not have a direct relationship with its members' retail customers and since energy efficiency programs are implemented at the retail level. In an effort to bridge the traditional gap between MRES as a wholesale supplier, and its members as retail DSM providers, the MRES Board of Directors began efforts in early 2006 to develop a program that would strongly encourage additional DSM, would assist and support member implementation of DSM, and would integrate MRES and member efforts. An overview of the DSM progress of MRES and its members is described below.

i. DSM Task Force

In 2006, the MRES Board of Directors created a DSM Task Force to chart a course toward developing and implementing DSM programs to be provided to all the member communities. The Task Force was comprised of 14 representatives from member communities, including 2 members of the MRES Board of Directors. The purpose of the Task Force was to evaluate and recommend energy efficiency and demand management strategies that would allow MRES to achieve the DSM goals identified. The Task Force also determined the respective roles of MRES and its members, and developed implementation and marketing strategies

for the rollout of DSM programs. As the result of the 12 Task Force meetings, MRES developed a portfolio of energy efficiency programs called Bright Energy Solutions® (BES) and developed a Coordinated Demand Response (CDR) program. Both of those programs continue to be enhanced and expanded by MRES over time.

ii. Bright Energy Solutions

One of the recommendations of the DSM Task Force was for MRES to create a brand that encompasses all of the DSM program offerings to the member communities. MRES created Bright Energy Solutions (BES) to assist the members in implementing DSM activities, to provide consistency in programs throughout the membership, and to make programs easily identifiable to customers and regional trade allies.

MRES conducted further study work to design individual measures and programs to be offered through Bright Energy Solutions. Bright Energy Solutions is currently offered to commercial, industrial and residential customers in 60 participating MRES member communities. The Bright Energy Solutions program offers a portfolio of energy efficiency cash incentive programs that will help the member's customers reduce their electric energy costs and operate more efficiently. At the same time, the savings provide MRES with a very cost effective power supply resource.

H. BES Programs Designed to Meet Goals

Under the Bright Energy Solutions banner, MRES member utilities began to offer a limited number of energy efficiency incentives in January 2008, through our member utilities, to commercial and industrial customers. Several residential programs were added in 2009. Since then, the BES offerings have been expanded for all customer classes. The 2019 BES incentive offerings are as follows:

Residential BES Programs:

- ENERGY STAR® Products and Residential Lighting
- Residential Heating and Cooling

Commercial and Industrial BES Programs:

- Commercial Refrigeration
- Compressed Air System Efficiency
- Custom Incentives for Businesses
- Food Service for Businesses
- Heating and Cooling for Businesses
- Lighting - New Construction
- Lighting Retrofits
- New Construction Design Review
- Pumps and VFDs for Businesses

The targeted audience for the BES programs is primarily business customers since commercial and industrial electrical consumption makes up the majority of the MRES members' retail sales. However, it is the goal of the BES program to ensure that all customers have an opportunity to save energy and money.

i. BES Savings Results

The following tables show the BES savings results from inception through 2013:

Year	Incentives Paid	kWh Savings	kW Savings
2008	\$ 485,040	6,237,775	1,595
2009	\$ 1,242,842	16,737,462	3,762
2010	\$ 1,809,139	26,494,210	5,252
2011	\$ 1,888,249	29,824,594	6,077
2012	\$ 1,617,411	24,325,963	5,190
2013	\$ 1,918,485	28,176,376	6,053
2014	\$ 1,990,601	32,851,425	6,226
2015	\$ 2,385,985	32,384,209	6,734
2016	\$ 2,666,278	39,503,342	7,189
2017	\$ 2,801,301	44,185,826	8,864
2018	\$ 2,616,411	47,227,827	8,296
Totals	\$ 21,421,745	327,949,009	65,236

In addition to helping MRES meet its Resource Plan goals, the expansion of the BES program has served to help the MRES Minnesota and Iowa members meet their state energy savings goals as well. Both Minnesota and Iowa strongly encourage energy efficiency through the adoption of state goals for each electric utility. The 2019 goal for MRES Minnesota members is to save 1.5 percent of average retail sales. Although the states of Iowa, North Dakota and South Dakota do not have formal energy saving goals, the MRES members in those states are very actively promoting the BES programs to ensure that their customers have an equal opportunity to save energy and money.

ii. Future Strategies for Savings

The Bright Energy Solutions program is now in its twelfth year of implementation. MRES is finding that as the most cost-effective and most universally applicable efficiency projects (i.e. lighting) are being completed, it becomes increasingly harder to get energy savings. MRES is continually looking for new marketing strategies, new implementation methods, and new technologies to encourage more participation and move projects to fruition. New Construction

Design review has been a popular and successful program, which we intend to continue. An engineering firm is contracted to review potential designs in the early stages of the project. Recommendations for additional energy saving measures are recommended to the project owner. A comprehensive calculation of the demand and energy savings are provided for the final design.

New programs will be evaluated in the future as technology becomes available and market opportunities are identified.

I. Cost-Effectiveness of BES Programs

As part of the development of the Bright Energy Solutions program, a number of steps were taken to analyze the costs, benefits, and applicability of the programs, both from the MRES perspective and the member utility perspective. That evaluation is described below.

i. Economic Analysis of Energy Efficiency

As MRES started developing DSM programs and making decisions about which efficiency measures to rebate and where to set rebate levels, it became apparent that more in-depth economic analysis was needed. MRES worked with consultant Morgan Marketing Partners for guidance in the development of the DSM programs and rebates. The incentive levels set for the measures covered by the program were assessed through a cost-effectiveness analysis using DSMore software, a model that utilizes the Total Resource Cost (TRC), Utility Cost Test (UCT), Ratepayer Impact Measure (RIM), Societal, and Participant test. The cost-effectiveness tests take into account for the energy and demand savings, associated avoided costs, net benefits to MRES members, incremental or installed costs, and the program costs.

The test that is the most applicable, and most important to MRES in determining cost-effectiveness is the UCT. This test compares the costs of DSM to the benefits of the program from the utility perspective. The costs of DSM include the incentives that are paid to the customer, the administrative costs, and the marketing or promotional costs. For MRES, the benefit of DSM is a reduction in future costs to MRES. By achieving savings through DSM, MRES has the opportunity to avoid purchases on the open market virtually every day. MRES chose to offer the energy efficiency measures that were found to be cost-effective using the UCT test. The results of all other tests were reviewed and considered as well. If a measure passed the UCT test, but did not pass one or more of the other Standard Practice Manual tests, those measures were given particular scrutiny to determine whether the measure should be offered by MRES. Factors that were considered included the cost to the participant, the benefits to the participant, the value of environmental benefits, and possible rate impacts to non-participants.

The following is a list of the TRC and UCT test results for different categories of DSM programs. Note that values over 1.0 indicate a passing test:

	UCT	TRC
Commercial & Industrial Compressed Air/Process	5.82	4.47
Commercial & Industrial Custom – Low Load Factor (Plug Load Specialty)	7.52	5.76
Commercial & Industrial HVAC	3.21	2.66
Commercial & Industrial Lighting	6.19	4.76
Commercial & Industrial Refrigeration	6.10	5.06
Commercial & Industrial Food Service	4.22	2.61
Commercial & Industrial Custom High Load Factor	6.60	4.08
Residential Appliances	4.17	4.36
Residential HVAC	1.73	1.56
Residential Lighting	4.03	2.83
Direct Load Control	1.32	3.15

ii. Member Program Selection

MRES offers the menu of Bright Energy Solutions programs to all S-1 members. Members may choose to offer any or all of the programs based on the demographics and needs of their customer base and their own preferences. MRES provides all of the incentives offered through the programs as a reimbursement to the member utility. MRES also provides marketing materials that each member can customize for their own use, as well as technical assistance and field inspection assistance when the incentive is in excess of \$20,000 per retail customer for a given project. MRES provides a tracking system to track the savings goals of each member, the incentive amounts paid, and kW and kWh savings from all rebate applications. The information is available to members in real-time through a web portal. MRES members must answer customer questions, review applications, conduct field inspections for rebate applications over \$20,000, and issue checks for rebates. Below is the current menu of program offerings, along with the incentives paid by MRES:

BRIGHT ENERGY SOLUTIONS®
INCENTIVE SCHEDULE A - Effective 2019-0101

Measure	Incentive	Unit
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Lighting Retrofits

Low Wattage Replacement Lamps

Low Watt T8 lamps - per lamp	\$ 1.00	EA
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LED Signs/Signals/Technologies

LED Exit Signs Electronic Fixtures (Retrofit Only)	\$ 8.00	EA
LED Auto Traffic Signals	\$ 25.00	EA

LED Pedestrian Signals	\$ 22.00	EA
LED Reach-in refrigerated case lighting - per door	\$ 25.00	EA
LED Reach-in refrigerated case lighting - per door - DLC Premium	\$ 30.00	EA
LED Recessed Downlights (indoor only)	\$ 6.00	EA
LED screw-in replacement lamps \geq 600 lumens - per lamp	\$ 1.50	EA
LED screw-in replacement lamps $<$ 600 lumens - per lamp	\$ 1.50	EA
LED screw-in replacement lamps - floods or spots	\$ 3.00	EA
LED horizontal case lighting - per foot of lamp	\$ 3.00	EA
LED horizontal case lighting - DLC Premium - per foot of lamp	\$ 4.00	EA
LED Linear Lamp - 4' T8 Replacement	\$ 3.00	EA
LED Linear Lamp - 4' T5HO Replacement	\$ 3.00	EA
LED Pin-Based Replacement Lamp - Replacing Fluorescent	\$ 4.00	EA

Controls

Occupancy Sensor	\$ 0.06	per Watt
Daylighting Sensor (continuous)	\$ 0.07	per Watt
Combo Occupancy and Daylighting Sensor	\$ 0.10	per Watt
Networked lighting control	\$ 0.12	per Watt
Occupancy Sensor Controlling LED Case Lighting	\$ 5.00	per Door

Lighting in New Construction

High Bay LED Fixtures - DLC Listed

LED High Bay Fixtures \leq 75 W	\$ 15.00	EA
LED High Bay Fixtures \leq 110 W	\$ 25.00	EA
LED High Bay Fixtures \leq 160 W	\$ 30.00	EA
LED High Bay Fixtures \leq 275 W	\$ 45.00	EA
LED High Bay Fixtures \leq 400 W	\$ 80.00	EA
LED High Bay Fixtures $>$ 400 W	\$ 105.00	EA

High Bay LED Fixtures - DLC Premium

LED High Bay Fixtures \leq 75 W	\$ 20.00	EA
LED High Bay Fixtures \leq 110 W	\$ 30.00	EA
LED High Bay Fixtures \leq 160 W	\$ 35.00	EA
LED High Bay Fixtures \leq 275 W	\$ 50.00	EA
LED High Bay Fixtures \leq 400 W	\$ 85.00	EA
LED High Bay Fixtures $>$ 400 W	\$ 115.00	EA

LED Troffer - DLC Listed

LED Troffer ($<$ 3000 Lumens)	\$ 4.00	EA
LED Troffer (3000 - 5799 Lumens)	\$ 6.00	EA
LED Troffer (\geq 5800 Lumens)	\$ 9.00	EA

LED Troffer - DLC Premium

LED Troffer ($<$ 3000 Lumens)	\$ 6.00	EA
LED Troffer (3000 - 5799 Lumens)	\$ 9.00	EA

LED Troffer (≥ 5800 Lumens)	\$ 14.00	EA
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Controls and Other Efficient Lighting Technologies

DLC-Listed Networked Lighting Controls	\$ 0.09	per Watt
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LED Technologies

LED Recessed Can Downlights (indoor only)	\$ 6.00	EA
Occupancy Sensor controlling LED refrigerated case lighting - per door	\$ 5.00	EA
LED screw-in replacement lamps ≥ 600 lumens - per lamp	\$ 1.50	EA
LED screw-in replacement lamps < 600 lumens - per lamp	\$ 1.50	EA
LED screw-in replacement lamps - floods or spots	\$ 3.00	EA
LED Pin Lamps (Replacing pin CFL)	\$ 4.00	EA
LED Linear Lamp - 4' T8 size	\$ 3.00	EA
LED Linear Lamp - 4' T5HO size	\$ 3.00	EA

HVAC/Cooling Technologies

Packaged Terminal Air Conditioners (PTAC)

High Eff PTAC Electric - all sizes	\$ 45.00	per ton
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Air Conditioning Systems - split systems

AC less than 65 kBtu 5.42 tons - 1 phase	\$ 100.00	per ton
AC less than 65 kBtu of 18.0 SEER or greater	\$ 140.00	per ton
AC 65 to 135 kBtu 5.42 to 11.25 tons	\$ 50.00	per ton
AC 135 to 239 KBTU 11.25 to 20 tons	\$ 50.00	per ton
AC 240 to 759 kBtu 20 to 63.3 tons	\$ 50.00	per ton
AC more than 760 kBtu 63.3 tons	\$ 50.00	per ton
Mini-Split Ductless Air Conditioners any size of 16 SEER or greater	\$ 250.00	EA
Quality Install less than 65 kBtu 5.42 tons - Adder to Incentives above.	\$ 80.00	per ton

Air Conditioning Systems - single packaged systems

AC less than 65 kBtu 5.42 tons	\$ 50.00	per ton
AC less than 65 kBtu 5.42 tons of 18 SEER or greater	\$ 90.00	per ton
AC 65 to 135 kBtu 5.42 to 11.25 tons	\$ 50.00	per ton
AC 135 to 239 KBTU 11.25 to 20 tons	\$ 50.00	per ton
AC 240 to 759 kBtu 20 to 63.3 tons	\$ 50.00	per ton
AC more than 760 kBtu 63.3 tons	\$ 50.00	per ton

Split System Air Source Heat Pumps

HVAC HP 65,000 1 Ph	\$ 100.00	per ton
HVAC HP 65,000 of 18.0 SEER or greater	\$ 140.00	per ton
HVAC HP 65,000 - 135,000	\$ 50.00	per ton
HVAC HP 135,000 - 240,000	\$ 50.00	per ton
HVAC HP 240,000	\$ 50.00	per ton

Mini-Split Ductless Air Source Heat Pump-any size of 16 SEER or greater	\$ 250.00	EA
Quality Install less than 65,000 Btu 5.42 tons - Adder to incentives above.	\$ 80.00	per ton

Variable Refrigerant Flow Multi-Split Air Cooled Heat Pump

Variable Refrigerant Flow Multi-Split Air Cooled Heat Pump (All Sizes)	\$ 75.00	per ton
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Air Source Heat Pumps - single packaged systems

HVAC HP 65,000 1 Ph	\$ 50.00	per ton
HVAC HP 65,000 for 18.0 SEER or greater	\$ 90.00	per ton
HVAC HP 65,000 3 Ph	\$ 50.00	per ton
HVAC HP 65,000 - 135,000	\$ 50.00	per ton
HVAC HP 135,000 - 240,000	\$ 50.00	per ton
HVAC HP 240,000 - 760,000	\$ 50.00	per ton
HVAC HP ≥ 760,000	\$ 50.00	per ton

Ground Source Heat Pumps

Ground Source HP Closed Loop - various types & sizes	\$ 200	per ton
Add a desuperheater	\$ 250.00	EA

Energy Star Window and Wall Air Conditioners

ES Window or wall AC under 14,000 Btu hr	\$ 25.00	EA
ES Window or wall AC over 14,000 Btu hr	\$ 25.00	EA

Heat Pump Water Heaters

HP Water Heater Energy Star qualified - residential style ≤55 gallons	\$ 75.00	EA
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Chillers

High Eff Air-Cooled Chiller - all sizes	\$ 50.00	per ton
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Tier 1 Efficiency Water Cooled

Centrifugal Water Cooled Chillers <150 ton	\$ 40.00	per ton
Centrifugal Water Cooled Chillers 150-300 ton	\$ 40.00	per ton
Centrifugal Water Cooled Chillers >300 ton	\$ 40.00	per ton
Scroll or Screw Water Cooled Chillers <150 ton	\$ 40.00	per ton
Scroll or Screw Water Cooled Chillers 150-300 ton	\$ 40.00	per ton
Scroll or Screw Water Cooled Chillers >300 ton	\$ 40.00	per ton

Tier 2 Efficiency Water Cooled

Centrifugal Water Cooled Chillers <150 ton	\$ 55.00	per ton
Centrifugal Water Cooled Chillers 150-300 ton	\$ 55.00	per ton
Centrifugal Water Cooled Chillers >300 ton	\$ 55.00	per ton
Scroll or Screw Water Cooled Chillers <150 ton	\$ 45.00	per ton
Scroll or Screw Water Cooled Chillers 150-300 ton	\$ 45.00	per ton
Scroll or Screw Water Cooled Chillers >300 ton	\$ 45.00	per ton

Other Energy Efficient Cooling Technologies

ECM in residential style furnace/air handler/fan coil	\$ 150.00	EA
ECM - HVAC Fan (exhaust or fan powered boxes)	\$ 100.00	EA
ECM Hot Water Circulator - less than 100 W	\$ 70.00	EA
ECM Hot Water Circulator - 100 - 500 W	\$ 350.00	EA
ECM Hot Water Circulator - greater than 500 W	\$ 1,000.00	EA
Demand controlled ventilation (carbon dioxide sensors)	\$ 35.00	per 1000 sq ft
Guest room energy management - PTACs	\$ 50.00	EA
Guest room energy management - PTHPs	\$ 50.00	EA
Window Film	\$ 0.40	per sq ft
Energy recovery ventilators (ERVs)	\$ 0.70	per CFM

Pumps / Variable Frequency Drives (VFDs)

Pumps HP 1.5	\$ 60.00	EA
Pumps HP 2	\$ 70.00	EA
Pumps HP 3	\$ 100.00	EA
Pumps HP 5	\$ 100.00	EA
Pumps HP 7.5	\$ 200.00	EA
Pumps HP 10	\$ 260.00	EA
Pumps HP 15	\$ 300.00	EA
Pumps HP 20	\$ 400.00	EA
VFDs on HVAC fans & pumps, process pumps all sizes	\$ 40.00	per HP
VFDs on new air compressors	\$ 35.00	per HP

Compressed Air Efficiency

Compressed Air Leak Detection Survey	40% of audit cost, \$5,000 max.	
VFDs on new air compressors	\$ 35.00	per HP
Engineered Nozzles for compressed air	\$ 20.00	EA
No-air loss drains - each	\$ 160.00	EA
Cycling refrigerated dryers	\$ 75.00	per 100 CFM
Dew point demand controls	\$ 150.00	per 100 CFM
Mist eliminators	\$ 4.00	per HP
Adding storage to achieve 5 gal/cfm storage	\$ 20.00	per HP
Low pressure blower replacing compressed air blow off	\$ 1,500.00	per blower HP

Specialty / Misc. Equipment

High Frequency Battery Charger - Less than 24/7 operation	\$ 100.00	EA
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High Frequency Battery Charger - 24/7 operation	\$ 300.00	EA
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Food Service & Commercial Refrigeration Equipment

ES Ice Machines less than 500 lbs per day	\$ 50.00	EA
ES Ice Machines 500-1000 lbs per day	\$ 200.00	EA
ES Ice Machines greater than 1000 lbs per day	\$ 300.00	EA
Commercial Dishwasher - under counter type - \$ depends on WH type	\$ 100 - 150	EA
Commercial Dishwasher - door type - \$ depends on WH type	\$ 225 - 500	EA
Commercial Dishwasher - single tank conveyer - \$ depends on WH type	\$ 225 - 425	EA
Commercial Dishwasher - multi-tank conveyer - \$ depends on WH type	\$ 525-1000	EA
Commercial Dishwasher - pot, pan, utensil unit - \$ depend on WH type	\$ 60-150	EA
ES 3 Pan Steam Cooker	\$ 600.00	EA
ES 4 Pan Steam Cooker	\$ 700.00	EA
ES 5 Pan Steam Cooker	\$ 800.00	EA
ES 6 Pan Steam Cooker	\$ 900.00	EA
ES Hot Holding Cabinets - Full Size Cabinets	\$ 400.00	EA
ES Holding Cabinets - Three Quarter Size	\$ 300.00	EA
ES Holding Cabinets - Half Size Cabinets	\$ 200.00	EA
ES Commercial Fryers	\$ 250.00	EA
ES Commercial Griddles	\$ 250.00	EA
ES Convection Ovens	\$ 200.00	EA
ES Combination Ovens	\$ 1,000.00	EA
LED horizontal case lighting - per foot of lamp	\$ 3.00	EA
LED horizontal case lighting - DLC Premium - per foot of lamp	\$ 4.00	EA
LED Reach-in refrigerated case lighting - per door	\$ 25.00	EA
LED Reach-in refrigerated case lighting - per door - DLC Premium	\$ 30.00	EA
Kitchen hood w temp or optical sensor w/ vfd exhaust and vfd makeup air	\$ 200.00	HP
Low heat freezer doors - per door	\$ 25.00	EA
No heat reach in freezer door	\$ 50.00	EA
No heat reach in cooler door	\$ 15.00	EA
ECM evap fan motors- walk-in freezers and coolers- excludes new const.	\$ 40.00	EA
ECM evap fan motors for compressors and condensers - per motor	\$ 50.00	EA
ECM fan motors for reach-in cases - per motor - excludes new const.	\$ 20.00	EA
Reach-in cooler/freezer cases with doors replacing multi-deck cases	\$ 30.00	per linear ft
Occupancy sensor controlling LED case lighting - per door	\$ 5.00	EA

Custom / Audits / Design Review

Custom Base Incentive	\$ 270.00	per kW
Retrocommissioning	50 to 100% of study cost	
Design Review Program	Incentives per Custom Program	

Residential Programs

Residential HVAC		
Ground Source HP Closed Loop Residential	\$ 200.00	per ton
Add a desuperheater	\$ 250.00	EA
ECM motor in air handler/fan coil	\$ 150.00	EA
ECM motor in natural gas furnace	\$ 150.00	EA
Air Source Heat Pump	\$ 250.00	EA
Air Source Heat Pump of 18.0 SEER or greater	\$ 350.00	EA
Mini-Split Ductless Air Source Heat Pump - 16 SEER or greater	\$ 250.00	EA
Central Air Conditioner	\$ 250.00	EA
Central Air Conditioner of 18.0 SEER or greater	\$ 350.00	EA
Mini-Split Ductless Air Conditioner - 16 SEER or greater	\$ 250.00	EA
Electric Heat Pump Water Heater (≤55 Gallons)	\$ 75.00	EA
ENERGY STAR® Programmable Thermostat	\$ 25.00	EA
Central A/C and Air Source Heat Pump Tuneup	\$ 30.00	EA
Central A/C Quality Install - Adder to standard incentives listed above.	\$ 200.00	EA
Central Heat Pump Quality Install - Adder to standard incentives listed above.	\$ 200.00	EA

ENERGY STAR Products

LED Screw In Lamp	\$ 1.50	EA
LED Downlight (Fixture or Retrofit Kit - NOT screw in replacement lamps)	\$ 4.00	EA
ES Room AC	\$ 25.00	EA
ES Dehumidifier	\$ 25.00	EA
ES Clothes Washer	\$ 25.00	EA
ES Refrigerator	\$ 25.00	EA

iii. Calculation of Savings

The savings calculations for all prescriptive rebates under Bright Energy Solutions are based on the algorithms provided by the Minnesota Division of Energy Resources (MN DER) in its Technical Resource Manual (TRM). If the BES program provides prescriptive rebates for measures that are not included in the MN TRM, those savings are calculated by consultant Franklin Energy of Port Washington, Wisconsin. Franklin Energy uses engineering calculations and the deemed savings from other state TRMs to determine savings. For custom rebates, the kW and kWh savings are determined using engineering calculations. Customers and contractors submit their projects to MRES for review, including estimated kW and kWh savings. MRES staff, and/or its consultant, reviews these

projects and savings estimates and determines the level of incentive to be awarded. For projects where savings of 1 million kWhs or more are anticipated, pre and post-metering is required. This review of the savings analysis helps assure that MRES funds are being cost effectively used to promote efficiency.

iv. Environmental Benefits

In addition to helping customers reduce and manage their energy costs, the Bright Energy Solutions programs provide other societal benefits. These benefits include reduced emissions of CO₂, carbon monoxide, SO_x, and NO_x. The estimated value of the environmental benefits was considered as part of the Societal Test when determining cost-effectiveness of the programs.

J. Coordinated Demand Response Program

On a parallel track with Bright Energy Solutions, MRES also began to develop a Coordinated Demand Response (CDR) program designed to encourage members to install or update load control equipment that would allow MRES and its members to shift customer load during times of peak demand to non-peak periods. Load control/demand response can be achieved through direct load control, interruptible service, building pre-heating/pre-cooling or storage, industrial process load control, or response to market prices. MRES will pay a verification payment based on the number of control points connected to the load management system and an annual verification of such points. The payment amounts are \$5.00 per year for each controlled central air conditioner and \$1.75 per year for each controlled electric water heater the member controls during the member's summer peak demand period and provides verification of such control.

i. Shared Benefits of CDR

MRES first focused on direct load control of air conditioners and electric water heaters since many MRES members were familiar with that technology and many already had equipment in place that could be used or updated. In 2011, MRES began to offer an incentive for every air conditioner and electric water heater that was controlled during the summer months of June, July, August and September. Testing and reporting requirements were put in place to ensure that the load control system was working properly and that load reduction was actually achieved. The incentive applies to members with existing load control systems as well as new systems that are operated under the CDR program.

Several barriers to the implementation of new direct load control by individual MRES member utilities were uncovered by the DSM Task Force. The primary barrier was that members did not have sufficient staff to install equipment, develop control strategies, monitor, operate, and test a direct load control system. To address this issue, MRES developed a CDR program that could be monitored and operated by MRES staff and/or individual member staff. The CDR program provides the following benefits:

- Lower demand charges for MRES members
- Cost-effective alternative to future peaking capacity for MRES
- Shared software/hardware costs
- Shared expertise/labor in operating the system
- Group pricing on load control devices and software fees
- Less staff time for MRES members

ii. CDR Participation

The development of the CDR program has been fairly slow due to the high capital investment associated with the installation of a load control system and with the time that it takes to install a system. Also, members wanted to coordinate any investment made in load control equipment with their plans to install advanced metering infrastructure (AMI), since both systems could use some of the same technology and communications systems. As of 2018, twelve members of MRES are participating in the CDR program and are at various stages of implementation. One of those members is installing CDR and AMI equipment simultaneously. AMI equipment may allow members to achieve demand response using dynamic price signals in the future.

iii. CDR Results

The following are the 2011 through 2018 direct load control results reported either by members with existing load control systems or through CDR participation:

	AC Points Controlled	AC Load Reduction kW	WH Points Controlled	WH Points Reduction kW
2011	8,732	8,732	8,318	2,911
2012	11,784	11,784	9,083	3,179
2013	11,952	11,952	8,815	3,085
2014	12,383	12,383	9,249	3,237
2015	13,964	13,964	10,883	3,809
2016	14,501	14,501	10,851	3,797
2017	15,302	15,302	11,602	4,060
2018	15,099	15,099	12,218	4,276
Totals	103,717	103,717	81,019	28,354

II. Beresford, SD Resource Planning

A. *City Information*

Beresford, located in Union and Lincoln Counties, is a community of more than 2,000 individuals located in southeastern South Dakota. The City has one elementary school, one junior high, and one high school. In 2010, the residential sector included 861 occupied housing units. The median age of the population is 38.5 years. About 19.1% of the population is 65 years of age or older and about 25.4% percent are under 18 years old.

In 2017, the municipal utility had 929 residential customers, 229 commercial customers, and 18 industrial customers. The residential sector's yearly usage averaged 9,988 kWh per customer in 2017. Commercial customers averaged 21,485 kWh. Industrial customers averaged 813,333 kWh. The rates for each type of customer are shown on the rate sheet in Exhibit 1.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

BERESFORD, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$16.00
	\$/kWh (Jun-Aug)	\$.1290
	\$/kWh (Sept-May)	\$.1210
Small Commercial	Customer Charge	\$26.00
	\$/kWh (Jun-Aug)	\$.1250
	\$/kWh (Sept-May)	\$.1170
Large Commercial	Customer Charge	\$48.00
	\$/kWh	\$.0490
	\$/kW (Jun-Aug)	\$20.00
	\$/kW (Sept-May)	\$17.60

Exhibit 2

BERESFORD, SD

MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

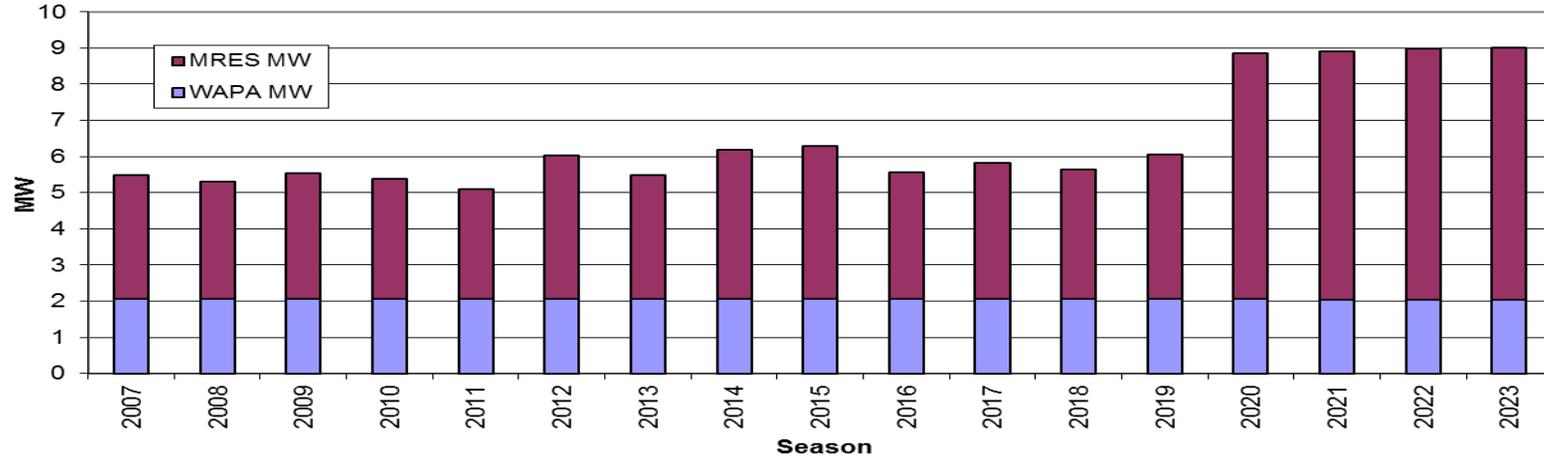
Monthly Splits

Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	6,128	2,900	3,250	2006	15,351,112	6,500,000	8,851,112
2007	6,212	2,900	3,413	2007	15,648,478	6,500,000	9,148,478
2008	5,520	2,900	2,653	2008	14,247,745	6,500,000	7,747,745
2009	5,426	2,900	2,695	2009	12,994,581	6,500,000	6,494,581
2010	5,770	2,900	3,039	2010	13,498,680	6,500,000	6,998,680
2011	6,940	2,900	4,209	2011	15,399,888	6,500,000	8,899,888
2012	6,957	2,900	4,079	2012	15,936,607	6,500,000	9,436,607
2013	6,502	2,900	3,771	2013	15,209,643	6,500,000	8,709,643
2014	6,010	2,900	3,790	2014	14,398,392	6,500,000	7,898,392
2015	6,388	2,900	3,536	2015	14,961,741	6,500,000	8,461,741
2016	6,976	2,900	4,245	2016	15,221,319	6,500,000	8,721,319
2017	6,558	2,900	3,680	2017	15,173,571	6,500,000	8,673,571
2018	6,984	2,900	4,106	2018	15,648,547	6,500,000	9,148,547
2019	9,326	2,900	6,595	2019	24,158,265	6,500,000	17,658,265
2020	9,403	2,900	6,672	2020	24,357,125	6,500,000	17,857,125
2021	9,458	2,871	6,754	2021	24,500,625	6,434,000	18,066,625
2022	9,509	2,871	6,805	2022	24,631,413	6,434,000	18,197,413
2023	9,569	2,871	6,865	2023	24,785,806	6,434,000	18,351,806
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	5,486	2,053	3,439	2007	15,794,834	5,770,000	10,024,834
2008	5,040	2,053	3,263	2008	15,529,323	5,806,000	9,723,323
2009	5,272	2,053	3,495	2009	14,777,339	5,770,000	9,007,339
2010	5,320	2,053	3,335	2010	14,490,007	5,770,000	8,720,007
2011	5,100	2,053	3,053	2011	14,361,028	5,770,000	8,591,028
2012	5,962	2,053	3,977	2012	15,855,202	5,806,000	10,049,202
2013	5,380	2,053	3,431	2013	15,032,613	5,770,000	9,262,613
2014	6,122	2,053	4,137	2014	16,169,863	5,770,000	10,399,863
2015	6,004	2,053	4,227	2015	14,871,343	5,770,000	9,101,343
2016	5,320	2,053	3,509	2016	14,762,829	5,806,000	8,956,829
2017	5,748	2,053	3,763	2017	14,891,409	5,770,000	9,121,409
2018	5,516	2,053	3,593	2018	15,376,373	5,770,000	9,606,373
2019	5,890	2,053	4,003	2019	16,557,694	5,770,000	10,787,694
2020	8,658	2,053	6,802	2020	24,646,735	5,806,000	18,840,735
2021	8,730	2,032	6,872	2021	24,811,812	5,731,000	19,080,812
2022	8,781	2,032	6,941	2022	24,948,995	5,712,000	19,236,995
2023	8,828	2,032	6,988	2023	25,097,370	5,712,000	19,385,370

Exhibit 3

Beresford, SD Winter Demand - Town Gate



Beresford, SD Winter Energy - Town Gate

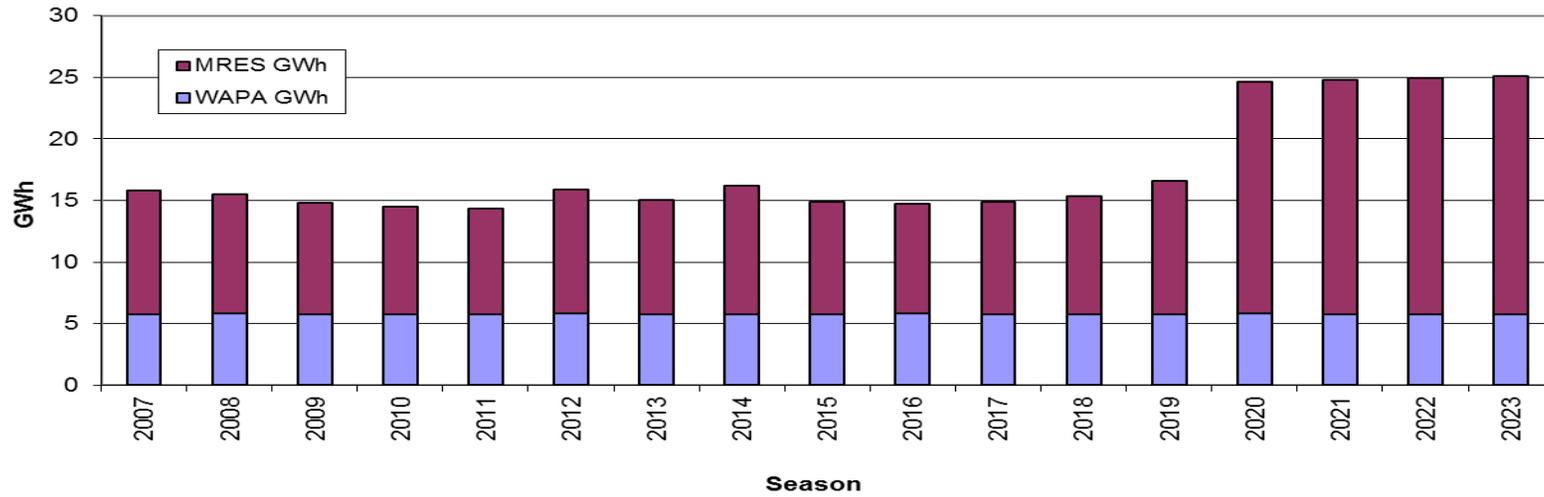
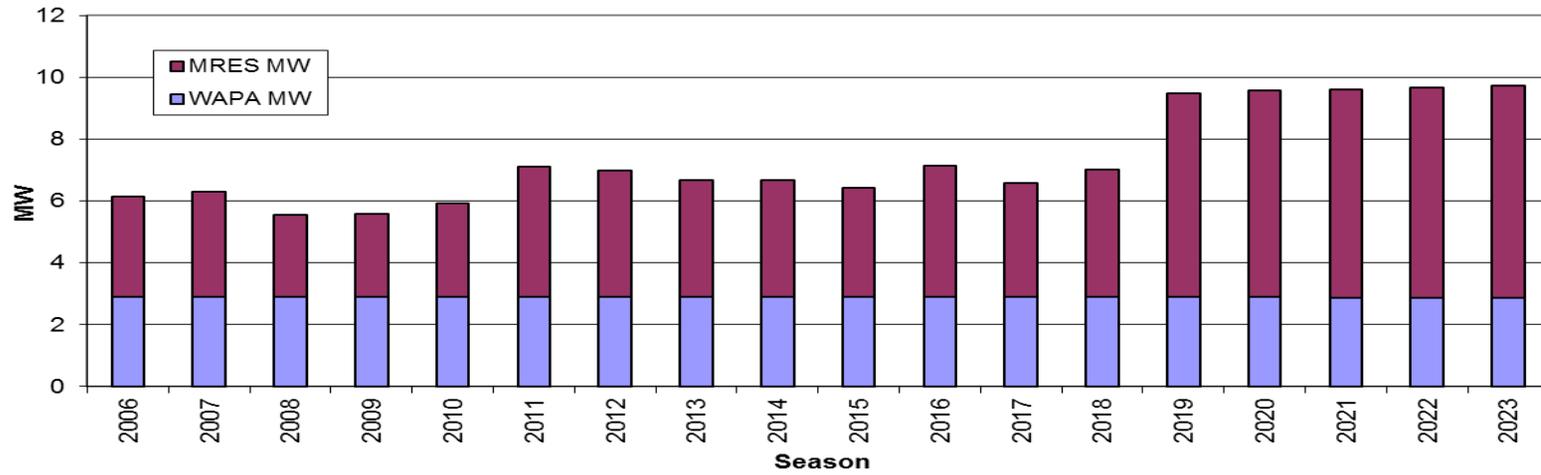


Exhibit 4

Beresford, SD Summer Demand - Town Gate



Beresford, SD Summer Energy - Town Gate

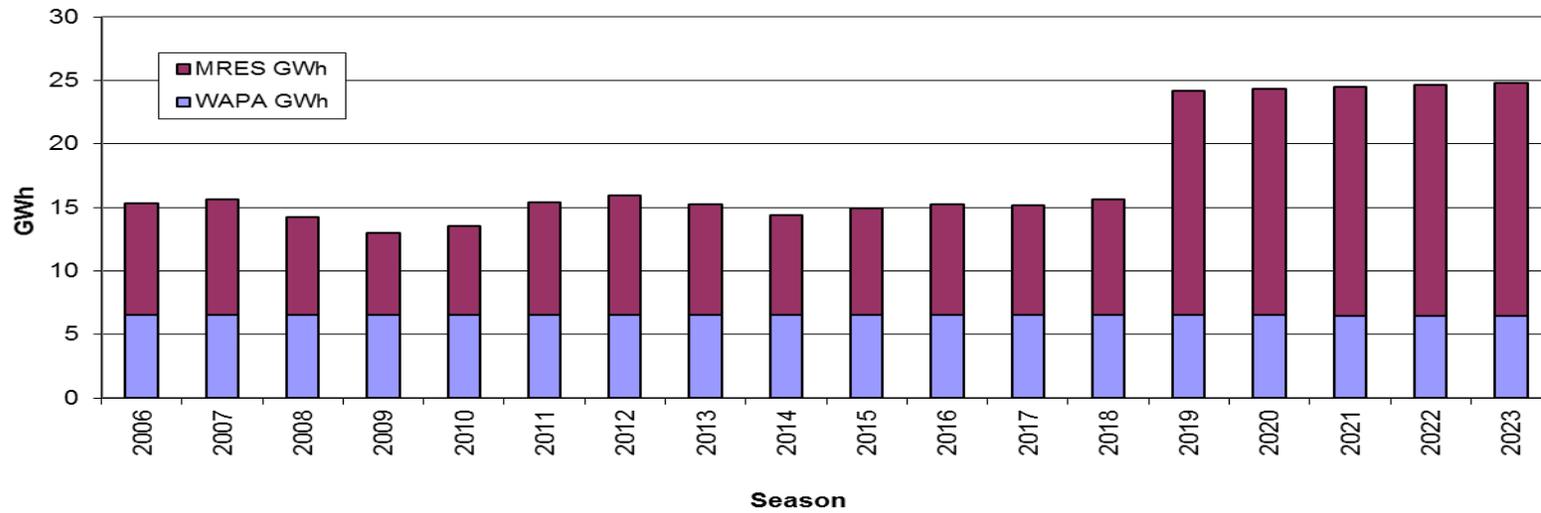


Exhibit 5

Beresford, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 5516 kW

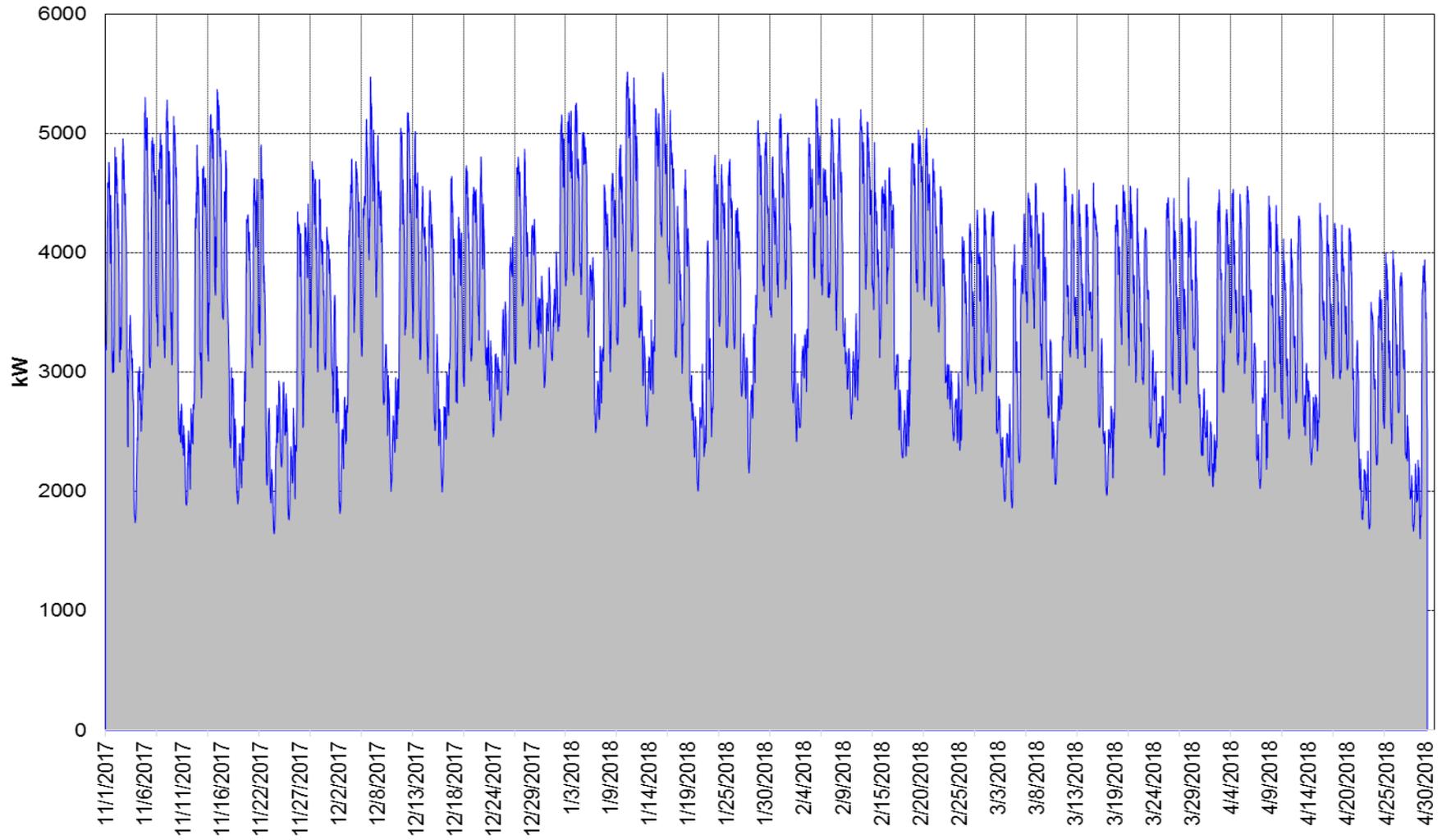


Exhibit 6

Beresford, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 6984 kW

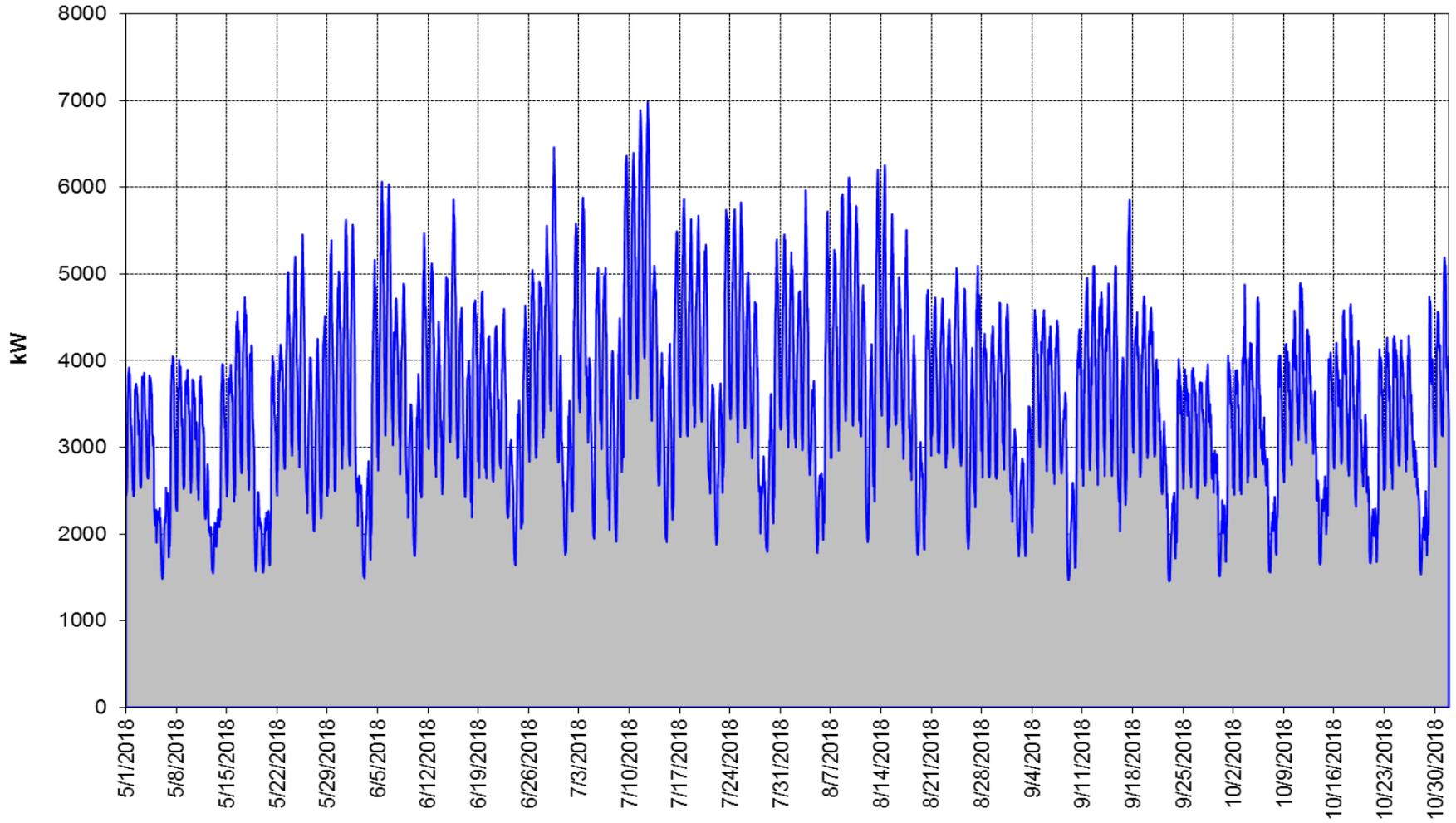


Exhibit 7

Beresford, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 5516 kW

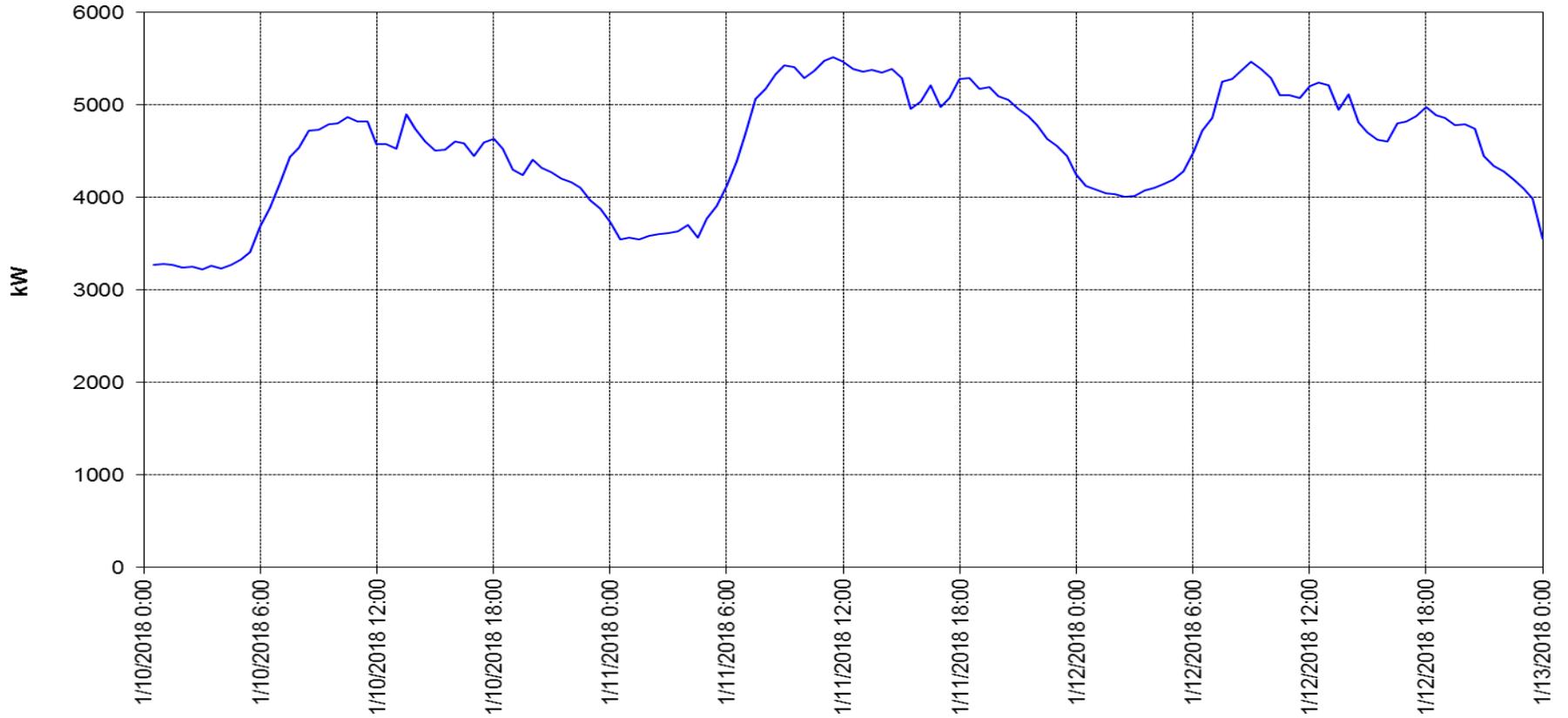
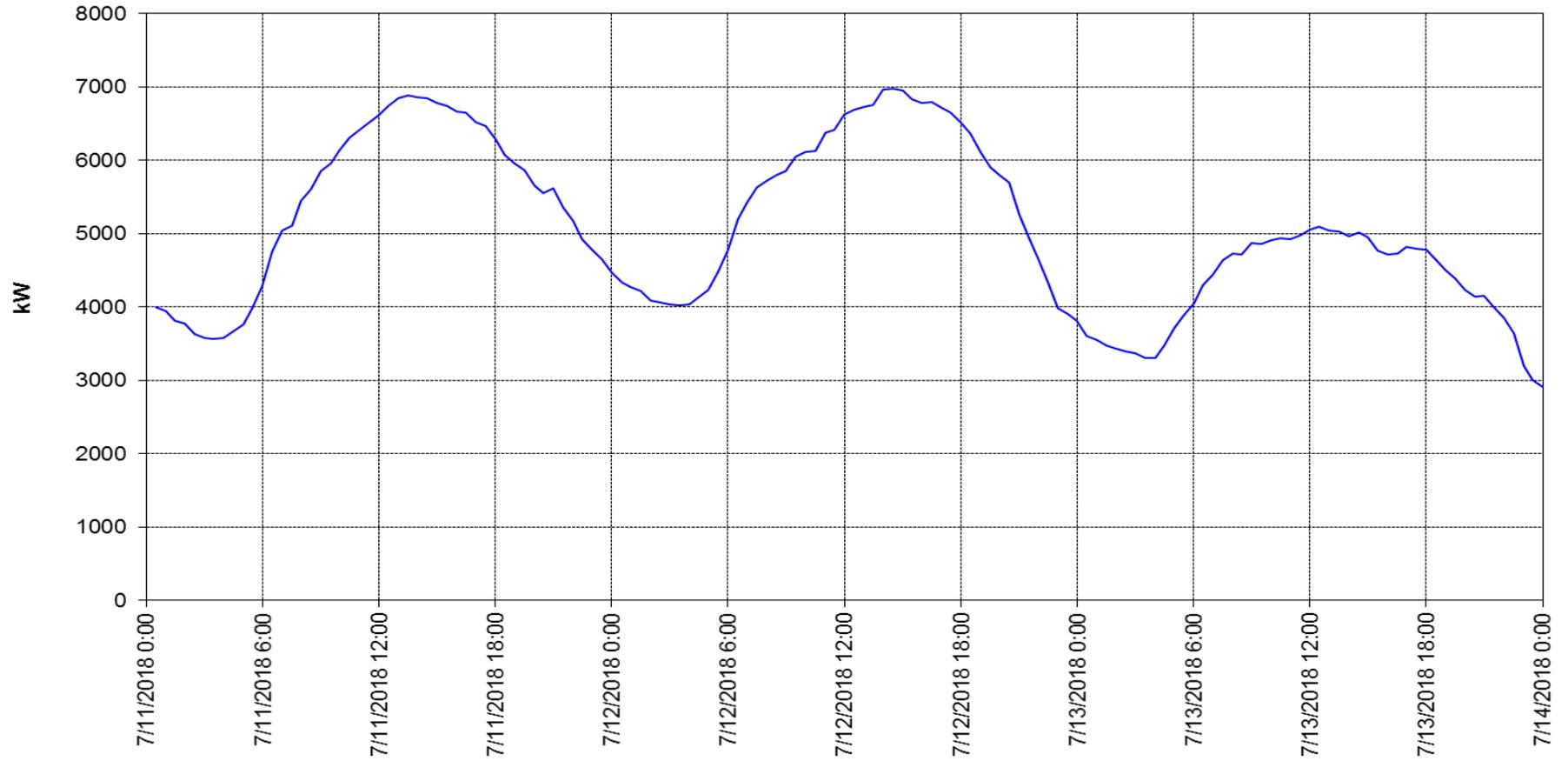


Exhibit 8

Beresford, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 6984 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Beresford is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Beresford to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Beresford has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Beresford			
Program/Measure	Quan	Incentive	kW	kWh
2014	193	\$ 7,867	16.7	59736
C&I HVAC	2	\$ 100	0.2	1644
Lighting Retrofit	191	\$ 7,767	16.4	58092
2015	67	\$ 10,145	29.0	68275
C&I HVAC	8	\$ 6,500	14.6	7988
Compressed Air System	2	\$ 1,760	6.5	25948
Lighting Retrofit	55	\$ 685	1.8	7889
VFDs and Pumps	2	\$ 1,200	6.1	26450
2016	535	\$ 4,687	11.7	69989
Commercial Refrigeration	5	\$ 1,150	1.9	16760
Lighting Retrofit	530	\$ 3,537	9.8	53229
2017	1855	\$ 9,091	28.8	138277
C&I Custom (non-lighting)	0	\$ 819	3.4	9724
Food Service	2	\$ 100	0.4	3304
Lighting New Construction	130	\$ 2,490	6.2	24943
Lighting Retrofit	200	\$ 600	1.6	8944
Lighting Retrofit	1523	\$ 5,082	17.2	91362
2018	320	\$ 8,302	36.9	274217
C&I Compressed Air	3	\$ 3,195	24.3	213899
C&I HVAC	6	\$ 1,150	1.6	2419
Lighting New Construction	79	\$ 2,218	6.2	30738
Lighting Retrofit	224	\$ 1,189	4.2	20040
Residential Energy Star Products	6	\$ 150	0.2	1074
Residential HVAC	2	\$ 400	0.4	6047
Grand Total	2970	\$ 40,092	123.1	610493

- **Load Management Program**

Description: Load management control on all electric water heaters, central air conditioners, and electric space heaters.

Energy Savings: Approximately 4 MW on peak.

Cost: Approximately \$4,000 annually.

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Beresford was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Beresford will continue to participate in the Bright Energy Solutions program. Beresford would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Beresford will participate in the all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Beresford plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, Beresford is successfully operating their own Load Management program, and it is unknown if they will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Beresford will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a

minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on August 19, 2019. The public hearing on the IRP was held at the September 3, 2019 City Council meeting. No comments or responses were made during the meeting. The City Council approved the resolution on September 3, 2019. A copy of the approved resolution is included in Appendix 2 at the end of this section.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	8/19/2019
Public Hearing Date	9/3/2019
Date Approved by City Council	9/3/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Beresford				
Program/Measure	Quan	Incentive	kW	kWh	
2014	193	\$ 7,867	16.7	59736	
C&I HVAC	2	\$ 100	0.2	1644	
Setback/Programmable Thermostats	2	\$ 100	0.2	1644	
Lighting Retrofit	191	\$ 7,767	16.4	58092	
High Bay Fluorescent Occ Sensors	78	\$ 780	1.8	14731	
LED & Induction Tech	7	\$ 105	0.4	1584	
T8 4ft w/Elec Bal	28	\$ 252	1.1	4300	
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	78	\$ 6,630	13.2	37477	
2015	67	\$ 10,145	29.0	68275	
C&I HVAC	8	\$ 6,500	14.6	7988	
Mini Split Ductless AC	1	\$ 100	0.4	246	
Unitary Air Cooled Split Sys AC 065k - 135k Btuh	1	\$ 500	0.6	309	
Unitary Air Cooled Split Sys AC 241k - 760k Btuh	1	\$ 2,000	5.5	3016	
Unitary Single Pkgd AC <65k Btuh (3ph)	1	\$ 250	0.5	253	
Unitary Single Pkgd AC 065k - 135k Btuh	2	\$ 900	2.0	1092	
Unitary Single Pkgd AC 241k - 760k Btuh	2	\$ 2,750	5.6	3072	
Compressed Air System	2	\$ 1,760	6.5	25948	
Compressed Air System Leak Survey	1	\$ 360	2.3	7148	
VFD Air Compressor	1	\$ 1,400	4.2	18800	
Lighting Retrofit	55	\$ 685	1.8	7889	
T8 4ft w/ Bal and Reflectors / Delamping	9	\$ 225	0.5	2388	
T8 4ft w/Elec Bal	46	\$ 460	1.3	5501	
VFDs and Pumps	2	\$ 1,200	6.1	26450	
Variable Freq Drives	2	\$ 1,200	6.1	26450	
2016	535	\$ 4,687	11.7	69989	
Commercial Refrigeration	5	\$ 1,150	1.9	16760	
ES Comm Glass Door Freezers	2	\$ 500	1.6	14236	
ES Comm Glass Door Refrigerators	3	\$ 650	0.3	2524	
Lighting Retrofit	530	\$ 3,537	9.8	53229	
4' LED Linear Lamps DCL Qual	362	\$ 1,086	3.3	18656	
LED & Induction Tech	164	\$ 2,431	6.4	34284	
LED 2 or 4 Pin-Based Repl Lamps	4	\$ 20	0.1	289	
2017	1855	\$ 9,091	28.8	138277	
C&I Custom (non-lighting)	0	\$ 819	3.4	9724	
Lighting: Custom	0	\$ 819	3.4	9724	
Food Service	2	\$ 100	0.4	3304	

ES Ice Machines	2	\$	100	0.4	3304
Lighting New Construction	130	\$	2,490	6.2	24943
LED Energy Star Recessed Downlight	86	\$	2,150	4.6	18332
LED Energy Star Screw-in Replacement Lamp	28	\$	196	1.2	5002
T8 4ft Reduced Wattage System	16	\$	144	0.4	1609
Lighting Retrofit	200	\$	600	1.6	8944
4' LED Linear Lamps DCL Qual	200	\$	600	1.6	8944
Lighting Retrofit	1523	\$	5,082	17.2	91362
4 Ft. LED Linear Lamps Repl T12 Fluorescent	172	\$	1,032	3.3	16442
4 Ft. LED Linear Lamps Repl T8 Fluorescent	438	\$	1,314	5.0	24650
4' LED Linear Lamps DCL Qual	912	\$	2,736	8.9	50270
LED & Induction Tech	1	\$	-	0.0	0
2018	320	\$	8,302	36.9	274217
C&I Compressed Air	3	\$	3,195	24.3	213899
Compressor Air Leak Survey	1	\$	1,635	19.6	192982
No-Loss Condensate Drains	1	\$	160	0.5	2117
VFD Air Compressor <= 200-HP Replacing Load/No-Load	1	\$	1,400	4.2	18800
C&I HVAC	6	\$	1,150	1.6	2419
Res StyleFurnace w/ECM	2	\$	300	0.4	1440
Smart Thermostat (Natural Gas Furnace With/AC)	2	\$	100	0.2	374
Split System Air Conditioning < 65000 BTUH - 15 SEER or Higher	2	\$	750	0.9	605
Lighting New Construction	79	\$	2,218	6.2	30738
LED High Bay Fixtures, DLC Premium 111-160 W	28	\$	1,960	5.4	26625
LED Linear Replacement Lamps	16	\$	48	0.2	966
LED Troffer 3000 - 5799 Lumens	35	\$	210	0.6	3147
Lighting Retrofit	224	\$	1,189	4.2	20040
4 Ft. LED Linear Lamps Repl T8 Fluorescent	224	\$	672	2.6	15133
Custom - Lighting	0	\$	517	1.7	4907
Residential Energy Star Products	6	\$	150	0.2	1074
ENERGY STAR Clothes Dryer (Electric)	1	\$	25	0.0	183
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	1	\$	25	0.0	198
ENERGY STAR Clothes Washer W/ Elec WH and Gas Dryer	1	\$	25	0.0	95
ENERGY STAR Dehumidifier	3	\$	75	0.1	599
Residential HVAC	2	\$	400	0.4	6047
Air Handler/Fan Coil W/ECM	1	\$	150	0.2	720
Air-Source Heat Pump (15 SEER)	1	\$	250	0.2	5327
Grand Total	2970	\$	40,092	123.1	610493

Appendix 2 – Beresford Resolution

RESOLUTION NO. 2019-11

WHEREAS, the City of Beresford purchases a significant portion of its power supply from the Western Area Power Administration (Western); and

WHEREAS, Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and

WHEREAS, the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and

WHEREAS, any public comments received have been addresses in order to strengthen the city's Integrated Resource Plan; and

WHEREAS, the IRP Summary Report included 5-year and 2-year action plans outlining actions to be taken by the Municipal utility during the next several years

NOW THEREFORE BE IT RESOLVED BY the City of Beresford City Council as follows:

That the "Integrated Resource Plan Summary Report for the City of Beresford dated September 1, 2019 shall be approved for filing with Western under the Energy Planning and Management Program."

Passed and approved this 3rd day of September, 2019.

(SEAL)



ATTEST:

Elaine Johnson
Elaine Johnson, Finance Officer

Nathan Anderson
Nathan Anderson, Mayor

III. Brookings, SD Resource Planning

A. *City Information*

Brookings, located in Brookings County, is a community of more than 22,000 individuals located in eastern South Dakota. Municipal services include electricity, water, sewer, and telephone services. The city is the home of South Dakota State University. Daktronics is also headquartered in Brookings.

The three largest employers in Brookings are South Dakota State University (2,121 employees), Daktronics (1,655 employees), and 3M (796 employees). In 2010, the residential sector included 8,715 occupied housing units. The median age of the population is 23.5 years. About 8.4% of the population is 65 years of age or older, and about 16.1% are under 18 years old.

In 2017, the municipal utility had 9,399 residential customers, 1,392 commercial customers, and 174 industrial customers. The residential sector's yearly usage averaged 10,016 kWh per customer in 2017. Commercial customers averaged 26,912 kWh, and industrial customers averaged 1,063,057 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

BROOKINGS, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$19.00
	\$/kWh Jun-Aug	\$.0970
	\$/kWh Sep-May	\$.0840
Small Commercial	Customer Charge	\$33.00
	\$/kWh Jun-Aug	\$.1080
	\$/kWh Sep-May	\$.0950
Large Commercial	Customer Charge	\$140.00
	\$/kWh	\$.0390
	\$/kW Jun-Aug	\$21.20
	\$/kW Sep-May	\$15.50
Industrial	Customer Charge	\$200.00
	\$/kWh	\$.0380
	\$/kW Jun-Aug	\$20.85
	\$/kW Sep-May	\$15.15

Exhibit 2

BROOKINGS, SD

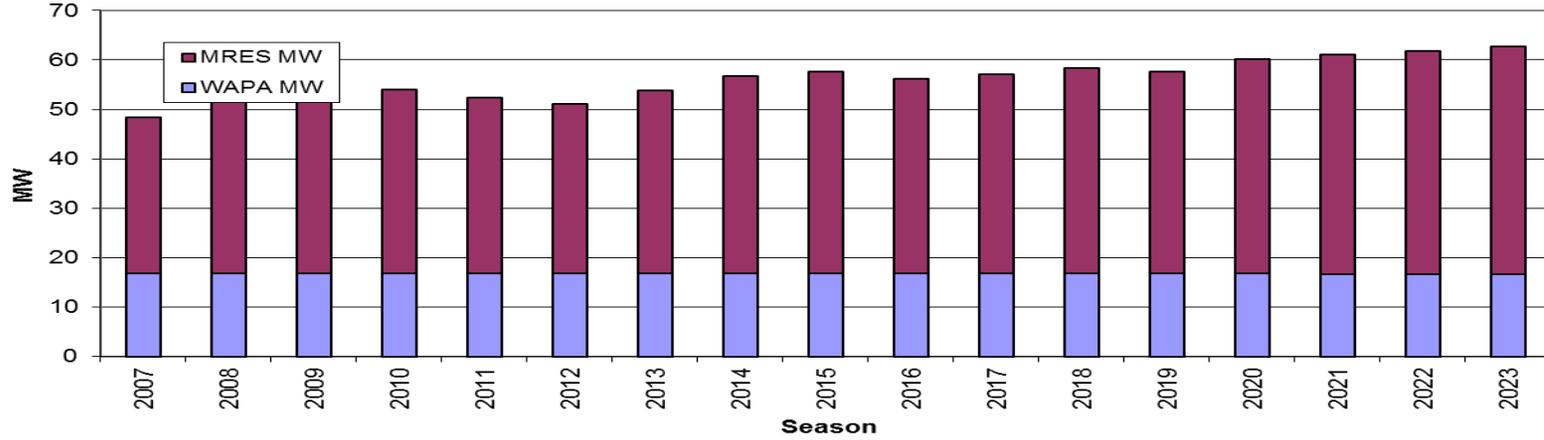
MRES Seasonal Load Report
 Town Gate Load
 BASE Forecast

Monthly Splits
 Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	53,842	18,941	34,901	2006	133,078,312	53,020,000	80,058,312
2007	53,491	18,941	34,550	2007	138,959,941	53,020,000	85,939,941
2008	52,168	18,941	33,227	2008	140,885,981	53,020,000	87,865,981
2009	50,308	18,941	32,046	2009	135,947,835	53,020,000	82,927,835
2010	55,077	18,941	36,136	2010	143,433,976	53,020,000	90,413,976
2011	58,977	18,941	40,036	2011	144,936,702	53,020,000	91,916,702
2012	57,406	18,941	38,465	2012	148,157,922	53,020,000	95,137,922
2013	59,884	18,941	40,943	2013	148,629,861	53,020,000	95,609,861
2014	55,827	18,941	36,886	2014	151,796,483	53,020,000	98,776,483
2015	58,020	18,941	39,079	2015	157,682,488	53,020,000	104,662,488
2016	62,562	18,941	43,621	2016	158,253,248	53,020,000	105,233,248
2017	60,497	18,941	41,556	2017	159,189,985	53,020,000	106,169,985
2018	60,644	18,941	41,703	2018	164,492,114	53,020,000	111,472,114
2019	60,181	18,941	41,240	2019	162,041,260	53,020,000	109,021,260
2020	61,179	18,941	42,238	2020	164,728,561	53,020,000	111,708,561
2021	62,154	18,752	43,402	2021	167,353,853	52,490,000	114,863,853
2022	62,960	18,752	44,208	2022	169,525,013	52,490,000	117,035,013
2023	63,734	18,752	44,982	2023	171,609,620	52,490,000	119,119,620
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	48,328	16,833	31,602	2007	142,261,011	50,599,000	91,662,011
2008	52,612	16,833	35,886	2008	153,941,948	50,933,000	103,008,948
2009	53,938	16,833	37,824	2009	153,941,076	50,599,000	103,342,076
2010	52,431	16,833	37,236	2010	151,004,978	50,599,000	100,405,978
2011	52,190	16,833	35,464	2011	157,138,976	50,599,000	106,539,976
2012	50,400	16,833	34,286	2012	146,428,900	50,933,000	95,495,900
2013	53,098	16,833	36,984	2013	157,903,971	50,599,000	107,304,971
2014	55,969	16,833	39,855	2014	168,047,008	50,599,000	117,448,008
2015	56,914	16,833	40,800	2015	168,769,417	50,599,000	118,170,417
2016	55,403	16,833	39,289	2016	163,169,876	50,933,000	112,236,876
2017	56,260	16,833	40,278	2017	165,913,411	50,599,000	115,314,411
2018	57,632	16,833	41,518	2018	171,425,750	50,599,000	120,826,750
2019	56,922	16,833	40,808	2019	172,181,458	50,599,000	121,582,458
2020	59,422	16,833	43,308	2020	175,223,229	50,933,000	124,290,229
2021	60,370	16,665	44,417	2021	178,053,338	50,252,000	127,801,338
2022	61,153	16,665	45,200	2022	180,538,222	50,092,000	130,446,222
2023	61,905	16,665	45,952	2023	182,798,833	50,092,000	132,706,833

Exhibit 3

Brookings, SD Winter Demand - Town Gate



Brookings, SD Winter Energy - Town Gate

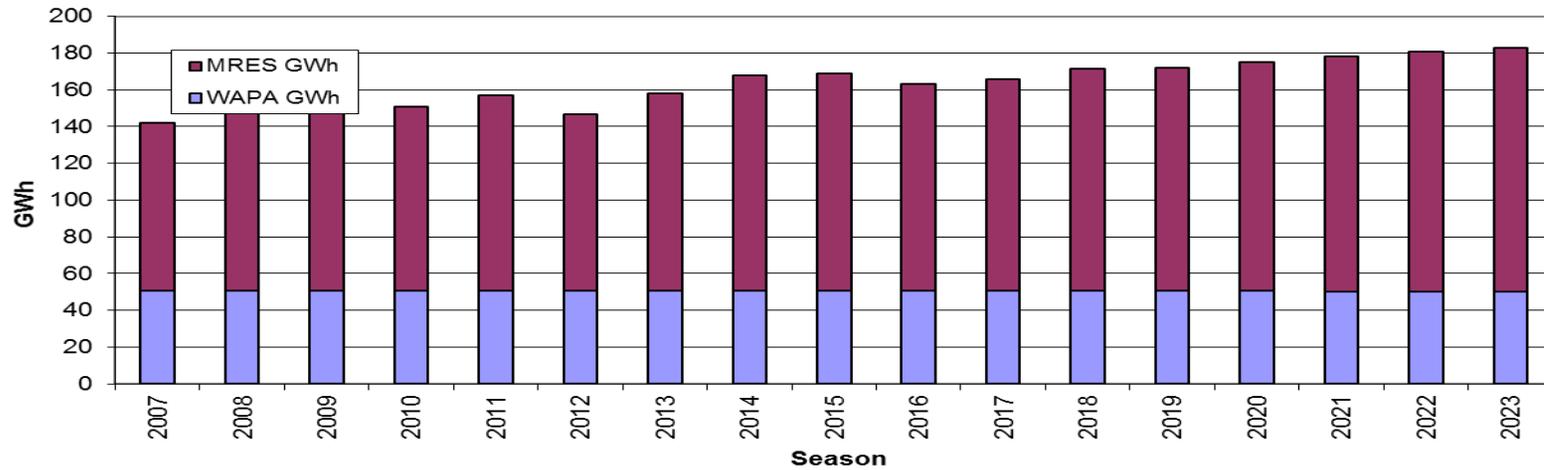
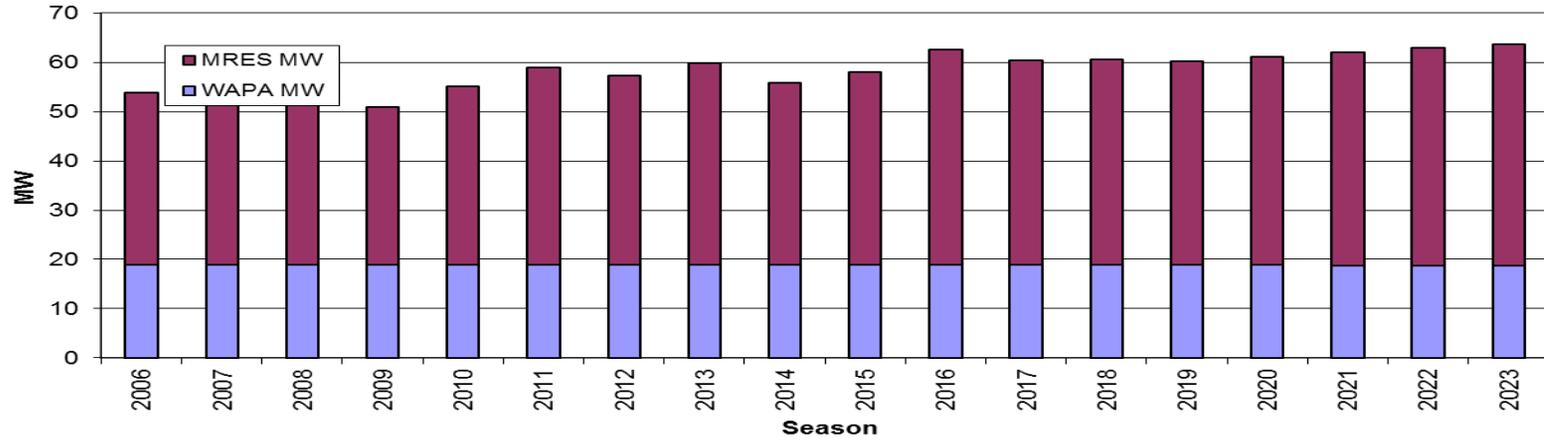


Exhibit 4

Brookings, SD Summer Demand - Town Gate



Brookings, SD Summer Energy - Town Gate

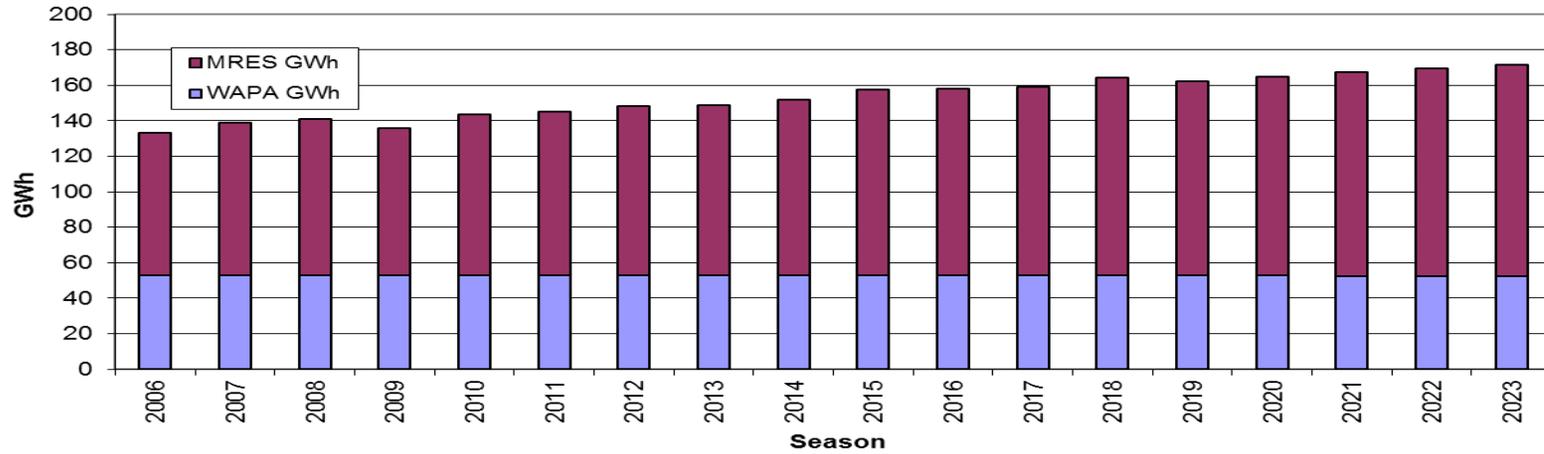


Exhibit 5

Brookings, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 57632 kW

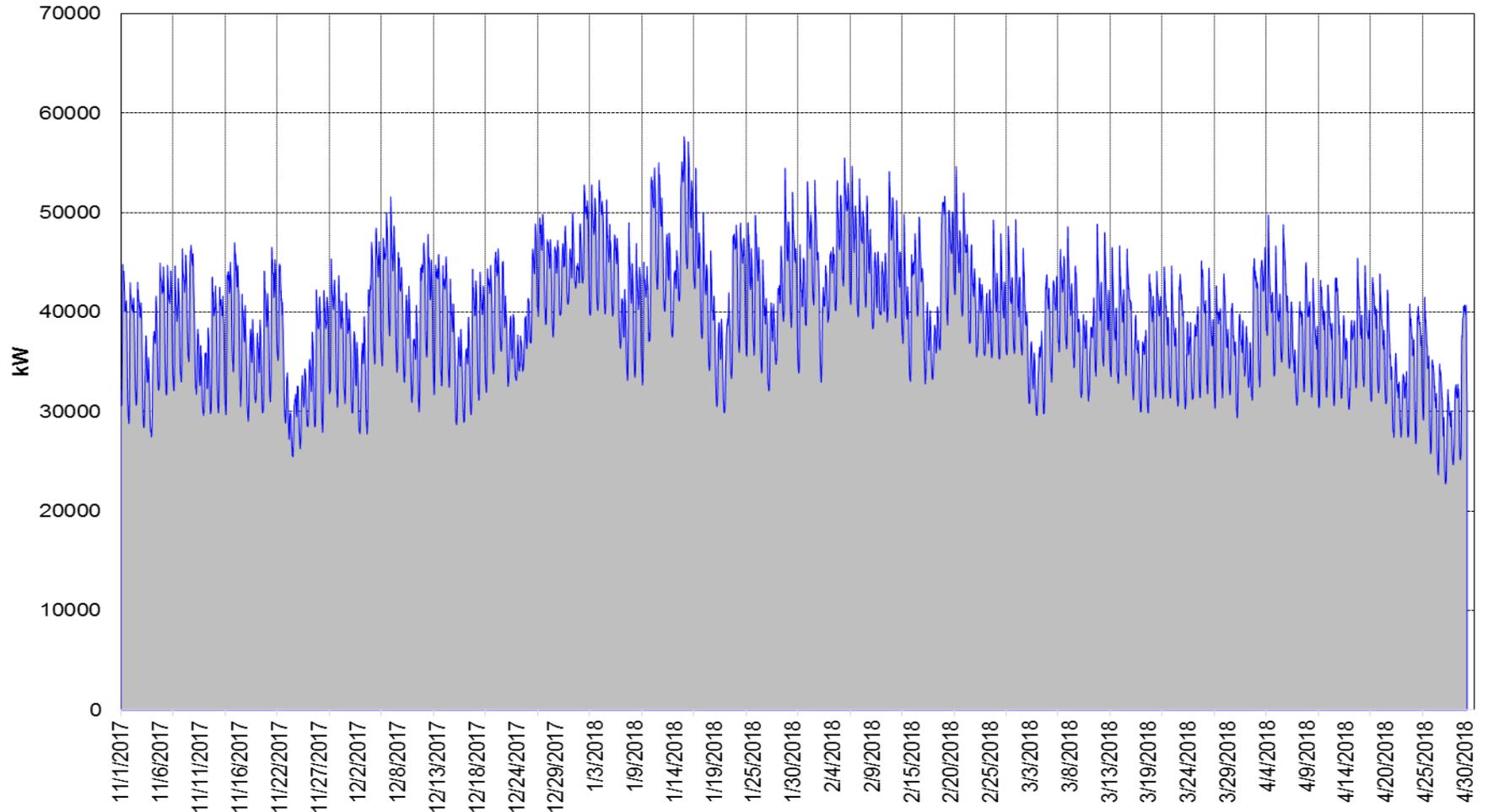


Exhibit 6

Brookings, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 60644 kW

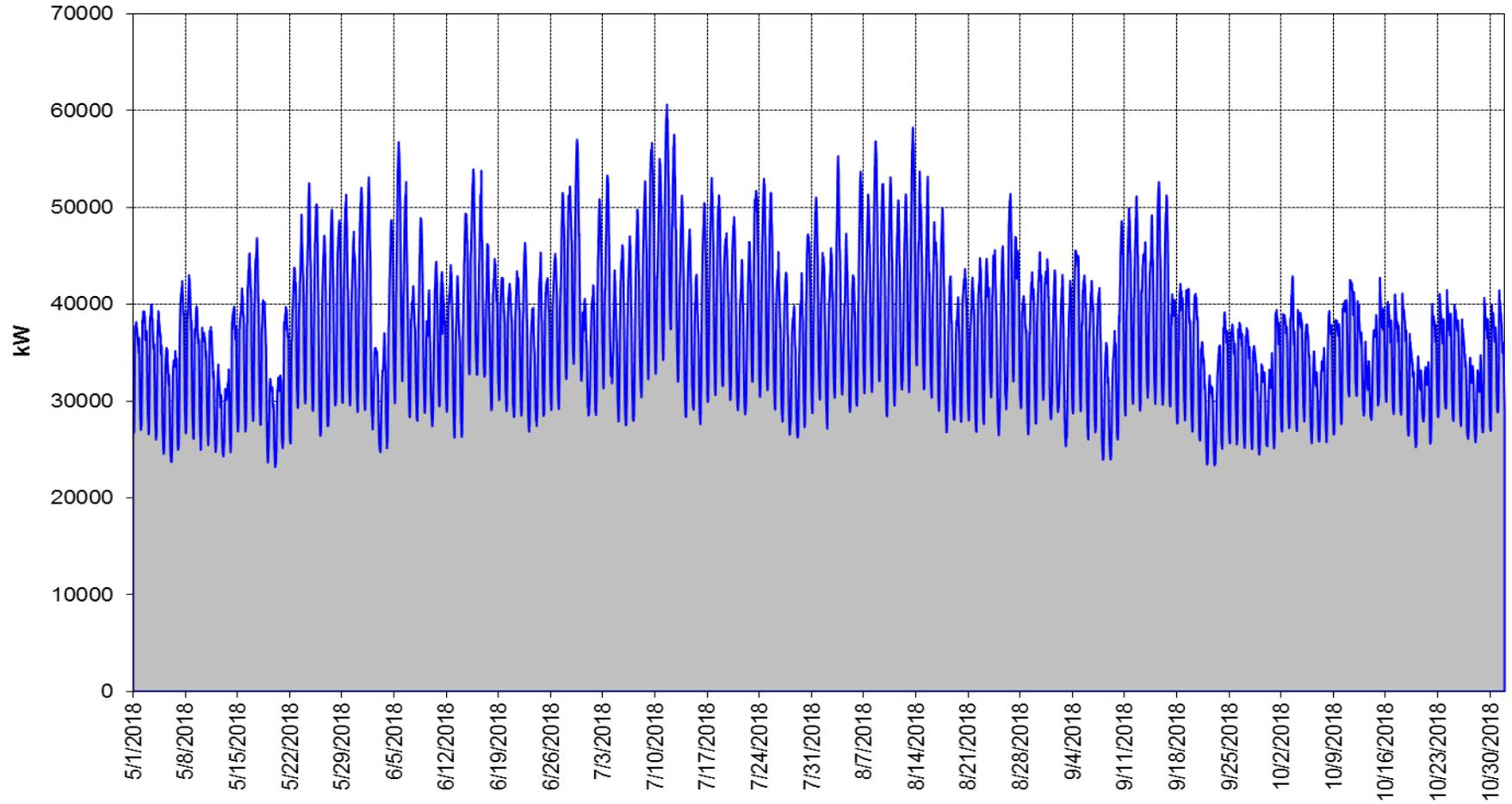


Exhibit 7

Brookings, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 57632 kW

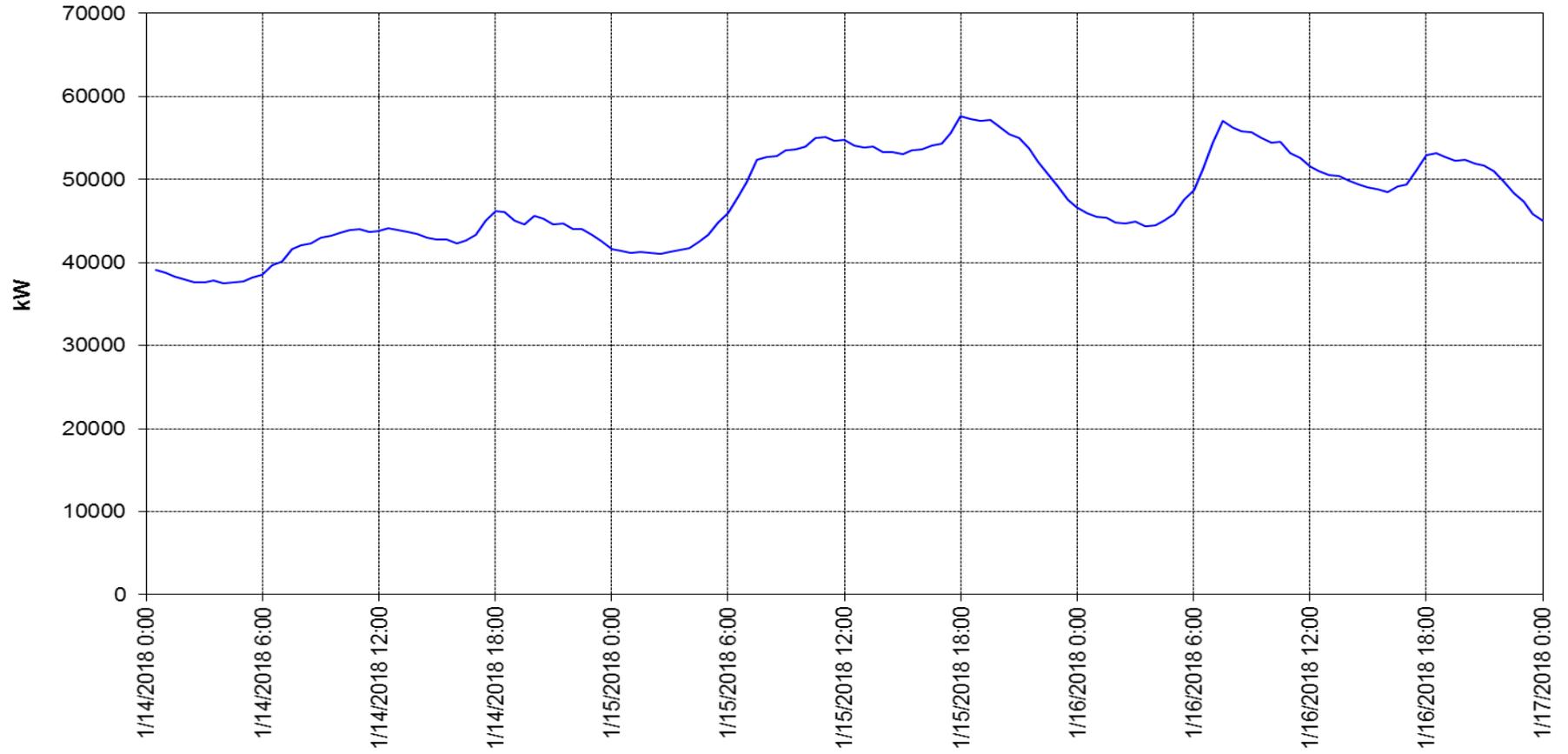
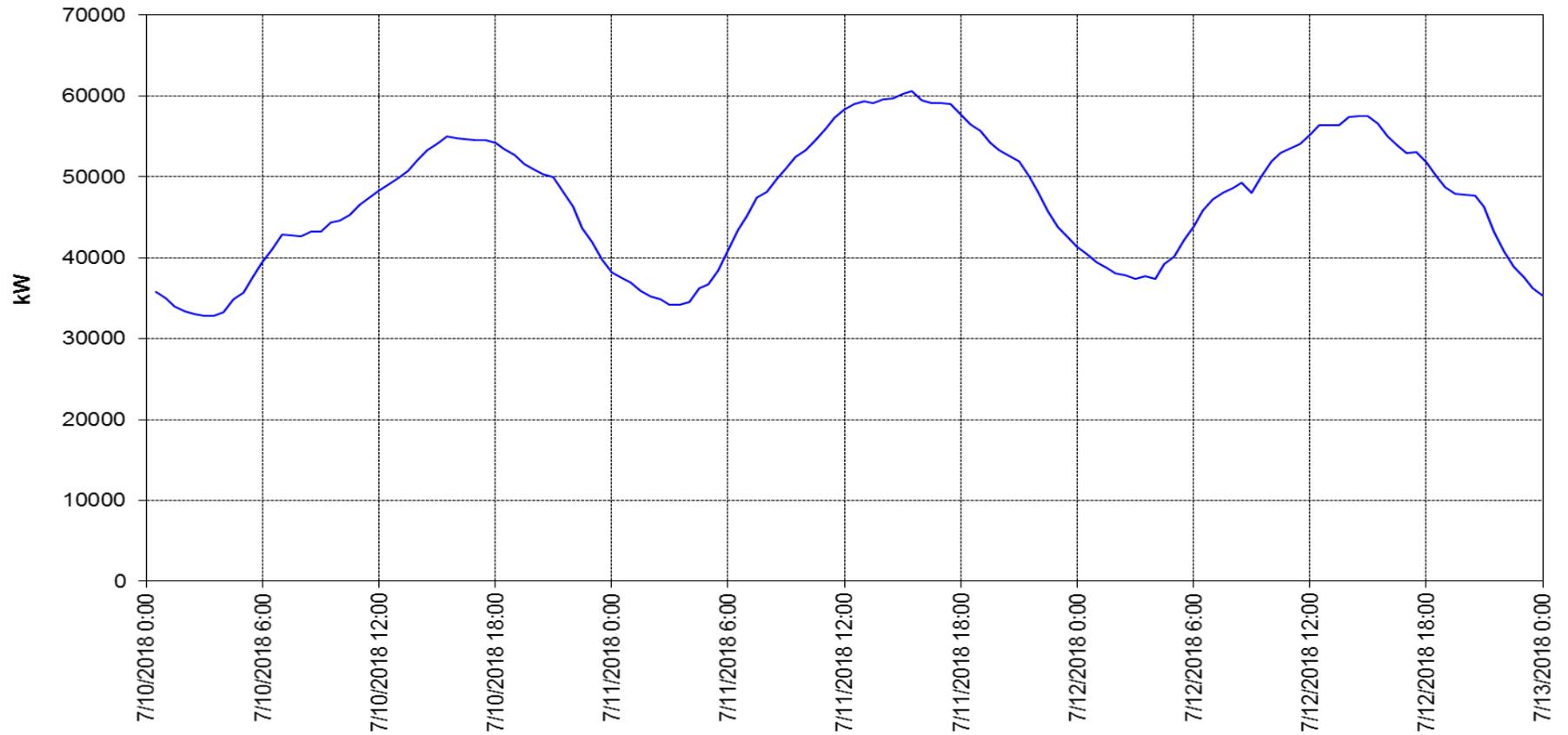


Exhibit 8

Brookings, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 60644 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Brookings is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Brookings to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Brookings has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Brookings				
Program/Measure	Quan	Incentive	kW	kWh	
2014	2327	\$ 105,623	359.4	1673387	
C&I HVAC	20	\$ 7,608	21.1	13156	
Compressed Air System	2	\$ 2,925	8.8	38698	
Custom Electric Program	4	\$ 2,253	8.0	35035	
Energy Star Appliances	82	\$ 3,111	2.5	15338	
Food Service	3	\$ 400	0.3	2027	
Lighting New Construction	781	\$ 40,060	156.2	1077522	
Lighting Retrofit	1321	\$ 36,391	106.2	330295	
Residential HVAC	111	\$ 9,275	38.1	66148	
VFDs and Pumps	3	\$ 3,600	18.3	95168	
2015	7277	\$ 209,005	559.2	1995651	
C&I HVAC	83	\$ 2,801	8.1	6344	
Custom Electric Program	1	\$ 110,429	349.3	743462	
Energy Star Appliances	334	\$ 4,613	3.8	27921	
Food Service	4	\$ 775	1.6	11258	
Lighting New Construction	354	\$ 4,729	10.5	58799	
Lighting Retrofit	5258	\$ 75,803	164.1	1060968	
Res HVAC Quality Installation	6	\$ 1,050	2.4	2910	
Residential HVAC	37	\$ 5,205	13.9	35624	
Residential Lighting	1200	\$ 3,600	5.4	48365	
2016	12290	\$ 196,074	512.0	3511764	
C&I HVAC	1	\$ 50	0.1	822	
Compressed Air System	2	\$ 1,665	35.4	279197	
Custom Electric Program	0	\$ 35,110	145.0	936376	
Energy Star Appliances	995	\$ 6,306	6.4	52762	
Lighting New Construction	33	\$ 495	1.3	7125	
Lighting Retrofit	9586	\$ 135,493	289.3	2061744	
Res HVAC Quality Installation	2	\$ 500	0.8	6040	
Residential HVAC	71	\$ 11,655	26.4	103212	
Residential Lighting	1600	\$ 4,800	7.2	64486	
2017	11532	\$ 222,455	704.6	4263290	
C&I Compressed Air	7	\$ 2,202	15.2	166914	
C&I Custom (non-lighting)	0	\$ 81,794	263.1	1944161	
C&I HVAC	148	\$ 16,083	35.9	59336	
C&I Pumps & VFDs	15	\$ 7,280	33.9	154355	

Energy Star Appliances	60	\$ 660	0.6	4128
Lighting New Construction	419	\$ 12,656	31.2	162117
Lighting Retrofit	10186	\$ 77,787	281.1	1648604
Residential Energy Star Products	557	\$ 5,197	5.1	37394
Residential HVAC	3	\$ 425	1.2	3496
Residential HVAC	137	\$ 18,370	37.4	82785
2018	16441.5	\$ 300,060	876.7	4627065
C&I Compressed Air	6	\$ 5,575	17.4	82752
C&I HVAC	25	\$ 37,170	94.6	120091
C&I Pumps & VFDs	19	\$ 5,860	22.1	92758
Lighting New Construction	1708.5	\$ 26,577	63.7	389099
Lighting Retrofit	14199	\$ 202,075	647.1	3822275
Residential Energy Star Products	370	\$ 2,177	3.4	24078
Residential HVAC	114	\$ 20,625	28.5	96011
Grand Total	49867.5	\$ 1,033,217	3011.8	16071157

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Brookings was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Brookings will continue to participate in the Bright Energy Solutions program. Brookings would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Brookings will participate in the all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Brookings plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, it is unknown if Brookings will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Brookings will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will by definition decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. The draft was reviewed by Brookings Municipal Utilities. A notice of public hearing on the IRP was published in the local newspaper on August 23, 2019. The public hearing on the IRP was held at the September 9, 2019 Municipal Utilities Board meeting. No comments or responses were made during the meeting. The Municipal Utilities

Board approved the resolution on September 9, 2019. A copy of the approved resolution is included in Appendix 2 at the end of this section.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	8/23/2019
Public Hearing Date	9/9/2019
Date Approved by City Council	9/9/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Brookings				
Program/Measure	Quan	Incentive	kW	kWh	
2014	2327	\$ 105,623	359.4	1673387	
C&I HVAC	20	\$ 7,608	21.1	13156	
ECM in Res Style Furnace	4	\$ 600	0.9	1600	
Energy Recovery Ventilator (ERV)	1	\$ 4,200	14.0	2240	
Energy Star Wall Sleeve AC	1	\$ 35	0.4	393	
Setback/Programmable Thermostats	6	\$ 300	0.7	5292	
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	4	\$ 800	1.2	1378	
Unitary Air Cooled Split Sys AC <65k Btuh (3ph)	2	\$ 350	0.5	579	
Unitary Air Cooled Split Sys AC 065k - 135k Btuh	1	\$ 510	1.1	506	
Unitary Air Cooled Split Sys AC 136k - 240k Btuh	1	\$ 813	2.3	1168	
Compressed Air System	2	\$ 2,925	8.8	38698	
Cycling Refrigerated Dryers	1	\$ 300	0.8	3448	
VFD Air Compressor	1	\$ 2,625	8.0	35250	
Custom Electric Program	4	\$ 2,253	8.0	35035	
Custom Lighting	3	\$ 1,845	7.2	16981	
HVAC: Custom cooling system with economizer	1	\$ 408	0.8	18054	
Energy Star Appliances	82	\$ 3,111	2.5	15338	
Energy Star Clothes Washer	26	\$ 1,300	0.4	3406	
Energy Star Decorative Lights	6	\$ 21	0.0	469	
ENERGY STAR Dehumidifier	4	\$ 40	0.4	360	
Energy Star Dishwasher	22	\$ 550	0.5	1383	
Energy Star Refrigerator	24	\$ 1,200	1.1	9720	
Food Service	3	\$ 400	0.3	2027	
ES Comm Solid Door Freezers	1	\$ 100	0.1	869	
ES Comm Solid Door Refrigerators	1	\$ 100	0.1	470	
ES Convection Ovens _ Electric Only	1	\$ 200	0.1	688	
Lighting New Construction	781	\$ 40,060	156.2	1077522	
Hi Bay Occupancy Sensor Control	1	\$ 500	2.0	41494	
T5HO 4ft Hi Bay Fixture	28	\$ 1,960	7.1	43709	
T8 4ft Hi Bay Fixture	752	\$ 37,600	147.1	992319	
Lighting Retrofit	1321	\$ 36,391	106.2	330295	
Compact Flourescent Fixtures & Lamps	93	\$ 1,212	3.2	13917	
LED & Induction Tech	84	\$ 1,379	3.1	16425	
Othr Eff Ltg Tech - per Unit	69	\$ 782	2.5	12952	

Othr Eff Ltg Tech - per Watt	1	\$ 96	0.0	1068
Rducd Wtg T8 4ft w Reflector/Delamping	69	\$ 1,449	6.4	12213
Rducd Wtg T8 Lamps ONLY	20	\$ 20	0.1	259
Reduced Wtg T8 4ft CEE Qual	359	\$ 6,165	21.9	69366
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	32	\$ 6,400	18.5	43886
T8 4ft w/ Bal Repl 8ft T12 HO	76	\$ 2,280	7.5	16709
T8 4ft w/Elec Bal	348	\$ 2,817	8.9	27008
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	170	\$ 13,790	34.3	116492
Residential HVAC	111	\$ 9,275	38.1	66148
Desuperheater	1	\$ 250	0.4	1221
HVAC Central AC unit	47	\$ 4,700	29.1	15892
HVAC Closed Loop Water to Air GS HP	1	\$ 700	0.6	13246
HVAC HE Furnace with ECM	13	\$ 1,950	2.8	9360
HVAC HP Water Heater	1	\$ 300	0.3	2830
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
Programmable Thermostat - AC Only	1	\$ 25	0.1	187
Programmable Thermostat - Elec Heat w/AC	4	\$ 100	0.4	9088
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	42	\$ 1,050	4.1	7854
VFDs and Pumps	3	\$ 3,600	18.3	95168
Variable Freq Drives	3	\$ 3,600	18.3	95168
2015	7277	\$ 209,005	559.2	1995651
C&I HVAC	83	\$ 2,801	8.1	6344
Pkgd Terminal AC (PTAC)	83	\$ 2,801	8.1	6344
Custom Electric Program	1	\$ 110,429	349.3	743462
Lighting: Custom	0	\$ 13,320	44.2	176561
Lighting: Custom lighting - LEDs	1	\$ 195	0.6	5694
New Construction Design Review: Custom	0	\$ 61,082	189.2	434846
Other : Custom - CO2 Laser to Fiber Laser	0	\$ 8,553	24.3	126360
Other : Custom: Ice Storage for cooling at				
BHS - this pulls demand off-peak	0	\$ 27,279	90.9	1
Energy Star Appliances	334	\$ 4,613	3.8	27921
Energy Star Clothes Dryer	4	\$ 320	0.1	732
Energy Star Clothes Washer	19	\$ 950	0.3	2489
Energy Star Decorative Lights	6	\$ 21	0.0	469
ENERGY STAR Dehumidifier	6	\$ 60	0.2	810
Energy Star Dishwasher	23	\$ 575	0.6	899
Energy Star Refrigerator	88	\$ 2,150	1.7	15192
Energy Star Room AC	1	\$ 25	0.1	34
ES Res Lighting - LED Recessed Can	8	\$ 32	0.0	417
ES Res Lighting - LED Screw-in Lamp	178	\$ 455	0.7	6692
Programmable Thermostat	1	\$ 25	0.1	187
Food Service	4	\$ 775	1.6	11258

ES Comm Dishwasher_Gas WH-Elec Boost	1	\$	175	0.6	5040
ES Comm Solid Door Refrigerators	2	\$	200	0.1	940
ES Holding Cabinets	1	\$	400	1.0	5278
Lighting New Construction	354	\$	4,729	10.5	58799
LED Energy Star Recessed Downlight	128	\$	3,200	6.0	34458
LED Energy Star Screw-in Replacement Lamp	62	\$	426	2.1	10373
LED Troffer DLC Qualified	36	\$	180	0.3	1920
T8 4ft Reduced Wattage System	128	\$	923	2.1	12048
Lighting Retrofit	5258	\$	75,803	164.1	1060968
Compact Fluorescent Fixtures & Lamps	12	\$	18	0.1	1054
LED & Induction Tech	4699	\$	69,354	145.6	971832
Rducd Wtg T8 4ft w Reflector/Delamping	19	\$	492	1.7	7831
Reduced Wattage T8 and T5HO Lamps ONLY	204	\$	204	0.6	3716
Reduced Wattage T8 Fluorescent Systems	215	\$	3,825	9.2	47069
Reduced Wtg T8 4ft CEE Qual	14	\$	252	0.8	1842
T8 4ft w/ Bal and Reflectors / Delamping	91	\$	1,638	6.2	27435
T8 4ft w/Elec Bal	4	\$	20	0.0	189
Res HVAC Quality Installation	6	\$	1,050	2.4	2910
HVAC Central AC unit	2	\$	700	1.7	1096
HVAC HE Furnace with ECM	2	\$	300	0.4	1440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	2	\$	50	0.2	374
Residential HVAC	37	\$	5,205	13.9	35624
Air Handler _ Fan Coil with ECM	1	\$	150	0.2	720
HVAC Central AC unit	11	\$	2,750	9.6	5391
HVAC HE Furnace with ECM	11	\$	1,650	2.3	7920
HVAC HP Water Heater	1	\$	100	0.2	1889
HVAC Mini Split_Ductless Air_Source HP	1	\$	250	0.4	4588
Programmable Thermostat - AC Only	1	\$	25	0.1	187
Programmable Thermostat - Elec Heat w/AC	5	\$	125	0.5	11360
Programmable Thermostat - Geothermal	1	\$	25	0.1	882
Programmable Thermostat - Heat Pump	2	\$	50	0.2	2228
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	2	\$	50	0.2	374
Summer AC Tune-Up	1	\$	30	0.1	85
Residential Lighting	1200	\$	3,600	5.4	48365
ES Res Lighting - LED Screw-in Lamp	1200	\$	3,600	5.4	48365
2016	12290	\$	196,074	512.0	3511764
C&I HVAC	1	\$	50	0.1	822
Setback/Programmable Thermostats	1	\$	50	0.1	822
Compressed Air System	2	\$	1,665	35.4	279197
Compressed Air System Leak Survey	2	\$	1,665	35.4	279197
Custom Electric Program	0	\$	35,110	145.0	936376

Lighting: Custom	0	\$ 10,426	41.9	136592
Lighting: Custom delamped 600 6 lamp HO T8 fixtures to 4 lamp and used TLEDs. r	0	\$ 21,600	90.0	700099
Lighting: Custom 198 80 watt bulbs replaced with 157 35.4 watt LED	0	\$ 3,084	13.1	99685
Energy Star Appliances	995	\$ 6,306	6.4	52762
Energy Star Clothes Dryer	20	\$ 1,600	0.5	3660
Energy Star Clothes Washer	22	\$ 1,100	0.4	2882
ENERGY STAR Dehumidifier	6	\$ 60	0.2	810
Energy Star Dishwasher	2	\$ 50	0.0	76
Energy Star Refrigerator	23	\$ 850	0.7	6585
Energy Star Room AC	1	\$ 25	0.1	34
ES Res Lighting - CFL Screw-in Lamp	14	\$ 21	0.1	455
ES Res Lighting - LED Recessed Can	119	\$ 476	0.7	6200
ES Res Lighting - LED Screw-in Lamp	786	\$ 2,074	3.5	31686
Programmable Thermostat	2	\$ 50	0.2	374
Lighting New Construction	33	\$ 495	1.3	7125
LED Energy Star Screw-in Replacement Lamp	33	\$ 495	1.3	7125
Lighting Retrofit	9586	\$ 135,493	289.3	2061744
4' LED Linear Lamps DCL Qual	333	\$ 1,848	5.0	25945
Hi Performance T8 4ft CEE Qual	2	\$ 21	0.1	367
LED & Induction Tech	7686	\$ 112,124	230.8	1716098
LED 2 or 4 Pin-Based Repl Lamps	204	\$ 1,020	3.8	27790
LED HiBay or LoBay Repl HID or Inc	15	\$ 1,305	2.9	16299
LED Reach-in Refrigerated Case Vertical Ltg	1	\$ 5,200	10.2	89232
Occupancy Sensor Controlling LED Case				
Lighting	1	\$ 725	2.3	28275
Othr Eff Ltg Tech - per Watt	1	\$ 22	0.1	510
Reduced Wattage T8 and T5HO Lamps ONLY	1028	\$ 1,058	4.2	29571
Reduced Wattage T8 Fluorescent Systems	226	\$ 3,150	7.5	38417
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	16	\$ 3,200	7.7	21646
T8 4ft w/Elec Bal	2	\$ 10	0.0	138
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	71	\$ 5,810	14.8	67456
Res HVAC Quality Installation	2	\$ 500	0.8	6040
Air Handler _ Fan Coil with ECM	1	\$ 150	0.2	720
HVAC Air_Source HP - 14.5 SEER	1	\$ 350	0.6	5320
Residential HVAC	71	\$ 11,655	26.4	103212
Air Handler _ Fan Coil with ECM	2	\$ 300	0.4	1440
Desuperheater	1	\$ 250	0.4	1221
HVAC Central AC unit	20	\$ 5,000	15.3	8579
HVAC Closed Loop Water to Air GS HP	1	\$ 800	1.2	16716
HVAC Closed Loop Water to Water GS HP	1	\$ 1,700	2.3	35235
HVAC HE Furnace with ECM	19	\$ 2,850	4.0	13680

HVAC HP Water Heater	1	\$ 100	0.2	1889
Programmable Thermostat - Elec Heat w/AC	8	\$ 200	0.8	18176
Programmable Thermostat - Geothermal	3	\$ 75	0.3	2646
Programmable Thermostat - Heat Pump	1	\$ 25	0.1	1114
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	13	\$ 325	1.3	2431
Summer AC Tune-Up	1	\$ 30	0.1	85
Residential Lighting	1600	\$ 4,800	7.2	64486
ES Res Lighting - LED Screw-in Lamp	1600	\$ 4,800	7.2	64486
2017	11532	\$ 222,455	704.6	4263290
C&I Compressed Air	7	\$ 2,202	15.2	166914
Compressor Air Leak Survey	1	\$ 834	9.8	143726
Cycling Refrigerated Dryers	1	\$ 63	0.2	719
Dew Point Demand Control	1	\$ 125	1.2	4839
No Loss Air Drains	3	\$ 480	1.4	6350
VFD Air Compressor	1	\$ 700	2.6	11280
C&I Custom (non-lighting)	0	\$ 81,794	263.1	1944161
Lighting: Custom	0	\$ 77,485	252.3	1890439
Other : Milk Chiller in Silo at Bel				
Brands3771.94 + kWh bonus - 4309.16	0	\$ 4,309	10.8	53722
C&I HVAC	148	\$ 16,083	35.9	59336
Air Cooled Chillers w-Condenser	1	\$ 7,000	20.6	11544
ECM in Res Style Air Handler _ Fan Coil	1	\$ 150	0.2	720
ECM in Res Style Furnace	1	\$ 150	0.2	720
High Efficiency PTAC Electric- 12 kBTUH	116	\$ 3,267	7.8	5811
Mini-Split / Ductless Air Source Heat Pump	4	\$ 1,000	1.6	25880
Programmable Thermostat (Natural Gas				
Furnace With/AC)	3	\$ 150	0.3	561
Res Style Fancoil/Air Handler w/ECM	6	\$ 900	1.3	4320
Res StyleFurnace w/ECM	3	\$ 450	0.6	2160
Setback/Programmable Thermostats	3	\$ 150	0.4	2466
Split System Air Conditioning < 65000 BTUH -				
15 SEER or Higher	3	\$ 800	1.0	775
Split System Air-Source HP < 65000 BTUH				
(1ph)	5	\$ 1,566	1.3	3896
Unitary Air Cooled Split Sys AC <65k Btuh				
(1ph)	2	\$ 500	0.6	484
C&I Pumps & VFDs	15	\$ 7,280	33.9	154355
Variable Freq Drives	15	\$ 7,280	33.9	154355
Energy Star Appliances	60	\$ 660	0.6	4128
Energy Star Clothes Dryer	1	\$ 80	0.0	183
Energy Star Clothes Washer	6	\$ 300	0.1	786
Energy Star Refrigerator	2	\$ 100	0.1	810
ES Res Lighting - LED Screw-in Lamp	49	\$ 130	0.2	1975

Programmable Thermostat	2	\$ 50	0.2	374
Lighting New Construction	419	\$ 12,656	31.2	162117
LED Energy Star Recessed Downlight	108	\$ 2,700	6.0	29674
LED Hi Bay or Low Bay Fixtures	137	\$ 6,620	21.1	100555
LED High Bay Fixtures 111-160 W	8	\$ 480	0.8	5345
LED High Bay Fixtures 161-275 W	4	\$ 300	0.5	3697
LED Recessed Downlight	81	\$ 2,025	1.2	14375
LED Troffer 3000 - 5799 Lumens	20	\$ 120	0.2	1417
LED Troffer DLC Qualified	61	\$ 411	1.5	7053
Lighting Retrofit	10186	\$ 77,787	281.1	1648604
4 Ft. LED Linear Lamps Repl T8 Fluorescent	2636	\$ 7,908	29.1	144383
4' LED Linear Lamps DCL Qual	5747	\$ 17,661	80.3	587016
Custom - Lighting	0	\$ 37,467	127.5	644987
LED & Induction Tech	824	\$ 9,497	31.6	189137
LED 2 or 4 Pin-Based Repl Lamps	528	\$ 2,640	5.8	37313
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	82	\$ 574	3.5	18358
LED Hi Bay or Low Bay Occ Sensor Ctl	15	\$ 150	0.6	4271
LED Pin-Based Replacement Lamps	324	\$ 1,620	1.2	15119
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	30	\$ 270	1.4	8020
Residential Energy Star Products	557	\$ 5,197	5.1	37394
Energy Star Clothes Dryer	13	\$ 1,040	0.3	2379
ENERGY STAR Clothes Dryer (Electric)	9	\$ 720	0.2	1644
Energy Star Clothes Washer	18	\$ 900	0.5	3564
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	7	\$ 350	0.2	1386
ENERGY STAR Clothes Washer W/ Elec WH and Gas Dryer	1	\$ 50	0.0	95
ENERGY STAR Dehumidifier	7	\$ 105	0.3	1399
Energy Star Refrigerator	12	\$ 360	0.3	2676
ENERGY STAR Refrigerator No Recycling	6	\$ 120	0.1	795
ENERGY STAR Refrigerator With Recycling	5	\$ 250	0.2	2025
ES Res Lighting - LED Recessed Can	12	\$ 48	0.1	626
ES Res Lighting - LED Screw-in Lamp	195	\$ 390	0.9	7860
Lighting Equipment LED Lamps	184	\$ 365	0.8	7416
Lighting Equipment LED Recessed Can	81	\$ 324	0.5	4220
Programmable Thermostat	2	\$ 50	0.2	374
Programmable Thermostat (Natural Gas Furnace With/AC)	5	\$ 125	0.5	935
Residential HVAC	3	\$ 425	1.2	3496
HVAC Central AC unit	1	\$ 250	0.9	504
HVAC HE Furnace with ECM	1	\$ 150	0.2	720
Programmable Thermostat - Elec Heat w/AC	1	\$ 25	0.1	2272

Residential HVAC	137	\$ 18,370	37.4	82785
Air-Source Heat Pump (15 SEER)	1	\$ 250	0.2	5327
Central AC 15 SEER	11	\$ 2,750	3.4	1922
Central AC/ASHP Tune-Up	9	\$ 270	0.5	667
Furnace W/ECM	17	\$ 2,550	3.6	12240
HVAC Central AC unit	24	\$ 6,000	16.9	9509
HVAC Central AC unit 18+ SEER	1	\$ 350	1.0	546
HVAC HE Furnace with ECM	33	\$ 4,950	7.0	23760
HVAC HP Water Heater	1	\$ 250	0.9	5727
Programmable Thermostat - Elec Heat w/AC	17	\$ 425	1.6	14076
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	9	\$ 225	0.9	369
Programmable Thermostat (Electric Furnace				
W/ AC)	2	\$ 50	0.2	4544
Programmable Thermostat (Heat Pump)	2	\$ 50	0.2	2228
Programmable Thermostat (Natural Gas				
Boiler With/AC)	1	\$ 25	0.1	187
Programmable Thermostat (Natural Gas				
Furnace With/AC)	4	\$ 100	0.4	748
Programmable Thermostat (Propane or Fuel				
Oil With/AC)	5	\$ 125	0.5	935
2018	16441.5	\$ 300,060	876.7	4627065
C&I Compressed Air	6	\$ 5,575	17.4	82752
Compressor Air Leak Survey	1	\$ 263	1.4	13525
Cycling Refrigerated Dryers	2	\$ 1,763	4.8	20257
Mist Eliminators	2	\$ 1,800	5.9	25470
VFD Air Compressor <= 200-HP Replacing				
Load/No-Load	1	\$ 1,750	5.3	23500
C&I HVAC	25	\$ 37,170	94.6	120091
Air-Cooled Chiller > 150 Tons	2	\$ 20,000	58.8	72688
Air-Cooled Chiller Up To < 150 Tons	2	\$ 4,935	14.5	18968
ECM HVAC Fan-powered box	3	\$ 300	0.8	5542
Guest Room Energy Management - PTAC	10	\$ 350	1.3	9960
Res StyleFurnace w/ECM	2	\$ 300	0.4	1440
Roof Top Unit A/C > 135000- 240000 BTUH	1	\$ 750	1.7	2172
Roof Top Unit A/C > 240000- 760000 BTUH	1	\$ 1,550	3.2	1938
Roof Top Unit A/C > 760000 BTUH	2	\$ 8,500	13.3	6714
Split System Air Conditioning < 65000 BTUH -				
15 SEER or Higher	2	\$ 485	0.6	669
C&I Pumps & VFDs	19	\$ 5,860	22.1	92758
High Efficiency Pump 15 HP	2	\$ 600	1.9	7080
Variable Frequency Drives Fan VFD HP 3	1	\$ 120	0.4	1379
Variable Frequency Drives Fan VFD HP 5	1	\$ 200	0.7	2299
Variable Frequency Drives Fan VFD HP 7.5	11	\$ 3,300	10.8	46859

Variable Frequency Drives Pump VFD HP 15	1	\$ 600	3.0	13225
Variable Frequency Drives Pump VFD HP 20	1	\$ 800	4.1	17633
Variable Frequency Drives Pump VFD HP 3	2	\$ 240	1.2	4282
Lighting New Construction	1708.5	\$ 26,577	63.7	389099
LED High Bay Fixtures 161-275 W	64	\$ 4,800	13.5	66803
LED High Bay Fixtures, DLC Premium 161-275 W	7	\$ 630	1.7	8356
LED Recessed Downlight	609	\$ 14,905	30.4	211345
LED Troffer < 3000 Lumens	195.5	\$ 782	1.5	10329
LED Troffer >= 5800 Lumens	89	\$ 801	2.6	12923
LED Troffer 3000 - 5799 Lumens	679	\$ 4,074	12.0	69201
LED Troffer, 3000 - 5799Lumens, DLC Premium	65	\$ 585	2.1	10143
Lighting Retrofit	14199	\$ 202,075	647.1	3822275
4 Ft. LED Linear Lamps Repl T12 Fluorescent	320	\$ 1,920	5.2	29820
4 Ft. LED Linear Lamps Repl T8 Fluorescent	11261	\$ 33,783	152.1	1124120
Custom - Lighting	0	\$ 150,538	442.9	2374446
Horizontal LED Reach in Case Lighting	1956	\$ 5,868	17.2	119138
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	147	\$ 953	5.4	31967
LED Exit Sign	2	\$ 24	0.0	272
LED High Bay Fixture-Mounted Occ. Sensor	20	\$ 200	1.1	6240
LED Recessed Downlight	277	\$ 6,545	12.5	74309
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	191	\$ 1,719	9.1	53172
Occupancy Sensor Over 500 W Controlled	1	\$ 45	0.1	672
Occupancy Sensor Under 500 W Controlled	24	\$ 480	1.5	8119
Residential Energy Star Products	370	\$ 2,177	3.4	24078
ENERGY STAR Clothes Dryer (Electric)	10	\$ 415	0.3	1827
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	12	\$ 375	0.3	2376
ENERGY STAR Dehumidifier	12	\$ 300	0.5	2395
ENERGY STAR Refrigerator No Recycling	11	\$ 270	0.1	564
ENERGY STAR Refrigerator With Recycling	4	\$ 100	0.3	1783
Lighting Equipment LED Lamps EStar	294	\$ 504	1.3	11849
Lighting Equipment LED Recessed Can EStar	22	\$ 88	0.1	1146
Programmable Thermostat (Natural Gas Furnace With/AC)	3	\$ 75	0.3	561
Smart Thermostat (Electric Furnace W/ AC)	1	\$ 25	0.1	1509
Smart Thermostat (Natural Gas Furnace With/AC)	1	\$ 25	0.1	68
Residential HVAC	114	\$ 20,625	28.5	96011
Air Handler/Fan Coil W/ECM	4	\$ 600	0.9	2880
Air-Source Heat Pump (15 SEER)	2	\$ 500	0.4	10653

Air-Source Heat Pump (18 SEER)	1	\$ 350	0.5	6197
Central AC 15 SEER	33	\$ 8,250	10.3	5767
Central AC 18+ SEER	2	\$ 700	1.3	728
Desuperheater	1	\$ 250	0.4	1221
Furnace W/ECM	49	\$ 7,350	10.4	35280
Ground-Source Heat Pump Closed Loop W- W < 11.25 Tons	1	\$ 1,000	1.4	21141
Mini-Split Air Conditioner	3	\$ 750	1.0	1169
Programmable Thermostat (Natural Gas Furnace With/AC)	2	\$ 50	0.2	374
Quality Installation - Air Source Heat Pump 18+ SEER	1	\$ 450	0.4	3016
Smart Thermostat (Electric Furnace W/ AC)	1	\$ 25	0.1	2272
Smart Thermostat (Geothermal)	3	\$ 75	0.3	2646
Smart Thermostat (Heat Pump)	3	\$ 75	0.2	2125
Smart Thermostat (Natural Gas Furnace With/AC)	8	\$ 200	0.6	541
Grand Total	49867.5	\$ 1,033,217	3011.8	16071157

Appendix 2 – Brookings Resolution

RESOLUTION NO. 22 - 19

RESOLUTION APPROVING INTEGRATED RESOURCE PLAN

WHEREAS the Brookings Municipal Utilities purchases a significant portion of its power supply from the Western Area Power Administration (Western); and

WHEREAS, Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and

WHEREAS, the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and

WHEREAS, any public comments received have been addressed in order to strengthen the city's Integrated Resource Plan; and

WHEREAS, the IRP Summary Report included 5-year and 2-year action plans outlining actions to be taken by the Municipal Utility during the next several years.

NOW, THEREFORE, BE IT RESOLVED BY the Brookings Municipal Utilities Board as follows:

That the "Integrated Resource Plan Summary Report for the City of Brookings dated September 2019 shall be approved for filing with Western under the Energy Planning and Management Program."

Adopted this 9th day of September, 2019.

ATTEST:

Doug Carruthers, Secretary

Tim Harvey, President

IV. Flandreau, SD Resource Planning

A. *City Information*

Flandreau, located in Moody County, is a community of more than 2,300 individuals located in eastern South Dakota. The residential sector includes 1,091 housing units. The median age of the population is 38.4 years. About 18.6% of the population is 65 years of age or older and about 25.9% percent are under 18 years old.

In 2017, the municipal utility had 1,061 residential customers, 287 commercial customers, and 4 industrial customers. The residential sector's yearly usage averaged 10,016 kWh per customer in 2017. Commercial customers averaged 56,432 kWh, and industrial customers averaged 58,500 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

FLANDREAU, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$14.50
	\$/kWh (Jul-Sept)	\$.1040
	\$/kWh (Oct-Jun)	\$.0840
Small Commercial	Customer Charge	\$24.50
	\$/kWh (Jul-Sept)	\$.1120
	\$/kWh (Oct-Jun)	\$.0910
Large Commercial	Customer Charge	\$66.00
	\$/kWh	\$.0370
	\$/kW (Jul-Sept)	\$20.40
	\$/kW (Oct-Jun)	\$14.80

Exhibit 2

FLANDREAU, SD

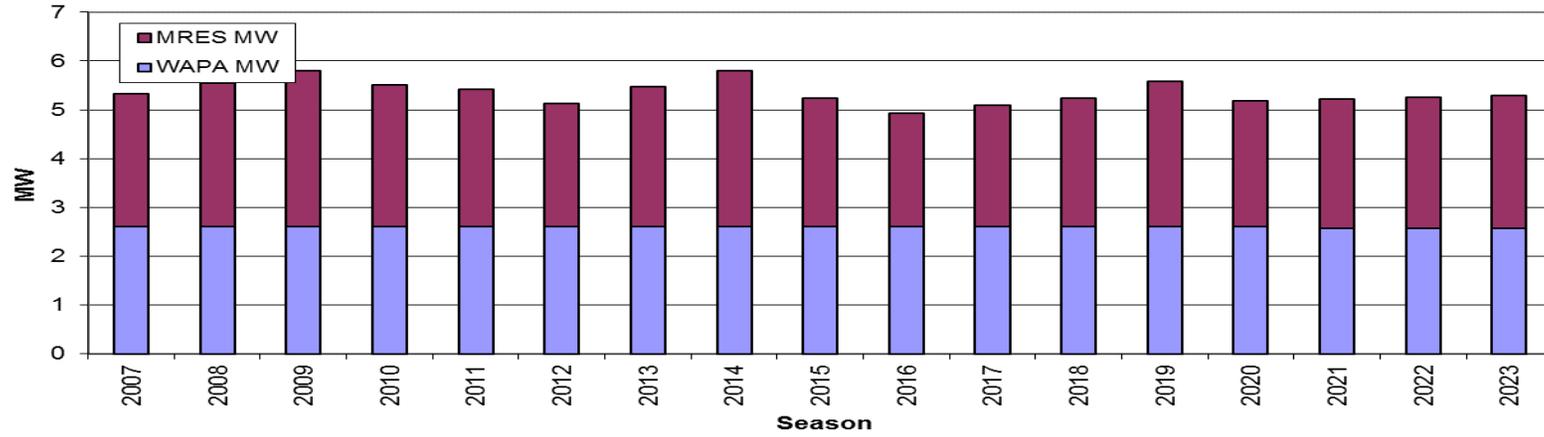
MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	6,532	2,784	4,227	2006	14,636,060	6,751,000	7,885,060
2007	6,148	2,784	3,843	2007	14,577,580	6,751,000	7,826,580
2008	5,858	2,784	3,553	2008	13,981,424	6,751,000	7,230,424
2009	5,430	2,784	3,180	2009	13,568,349	6,751,000	6,817,349
2010	6,200	2,784	3,729	2010	14,605,558	6,751,000	7,854,558
2011	6,690	2,784	4,385	2011	14,473,307	6,751,000	7,722,307
2012	6,541	2,784	4,236	2012	15,050,148	6,751,000	8,299,148
2013	6,502	2,784	3,854	2013	14,789,088	6,751,000	8,038,088
2014	5,738	2,784	3,236	2014	13,904,405	6,751,000	7,153,405
2015	5,819	2,784	3,514	2015	14,131,358	6,751,000	7,380,358
2016	6,029	2,784	3,724	2016	13,945,395	6,751,000	7,194,395
2017	5,835	2,784	3,530	2017	13,761,692	6,751,000	7,010,692
2018	6,143	2,784	3,838	2018	14,211,395	6,751,000	7,460,395
2019	5,591	2,784	3,286	2019	13,559,320	6,751,000	6,808,320
2020	5,628	2,784	3,323	2020	13,649,336	6,751,000	6,898,336
2021	5,665	2,756	3,383	2021	13,738,212	6,684,000	7,054,212
2022	5,701	2,756	3,419	2022	13,826,397	6,684,000	7,142,397
2023	5,737	2,756	3,455	2023	13,913,903	6,684,000	7,229,903
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	5,192	2,599	2,724	2007	15,590,766	7,840,000	7,750,766
2008	5,547	2,599	2,948	2008	16,289,895	7,891,000	8,398,895
2009	5,762	2,599	3,206	2009	15,973,011	7,840,000	8,133,011
2010	5,485	2,599	2,905	2010	15,720,590	7,840,000	7,880,590
2011	5,374	2,599	2,818	2011	16,082,769	7,840,000	8,242,769
2012	5,129	2,599	2,530	2012	14,906,299	7,891,000	7,015,299
2013	5,467	2,599	2,868	2013	15,858,832	7,840,000	8,018,832
2014	5,794	2,599	3,195	2014	16,414,700	7,840,000	8,574,700
2015	5,236	2,599	2,637	2015	15,368,477	7,840,000	7,528,477
2016	4,924	2,599	2,325	2016	14,316,644	7,891,000	6,425,644
2017	5,045	2,599	2,489	2017	14,468,209	7,840,000	6,628,209
2018	5,235	2,599	2,636	2018	15,492,579	7,840,000	7,652,579
2019	5,544	2,599	2,988	2019	15,331,373	7,840,000	7,491,373
2020	5,189	2,599	2,590	2020	14,959,909	7,891,000	7,068,909
2021	5,223	2,573	2,650	2021	15,057,965	7,788,000	7,269,965
2022	5,256	2,573	2,683	2022	15,155,095	7,762,000	7,393,095
2023	5,290	2,573	2,717	2023	15,251,475	7,762,000	7,489,475

Exhibit 3

Flandreau, SD
Winter Demand - Town Gate



Flandreau, SD
Winter Energy - Town Gate

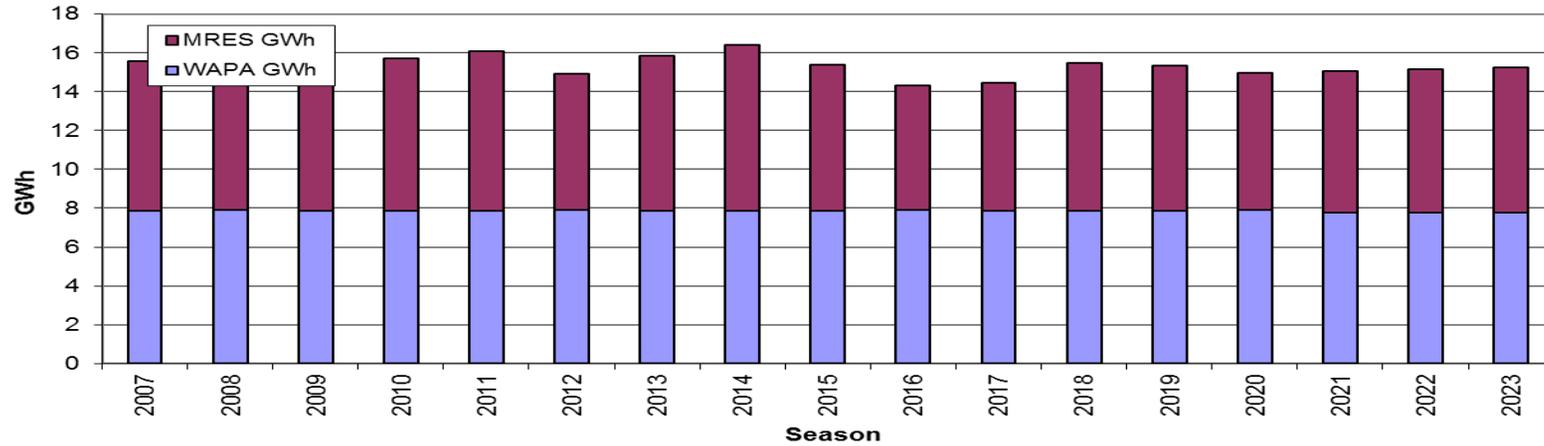
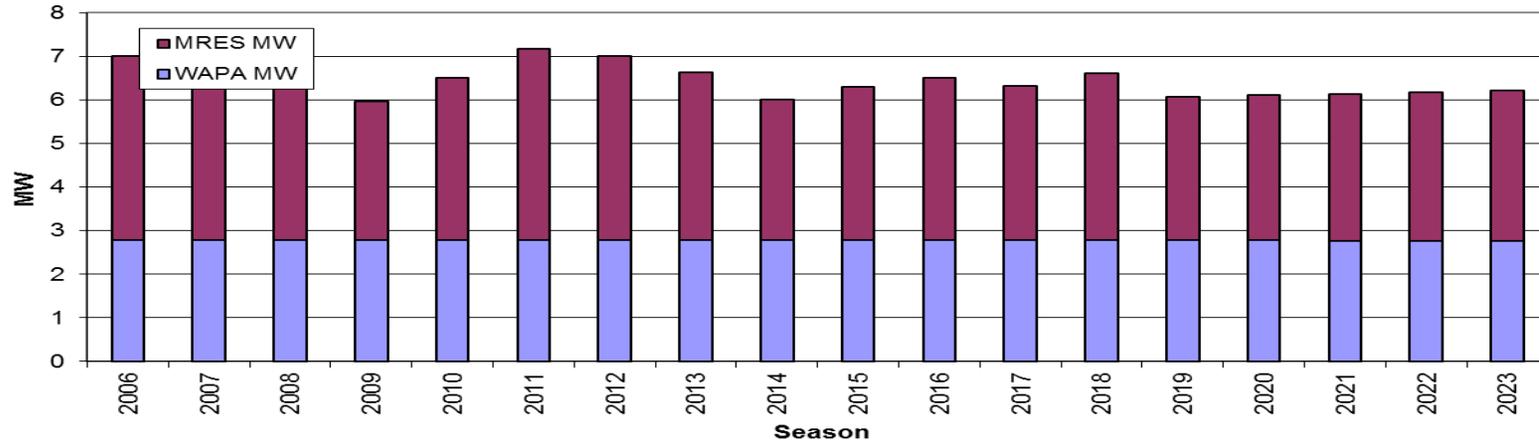


Exhibit 4

Flandreau, SD Summer Demand - Town Gate



Flandreau, SD Summer Energy - Town Gate

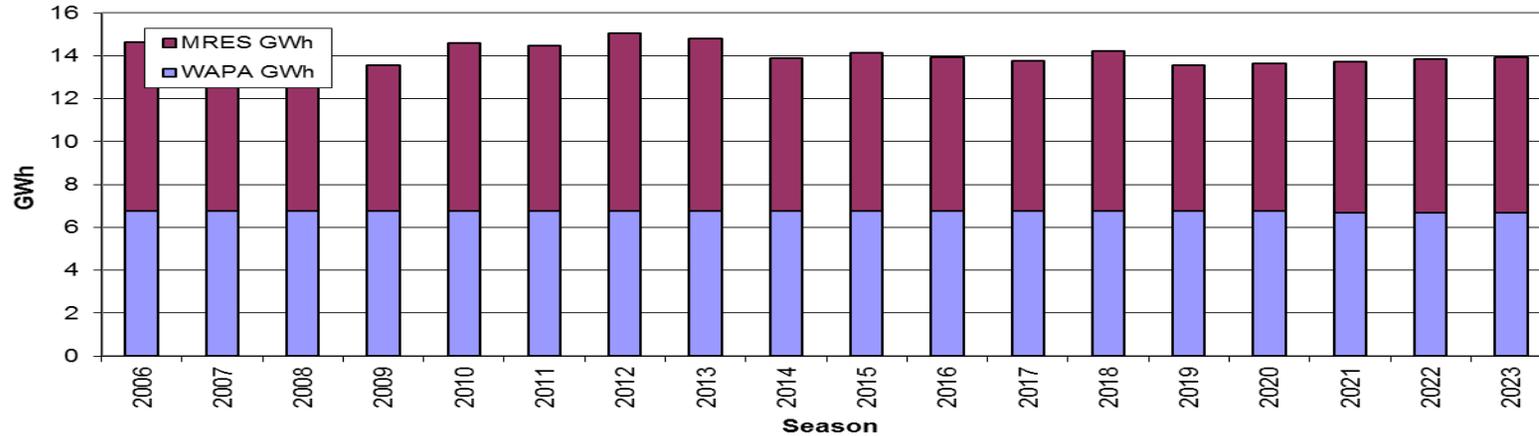


Exhibit 5

Flandreau, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 5235 kW

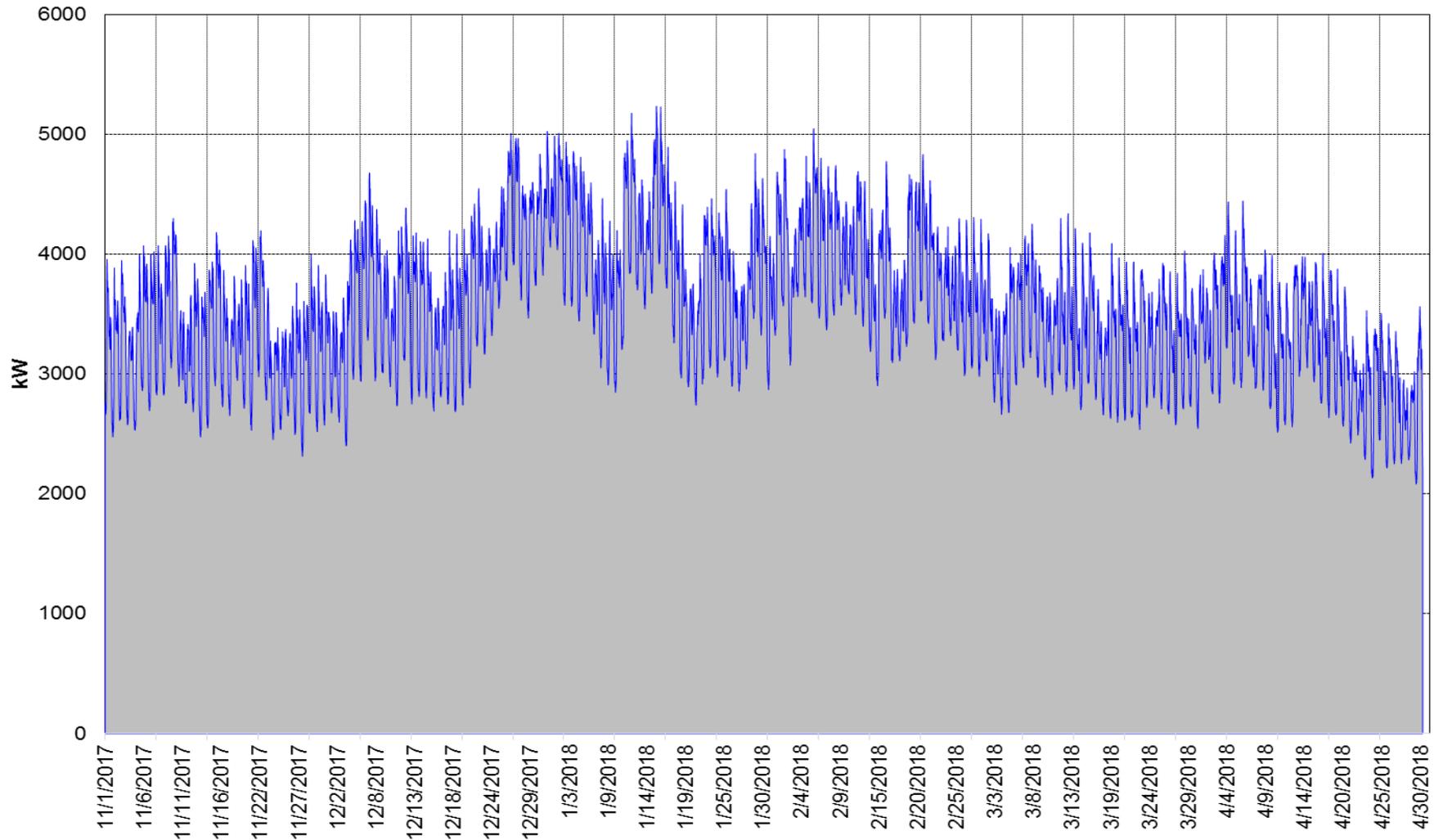


Exhibit 6

Flandreau, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 6143 kW

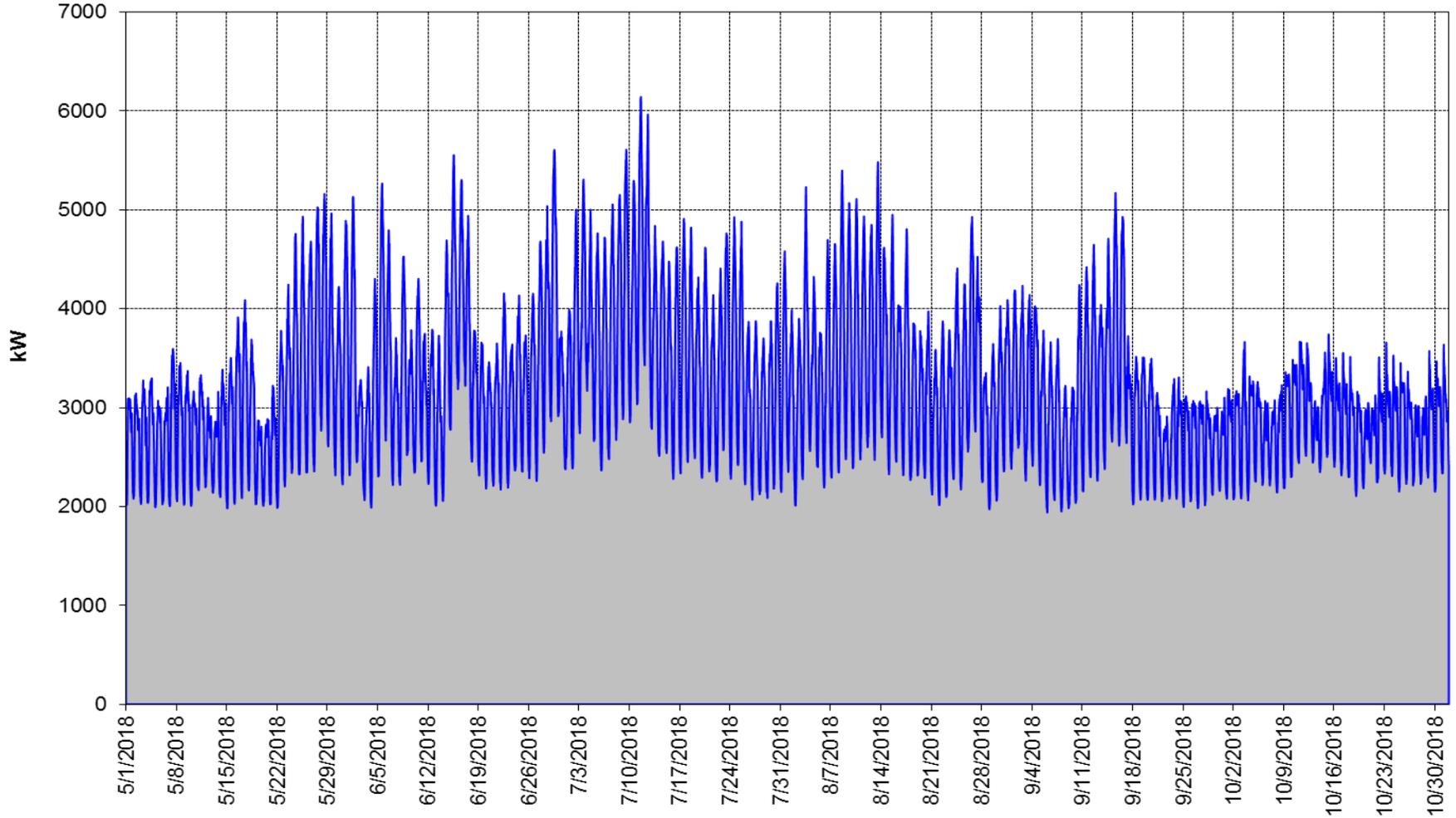


Exhibit 7

Flandreau, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 5235 kW

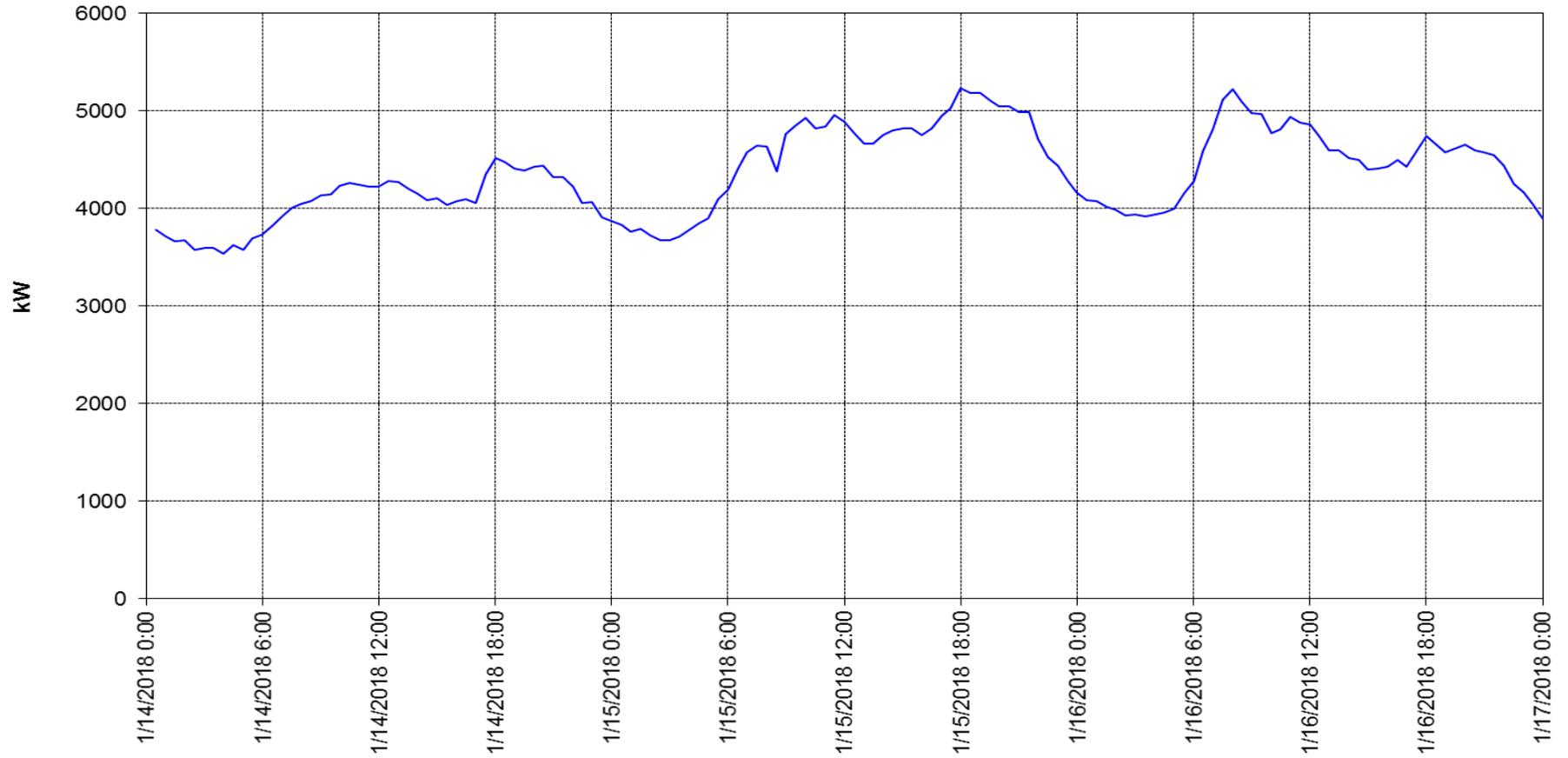
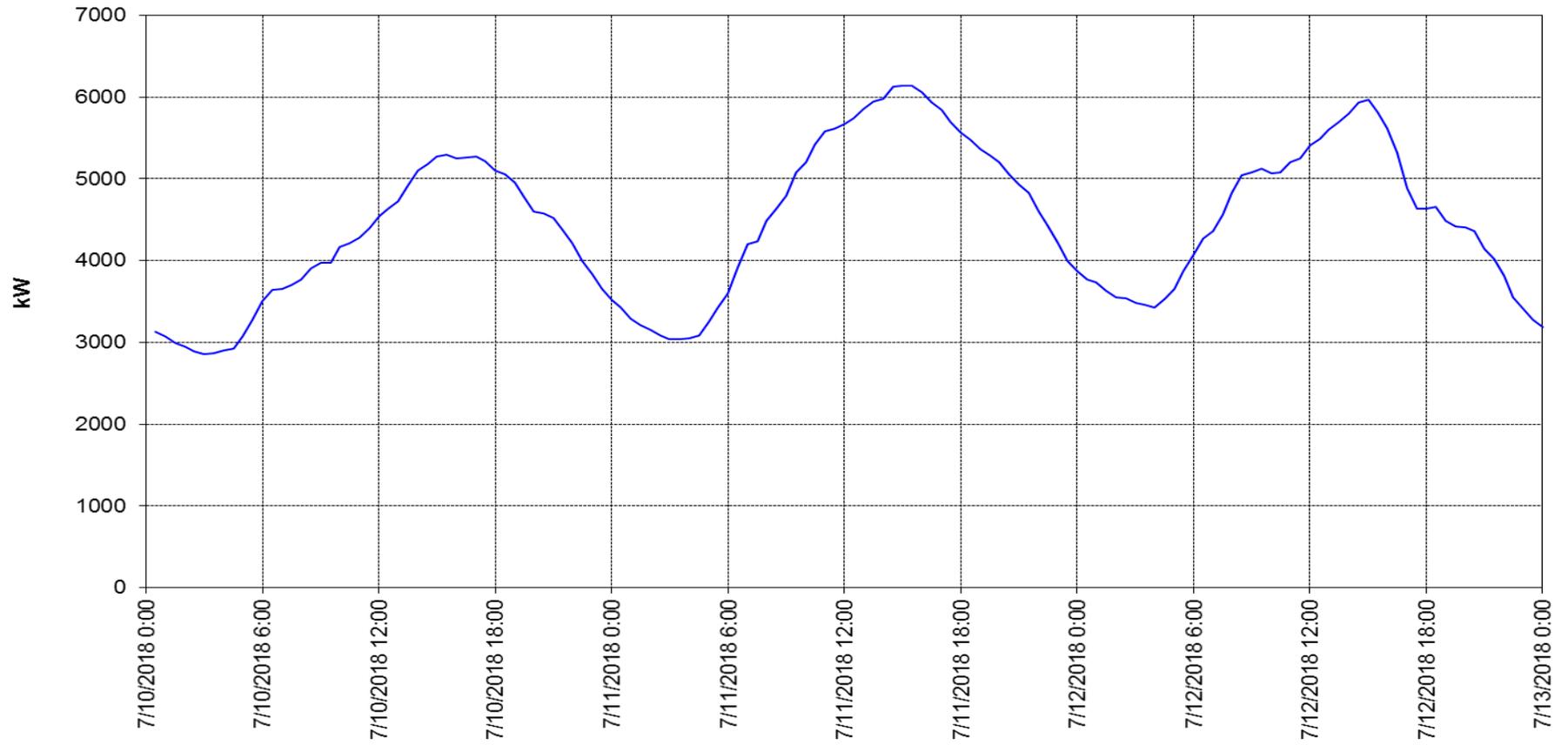


Exhibit 8

Flandreau, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 6143 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Flandreau is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Flandreau to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Flandreau has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Flandreau			
Program/Measure	Quan	Incentive	kW	kWh
2014	1021	\$ 9,204	30.1	67915
C&I HVAC	3	\$ 450	0.7	1696
Direct Installation at Customer Location	6	\$ -	0.5	2595
Energy Star Appliances	4	\$ 150	0.1	936
Lighting New Construction	55	\$ 2,750	8.3	19940
Lighting Retrofit	946	\$ 5,254	17.9	39763
Residential HVAC	6	\$ 550	2.6	2885
Specialty Measures	1	\$ 50	0.0	100
2015	400	\$ 24,318	77.0	85869
C&I HVAC	2	\$ 850	1.9	1335
Custom Electric Program	0	\$ 17,475	58.3	1
Direct Installation at Customer Location	18	\$ -	0.8	3216
Energy Star Appliances	85	\$ 514	0.6	4095
Lighting New Construction	95	\$ 1,354	3.9	22172
Lighting Retrofit	195	\$ 3,399	9.9	52167
Residential HVAC	5	\$ 725	1.7	2883
2016	1545	\$ 16,171	45.1	224628
C&I HVAC	4	\$ 750	1.1	2765
Commercial Refrigeration	5	\$ 1,150	1.9	16760
Custom Electric Program	0	\$ 2,570	8.3	25910
Energy Star Appliances	201	\$ 697	1.0	8830
Lighting New Construction	26	\$ 360	1.0	4134
Lighting Retrofit	1307	\$ 10,514	31.6	164255
Residential HVAC	2	\$ 130	0.3	1974
2017	78	\$ 5,449	14.6	65091
C&I Custom (non-lighting)	0	\$ 3,679	11.9	50967
Commercial Refrigeration	1	\$ 250	0.4	4186
Lighting New Construction	23	\$ 168	0.7	3842
Residential Energy Star Products	48	\$ 602	0.4	3533
Residential HVAC	6	\$ 750	1.1	2563
2018	187	\$ 4,363	10.8	57309
Lighting New Construction	18	\$ 468	0.7	4535
Lighting Retrofit	88	\$ 1,524	5.5	31270
Residential Energy Star Products	69	\$ 316	0.6	5664
Residential HVAC	12	\$ 2,055	3.9	15840
Grand Total	3231	\$ 59,504	177.6	500811

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Flandreau was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Flandreau will continue to participate in the Bright Energy Solutions program. Flandreau would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Flandreau will participate in all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Flandreau plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, it is unknown if Flandreau will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Flandreau will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a

minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 24, 2019. The public hearing on the IRP was held at the August 5, 2019 City Council meeting. No comments or responses were made during the meeting. The City Council approved the resolution on August 5, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	7/24/2019
Public Hearing Date	8/5/2019
Date Approved by City Council	8/5/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Flandreau				
Program/Measure	Quan	Incentive	kW	kWh	
2014	1021	\$ 9,204	30.1	67915	
C&I HVAC	3	\$ 450	0.7	1696	
ECM in Res Style Furnace	1	\$ 150	0.2	400	
Setback/Programmable Thermostats	1	\$ 50	0.1	882	
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 250	0.4	414	
Direct Installation at Customer Location	6	\$ -	0.5	2595	
LED Screw-in Replacement Lamp	6	\$ -	0.5	2595	
Energy Star Appliances	4	\$ 150	0.1	936	
Energy Star Dishwasher	2	\$ 50	0.0	126	
Energy Star Refrigerator	2	\$ 100	0.1	810	
Lighting New Construction	55	\$ 2,750	8.3	19940	
T8 4ft Hi Bay Fixture	55	\$ 2,750	8.3	19940	
Lighting Retrofit	946	\$ 5,254	17.9	39763	
Compact Flourescent Fixtures & Lamps	30	\$ 540	1.6	3671	
LED & Induction Tech	59	\$ 870	3.2	6985	
Othr Eff Ltg Tech - per Unit	30	\$ 680	1.7	4882	
Rducd Wtg T8 4ft w Reflector/Delamping	7	\$ 147	0.7	1239	
Rducd Wtg T8 Lamps ONLY	630	\$ 630	1.9	4945	
Reduced Wtg T8 4ft CEE Qual	183	\$ 2,345	8.8	17793	
T8 4ft w/Elec Bal	7	\$ 42	0.1	248	
Residential HVAC	6	\$ 550	2.6	2885	
HVAC Central AC unit	2	\$ 200	2.0	1071	
HVAC HE Furnace with ECM	2	\$ 300	0.4	1440	
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	2	\$ 50	0.2	374	
Specialty Measures	1	\$ 50	0.0	100	
Energy Star Clothes Washer - Elec WH	1	\$ 50	0.0	100	
2015	400	\$ 24,318	77.0	85869	
C&I HVAC	2	\$ 850	1.9	1335	
Unitary Single Pkgd AC 065k - 135k Btuh	2	\$ 850	1.9	1335	
Custom Electric Program	0	\$ 17,475	58.3	1	
HVAC: CustomGeothermal hybrid System 0 kWh savings	0	\$ 17,475	58.3	1	
Direct Installation at Customer Location	18	\$ -	0.8	3216	
LED Screw-in Replacement Lamp	18	\$ -	0.8	3216	
Energy Star Appliances	85	\$ 514	0.6	4095	
Energy Star Ceiling Fan w/ Light Kit	2	\$ 50	0.0	242	

Energy Star Clothes Washer	3	\$ 150	0.1	393
Energy Star Dishwasher	2	\$ 50	0.0	76
Energy Star Refrigerator	1	\$ 20	0.0	132
ES Res Lighting - LED Screw-in Lamp	76	\$ 219	0.3	3065
Programmable Thermostat	1	\$ 25	0.1	187
Lighting New Construction	95	\$ 1,354	3.9	22172
CEE Qual T8 4ft Hi Performance System	75	\$ 354	1.1	6324
T8 4ft Hi Bay Fixture	20	\$ 1,000	2.7	15848
Lighting Retrofit	195	\$ 3,399	9.9	52167
LED & Induction Tech	143	\$ 1,539	5.7	23442
T8 4ft w/Elec Bal	32	\$ 160	0.4	2276
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	20	\$ 1,700	3.8	26449
Residential HVAC	5	\$ 725	1.7	2883
HVAC Central AC unit	1	\$ 250	1.0	536
HVAC HE Furnace with ECM	3	\$ 450	0.6	2160
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	187
2016	1545	\$ 16,171	45.1	224628
C&I HVAC	4	\$ 750	1.1	2765
ECM in Res Style Furnace	1	\$ 150	0.2	720
Setback/Programmable Thermostats	2	\$ 100	0.2	1644
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 500	0.6	401
Commercial Refrigeration	5	\$ 1,150	1.9	16760
ES Comm Glass Door Freezers	2	\$ 500	1.6	14236
ES Comm Glass Door Refrigerators	3	\$ 650	0.3	2524
Custom Electric Program	0	\$ 2,570	8.3	25910
Lighting: Custom	0	\$ 390	1.2	11392
Lighting: Custom 42 8ft HO fixtures with 95 Watt lamps 227 x 42=9534 Watts 9.5	0	\$ 2,180	7.1	14518
Energy Star Appliances	201	\$ 697	1.0	8830
Energy Star Refrigerator	2	\$ 100	0.1	810
ES Res Lighting - LED Screw-in Lamp	199	\$ 597	0.9	8020
Lighting New Construction	26	\$ 360	1.0	4134
LED Energy Star Recessed Downlight	1	\$ 25	0.1	213
LED Energy Star Screw-in Replacement Lamp	21	\$ 315	0.9	3752
LED Troffer DLC Qualified	4	\$ 20	0.0	169
Lighting Retrofit	1307	\$ 10,514	31.6	164255
4' LED Linear Lamps DCL Qual	712	\$ 2,232	6.9	37150
LED & Induction Tech	543	\$ 7,424	21.9	113342
LED 2 or 4 Pin-Based Repl Lamps	24	\$ 120	0.3	1875
Othr Eff Ltg Tech - per Unit	2	\$ 90	0.3	1903
Rducd Wtg T8 4ft w Reflector/Delamping	20	\$ 540	1.8	8590
Reduced Wattage T8 Fluorescent Systems	6	\$ 108	0.3	1395

Residential HVAC	2	\$ 130	0.3	1974
HVAC HP Water Heater	1	\$ 100	0.2	1889
Summer AC Tune-Up	1	\$ 30	0.1	85
2017	78	\$ 5,449	14.6	65091
C&I Custom (non-lighting)	0	\$ 3,679	11.9	50967
Lighting: Custom	0	\$ 3,679	11.9	50967
Commercial Refrigeration	1	\$ 250	0.4	4186
ENERGY STAR Commercial Solid Door Freezers > 50 Cu Ft	1	\$ 250	0.4	4186
Lighting New Construction	23	\$ 168	0.7	3842
LED Energy Star Screw-in Replacement Lamp	10	\$ 90	0.5	2673
LED Troffer DLC Qualified	13	\$ 78	0.2	1169
Residential Energy Star Products	48	\$ 602	0.4	3533
Energy Star Clothes Dryer	2	\$ 160	0.1	366
ENERGY STAR Clothes Dryer (Electric)	1	\$ 80	0.0	183
Energy Star Clothes Washer	3	\$ 150	0.1	594
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	1	\$ 50	0.0	198
Energy Star Refrigerator	1	\$ 50	0.0	405
ENERGY STAR Refrigerator No Recycling	1	\$ 20	0.0	132
ES Res Lighting - LED Recessed Can	7	\$ 28	0.0	365
ES Res Lighting - LED Screw-in Lamp	32	\$ 64	0.1	1290
Residential HVAC	6	\$ 750	1.1	2563
Central AC 15 SEER	1	\$ 250	0.3	175
Furnace W/ECM	1	\$ 150	0.2	720
HVAC HE Furnace with ECM	2	\$ 300	0.4	1440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	41
Programmable Thermostat (Natural Gas Boiler With/AC)	1	\$ 25	0.1	187
2018	187	\$ 4,363	10.8	57309
Lighting New Construction	18	\$ 468	0.7	4535
LED High Bay Fixtures 111-160 W	15	\$ 450	0.6	4271
LED Troffer 3000 - 5799 Lumens	3	\$ 18	0.0	263
Lighting Retrofit	88	\$ 1,524	5.5	31270
Custom - Lighting	0	\$ 1,170	2.6	13253
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	64	\$ 192	2.0	12214
LED Exit Sign	6	\$ 72	0.1	842
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	18	\$ 90	0.8	4961
Residential Energy Star Products	69	\$ 316	0.6	5664
ENERGY STAR Clothes Dryer (Electric)	1	\$ 80	0.0	183
ENERGY STAR Refrigerator No Recycling	1	\$ 25	0.0	43

ENERGY STAR Refrigerator With Recycling	1	\$ 25	0.1	446
Energy Star Room AC	1	\$ 25	0.1	94
Lighting Equipment LED Lamps	60	\$ 120	0.3	2418
Lighting Equipment LED Recessed Can	4	\$ 16	0.0	208
Smart Thermostat (Electric Furnace W/ AC)	1	\$ 25	0.1	2272
Residential HVAC	12	\$ 2,055	3.9	15840
Central AC 15 SEER	3	\$ 750	0.9	524
Central AC/ASHP Tune-Up	1	\$ 30	0.1	74
Furnace W/ECM	5	\$ 750	1.1	3600
Heat Pump Water Heater <= 55 Gallons	2	\$ 500	1.7	11454
Programmable Thermostat (Natural Gas Boiler With/AC)	1	\$ 25	0.1	187
Grand Total	3231	\$ 59,504	177.6	500811

Appendix 2 – Flandreau Resolution

RESOLUTION NO. 2019-03

A RESOLUTION TO APPROVE AN INTEGRATED RESOURCE PLAN SUMMARY REPORT

WHEREAS, the City of Flandreau purchases a significant portion of its power supply from the Western Area Power Administration (Western); and

WHEREAS, Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and

WHEREAS, the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, our customers were informed of our IRP and resulting Action Plans through various means including a Public Hearing where public questions and comments were encouraged; and

WHEREAS, any public comments received will be addressed in order to strengthen the City's Integrated Resource Plan.

NOW THEREFORE BE IT RESOLVED by the City of Flandreau City Council as follows:

That the "Integrated Resource Plan Summary Report for the City of Flandreau dated September 2019 shall be approved for filing with Western under the Energy Planning and Management Program."

Passed and approved this 5th day of August, 2019.

Mark R. Bonrud
Mayor

ATTEST:

Jeff Pederson
City Administrator

Adopted: August 5th, 2019
Published: August 14th, 2019
Effective: September 3rd, 2019

V. Fort Pierre, SD Resource Planning

A. City Information

Fort Pierre, located in Moody County, is a community of more than 2,000 individuals located in central South Dakota. The residential sector includes 959 housing units. The median age of the population is 41.8 years. About 16% of the population is 65 years of age or older and about 24.1% percent are under 18 years old.

In 2017, the municipal utility had 1,038 residential customers and 296 commercial customers. The residential sector's yearly usage averaged 11,919 kWh per customer in 2017, and commercial customers averaged 48,247 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

FORT PIERRE, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$12.00
	\$/kWh (Jun-Aug)	\$.0950
	\$/kWh (Sep-May)	
	First 1,000	\$.0820
	Over 1,000	\$.0740
Small Commercial - Single Phase	Customer Charge	\$18.00
	Three Phase Customer Charge	\$24.50
	\$/kWh (Jun-Aug)	\$.0970
	\$/kWh (Sep-May)	\$.0830
Large Commercial	Customer Charge	\$34.00
	\$/kWh	\$.0350
	\$/kW (Jun-Aug)	\$16.70
	\$/kW (Sep-May)	\$12.90

Exhibit 2

FORT PIERRE, SD

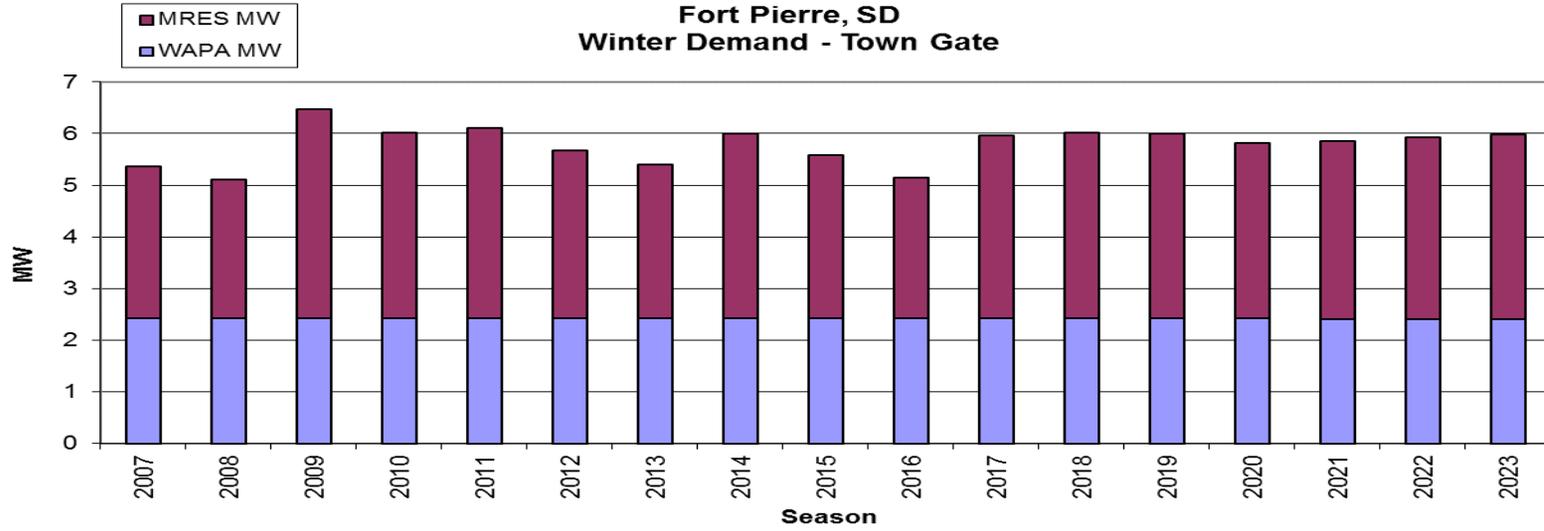
MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	5,558	3,005	3,034	2006	11,715,639	6,414,000	5,301,639
2007	5,754	3,005	3,230	2007	11,664,740	6,414,000	5,250,740
2008	5,139	3,005	2,615	2008	11,580,280	6,414,000	5,166,280
2009	5,253	3,005	2,714	2009	12,201,273	6,414,000	5,787,273
2010	5,772	3,005	3,248	2010	12,707,522	6,414,000	6,293,522
2011	5,471	3,005	2,759	2011	11,645,213	6,414,000	5,231,213
2012	6,102	3,005	3,578	2012	12,593,757	6,414,000	6,179,757
2013	5,659	3,005	3,051	2013	12,127,469	6,414,000	5,713,469
2014	5,700	3,005	3,176	2014	11,857,306	6,414,000	5,443,306
2015	5,846	3,005	3,017	2015	12,513,999	6,414,000	6,099,999
2016	6,498	3,005	3,974	2016	12,907,204	6,414,000	6,493,204
2017	5,962	3,005	3,438	2017	12,412,052	6,414,000	5,998,052
2018	5,843	3,005	3,319	2018	12,931,902	6,414,000	6,517,902
2019	6,023	3,005	3,499	2019	12,765,889	6,414,000	6,351,889
2020	6,083	3,005	3,559	2020	12,892,377	6,414,000	6,478,377
2021	6,142	2,975	3,643	2021	13,017,594	6,350,000	6,667,594
2022	6,201	2,975	3,702	2022	13,141,482	6,350,000	6,791,482
2023	6,258	2,975	3,759	2023	13,263,809	6,350,000	6,913,809
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	5,139	2,428	2,943	2007	12,744,913	6,052,000	6,692,913
2008	5,108	2,428	2,680	2008	13,217,031	6,091,000	7,126,031
2009	6,087	2,428	4,035	2009	14,813,307	6,052,000	8,761,307
2010	5,834	2,428	3,596	2010	14,987,302	6,052,000	8,935,302
2011	5,778	2,428	3,681	2011	15,161,911	6,052,000	9,109,911
2012	5,288	2,428	3,236	2012	12,763,022	6,091,000	6,672,022
2013	5,372	2,428	2,964	2013	14,046,340	6,052,000	7,994,340
2014	5,999	2,428	3,571	2014	14,665,762	6,052,000	8,613,762
2015	5,298	2,428	3,149	2015	14,102,102	6,052,000	8,050,102
2016	5,068	2,428	2,717	2016	13,554,521	6,091,000	7,463,521
2017	5,589	2,428	3,531	2017	14,038,947	6,052,000	7,986,947
2018	5,652	2,428	3,595	2018	14,638,504	6,052,000	8,586,504
2019	5,766	2,428	3,570	2019	14,958,543	6,052,000	8,906,543
2020	5,686	2,428	3,388	2020	14,614,321	6,091,000	8,523,321
2021	5,742	2,404	3,442	2021	14,757,260	6,011,000	8,746,260
2022	5,796	2,404	3,517	2022	14,898,710	5,992,000	8,906,710
2023	5,850	2,404	3,569	2023	15,038,476	5,992,000	9,046,476

Exhibit 3

**Fort Pierre, SD
Winter Demand - Town Gate**



**Fort Pierre, SD
Winter Energy - Town Gate**

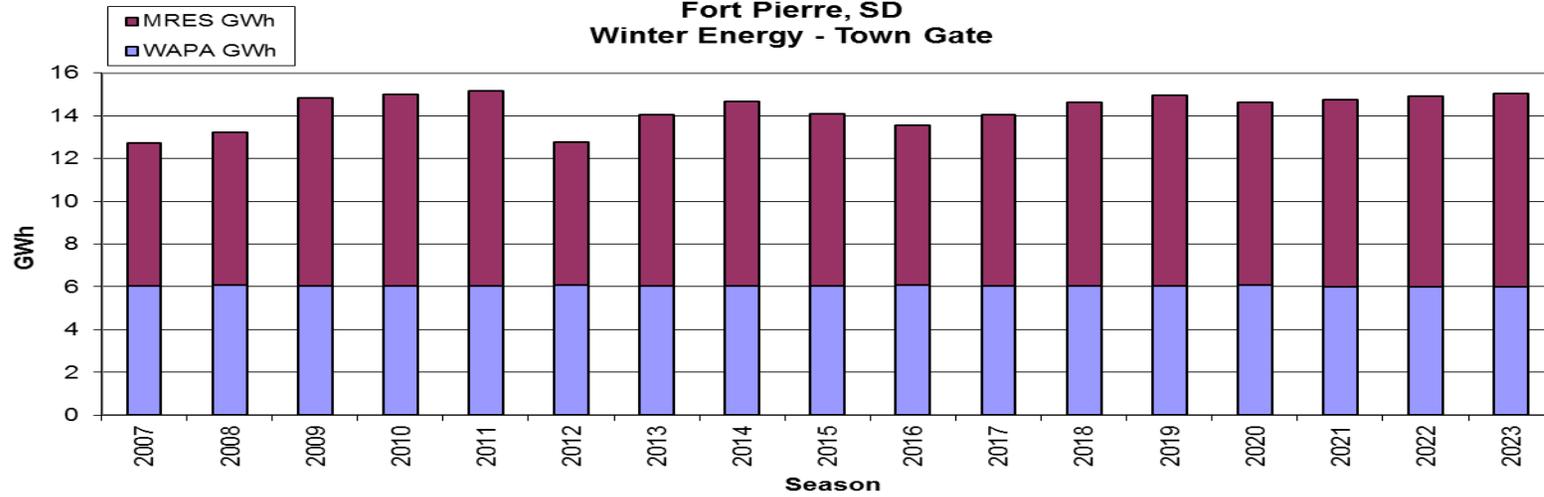


Exhibit 4

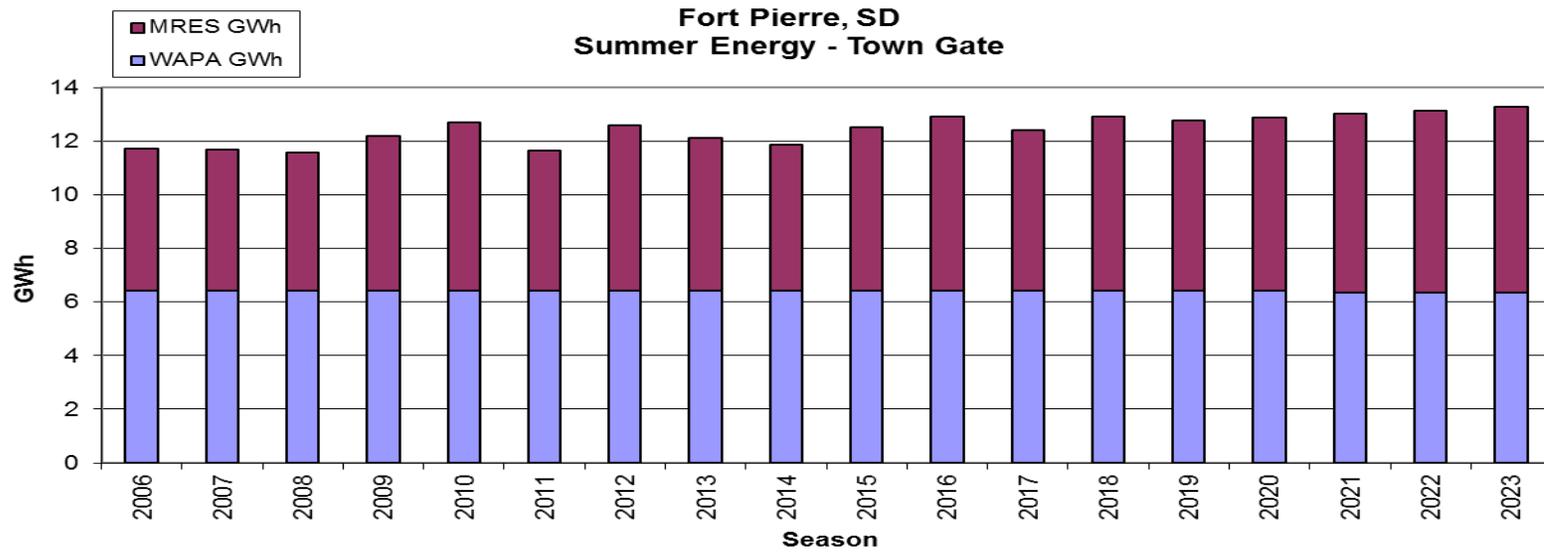
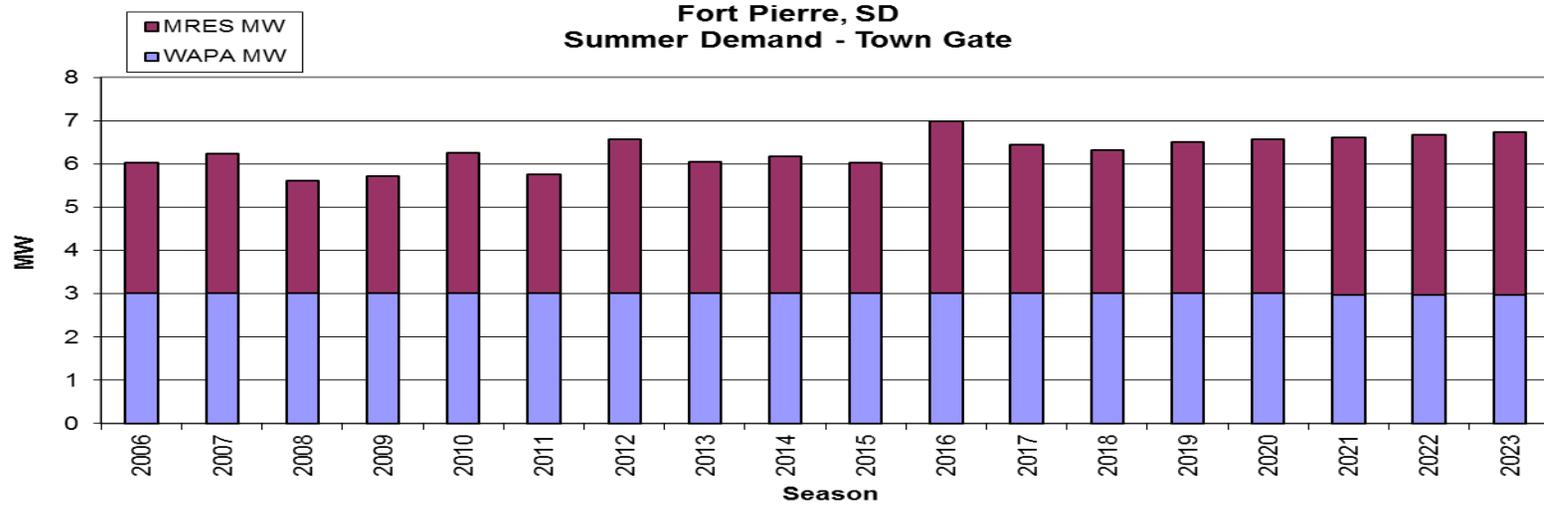


Exhibit 5

Fort Pierre, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 5652 kW

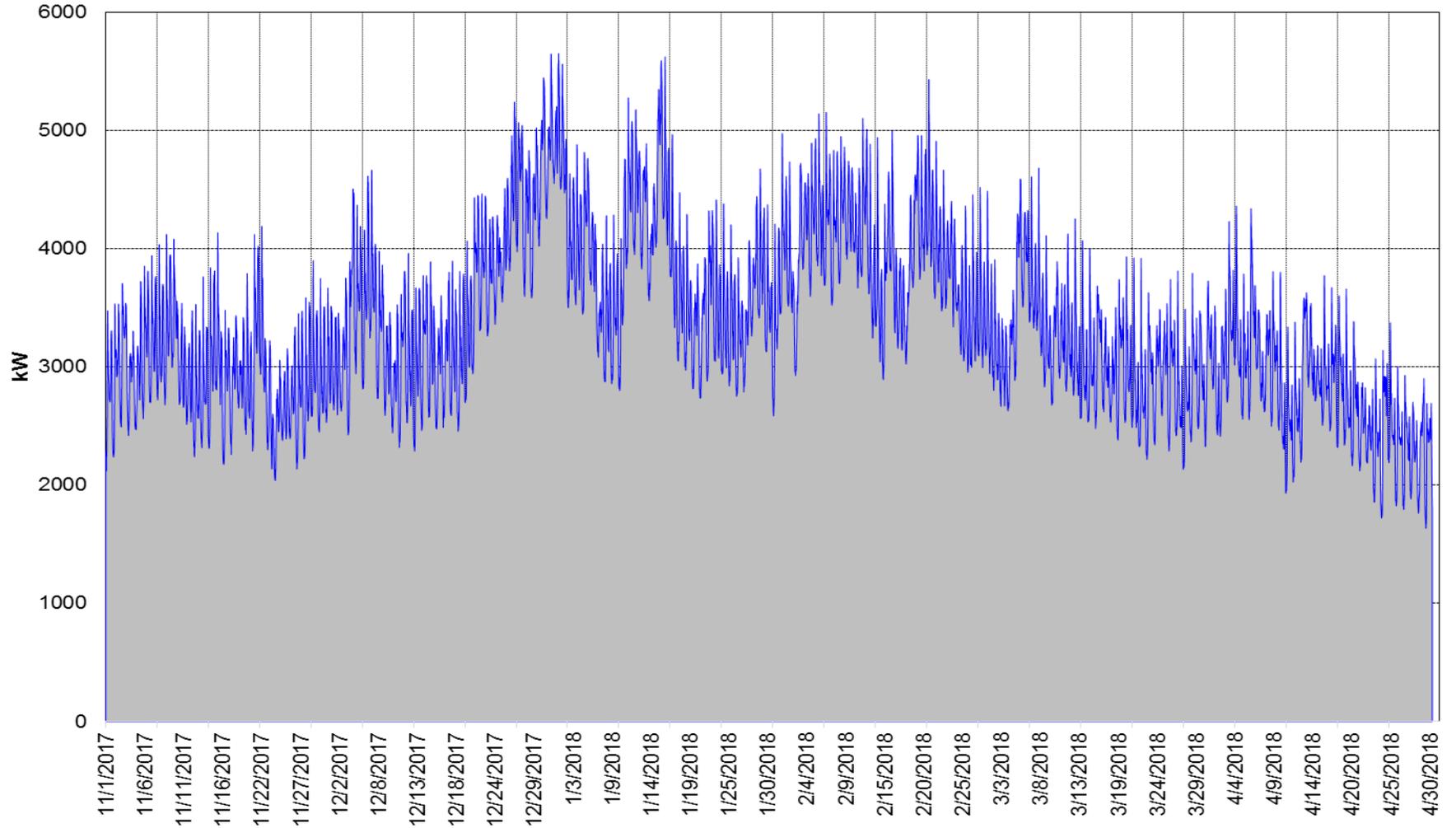


Exhibit 6

Fort Pierre, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 5843 kW

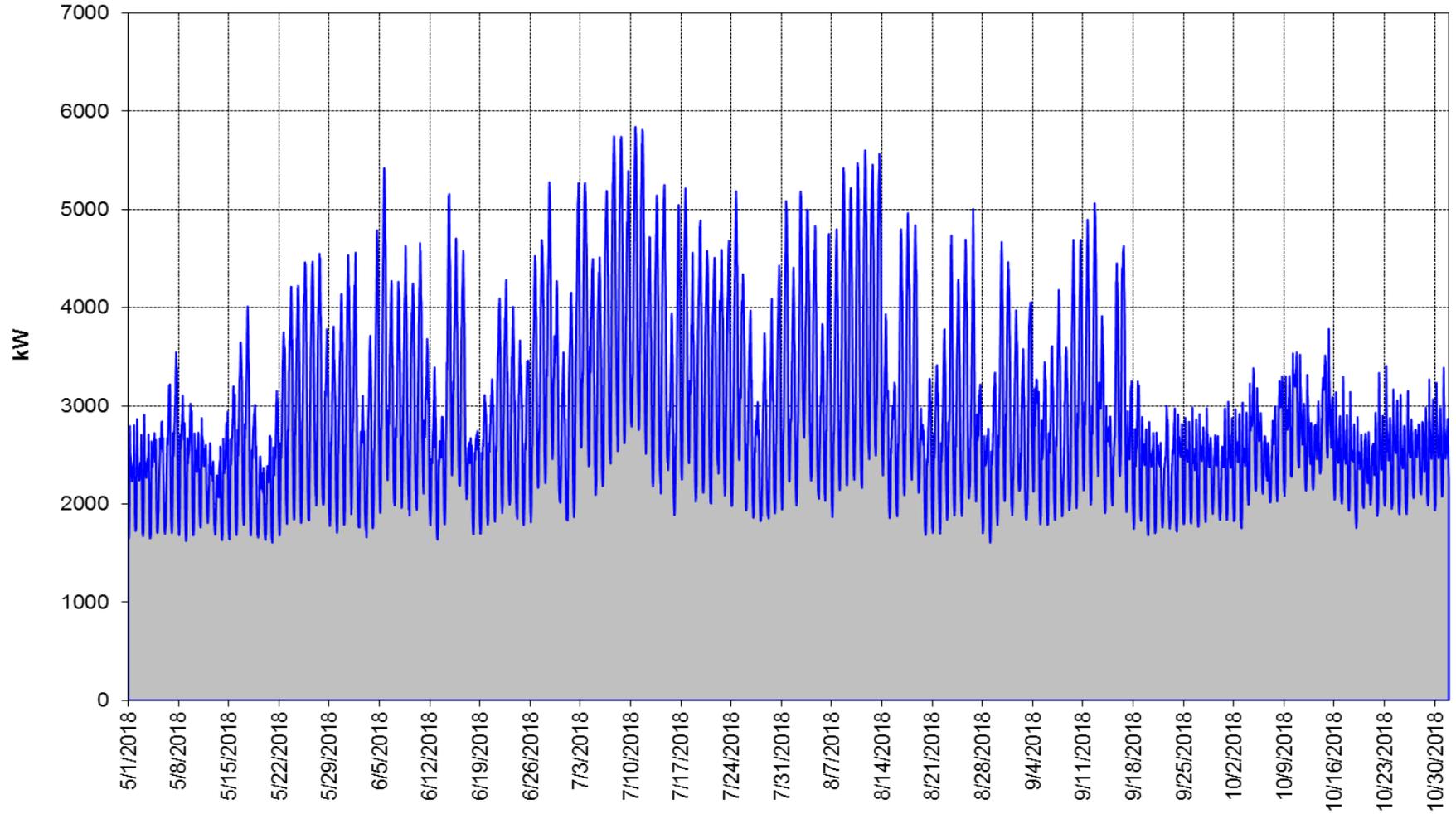


Exhibit 7

Fort Pierre, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 5652 kW

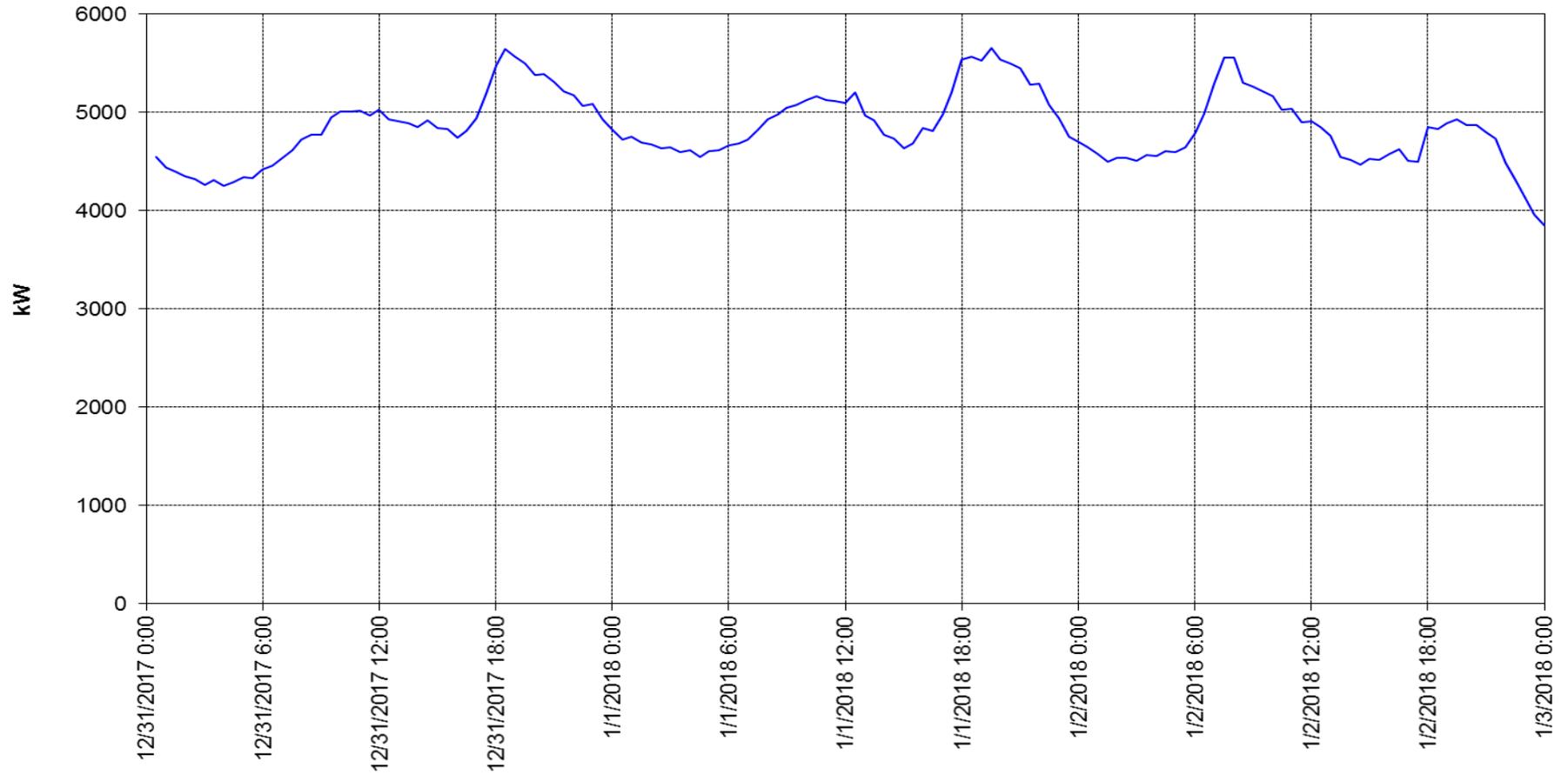
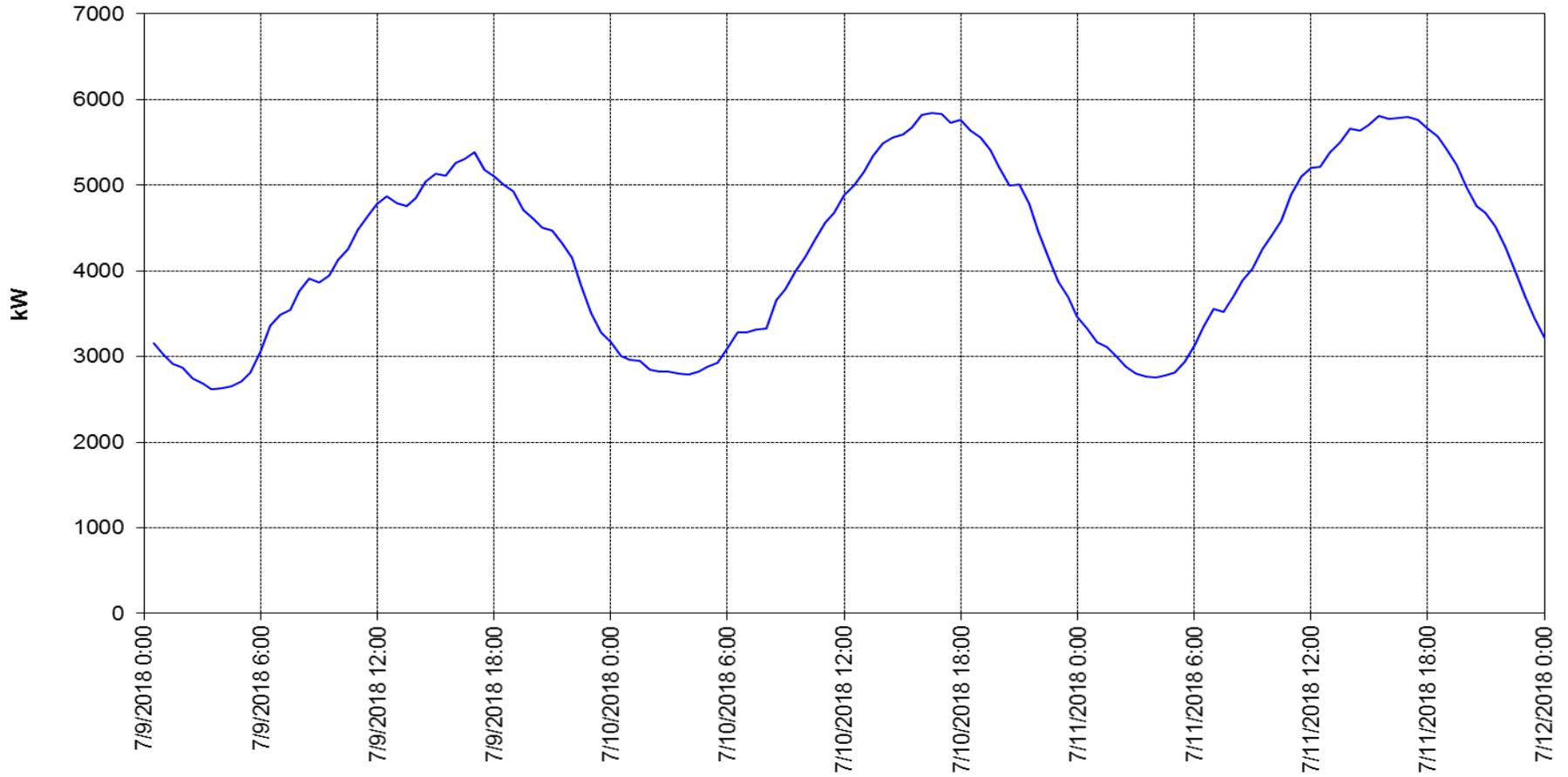


Exhibit 8

Fort Pierre, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 5843 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Fort Pierre is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Fort Pierre to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Fort Pierre has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Fort Pierre			
Program/Measure	Quan	Incentive	kW	kWh
2014	229	\$ 7,980	23.3	72999
C&I HVAC	2	\$ 200	0.3	1222
Energy Star Appliances	9	\$ 400	0.2	1591
Lighting Retrofit	187	\$ 4,230	12.7	48609
Residential HVAC	31	\$ 3,150	10.0	21577
2015	73	\$ 5,695	16.8	36571
Energy Star Appliances	9	\$ 350	0.3	1255
Lighting Retrofit	9	\$ 765	1.8	12344
Res HVAC Quality Installation	8	\$ 1,950	9.1	6931
Residential HVAC	47	\$ 2,630	5.6	16041
2016	63	\$ 5,568	12.7	30543
C&I HVAC	1	\$ 250	0.4	6470
Comm HVAC Quality Install	6	\$ 1,100	2.2	10682
Energy Star Appliances	12	\$ 48	0.1	625
Res HVAC Quality Installation	12	\$ 2,525	6.8	6927
Residential HVAC	32	\$ 1,645	3.2	5839
2017	224	\$ 9,098	19.4	62914
C&I Custom (non-lighting)	0	\$ 422	1.4	3294
Lighting Retrofit	124	\$ 1,842	1.5	18571
Lighting Retrofit	36	\$ 1,484	3.9	18758
Residential Energy Star Products	18	\$ 140	0.1	1021
Residential HVAC	2	\$ 175	0.3	907
Residential HVAC	44	\$ 5,035	12.2	20363
2018	54	\$ 5,392	7.9	30538
C&I HVAC	1	\$ 350	0.4	339
Residential Energy Star Products	18	\$ 72	0.1	938
Residential HVAC	35	\$ 4,970	7.4	29262
Grand Total	643	\$ 33,733	80.0	233566

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Fort Pierre was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Fort Pierre will continue to participate in the Bright Energy Solutions program. Fort Pierre would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Fort Pierre will participate in the all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Fort Pierre plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, it is unknown if Fort Pierre will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Fort Pierre will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom

installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on August 23, 2019. The public hearing on the IRP was held at the September 3, 2019 City Council meeting. No comments or responses were made during the meeting. The City Council approved the resolution on September 3, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	8/23/2019
Public Hearing Date	9/3/2019
Date Approved by City Council	9/3/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Fort Pierre			
Program/Measure	Quan	Incentive	kW	kWh
2014	229	\$ 7,980	23.3	72999
C&I HVAC	2	\$ 200	0.3	1222
ECM in Res Style Furnace	1	\$ 150	0.2	400
Setback/Programmable Thermostats	1	\$ 50	0.1	822
Energy Star Appliances	9	\$ 400	0.2	1591
Energy Star Clothes Washer	5	\$ 250	0.1	655
Energy Star Dishwasher	2	\$ 50	0.0	126
Energy Star Refrigerator	1	\$ 50	0.0	405
Energy Star Refrigerators	1	\$ 50	0.0	405
Lighting Retrofit	187	\$ 4,230	12.7	48609
LED & Induction Tech	57	\$ 1,425	3.1	11366
Rducd Wtg T8 4ft w Reflector/Delamping	7	\$ 189	0.6	2188
T8 4ft w/ Bal and Reflectors / Delamping	117	\$ 2,106	7.7	31745
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	6	\$ 510	1.3	3310
Residential HVAC	31	\$ 3,150	10.0	21577
Air Handler _ Fan Coil with ECM	1	\$ 150	0.2	720
HVAC Air_Source HP - 14.5 SEER	1	\$ 250	0.2	1581
HVAC Central AC unit	7	\$ 700	6.1	3342
HVAC Central AC unit 18+ SEER	1	\$ 225	0.0	0
HVAC HE Furnace with ECM	9	\$ 1,350	1.9	6480
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
Programmable Thermostat - Heat Pump	1	\$ 25	0.1	1114
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	10	\$ 250	1.0	1870
2015	73	\$ 5,695	16.8	36571
Energy Star Appliances	9	\$ 350	0.3	1255
Energy Star Clothes Washer	4	\$ 200	0.1	524
Energy Star Dishwasher	3	\$ 75	0.1	139
Energy Star Refrigerator	1	\$ 50	0.0	405
Programmable Thermostat	1	\$ 25	0.1	187
Lighting Retrofit	9	\$ 765	1.8	12344
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	9	\$ 765	1.8	12344
Res HVAC Quality Installation	8	\$ 1,950	9.1	6931
HVAC Central AC unit	2	\$ 700	2.0	1252
HVAC Central AC unit 18+ SEER	2	\$ 900	6.5	3865
HVAC HE Furnace with ECM	2	\$ 300	0.4	1440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	2	\$ 50	0.2	374
Residential HVAC	47	\$ 2,630	5.6	16041

HVAC Central AC unit	2	\$ 500	1.6	897
HVAC HE Furnace with ECM	3	\$ 450	0.6	2160
HVAC Mini Split_Ductless Air_Source HP	2	\$ 500	0.9	9176
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	4	\$ 100	0.4	748
Summer AC Tune-Up	36	\$ 1,080	2.1	3060
2016	63	\$ 5,568	12.7	30543
C&I HVAC	1	\$ 250	0.4	6470
Mini Split Ductless Air Source HP	1	\$ 250	0.4	6470
Comm HVAC Quality Install	6	\$ 1,100	2.2	10682
ECM in Res Style Air Handler _ Fan Coil	2	\$ 300	0.4	1440
Setback/Programmable Thermostats	2	\$ 100	0.2	5183
Split System Air Source HP <65k Btuh (1ph)	1	\$ 420	0.9	3482
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 280	0.6	577
Energy Star Appliances	12	\$ 48	0.1	625
ES Res Lighting - LED Recessed Can	12	\$ 48	0.1	625
Res HVAC Quality Installation	12	\$ 2,525	6.8	6927
HVAC Central AC unit	4	\$ 1,400	4.0	2531
HVAC Central AC unit 18+ SEER	1	\$ 450	1.6	955
HVAC HE Furnace with ECM	4	\$ 600	0.9	2880
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	3	\$ 75	0.3	561
Residential HVAC	32	\$ 1,645	3.2	5839
HVAC Central AC unit	1	\$ 250	0.6	358
HVAC HE Furnace with ECM	4	\$ 600	0.9	2880
Programmable Thermostat - AC Only	1	\$ 25	0.1	187
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	2	\$ 50	0.2	374
Summer AC Tune-Up	24	\$ 720	1.4	2040
2017	224	\$ 9,098	19.4	62914
C&I Custom (non-lighting)	0	\$ 422	1.4	3294
Lighting: Replace (8) 6-lamp T5HO High Bay with				
(8) 148W LED High Bay	0	\$ 422	1.4	3294
Lighting Retrofit	124	\$ 1,842	1.5	18571
LED & Induction Tech	124	\$ 1,842	1.5	18571
Lighting Retrofit	36	\$ 1,484	3.9	18758
Custom - Lighting	0	\$ 600	2.1	7061
Fluorescent T8 4 Ft. Lamps W/ Ballast 4 Ft. 4-				
Lamp	2	\$ 20	0.0	293
Reduced Wattage T8 Fluorescent Systems	13	\$ 234	0.7	3717
T8 4 Ft. Lamps W/ Ballast Repl 8 Ft. T12 T5HO 4				
Ft. 4-Lamp T12-HO 8 ft 2 -Lamp	21	\$ 630	1.1	7688
Residential Energy Star Products	18	\$ 140	0.1	1021
Energy Star Clothes Dryer	1	\$ 80	0.0	183

ES Res Lighting - LED Recessed Can	13	\$ 52	0.1	677
Lighting Equipment LED Lamps	4	\$ 8	0.0	161
Residential HVAC	2	\$ 175	0.3	907
HVAC HE Furnace with ECM	1	\$ 150	0.2	720
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	187
Residential HVAC	44	\$ 5,035	12.2	20363
Central AC 15 SEER	2	\$ 500	0.6	350
Central AC 18+ SEER	2	\$ 700	1.3	728
Furnace W/ECM	5	\$ 750	1.1	3600
HVAC Air_Source HP - 18.0 SEER	1	\$ 350	0.5	6197
HVAC Central AC unit	3	\$ 1,050	5.6	3500
HVAC HE Furnace with ECM	4	\$ 600	0.9	2880
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	4	\$ 100	0.4	602
Programmable Thermostat (Natural Gas Furnace With/AC)	4	\$ 100	0.4	748
Programmable Thermostat (Propane or Fuel Oil With/AC)	1	\$ 25	0.1	187
Quality Installation - Central AC 15 SEER	1	\$ 350	0.5	313
Summer AC Tune-Up	17	\$ 510	0.9	1258
2018	54	\$ 5,392	7.9	30538
C&I HVAC	1	\$ 350	0.4	339
Split System Air Conditioning < 65000 BTUH - 15 SEER or Higher	1	\$ 350	0.4	339
Residential Energy Star Products	18	\$ 72	0.1	938
Lighting Equipment LED Recessed Can EStar	18	\$ 72	0.1	938
Residential HVAC	35	\$ 4,970	7.4	29262
Air Handler/Fan Coil W/ECM	1	\$ 150	0.2	720
Air-Source Heat Pump (15 SEER)	1	\$ 250	0.2	5327
Central AC 15 SEER	4	\$ 1,000	1.2	699
Central AC 18+ SEER	2	\$ 700	1.3	728
Central AC/ASHP Tune-Up	14	\$ 420	0.7	1037
Furnace W/ECM	10	\$ 1,500	2.1	7200
Mini-Split / Ductless Air Source Heat Pump	2	\$ 500	0.7	13048
Quality Installation - Central AC 18+ SEER	1	\$ 450	0.8	502
Grand Total	643	\$ 33,733	80.0	233566

Appendix 2 – Fort Pierre Resolution

Resolution # 2019-14

City of Fort Pierre—Integrated Resource Plan COOP Filing

WHEREAS, the City of Fort Pierre purchases a significant portion of its power supply From Western Area Power Administration (Western); and

WHEREAS, Western has recently published its Energy Planning Management Program Rules specifying the requirement for preparing and filing of an Integrated Resource Plan (IRP); and

WHEREAS, the City of Fort Pierre has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, Our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and

WHEREAS, any public comment received has been addressed in order to strengthen the city's IRP; and

WHEREAS, the IRP Summary Report included actions to be taken by the Municipal Utility during the next several years,

THEREFORE BE IT RESOLVED, by the Fort Pierre City Council:

That the "Integrated Resource Plan Summary Report for the City of Fort Pierre dated September 2019 be approved for filing with Western under the Energy Planning and Management Program."

Adopted and effective this 3rd day of September, 2019.



Gloria Hanson, Mayor
City of Fort Pierre

Attest: 
Roxanne Heezen, Finance Officer

VI. Hillsboro, ND Resource Planning

A. City Information

Hillsboro, located in Traill County, is a community of more than 1,600 individuals located in eastern North Dakota. The City has one elementary school and one high school. The residential sector included 763 housing units, and the median age of the population is 40.5 years. About 18.7% of the population is 65 years of age or older and about 25.6% percent are under 18 years old.

In 2017, the municipal utility had 901 residential customers, and 136 commercial customers. The residential sector's yearly usage averaged 17,679 kWh per customer in 2017, and commercial customers averaged 81,330 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

HILLSBORO, NORTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$16.00
	\$/kWh	\$.0820
Small Commercial	Customer Charge	\$42.00
	\$/kWh	\$.0750
Large Commercial	Customer Charge	\$42.00
	\$/kWh	\$.0750

Exhibit 2 HILLSBORO, ND

MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	4,334	2,140	2,210	2006	9,614,808	5,571,000	4,043,808
2007	3,629	2,140	1,489	2007	9,105,049	5,571,000	3,534,049
2008	4,226	2,140	2,102	2008	9,277,534	5,571,000	3,706,534
2009	4,269	2,140	2,145	2009	10,273,081	5,571,000	4,702,081
2010	4,386	2,140	2,262	2010	10,023,859	5,571,000	4,452,859
2011	4,119	2,140	2,113	2011	10,089,077	5,571,000	4,518,077
2012	4,261	2,140	2,137	2012	10,460,323	5,571,000	4,889,323
2013	4,837	2,140	2,713	2013	11,098,200	5,571,000	5,527,200
2014	5,022	2,140	2,898	2014	10,958,903	5,571,000	5,387,903
2015	4,328	2,140	2,322	2015	10,887,059	5,571,000	5,316,059
2016	4,568	2,140	2,444	2016	10,880,975	5,571,000	5,309,975
2017	5,256	2,140	3,132	2017	11,329,552	5,571,000	5,758,552
2018	5,060	2,140	2,936	2018	12,181,063	5,571,000	6,610,063
2019	5,123	2,140	2,999	2019	11,636,293	5,571,000	6,065,293
2020	5,189	2,140	3,065	2020	11,785,995	5,571,000	6,214,995
2021	5,247	2,119	3,144	2021	11,918,146	5,515,000	6,403,146
2022	5,302	2,119	3,199	2022	12,042,874	5,515,000	6,527,874
2023	5,356	2,119	3,253	2023	12,164,452	5,515,000	6,649,452
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	6,356	3,206	3,150	2007	16,198,392	9,100,000	7,098,392
2008	6,898	3,206	3,692	2008	17,722,966	9,150,000	8,572,966
2009	7,190	3,206	4,248	2009	19,152,748	9,100,000	10,052,748
2010	7,308	3,206	4,102	2010	18,072,573	9,100,000	8,972,573
2011	7,157	3,206	3,975	2011	19,531,313	9,100,000	10,431,313
2012	7,316	3,206	4,110	2012	16,458,135	9,150,000	7,308,135
2013	7,593	3,206	4,387	2013	19,678,184	9,100,000	10,578,184
2014	7,831	3,206	4,625	2014	21,297,823	9,100,000	12,197,823
2015	7,600	3,206	4,394	2015	19,398,807	9,100,000	10,298,807
2016	7,420	3,206	4,214	2016	17,647,335	9,150,000	8,497,335
2017	7,399	3,206	4,193	2017	18,522,251	9,100,000	9,422,251
2018	7,639	3,206	4,433	2018	20,571,896	9,100,000	11,471,896
2019	8,187	3,206	4,981	2019	21,012,079	9,100,000	11,912,079
2020	7,978	3,206	4,772	2020	20,200,798	9,150,000	11,050,798
2021	8,067	3,206	4,893	2021	20,438,745	9,044,000	11,394,745
2022	8,151	3,174	4,977	2022	20,657,886	9,009,000	11,648,886
2023	8,234	3,174	5,060	2023	20,869,060	9,009,000	11,860,060

Exhibit 3

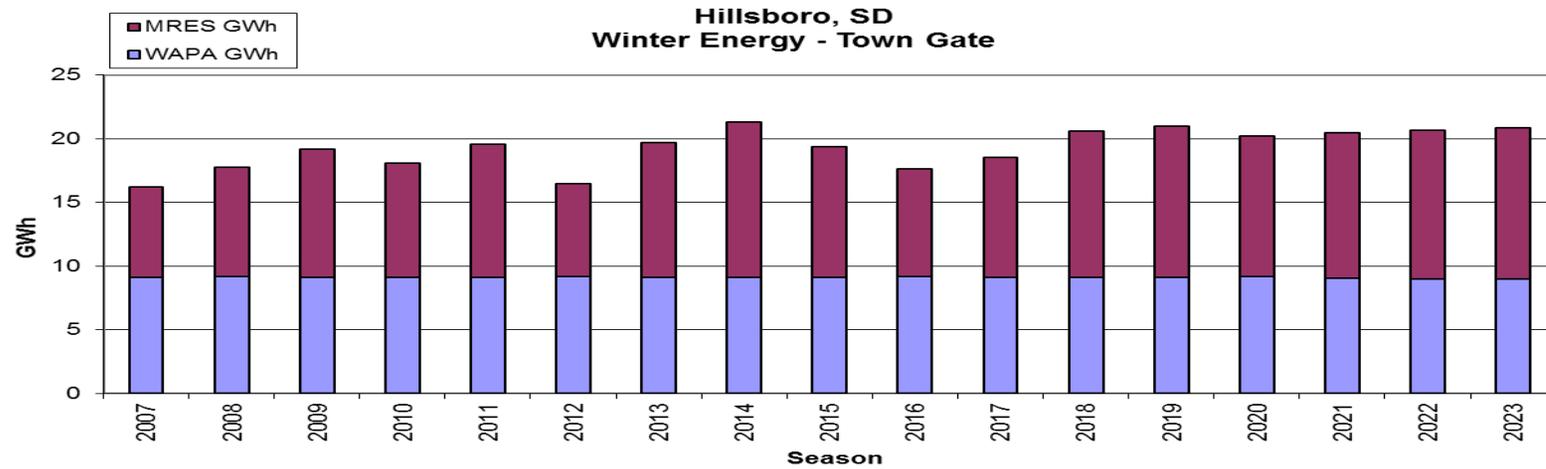
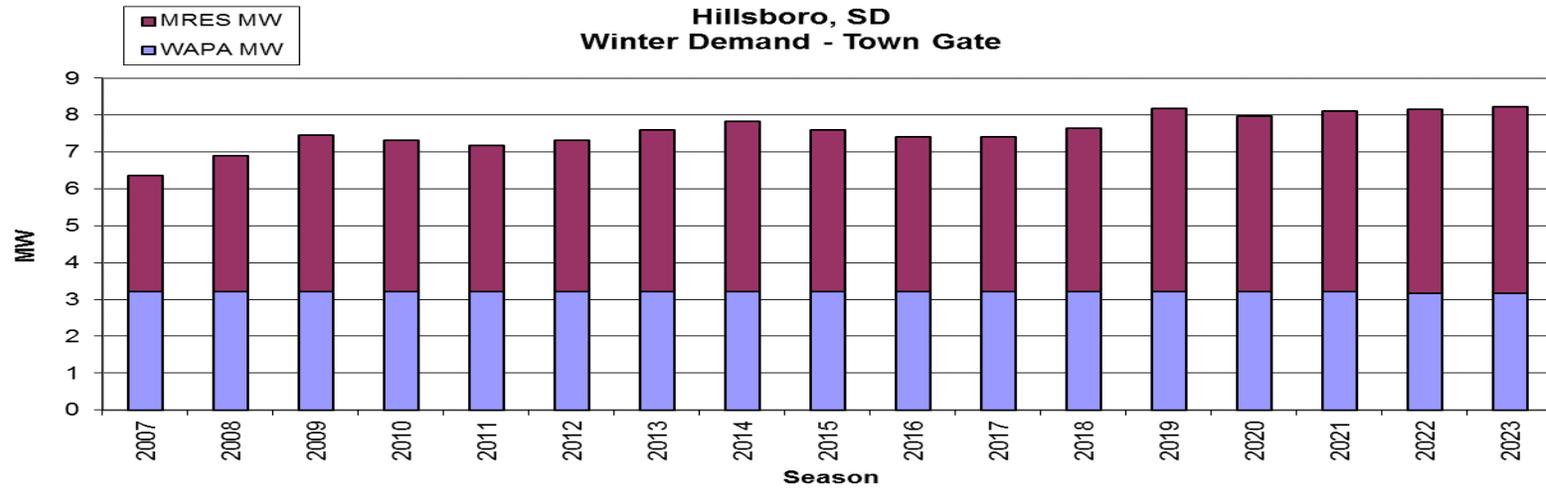
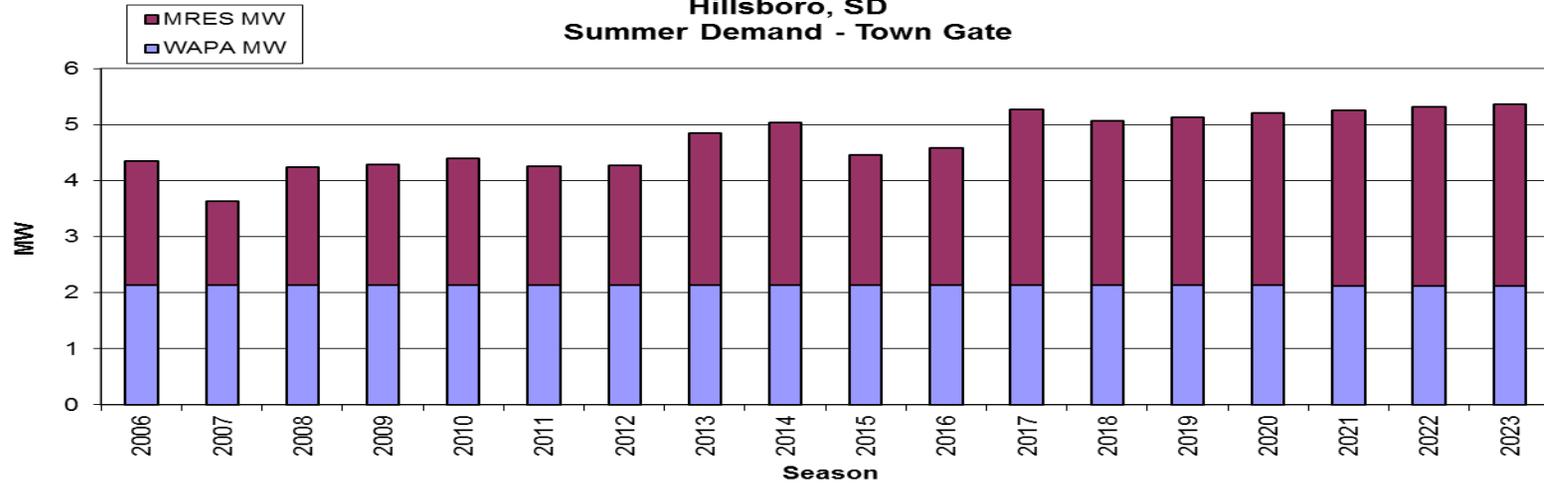


Exhibit 4

Hillsboro, SD Summer Demand - Town Gate



Hillsboro, SD Summer Energy - Town Gate

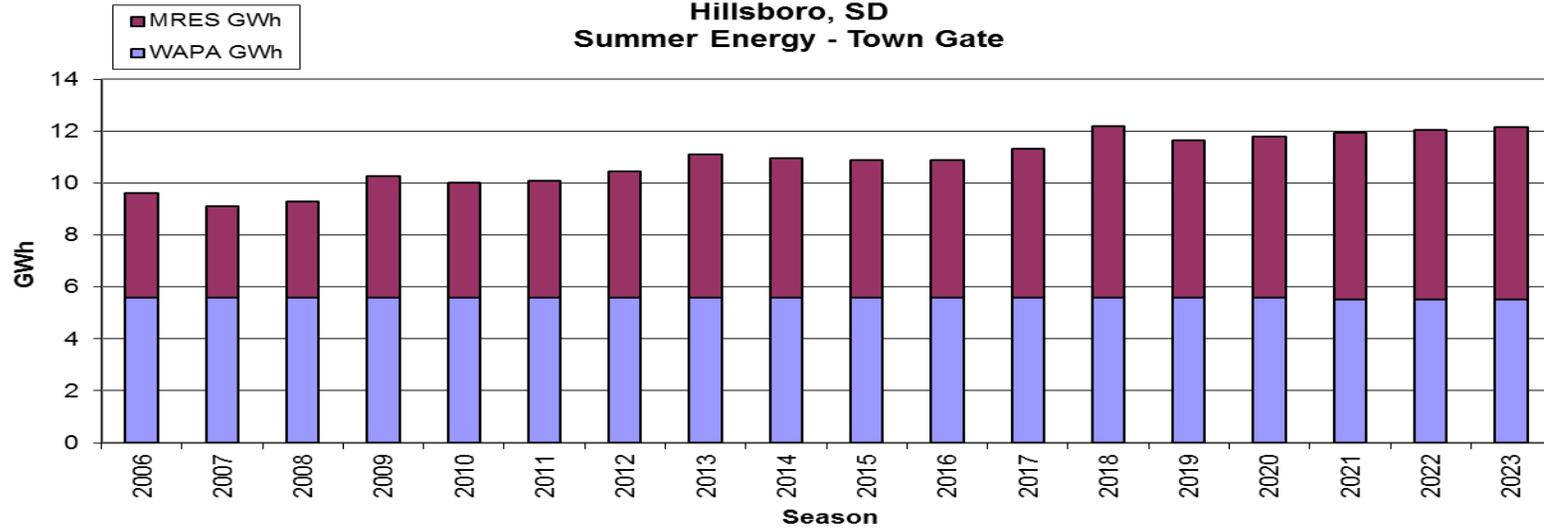


Exhibit 5

Hillsboro, ND Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 7639 kW

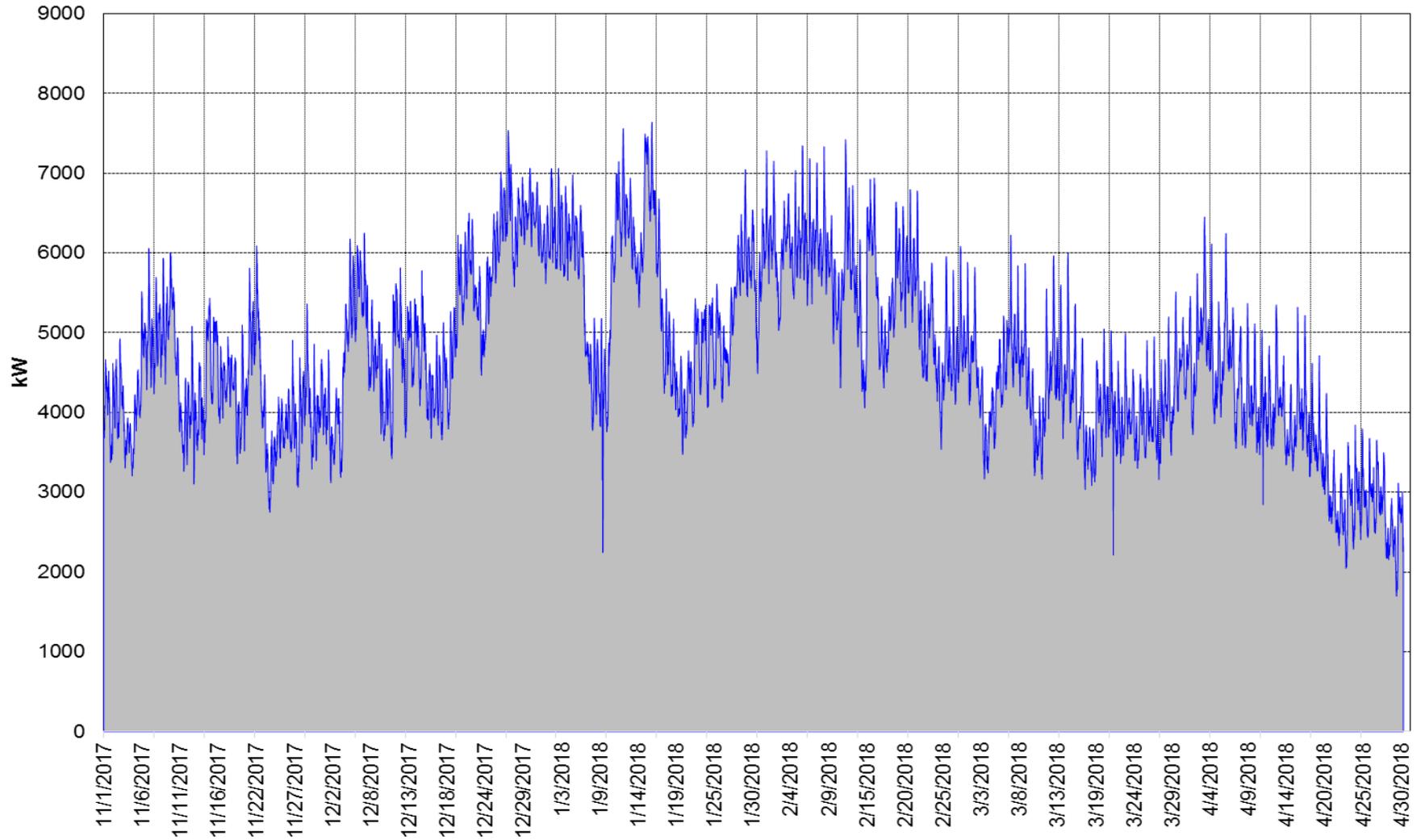


Exhibit 6

Hillsboro, ND Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 5061 kW

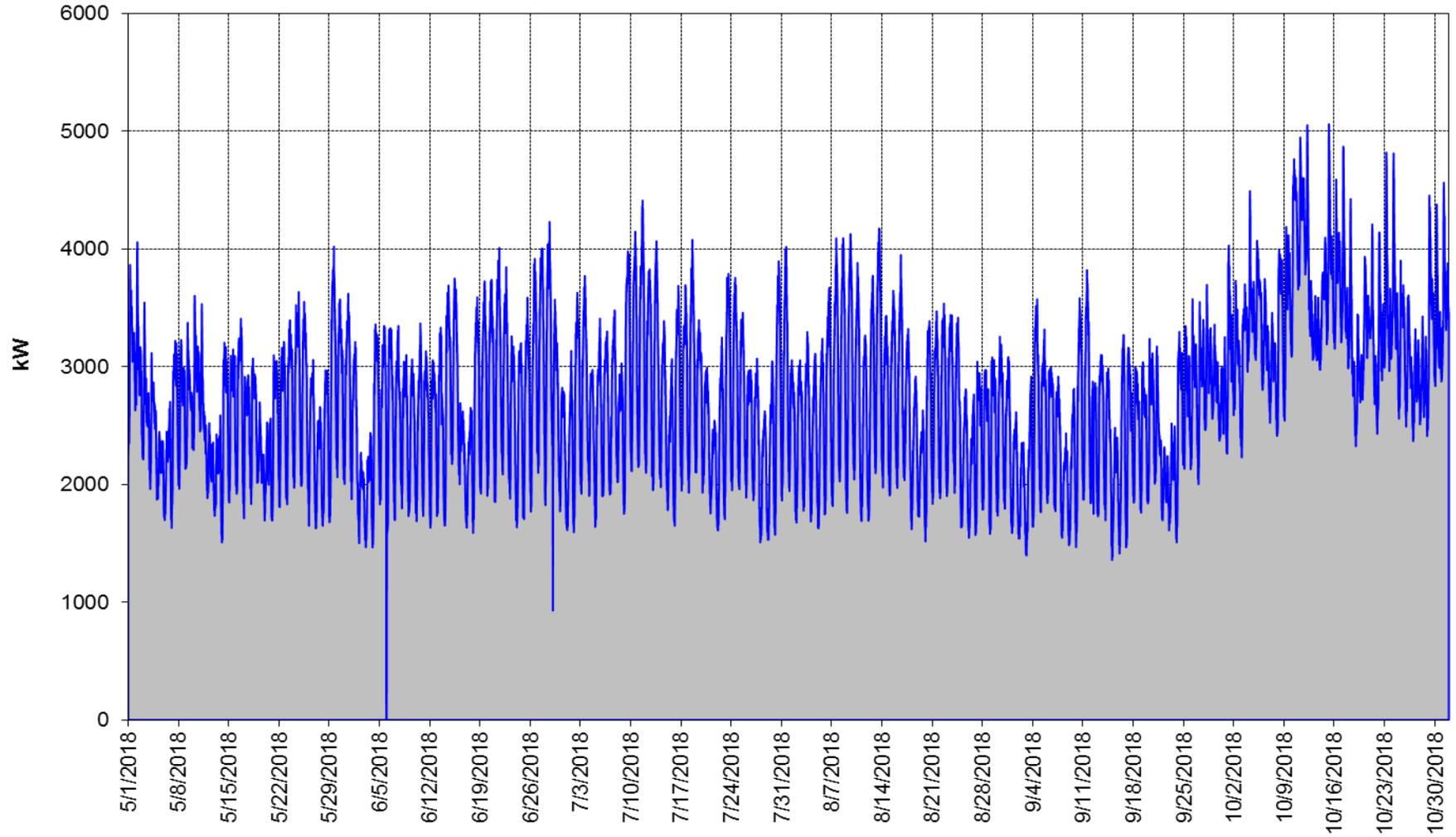


Exhibit 7

Hillsboro, ND Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 7639 kW

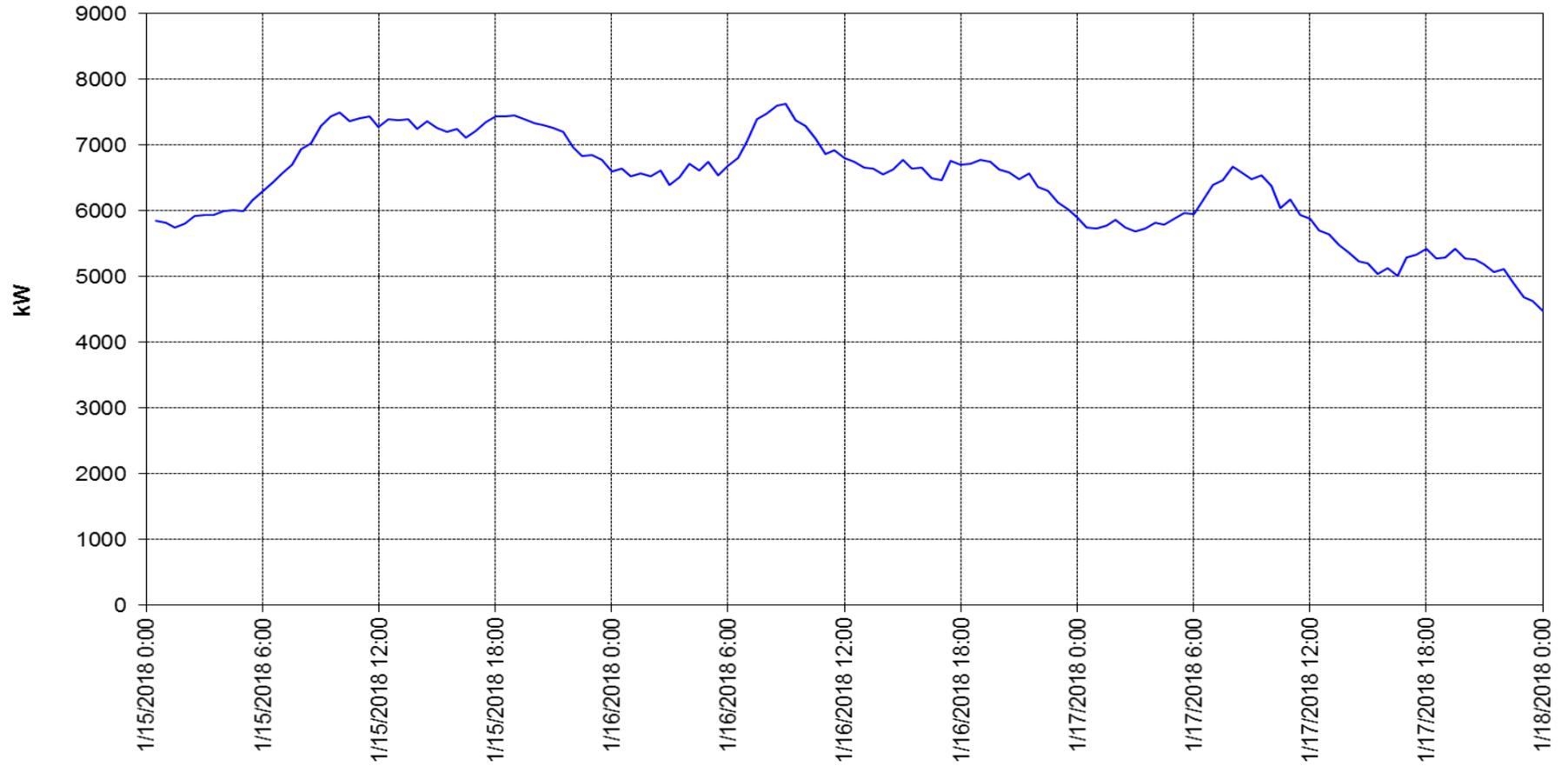
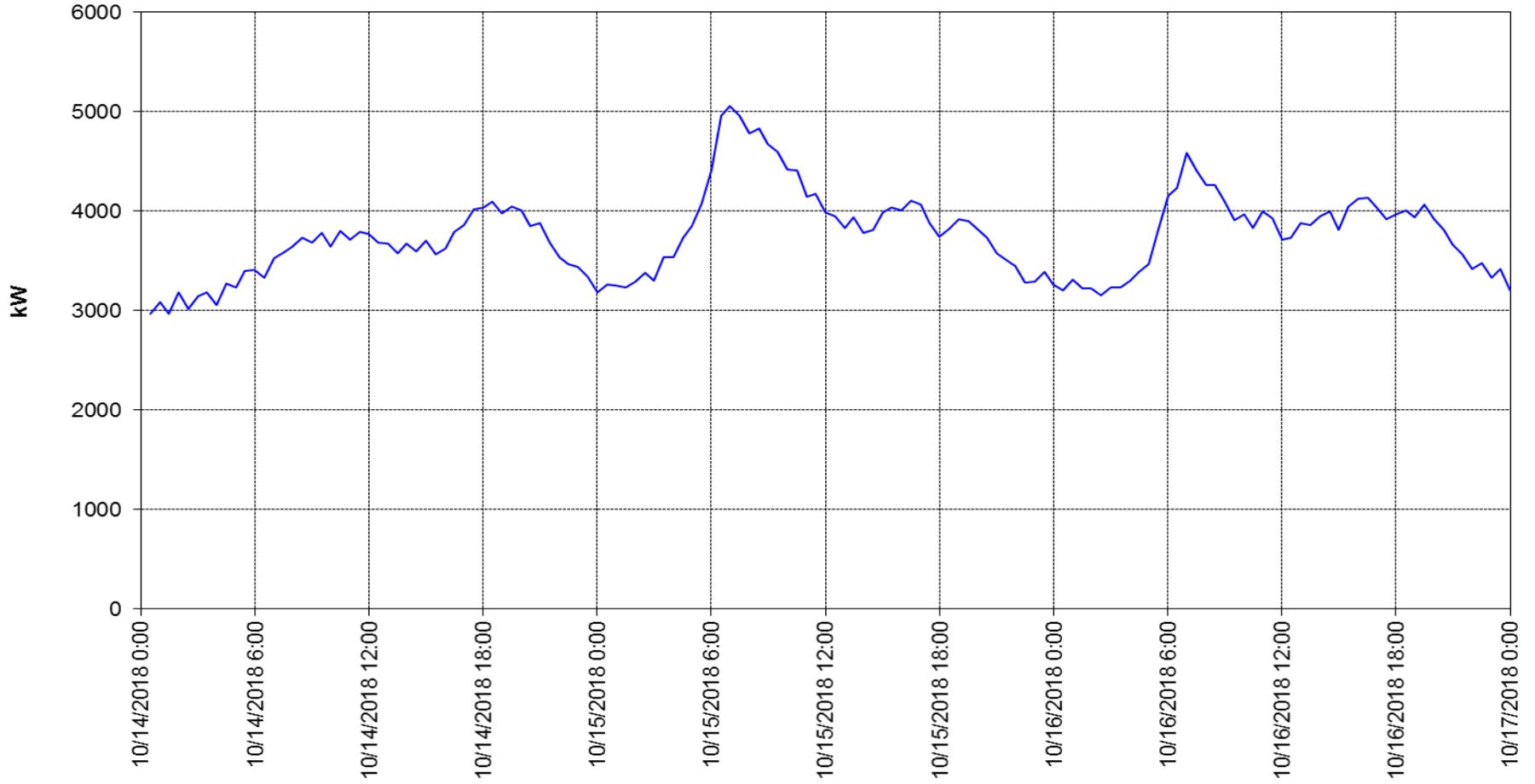


Exhibit 8

Hillsboro, ND Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 5061 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Hillsboro is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Hillsboro to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Hillsboro has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Hillsboro			
Program/Measure	Quan	Incentive	kW	kWh
2014	730	\$ 11,814	34.0	216293
C&I HVAC	4	\$ 1,250	1.5	19076
Custom Electric Program	4	\$ 4,165	13.1	122376
Direct Installation at Customer Location	5	\$ -	0.4	2162
Energy Star Appliances	8	\$ 250	0.2	686
Food Service	1	\$ 600	0.7	6048
Lighting New Construction	20	\$ 1,000	4.0	20478
Lighting Retrofit	687	\$ 4,349	13.7	38997
Residential HVAC	1	\$ 200	0.4	6470
2015	135	\$ 15,507	41.7	268966
C&I HVAC	8	\$ 7,037	13.8	114670
Commercial Refrigeration	12	\$ 1,680	4.6	37998
Custom Electric Program	0	\$ 1,211	3.9	11655
Energy Star Appliances	16	\$ 189	0.2	1465
Lighting New Construction	30	\$ 1,500	4.1	23771
Lighting Retrofit	66	\$ 1,860	4.9	26451
Residential HVAC	1	\$ 30	0.1	85
VFDs and Pumps	2	\$ 2,000	10.1	52871
2016	562	\$ 29,086	76.2	462257
C&I HVAC	6	\$ 10,443	18.8	178534
Compressed Air System	4	\$ 1,373	5.3	23788
Custom Electric Program	0	\$ 751	3.2	7033
Energy Star Appliances	317	\$ 1,259	1.6	14246
Lighting New Construction	99	\$ 2,690	8.3	39071
Lighting Retrofit	134	\$ 12,250	37.3	193875
VFDs and Pumps	2	\$ 320	1.6	5710
2017	532	\$ 15,902	42.3	257158
C&I Compressed Air	1	\$ 4,375	16.0	70500
C&I Custom (non-lighting)	0	\$ 1,634	9.0	26522
C&I HVAC	4	\$ 1,000	1.6	25880
Commercial Refrigeration	8	\$ 1,800	3.1	29929
Energy Star Appliances	39	\$ 258	0.2	1897
Food Service	3	\$ 750	1.4	12813
Lighting New Construction	170	\$ 2,005	5.0	25853
Residential Energy Star Products	298	\$ 1,355	1.7	14977
Residential HVAC	1	\$ 25	0.1	187
Residential HVAC	8	\$ 2,700	4.1	48600

2018	406	\$ 3,090	6.5	41496
C&I HVAC	2	\$ 400	0.4	1349
Lighting New Construction	28	\$ 870	1.6	9549
Lighting Retrofit	237	\$ 711	3.2	15920
Residential Energy Star Products	138	\$ 859	1.0	8154
Residential HVAC	1	\$ 250	0.3	6524
Grand Total	2365	\$ 75,398	200.6	1246170

- **Load Management/CDR Program**

Description: Hillsboro just began deployment of the MRES hosted CDR program. It is currently estimated that 800 water heaters at .350 kW each and 200 air conditioners at 1 kW each are under control, for a total of 480 KW in peak reduction.

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Hillsboro was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Hillsboro will continue to participate in the Bright Energy Solutions program. Hillsboro would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Hillsboro will participate in the all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Hillsboro plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

It is expected that Hillsboro will continue expanding the MRES Coordinated Demand Response (CDR) program. The level of future participation is unknown, as implementation of the program just begun.

ii. Milestones

As part of the annual WAPA IRP updates, Hillsboro will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 5th and July 12th, 2019. The public hearing on the IRP was held at the July 15, 2019 City Commission meeting. No comments or responses were made during the meeting. The City

Council approved the resolution on July 15, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	7/5/2019& 7/12/2019
Public Hearing Date	7/15/2019
Date Approved by City Commission	7/15/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Hillsboro			
Program/Measure	Quan	Incentive	kW	kWh
2014	730	\$ 11,814	34.0	216293
C&I HVAC	4	\$ 1,250	1.5	19076
Desuperheater	1	\$ 250	0.4	1221
ECM in Res Style Furnace	1	\$ 150	0.2	400
GS HP_Closed Loop Water to Air	1	\$ 800	0.7	15816
Setback/Programmable Thermostats	1	\$ 50	0.1	1639
Custom Electric Program	4	\$ 4,165	13.1	122376
facility remodeled with removal of ceiling and new lighting layout. Code would b	1	\$ 1,290	4.0	37668
Lighting: Removal of 18 of 400wHPS, 12 recessed cans at 65w ea, 3 HPS at 1000w	1	\$ 2,224	7.0	64932
removal of 11 at 205w, 5 at 295w, 1 at 100w for 3820watts removed. Installed 8 a	1	\$ 0	0.0	14136
removal of 7 of 400w metal halide and HPS - watts removed 3255 with installtion	1	\$ 651	2.1	5640
Direct Installation at Customer Location	5	\$ -	0.4	2162
LED Screw-in Replacement Lamp	5	\$ -	0.4	2162
Energy Star Appliances	8	\$ 250	0.2	686
Energy Star Ceiling Fan w/ Light Kit	1	\$ 25	0.0	121
Energy Star Clothes Washer	2	\$ 100	0.0	262
Energy Star Dishwasher	5	\$ 125	0.2	303
Food Service	1	\$ 600	0.7	6048
ES Ice Machines	1	\$ 600	0.7	6048
Lighting New Construction	20	\$ 1,000	4.0	20478
T8 4ft Hi Bay Fixture	20	\$ 1,000	4.0	20478
Lighting Retrofit	687	\$ 4,349	13.7	38997
Compact Flourescent Fixtures & Lamps	56	\$ 84	2.5	8654
Hi Performance T8 4ft CEE Qual	17	\$ 149	0.5	1088
LED & Induction Tech	4	\$ 48	0.1	760
Rducd Wtg T8 Lamps ONLY	530	\$ 530	2.1	6871
Reduced Wtg T8 4ft CEE Qual	16	\$ 198	0.6	2333
T8 2ft w/Elec Bal	3	\$ 17	0.0	75
T8 4ft w/Elec Bal	1	\$ 5	0.0	32
T8 8ft HO w/Elec Bal	23	\$ 368	0.8	2379
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	37	\$ 2,950	7.1	16805
Residential HVAC	1	\$ 200	0.4	6470
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
2015	135	\$ 15,507	41.7	268966
C&I HVAC	8	\$ 7,037	13.8	114670

CO2 Demand Controlled Ventilation	1	\$ 272	0.9	1490
Energy Recovery Ventilator (ERV)	1	\$ 825	2.8	440
GS HP_Closed Loop Water to Air	4	\$ 5,440	9.5	111936
Single Pkgd Air Source HP <65k Btuh (3ph)	1	\$ 150	0.2	490
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 350	0.4	314
Commercial Refrigeration	12	\$ 1,680	4.6	37998
ECM Fan Motor for Cooler-Freezer	9	\$ 180	0.5	5931
LED Vertical Reach-in Refrigerated Case Lighting	2	\$ 780	1.5	13995
Replace Open Multi-Deck Cases w Glass Display	1	\$ 720	2.6	18072
Custom Electric Program	0	\$ 1,211	3.9	11655
Lighting: comcheck done for code vs. installation for school addition and fitne	0	\$ 1,211	3.9	11655
Energy Star Appliances	16	\$ 189	0.2	1465
Energy Star Clothes Washer	1	\$ 50	0.0	131
Energy Star Refrigerator	2	\$ 100	0.1	810
ES Res Lighting - LED Screw-in Lamp	13	\$ 39	0.1	524
Lighting New Construction	30	\$ 1,500	4.1	23771
T8 4ft Hi Bay Fixture	30	\$ 1,500	4.1	23771
Lighting Retrofit	66	\$ 1,860	4.9	26451
T8 4ft w/ Bal and Reflectors / Delamping	30	\$ 540	1.7	9752
T8 4ft w/ Bal Repl 8ft T12 HO	30	\$ 900	2.5	12402
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	6	\$ 420	0.7	4297
Residential HVAC	1	\$ 30	0.1	85
Summer AC Tune-Up	1	\$ 30	0.1	85
VFDs and Pumps	2	\$ 2,000	10.1	52871
Variable Freq Drives	2	\$ 2,000	10.1	52871
2016	562	\$ 29,086	76.2	462257
C&I HVAC	6	\$ 10,443	18.8	178534
CO2 Demand Controlled Ventilation	1	\$ 933	3.1	5120
Energy Recovery Ventilator (ERV)	1	\$ 510	1.7	272
GS HP_Closed Loop Water to Water	4	\$ 9,000	14.0	173142
Compressed Air System	4	\$ 1,373	5.3	23788
Added Compressed Air Storage	1	\$ 400	1.2	5636
Dew Point Demand Control	1	\$ 113	1.0	4352
No Loss Air Drains	1	\$ 160	0.6	2520
VFD Air Compressor	1	\$ 700	2.6	11280
Custom Electric Program	0	\$ 751	3.2	7033
Lighting: removal of 7 of 400w MH at 456watts each = 3192 watts removed; instal	0	\$ 643	2.7	6194
Lighting: removal of one 400wMH at 456 watts-installed RAB DLC LED at 95watts	0	\$ 108	0.5	839
Energy Star Appliances	317	\$ 1,259	1.6	14246
Energy Star Clothes Dryer	2	\$ 160	0.1	366

Energy Star Clothes Washer	2	\$ 100	0.0	262
Energy Star Refrigerator	1	\$ 20	0.0	132
ES Res Lighting - CFL Screw-in Lamp	1	\$ 2	0.0	32
ES Res Lighting - LED Recessed Can	78	\$ 312	0.5	4064
ES Res Lighting - LED Screw-in Lamp	233	\$ 666	1.0	9390
Lighting New Construction	99	\$ 2,690	8.3	39071
CEE Qual T8 4ft Hi Performance System	20	\$ 80	0.3	1501
LED Energy Star Recessed Downlight	10	\$ 250	0.6	3059
LED Hi Bay or Low Bay Fixtures	31	\$ 2,170	6.8	32208
LED Troffer DLC Qualified	38	\$ 190	0.5	2303
Lighting Retrofit	134	\$ 12,250	37.3	193875
LED HiBay or LoBay Repl HID or Inc	86	\$ 8,170	27.1	128070
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	48	\$ 4,080	10.2	65805
VFDs and Pumps	2	\$ 320	1.6	5710
Variable Freq Drives	2	\$ 320	1.6	5710
2017	532	\$ 15,902	42.3	257158
C&I Compressed Air	1	\$ 4,375	16.0	70500
VFD Air Compressor	1	\$ 4,375	16.0	70500
C&I Custom (non-lighting)	0	\$ 1,634	9.0	26522
Lighting: removal of 22 T12 at 50w, 15 T12 at 144w and 20 65w inc cans for 4560	0	\$ 736	5.7	17882
Lighting: removal of 8 of 4' 4-lamp T12; 1 of 4' 2-lamp T12; 2 of 2' T12 and 3 i	0	\$ 297	1.2	2857
Removal of 28 3-lamp T8 at 108w each and 2 of 8' T12Ho at 237w each for 3498 wat	0	\$ 601	2.1	5783
C&I HVAC	4	\$ 1,000	1.6	25880
Mini Split Ductless Air Source HP	4	\$ 1,000	1.6	25880
Commercial Refrigeration	8	\$ 1,800	3.1	29929
ES Comm Glass Door Freezers	3	\$ 750	2.4	23778
ES Comm Glass Door Refrigerators	5	\$ 1,050	0.6	6151
Energy Star Appliances	39	\$ 258	0.2	1897
Energy Star Clothes Dryer	1	\$ 80	0.0	183
Energy Star Clothes Washer	1	\$ 50	0.0	131
Energy Star Refrigerator	1	\$ 20	0.0	132
ES Res Lighting - LED Screw-in Lamp	36	\$ 108	0.2	1451
Food Service	3	\$ 750	1.4	12813
ES Comm Dishwasher_Elec WH-Elec Boost	1	\$ 250	0.8	7140
ES Comm Solid Door Freezers	1	\$ 250	0.4	4186
ES Comm Solid Door Refrigerators	1	\$ 250	0.2	1487
Lighting New Construction	170	\$ 2,005	5.0	25853
LED Energy Star Recessed Downlight	25	\$ 625	1.2	6440
LED Hi Bay or Low Bay Fixtures	6	\$ 420	1.3	6349
LED Troffer DLC PREMIUM Qualified	9	\$ 126	0.3	1728

LED Troffer DLC Qualified	46	\$ 282	0.8	4205
T8 4ft Reduced Wattage System	84	\$ 552	1.4	7131
Residential Energy Star Products	298	\$ 1,355	1.7	14977
Energy Star Clothes Dryer	4	\$ 320	0.1	732
Energy Star Clothes Washer	3	\$ 150	0.1	594
ENERGY STAR Dehumidifier	1	\$ 15	0.0	200
Energy Star Refrigerator	3	\$ 90	0.1	669
ES Res Lighting - LED Recessed Can	103	\$ 412	0.6	5366
ES Res Lighting - LED Screw-in Lamp	184	\$ 368	0.8	7416
Residential HVAC	1	\$ 25	0.1	187
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	187
Residential HVAC	8	\$ 2,700	4.1	48600
HVAC Air_Source HP - 18.0 SEER	1	\$ 350	0.5	6197
HVAC Closed Loop Water to Air GS HP	2	\$ 2,100	3.0	40587
HVAC HE Furnace with ECM	1	\$ 150	0.2	720
Programmable Thermostat - Geothermal	1	\$ 25	0.1	273
Programmable Thermostat - Heat Pump	2	\$ 50	0.2	782
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	41
2018	406	\$ 3,090	6.5	41496
C&I HVAC	2	\$ 400	0.4	1349
Res Style Fancoil/Air Handler w/ECM	1	\$ 150	0.2	720
Split System Air-Source HP < 65000 BTUH (1ph)	1	\$ 250	0.2	629
Lighting New Construction	28	\$ 870	1.6	9549
LED High Bay Fixtures 161-275 W	18	\$ 810	1.4	8650
LED Troffer 3000 - 5799 Lumens	10	\$ 60	0.2	899
Lighting Retrofit	237	\$ 711	3.2	15920
4 Ft. LED Linear Lamps Repl T8 Fluorescent	237	\$ 711	3.2	15920
Residential Energy Star Products	138	\$ 859	1.0	8154
ENERGY STAR Clothes Dryer (Electric)	2	\$ 160	0.1	365
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	4	\$ 150	0.1	792
ENERGY STAR Dehumidifier	1	\$ 25	0.0	200
ENERGY STAR Refrigerator No Recycling	2	\$ 40	0.0	265
Lighting Equipment LED Lamps	12	\$ 24	0.1	484
Lighting Equipment LED Lamps EStar	4	\$ 8	0.0	161
Lighting Equipment LED Recessed Can	106	\$ 424	0.6	5523
Lighting Equipment LED Recessed Can EStar	7	\$ 28	0.0	365
Residential HVAC	1	\$ 250	0.3	6524
Mini-Split / Ductless Air Source Heat Pump	1	\$ 250	0.3	6524
Grand Total	2365	\$ 75,398	200.6	1246170

Appendix 2 – Hillsboro Resolution

Appendix 2 – Hillsboro Resolution

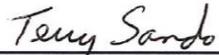
RESOLUTION 2019-02

- WHEREAS,** the City of Hillsboro purchases of significant portion of its power supply from the Western Area Power Administration (Western); and
- WHEREAS,** Western has recently published its Energy Planning and Management Program Rules specifying requirements for preparing and filling of an Integrated Recourse Plan (IRP); and
- WHEREAS,** the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and
- WHEREAS,** our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and
- WHEREAS,** any public comments received have been addressed in order to strengthen the city's Integrated Recourse Plan; and
- WHEREAS,** the IRP Summary report included 5-year and 2-year action plans outlining actions to be taken by the Municipal utility during the next several years.

NOW THEREFORE BE IT RESOLVED BY the City of Hillsboro City Commission as follows:

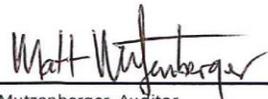
That the "Integrated Resource Plan Summary Report for the City of Hillsboro dated July 2019 shall be approved for filling with Western under the energy Planning and Management Program."

Passed and approved this 15th Day of July, 2019.

X 

Terry Sando, Commission President

ATTEST:

X 

Matt Mutzenberger, Auditor

VII. Pierre, SD Resource Planning

A. *City Information*

Pierre, located in Hughes County, is the capital of South Dakota and is a community of more than 13,600 individuals located in central South Dakota. The residential sector includes 6,159 housing units, and the median age of the population is 39.3 years. About 13.9% of the population is 65 years of age or older and about 22.9% percent are under 18 years old.

In 2017, the municipal utility had 6,180 residential customers, 999 commercial customers, and 184 industrial customers. The residential sector's yearly usage averaged 10,859 kWh per customer in 2017. Commercial customers averaged 25,462 kWh, and industrial customers averaged 441,886 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

PIERRE, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$15.00
	\$/kWh Jun-Aug	\$.0930
	\$/kWh Sep-May	
	First 1,000	\$.0830
	Over 1,000	\$.0730
Small Commercial	Customer Charge	\$26.00
	\$/kWh Jun-Aug	\$.0950
	\$/kWh Sep-May	\$.0850
Large Commercial	Customer Charge	\$45.00
	\$/kW Jun-Aug	\$18.50
	\$/kW Sep-May	\$14.75
	\$/kWh	\$.0350

Exhibit 2

PIERRE, SD

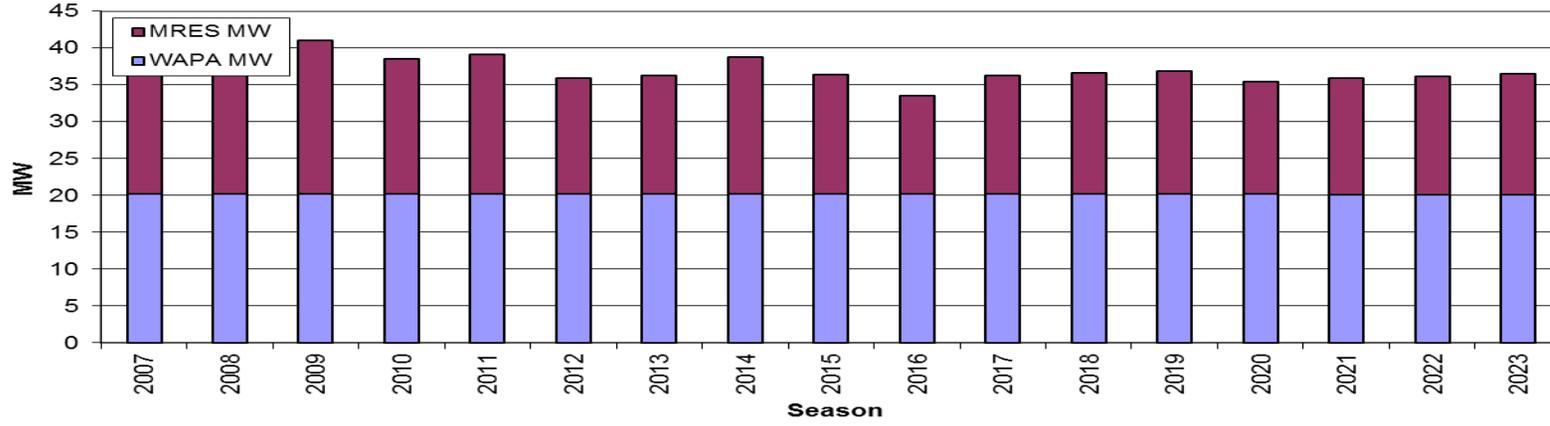
MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	Total	WAPA	MRES	Summer	Total	WAPA	MRES
2006	44,483	27,581	21,072	2006	100,470,836	62,504,000	37,966,836
2007	45,525	26,908	22,114	2007	99,044,825	62,504,000	36,540,825
2008	39,320	26,908	15,909	2008	92,508,453	62,504,000	30,004,453
2009	39,340	26,908	14,260	2009	91,636,661	62,504,000	29,132,661
2010	41,154	27,581	17,274	2010	94,580,014	62,504,000	32,076,014
2011	44,824	27,581	21,413	2011	93,555,860	62,504,000	31,051,860
2012	44,462	26,908	21,051	2012	96,548,941	62,504,000	34,044,941
2013	41,902	26,908	17,931	2013	92,862,640	62,504,000	30,358,640
2014	39,707	26,908	16,296	2014	88,419,641	62,504,000	25,915,641
2015	40,512	26,908	15,087	2015	91,041,598	62,504,000	28,537,598
2016	42,790	26,908	19,379	2016	91,755,537	62,504,000	29,251,537
2017	39,933	26,908	16,522	2017	87,736,922	62,504,000	25,232,922
2018	39,414	26,908	16,003	2018	90,149,941	62,504,000	27,645,941
2019	39,381	26,908	15,970	2019	87,993,877	62,504,000	25,489,877
2020	39,885	26,908	16,474	2020	89,119,856	62,504,000	26,615,856
2021	40,371	26,639	17,194	2021	90,205,289	61,879,000	28,326,289
2022	40,699	26,639	17,522	2022	90,940,246	61,879,000	29,061,246
2023	40,989	26,639	17,812	2023	91,587,868	61,879,000	29,708,868
Demand (kW)				Energy (kWh)			
Winter	Total	WAPA	MRES	Winter	Total	WAPA	MRES
2007	38,407	20,236	18,664	2007	96,029,369	51,899,000	44,130,369
2008	37,297	20,236	17,061	2008	97,026,976	52,240,000	44,786,976
2009	39,668	20,236	20,837	2009	99,272,381	51,899,000	47,373,381
2010	38,483	20,236	18,255	2010	98,199,947	51,899,000	46,300,947
2011	38,576	20,236	18,833	2011	99,950,173	51,899,000	48,051,173
2012	35,648	20,236	15,683	2012	89,298,758	52,240,000	37,058,758
2013	36,264	20,236	16,028	2013	94,898,050	51,899,000	42,999,050
2014	38,718	20,236	18,524	2014	98,950,365	51,899,000	47,051,365
2015	35,839	20,236	16,182	2015	93,490,085	51,899,000	41,591,085
2016	32,577	20,236	13,301	2016	89,384,447	52,240,000	37,144,447
2017	35,261	20,236	16,077	2017	90,943,392	51,899,000	39,044,392
2018	36,676	20,236	16,440	2018	93,861,603	51,899,000	41,962,603
2019	36,354	20,236	16,611	2019	94,410,286	51,899,000	42,511,286
2020	35,460	20,236	15,224	2020	91,883,906	52,240,000	39,643,906
2021	35,892	20,034	15,858	2021	93,022,196	51,542,000	41,480,196
2022	36,184	20,034	16,150	2022	93,907,187	51,381,000	42,526,187
2023	36,442	20,034	16,408	2023	94,608,678	51,381,000	43,227,678

Exhibit 3

Pierre, SD
Winter Demand - Town Gate



Pierre, SD
Winter Energy - Town Gate

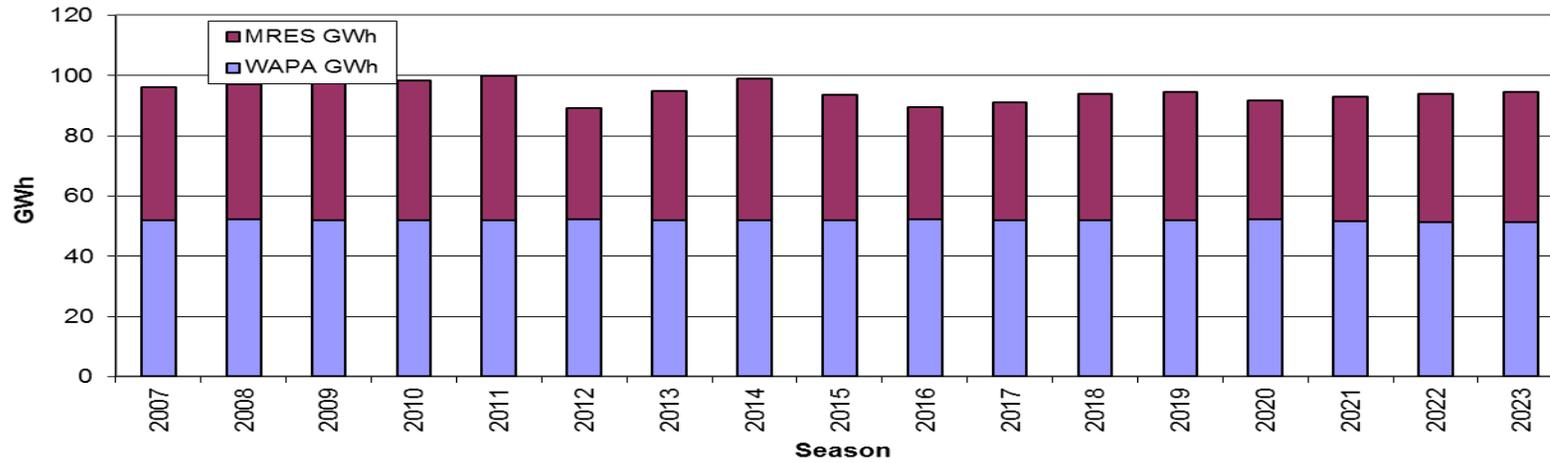
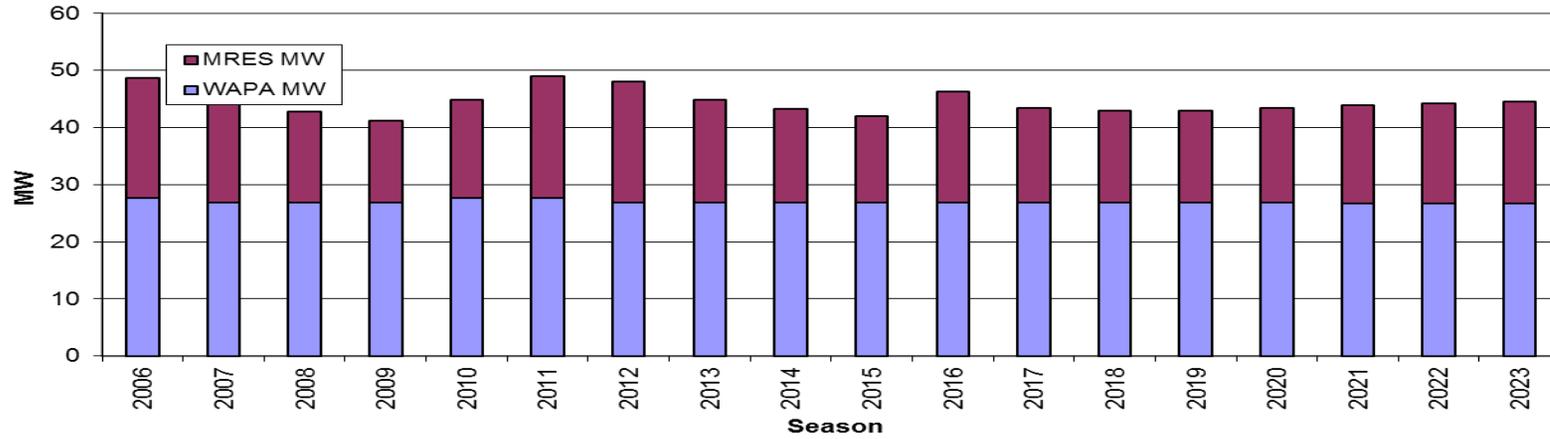


Exhibit 4

Pierre, SD Summer Demand - Town Gate



Pierre, SD Summer Energy - Town Gate

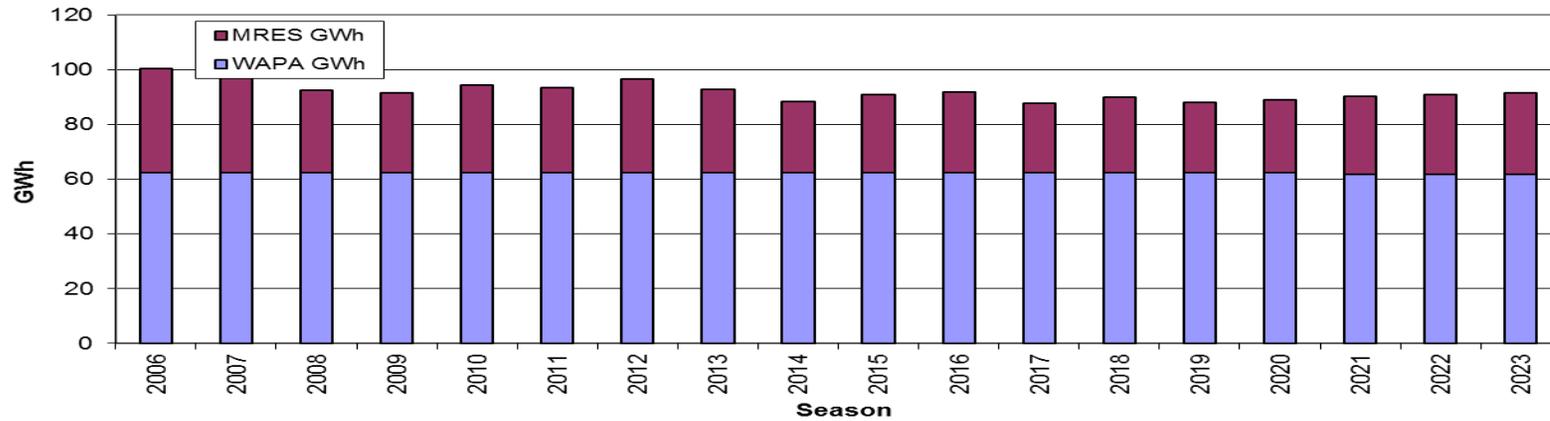


Exhibit 5

Pierre, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 36676 kW

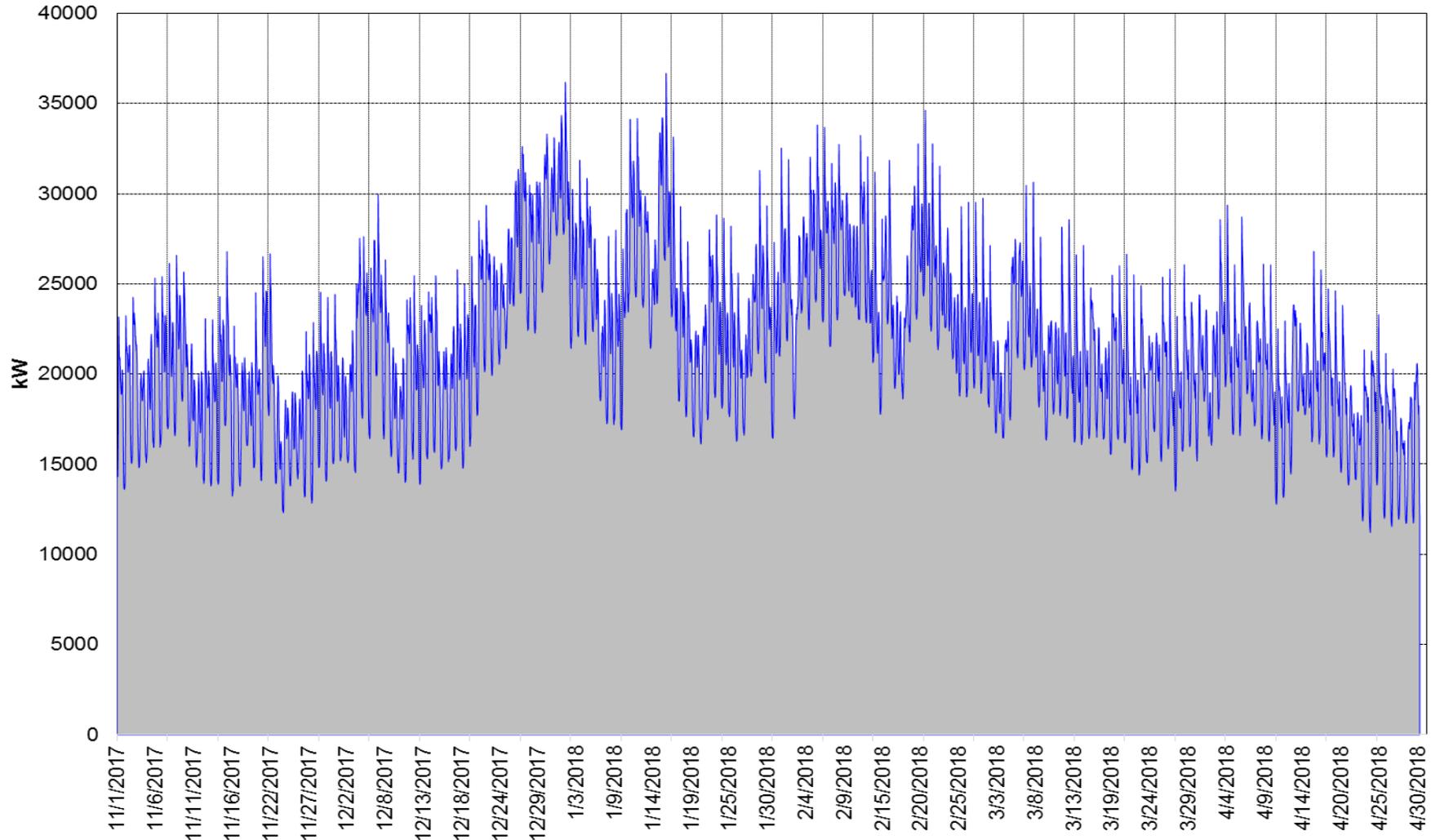


Exhibit 6

Pierre, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 39414 kW

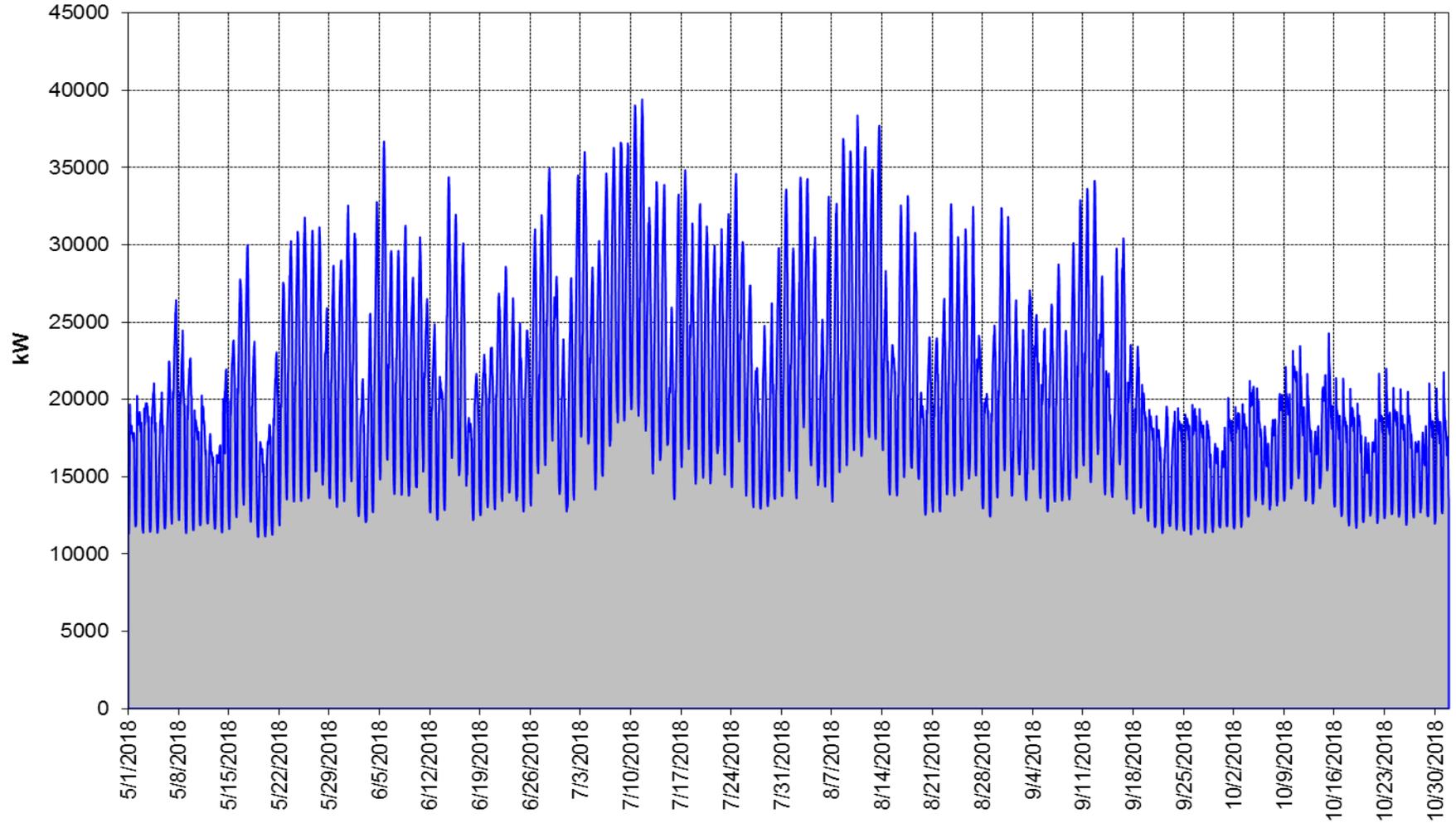


Exhibit 7

Pierre, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 36676 kW

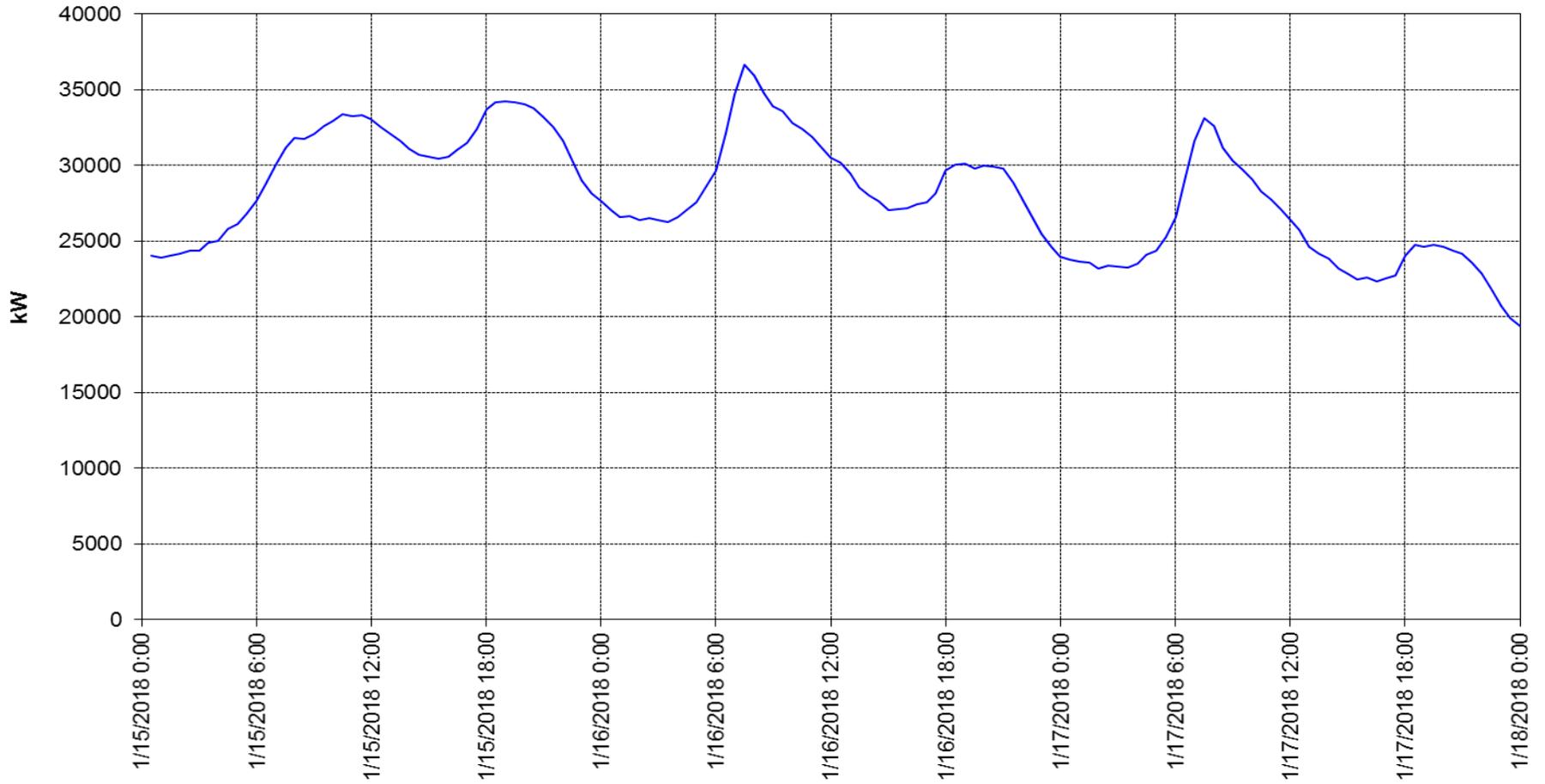
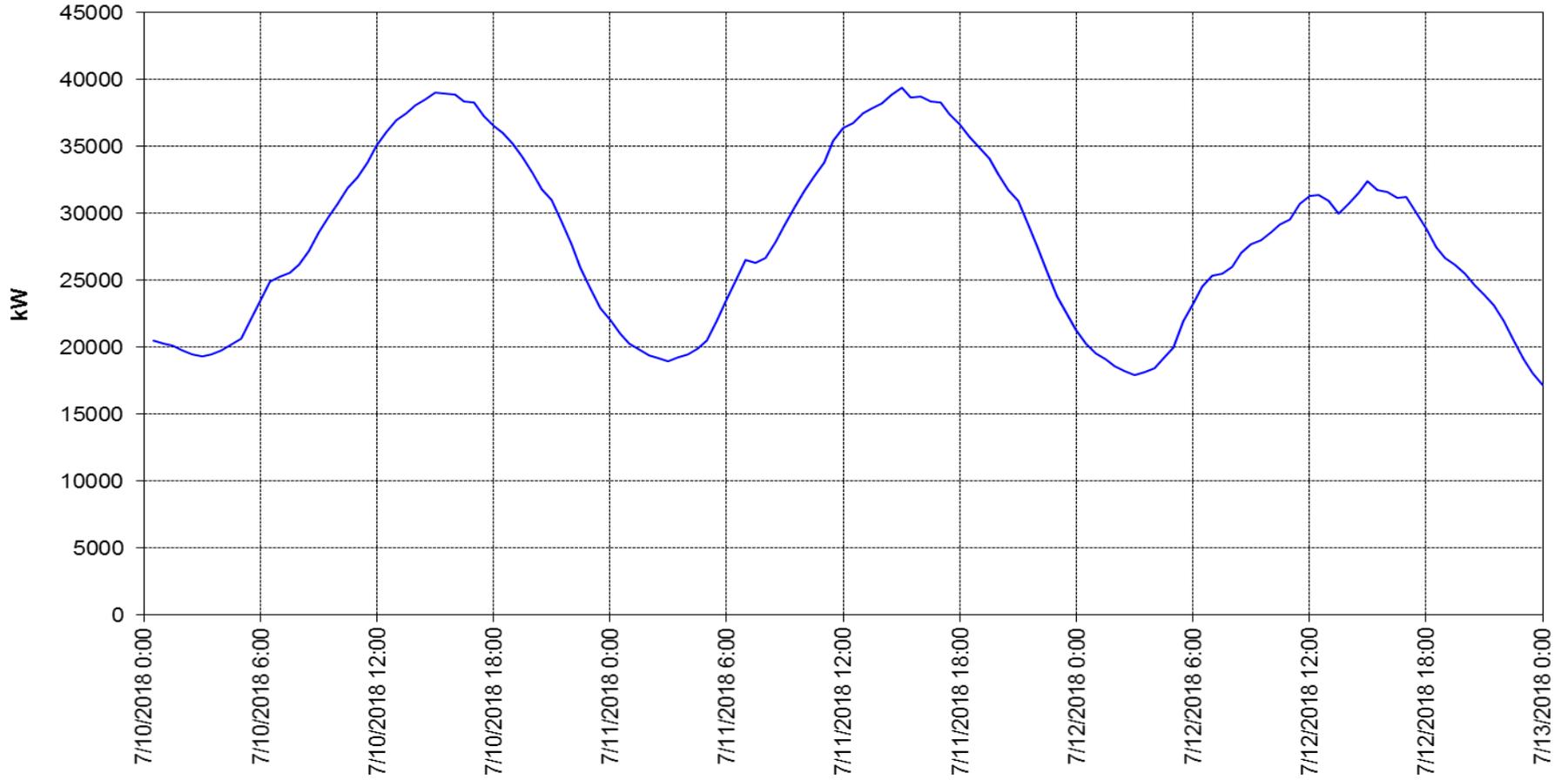


Exhibit 8

Pierre, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 39414 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Pierre is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Pierre to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Pierre has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Pierre				
Program/Measure	Quan	Incentive	kW	kWh	
2014	2330	\$ 81,510	277.2	1144121	
C&I HVAC	9	\$ 1,025	1.8	7004	
Commercial Refrigeration	15	\$ 300	0.8	9885	
Custom Electric Program	6	\$ 7,869	30.2	87005	
Energy Star Appliances	101	\$ 3,574	1.8	13709	
Lighting New Construction	23	\$ 289	0.8	1907	
Lighting Retrofit	1787	\$ 23,466	70.4	238107	
Residential HVAC	243	\$ 25,775	74.2	134731	
Residential Lighting	142	\$ 213	0.7	6219	
VFDs and Pumps	4	\$ 19,000	96.3	645554	
2015	1504	\$ 105,788	303.0	625840	
C&I HVAC	6	\$ 1,250	2.0	21242	
Custom Electric Program	0	\$ 50,529	160.9	268789	
Energy Star Appliances	181	\$ 2,863	2.0	12911	
Food Service	8	\$ 2,000	7.5	34178	
Lighting Retrofit	272	\$ 4,971	12.9	69235	
Res HVAC Quality Installation	91	\$ 17,300	56.4	90628	
Residential HVAC	406	\$ 25,315	58.8	106953	
Residential Lighting	540	\$ 1,560	2.4	21904	
2016	2100	\$ 76,067	202.4	533504	
C&I HVAC	27	\$ 6,550	13.5	30859	
Comm HVAC Quality Install	10	\$ 2,716	5.6	16028	
Energy Star Appliances	741	\$ 4,620	5.2	39075	
Lighting New Construction	77	\$ 2,460	5.3	28049	
Lighting Retrofit	759	\$ 12,041	37.2	195519	
Res HVAC Quality Installation	154	\$ 29,550	97.3	128624	
Residential HVAC	332	\$ 18,130	38.2	95350	
2017	8461	\$ 133,635	245.7	1343818	
C&I Custom (non-lighting)	0	\$ 1,322	4.4	17348	
C&I HVAC	37	\$ 7,170	14.6	54034	
Lighting New Construction	131	\$ 1,052	2.5	14128	
Lighting Retrofit	4935	\$ 70,996	89.2	860588	
Lighting Retrofit	2228	\$ 9,648	33.8	153541	
Residential Energy Star Products	766	\$ 5,226	5.6	45878	
Residential HVAC	6	\$ 1,175	4.0	3546	
Residential HVAC	358	\$ 37,045	91.6	194756	
2018	1096	\$ 61,358	106.0	281730	

C&I HVAC	21	\$ 5,440	8.0	25361
Lighting Retrofit	279	\$ 5,532	19.5	67382
Residential Energy Star Products	445	\$ 1,951	2.8	22217
Residential HVAC	351	\$ 48,435	75.9	166770
Grand Total	15491	\$ 458,358	1134.3	3929012

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Pierre was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Pierre will continue to participate in the Bright Energy Solutions program. Pierre would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Pierre will participate in the all of the Bright Energy Solutions programs the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Pierre plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, Pierre is considering participation in the MRES Coordinated Demand Response (CDR) program. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Pierre will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on September 2, 2019. The public hearing on the IRP was held at the September 17, 2019 City Commission meeting. No comments or responses were made during the meeting. The City Commission approved the resolution on September 17, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	9/2/2019
Public Hearing Date	9/17/2019
Date Approved by City Council	9/17/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Pierre			
Program/Measure	Quan	Incentive	kW	kWh
2014	2330	\$ 81,510	277.2	1144121
C&I HVAC	9	\$ 1,025	1.8	7004
ECM in Res Style Air Handler _ Fan Coil	1	\$ 150	0.2	400
ECM in Res Style Furnace	2	\$ 300	0.5	800
Setback/Programmable Thermostats	3	\$ 150	0.4	3555
Split System Air Source HP <65k Btuh (1ph)	1	\$ 150	0.4	1776
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	2	\$ 275	0.4	473
Commercial Refrigeration	15	\$ 300	0.8	9885
ECM Fan Motor for Cooler-Freezer	15	\$ 300	0.8	9885
Custom Electric Program	6	\$ 7,869	30.2	87005
Custom	1	\$ 1,486	4.8	18075
Custom Lighting	2	\$ 3,689	14.5	46245
Custom Lighting Retrofit	1	\$ 1,734	7.4	13336
Lighting Retrofit	2	\$ 960	3.7	9349
Energy Star Appliances	101	\$ 3,574	1.8	13709
Energy Star Clothes Washer	49	\$ 2,450	0.8	6356
Energy Star Decorative Lights	21	\$ 74	0.0	1641
Energy Star Dishwasher	20	\$ 500	0.5	1257
Energy Star Refrigerator	8	\$ 400	0.4	3240
Energy Star Refrigerators	3	\$ 150	0.1	1215
Lighting New Construction	23	\$ 289	0.8	1907
CEE Qual T8 4ft Low Wattage System	21	\$ 189	0.5	1196
T8 4ft Hi Bay Fixture	2	\$ 100	0.3	711
Lighting Retrofit	1787	\$ 23,466	70.4	238107
Compact Flourescent Fixtures & Lamps	13	\$ 52	0.7	2726
LED & Induction Tech	57	\$ 1,084	2.7	10726
Othr Eff Ltg Tech - per Unit	4	\$ 80	0.2	883
Rducd Wtg T8 4ft w Reflector/Delamping	163	\$ 4,331	14.0	49806
Rducd Wtg T8 Lamps ONLY	788	\$ 788	3.2	10161
Reduced Wtg T8 4ft CEE Qual	289	\$ 4,695	14.5	37049
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	19	\$ 1,330	2.2	4533
T8 2ft w/Elec Bal	3	\$ 18	0.0	109
T8 4ft w/ Bal and Reflectors	288	\$ 7,200	21.1	80912
T8 4ft w/ Bal and Reflectors / Delamping	150	\$ 3,750	11.4	40029
T8 4ft w/Elec Bal	12	\$ 129	0.4	1120
T8 8ft w/Elec Bal	1	\$ 9	0.0	53
Residential HVAC	243	\$ 25,775	74.2	134731
Air Handler _ Fan Coil with ECM	11	\$ 1,650	2.3	7920

HVAC Air_Source HP - 14.5 SEER	12	\$ 3,000	2.4	18972
HVAC Air_Source HP - 18.0 SEER	2	\$ 700	1.0	4486
HVAC Central AC unit	54	\$ 5,400	45.0	24539
HVAC Central AC unit 18+ SEER	10	\$ 2,250	0.0	0
HVAC HE Furnace with ECM	70	\$ 10,500	15.0	48480
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
Programmable Thermostat - Heat Pump	9	\$ 225	0.9	10026
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	74	\$ 1,850	7.2	13838
Residential Lighting	142	\$ 213	0.7	6219
CFL Lamps	142	\$ 213	0.7	6219
VFDs and Pumps	4	\$ 19,000	96.3	645554
Variable Freq Drives	4	\$ 19,000	96.3	645554
2015	1504	\$ 105,788	303.0	625840
C&I HVAC	6	\$ 1,250	2.0	21242
ECM in Res Style Furnace	1	\$ 150	0.2	720
Mini Split Ductless Air Source HP	3	\$ 750	1.3	19410
Setback/Programmable Thermostats	1	\$ 50	0.1	822
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 300	0.4	290
Custom Electric Program	0	\$ 50,529	160.9	268789
Lighting: Custom LED	0	\$ 816	3.0	18230
Lighting: Custom LED high bay new const.	0	\$ 2,516	8.1	21808
Lighting: Custom LED replacing MH.	0	\$ 871	2.8	6795
New Construction Design Review: New Elementary School	0	\$ 46,325	147.0	221956
Energy Star Appliances	181	\$ 2,863	2.0	12911
Energy Star Ceiling Fan w/ Light Kit	1	\$ 25	0.0	121
Energy Star Clothes Dryer	2	\$ 160	0.1	366
Energy Star Clothes Washer	29	\$ 1,450	0.5	3799
ENERGY STAR Dehumidifier	1	\$ 10	0.0	135
Energy Star Dishwasher	20	\$ 500	0.5	760
Energy Star Refrigerator	10	\$ 320	0.3	2412
ES Res Lighting - CFL Screw-in Lamp	16	\$ 24	0.1	519
ES Res Lighting - LED Recessed Can	46	\$ 184	0.3	2395
ES Res Lighting - LED Screw-in Lamp	55	\$ 165	0.2	2217
Programmable Thermostat	1	\$ 25	0.1	187
Food Service	8	\$ 2,000	7.5	34178
ES Comm Solid Door Refrigerators	4	\$ 400	0.2	1880
ES Convection Ovens _ Electric Only	2	\$ 400	0.3	1958
ES Steam Cooker _ Electric Only	2	\$ 1,200	6.9	30340
Lighting Retrofit	272	\$ 4,971	12.9	69235
Hi Performance T8 4ft CEE Qual	21	\$ 147	0.4	2560
LED & Induction Tech	19	\$ 345	0.7	3795

Rducd Wtg T8 4ft w Reflector/Delamping	144	\$ 2,908	7.7	40936
Reduced Wattage T8 Fluorescent Systems	46	\$ 521	1.4	6797
T8 4ft w/ Bal and Reflectors / Delamping	42	\$ 1,050	2.6	15147
Res HVAC Quality Installation	91	\$ 17,300	56.4	90628
Air Handler _ Fan Coil with ECM	4	\$ 600	0.9	2880
HVAC Air_Source HP - 14.5 SEER	4	\$ 1,400	3.1	25598
HVAC Air_Source HP - 18.0 SEER	1	\$ 450	0.9	5730
HVAC Central AC unit	21	\$ 7,350	25.7	16111
HVAC Central AC unit 18+ SEER	7	\$ 3,150	17.9	10699
HVAC HE Furnace with ECM	24	\$ 3,600	5.1	17280
Programmable Thermostat - Elec Heat w/AC	1	\$ 25	0.1	2272
Programmable Thermostat - Heat Pump	5	\$ 125	0.5	5570
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	24	\$ 600	2.3	4488
Residential HVAC	406	\$ 25,315	58.8	106953
Air Handler _ Fan Coil with ECM	4	\$ 600	0.9	2880
HVAC Air_Source HP - 14.5 SEER	2	\$ 500	0.4	3162
HVAC Air_Source HP - 18.0 SEER	2	\$ 700	1.3	3116
HVAC Central AC unit	27	\$ 6,300	20.1	11259
HVAC Central AC unit 18+ SEER	3	\$ 1,050	5.8	3238
HVAC HE Furnace with ECM	35	\$ 5,250	7.5	25200
HVAC Mini Split_Ductless Air_Source HP	5	\$ 1,250	2.2	22940
Programmable Thermostat - Heat Pump	4	\$ 100	0.4	4456
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	31	\$ 775	3.0	5797
Summer AC Tune-Up	293	\$ 8,790	17.3	24905
Residential Lighting	540	\$ 1,560	2.4	21904
CFL Lamps	40	\$ 60	0.2	1752
ES Res Lighting - LED Screw-in Lamp	500	\$ 1,500	2.3	20152
2016	2100	\$ 76,067	202.4	533504
C&I HVAC	27	\$ 6,550	13.5	30859
ECM in Res Style Furnace	2	\$ 300	0.4	1440
Mini Split Ductless Air Source HP	2	\$ 500	0.9	12940
Setback/Programmable Thermostats	12	\$ 600	1.4	9864
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	2	\$ 650	0.8	504
Unitary Single Pkgd AC 065k - 135k Btuh	9	\$ 4,500	10.0	6111
Comm HVAC Quality Install	10	\$ 2,716	5.6	16028
ECM in Res Style Furnace	3	\$ 450	0.6	2160
Setback/Programmable Thermostats	3	\$ 150	0.4	3555
Split System Air Source HP <65k Btuh (1ph)	1	\$ 720	1.5	7436
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	3	\$ 1,396	3.1	2877
Energy Star Appliances	741	\$ 4,620	5.2	39075
Energy Star Clothes Dryer	10	\$ 800	0.3	1830

Energy Star Clothes Washer	20	\$ 1,000	0.3	2620
Energy Star Dishwasher	1	\$ 25	0.0	38
Energy Star Refrigerator	15	\$ 390	0.3	2799
Energy Star Room AC	3	\$ 75	0.2	102
ES Res Lighting - CFL Screw-in Lamp	4	\$ 6	0.0	129
ES Res Lighting - LED Recessed Can	225	\$ 900	1.3	11723
ES Res Lighting - LED Screw-in Lamp	455	\$ 1,224	2.0	18338
Programmable Thermostat	8	\$ 200	0.8	1496
Lighting New Construction	77	\$ 2,460	5.3	28049
LED Energy Star Recessed Downlight	61	\$ 1,525	2.8	15715
LED Hi Bay or Low Bay Fixtures	16	\$ 935	2.5	12334
Lighting Retrofit	759	\$ 12,041	37.2	195519
4' LED Linear Lamps DCL Qual	64	\$ 384	1.1	8586
LED & Induction Tech	562	\$ 8,370	27.7	141983
LED HiBay or LoBay Repl HID or Inc	22	\$ 2,090	5.0	27589
Reduced Wattage T8 and T5HO Lamps ONLY	32	\$ 32	0.1	529
Reduced Wattage T8 Fluorescent Systems	16	\$ 261	0.6	3179
T8 2ft w/Elec Bal	2	\$ 12	0.0	98
T8 4ft w/ Bal and Reflectors / Delamping	13	\$ 325	1.0	4835
T8 4ft w/ Bal Repl 8ft T12 HO	6	\$ 180	0.4	2333
T8 4ft w/Elec Bal	42	\$ 387	1.2	6387
Res HVAC Quality Installation	154	\$ 29,550	97.3	128624
Air Handler _ Fan Coil with ECM	3	\$ 450	0.6	2160
HVAC Air_Source HP - 14.5 SEER	1	\$ 350	0.7	5494
HVAC Air_Source HP - 18.0 SEER	5	\$ 2,250	3.9	26442
HVAC Central AC unit	35	\$ 12,250	44.0	27583
HVAC Central AC unit 18+ SEER	14	\$ 6,300	33.8	20166
HVAC HE Furnace with ECM	45	\$ 6,675	9.4	31680
Programmable Thermostat - Heat Pump	6	\$ 150	0.6	6684
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	45	\$ 1,125	4.4	8415
Residential HVAC	332	\$ 18,130	38.2	95350
Air Handler _ Fan Coil with ECM	3	\$ 450	0.6	2160
HVAC Air_Source HP - 14.5 SEER	2	\$ 500	0.6	9034
HVAC Air_Source HP - 18.0 SEER	1	\$ 350	0.7	1558
HVAC Central AC unit	13	\$ 3,250	10.6	5965
HVAC HE Furnace with ECM	25	\$ 3,675	5.3	18000
HVAC HP Water Heater	1	\$ 100	0.2	1889
HVAC Mini Split_Ductless Air_Source HP	1	\$ 250	0.4	4588
HVAC Mini Split_Ductless Heat Pump	5	\$ 1,250	2.2	22940
Programmable Thermostat - Heat Pump	3	\$ 75	0.3	3342
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	22	\$ 550	2.1	4114

Summer AC Tune-Up	256	\$ 7,680	15.1	21760
2017	8461	\$ 133,635	245.7	1343818
C&I Custom (non-lighting)	0	\$ 1,322	4.4	17348
Lighting: c	0	\$ 538	1.9	4933
Lighting: Custom	0	\$ 785	2.5	12415
C&I HVAC	37	\$ 7,170	14.6	54034
ECM in Res Style Air Handler _ Fan Coil	5	\$ 750	1.1	3600
ECM in Res Style Furnace	4	\$ 600	0.9	2880
Mini Split Ductless Air Source HP	1	\$ 250	0.4	6470
Programmable Thermostat (Natural Gas Furnace With/AC)	1	\$ 50	0.1	187
Res StyleFurnace w/ECM	1	\$ 150	0.2	720
Setback/Programmable Thermostats	15	\$ 750	1.8	23220
Split System Air Conditioning Quality Install < 65,000 BTUH (1ph)	1	\$ 420	0.9	866
Split System Air Source HP <65k Btuh (1ph)	3	\$ 1,260	2.7	10446
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	6	\$ 2,940	6.6	5645
Lighting New Construction	131	\$ 1,052	2.5	14128
LED Energy Star Recessed Downlight	14	\$ 350	0.7	3607
LED Troffer DLC Qualified	117	\$ 702	1.9	10521
Lighting Retrofit	4935	\$ 70,996	89.2	860588
LED & Induction Tech	4652	\$ 69,263	85.5	837877
LED 2 or 4 Pin-Based Repl Lamps	100	\$ 500	0.4	4666
Reduced Wattage T8 and T5HO Lamps ONLY	108	\$ 108	0.3	1785
T8 4ft w/ Bal and Reflectors / Delamping	30	\$ 750	2.0	10495
T8 4ft w/Elec Bal	45	\$ 375	1.1	5765
Lighting Retrofit	2228	\$ 9,648	33.8	153541
4 Ft. LED Linear Lamps Repl T8 Fluorescent	2180	\$ 6,540	24.1	119406
4' LED Linear Lamps DCL Qual	48	\$ 288	0.2	2960
Custom - Lighting	0	\$ 2,820	9.5	31175
Residential Energy Star Products	766	\$ 5,226	5.6	45878
Energy Star Clothes Dryer	13	\$ 1,040	0.3	2379
ENERGY STAR Clothes Dryer (Electric)	9	\$ 720	0.2	1644
Energy Star Clothes Washer	14	\$ 700	0.4	2772
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	10	\$ 500	0.3	1980
ENERGY STAR Dehumidifier	3	\$ 45	0.1	600
Energy Star Refrigerator	8	\$ 220	0.2	1602
ENERGY STAR Refrigerator With Recycling	1	\$ 50	0.0	405
ES Res Lighting - LED Recessed Can	112	\$ 448	0.6	5834
ES Res Lighting - LED Screw-in Lamp	263	\$ 606	1.2	10600
Lighting Equipment LED Lamps	275	\$ 526	1.2	11084
Lighting Equipment LED Recessed Can	51	\$ 202	0.3	2657

Programmable Thermostat	3	\$ 69	0.3	561
Programmable Thermostat (Electric Furnace W/ AC)	1	\$ 25	0.1	2272
Programmable Thermostat (Heat Pump)	1	\$ 25	0.1	1114
Programmable Thermostat (Natural Gas Furnace With/AC)	2	\$ 50	0.2	374
Residential HVAC	6	\$ 1,175	4.0	3546
HVAC Central AC unit	2	\$ 500	1.5	839
HVAC Central AC unit 18+ SEER	1	\$ 350	1.9	1080
HVAC HE Furnace with ECM	2	\$ 300	0.4	1440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	187
Residential HVAC	358	\$ 37,045	91.6	194756
Air Handler _ Fan Coil with ECM	2	\$ 300	0.4	1440
Air Handler/Fan Coil W/ECM	2	\$ 300	0.4	1440
Air-Source Heat Pump (18 SEER)	2	\$ 700	1.0	12394
Central AC 15 SEER	7	\$ 1,750	2.2	1223
Central AC 18+ SEER	2	\$ 700	1.3	728
Central AC/ASHP Tune-Up	22	\$ 660	1.2	1630
Furnace W/ECM	17	\$ 2,550	3.6	12240
HVAC Air_Source HP - 15.0 SEER	4	\$ 1,200	1.5	28118
HVAC Central AC unit	30	\$ 8,500	27.7	16346
HVAC Central AC unit 18+ SEER	11	\$ 4,050	22.8	12888
HVAC HE Furnace with ECM	46	\$ 6,900	9.8	33120
HVAC HP Water Heater	1	\$ 250	0.9	5727
HVAC Mini Split_Ductless Heat Pump	4	\$ 1,000	1.6	21444
Mini-Split / Ductless Air Source Heat Pump	3	\$ 750	1.2	16083
Programmable Thermostat - Elec Heat w/AC	4	\$ 100	0.4	9088
Programmable Thermostat - Heat Pump	1	\$ 25	0.1	1114
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	40	\$ 1,000	3.9	2808
Programmable Thermostat (Heat Pump)	2	\$ 50	0.2	2228
Programmable Thermostat (Natural Gas Boiler With/AC)	10	\$ 250	1.0	1870
Programmable Thermostat (Natural Gas Furnace With/AC)	6	\$ 150	0.6	1122
Quality Installation - Central AC 15 SEER	5	\$ 1,750	2.5	1566
Summer AC Tune-Up	137	\$ 4,110	7.4	10138
2018	1096	\$ 61,358	106.0	281730
C&I HVAC	21	\$ 5,440	8.0	25361
Mini-Split / Ductless Air Source Heat Pump	10	\$ 2,500	3.4	15150
Res Style Fancoil/Air Handler w/ECM	1	\$ 150	0.2	720
Res StyleFurnace w/ECM	5	\$ 750	1.1	3600

Split System Air Conditioning < 65000 BTUH - 15 SEER or Higher	3	\$ 900	1.1	1130
Split System Air Conditioning Quality Install < 65,000 BTUH (1ph) 18+ SEER	1	\$ 720	1.8	1574
Split System Air-Source HP < 65000 BTUH (1ph) >= 18 SEER	1	\$ 420	0.3	3187
Lighting Retrofit	279	\$ 5,532	19.5	67382
4 Ft. LED Linear Lamps Repl T8 Fluorescent	264	\$ 792	3.6	17726
Custom - Lighting	0	\$ 4,563	15.2	46035
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	4	\$ 12	0.2	787
LED Recessed Downlight	11	\$ 165	0.5	2834
Residential Energy Star Products	445	\$ 1,951	2.8	22217
ENERGY STAR Clothes Dryer (Electric)	8	\$ 365	0.2	1462
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	9	\$ 300	0.2	1782
ENERGY STAR Refrigerator No Recycling	10	\$ 250	0.0	432
Energy Star Room AC	1	\$ 25	0.1	94
Lighting Equipment LED Lamps	264	\$ 519	1.2	10640
Lighting Equipment LED Lamps EStar	81	\$ 162	0.4	3265
Lighting Equipment LED Recessed Can EStar	70	\$ 280	0.4	3647
Programmable Thermostat (Natural Gas Furnace With/AC)	1	\$ 25	0.1	187
Smart Thermostat (Heat Pump)	1	\$ 25	0.1	708
Residential HVAC	351	\$ 48,435	75.9	166770
Air Handler/Fan Coil W/ECM	5	\$ 750	1.1	3600
Air-Source Heat Pump (15 SEER)	3	\$ 750	0.6	15980
Air-Source Heat Pump (18 SEER)	3	\$ 1,050	1.5	18591
Central AC 15 SEER	23	\$ 5,750	7.2	4020
Central AC 18+ SEER	14	\$ 4,900	9.2	5097
Central AC/ASHP Tune-Up	147	\$ 4,410	7.9	10891
Furnace W/ECM	83	\$ 12,450	17.7	59760
Heat Pump Water Heater <= 55 Gallons	2	\$ 500	1.7	11454
Mini-Split / Ductless Air Source Heat Pump	2	\$ 500	0.8	10722
Mini-Split Air Conditioner	11	\$ 2,750	6.0	3135
Programmable Thermostat (Heat Pump)	1	\$ 25	0.1	1114
Programmable Thermostat (Natural Gas Furnace With/AC)	3	\$ 75	0.3	561
Quality Installation - Air-Source Heat Pump 15+ SEER 8.2 HSPF	3	\$ 1,050	0.9	7849
Quality Installation - Central AC 15 SEER	31	\$ 10,850	15.5	9708
Quality Installation - Central AC 18+ SEER	5	\$ 2,250	4.2	2512
Smart Thermostat (Heat Pump)	1	\$ 25	0.1	708
Smart Thermostat (Natural Gas Furnace With/AC)	14	\$ 350	1.1	1066

Grand Total	15491	\$ 458,358	1134.3	3929012
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Appendix 2 – Pierre Resolution

RESOLUTION NO. 2653

- WHEREAS,** the City of Pierre purchases a significant portion of its power supply from the Western Area Power Administration (Western); and
- WHEREAS,** Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and
- WHEREAS,** the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and
- WHEREAS,** our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and
- WHEREAS,** any public comments received have been addresses in order to strengthen the city's Integrated Resource Plan; and
- WHEREAS,** the IRP Summary Report included 5-year and 2-year action plans outlining actions to be taken by the Municipal utility during the next several years

NOW THEREFORE BE IT RESOLVED BY the City of Pierre City Commission as follows:

That the "Integrated Resource Plan Summary Report for the City of Pierre shall be approved for filing with Western under the Energy Planning and Management Program."

Passed and approved this 17th day of September, 2019.

(SEAL)


Steve Harding, Mayor

ATTEST:


Twila Hight, Finance Officer

VIII. Vermillion, SD Resource Planning

A. *City Information*

Vermillion, located in Clay County, is a community of more than 10,500 individuals located in southeastern South Dakota. Municipal services include electricity, water, sanitary sewer, storm sewer, recycling and landfill services. The City is the home of the University of South Dakota. The City has many large employers. The three largest are the University of South Dakota (1400 employees), Sanford Health (268 employees), and Aramark (220 employees). Other major employers (each employing between 100 and 200 people) include Masaba, Hy-Vee, Polaris Industries, Wal-Mart, SESDAC, Vermillion Public School District, and the City of Vermillion.

In 2018, the municipal utility had 4,161 residential customers, and 514 commercial customers. The residential sector's yearly usage averaged 8,074 Wh per customer in 2018, and commercial customers averaged 67,077 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

VERMILLION, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$11.00
	\$/kWh Jun-Aug	\$.0980
	\$/kWh Sep-May	\$.0910
Small Commercial - Single Phase	Customer Charge	\$18.00
	Three Phase Customer Charge	\$28.00
	\$/kWh (Jun-Sept)	\$.1020
	\$/kWh (Oct-May)	\$.0960
Large Commercial	Customer Charge	\$40.00
	\$/kW Jun-Sept	\$15.00
	\$/kW Oct-May	\$12.50
	\$/kWh	\$.0390

Exhibit 2

VERMILLION, SD

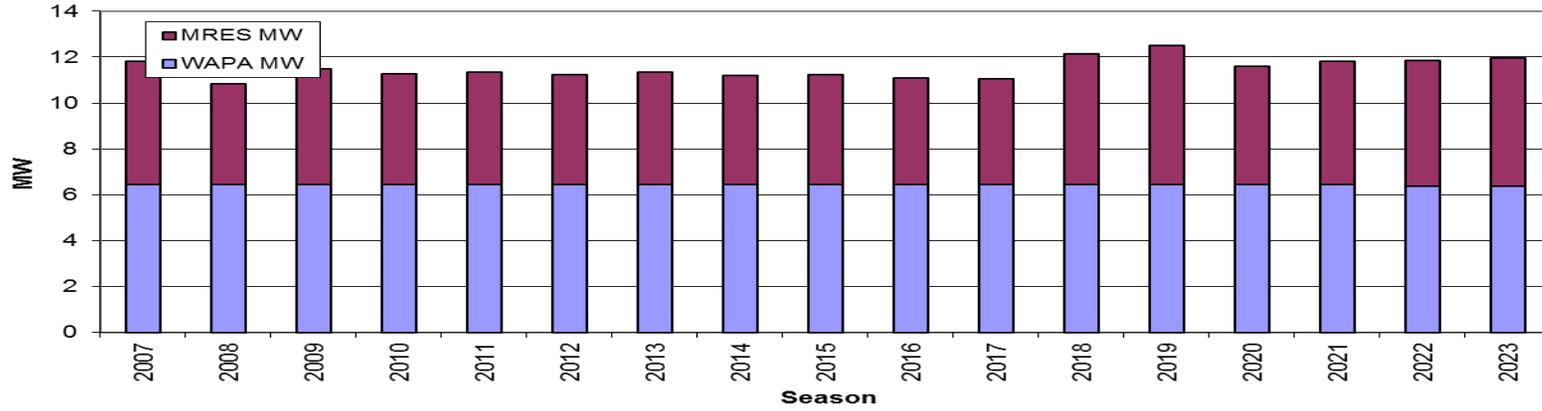
MRES Seasonal Load Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Summer	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2006	16,132	10,796	5,336	2006	35,071,534	23,071,000	12,000,534
2007	15,424	10,796	4,811	2007	36,243,138	23,071,000	13,172,138
2008	14,746	10,796	4,273	2008	34,110,666	23,071,000	11,039,666
2009	14,776	10,796	4,469	2009	32,871,257	23,071,000	9,800,257
2010	15,619	10,796	5,687	2010	36,220,691	23,071,000	13,149,691
2011	16,720	10,796	6,413	2011	36,731,820	23,071,000	13,660,820
2012	17,114	10,796	6,486	2012	38,438,173	23,071,000	15,367,173
2013	16,562	10,796	6,255	2013	36,069,679	23,071,000	12,998,679
2014	15,393	10,796	5,086	2014	34,259,051	23,071,000	11,188,051
2015	14,915	10,796	4,537	2015	35,375,489	23,071,000	12,304,489
2016	15,966	10,796	5,539	2016	36,570,094	23,071,000	13,499,094
2017	16,364	10,796	5,568	2017	36,055,155	23,071,000	12,984,155
2018	16,669	10,796	5,911	2018	37,393,026	23,071,000	14,322,026
2019	15,362	10,796	5,055	2019	35,205,258	23,071,000	12,134,258
2020	15,576	10,796	5,269	2020	35,696,315	23,071,000	12,625,315
2021	15,785	10,688	5,581	2021	36,173,694	22,840,000	13,333,694
2022	15,940	10,688	5,736	2022	36,529,892	22,840,000	13,689,892
2023	16,088	10,688	5,884	2023	36,868,022	22,840,000	14,028,022
Demand (kW)				Energy (kWh)			
Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>	Winter	<u>Total</u>	<u>WAPA</u>	<u>MRES</u>
2007	11,265	6,430	5,399	2007	30,948,004	18,878,000	12,070,004
2008	10,714	6,430	4,404	2008	31,983,696	18,998,000	12,985,696
2009	11,496	6,430	5,066	2009	32,137,630	18,878,000	13,259,630
2010	11,148	6,430	4,838	2010	32,095,175	18,878,000	13,217,175
2011	11,240	6,430	4,930	2011	33,119,499	18,878,000	14,241,499
2012	10,855	6,430	4,812	2012	31,840,775	18,998,000	12,842,775
2013	11,218	6,430	4,908	2013	32,541,069	18,878,000	13,663,069
2014	11,079	6,430	4,769	2014	33,351,453	18,878,000	14,473,453
2015	11,099	6,430	4,789	2015	32,445,657	18,878,000	13,567,657
2016	10,959	6,430	4,649	2016	31,634,232	18,998,000	12,636,232
2017	10,940	6,430	4,630	2017	32,247,721	18,878,000	13,369,721
2018	12,039	6,430	5,729	2018	32,959,693	18,878,000	14,081,693
2019	12,384	6,430	6,074	2019	33,897,079	18,878,000	15,019,079
2020	11,476	6,430	5,166	2020	33,130,117	18,998,000	14,132,117
2021	11,630	6,430	5,383	2021	33,579,570	18,753,000	14,826,570
2022	11,744	6,366	5,497	2022	33,949,970	18,690,000	15,259,970
2023	11,853	6,366	5,606	2023	34,270,965	18,690,000	15,580,965

Exhibit 3

Vermillion, SD
Winter Demand - Town Gate



Vermillion, SD
Winter Energy - Town Gate

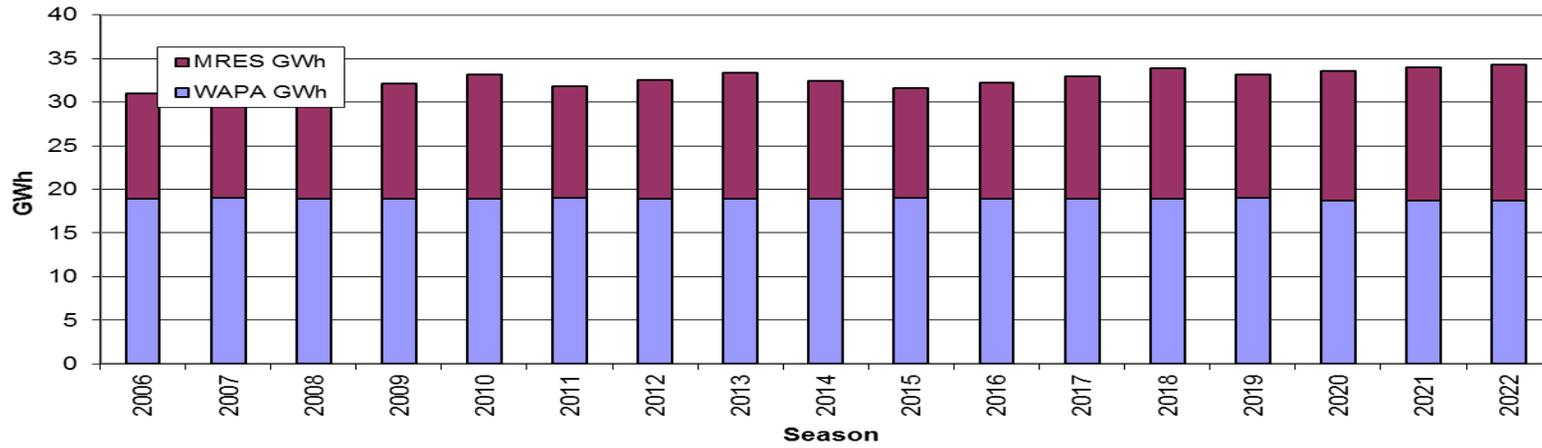
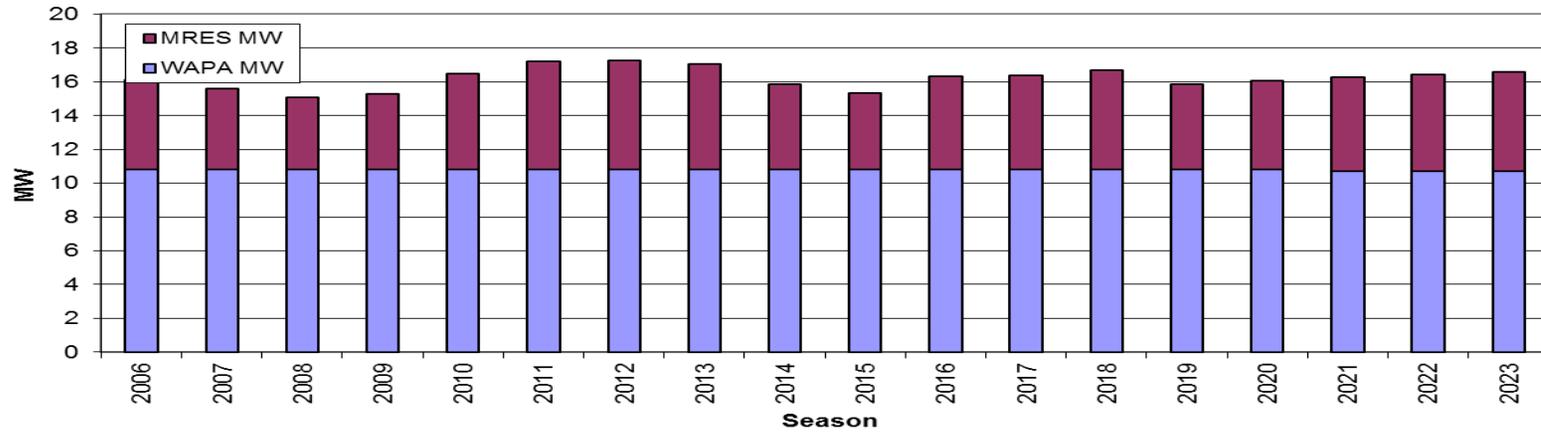


Exhibit 4

Vermillion, SD Summer Demand - Town Gate



Vermillion, SD Summer Energy - Town Gate

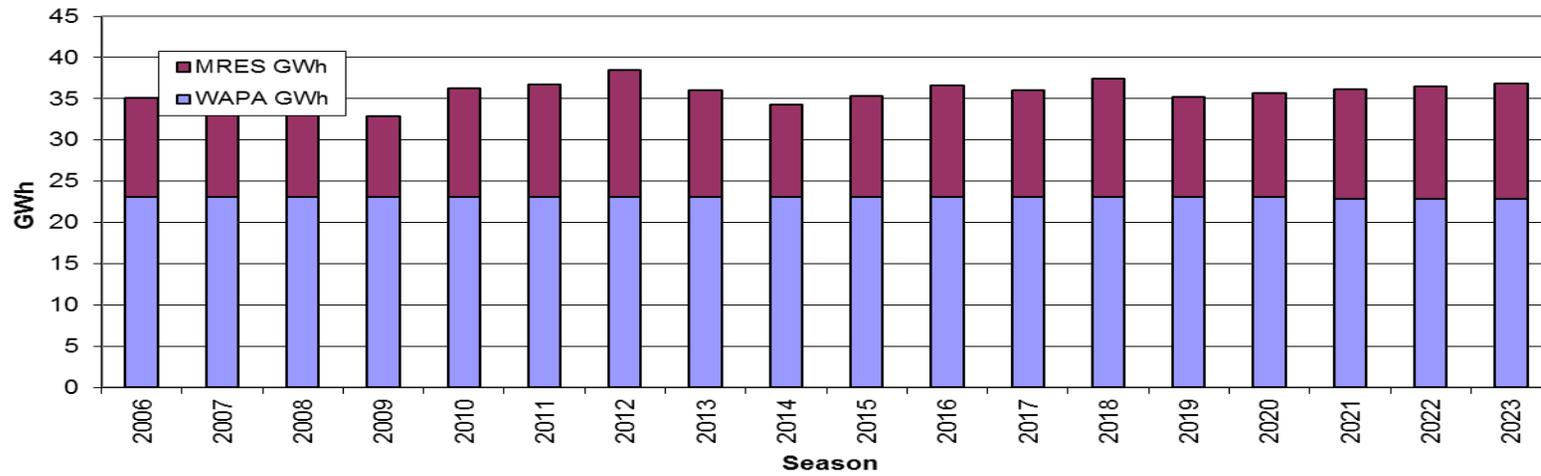


Exhibit 5

Vermillion, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 12039 kW

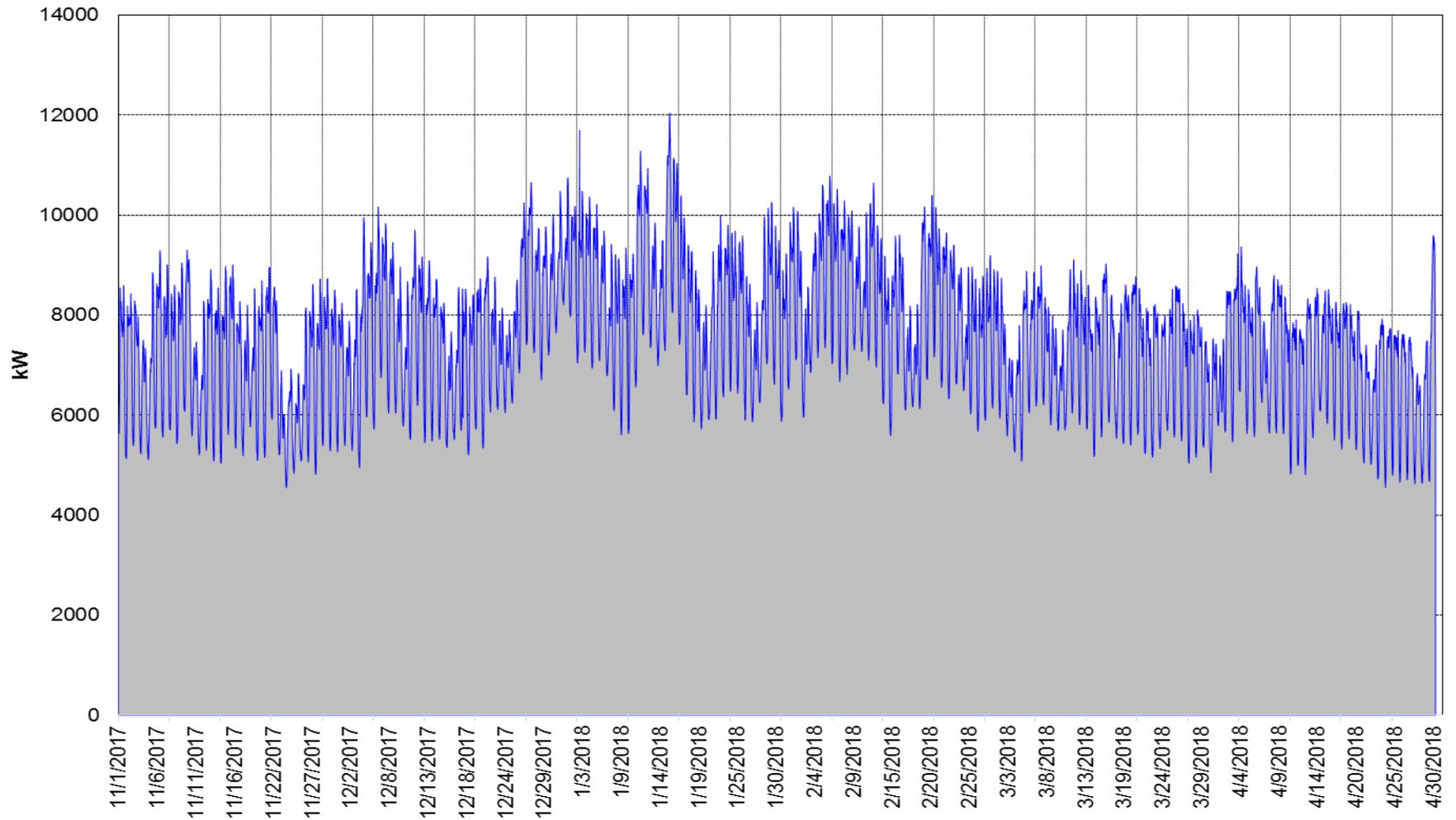


Exhibit 6

Vermillion, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 16669 kW

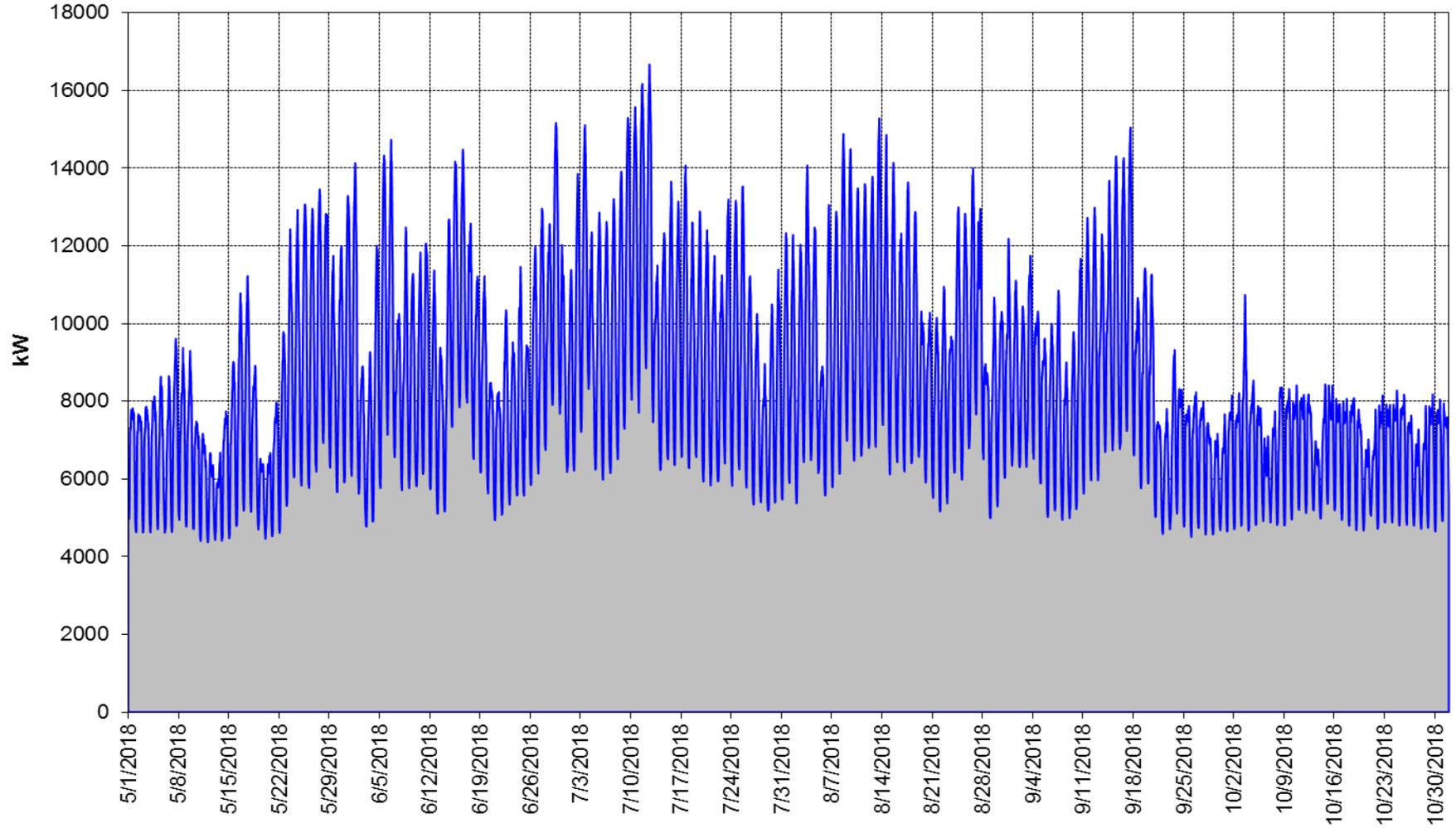


Exhibit 7

Vermillion, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 12039 kW

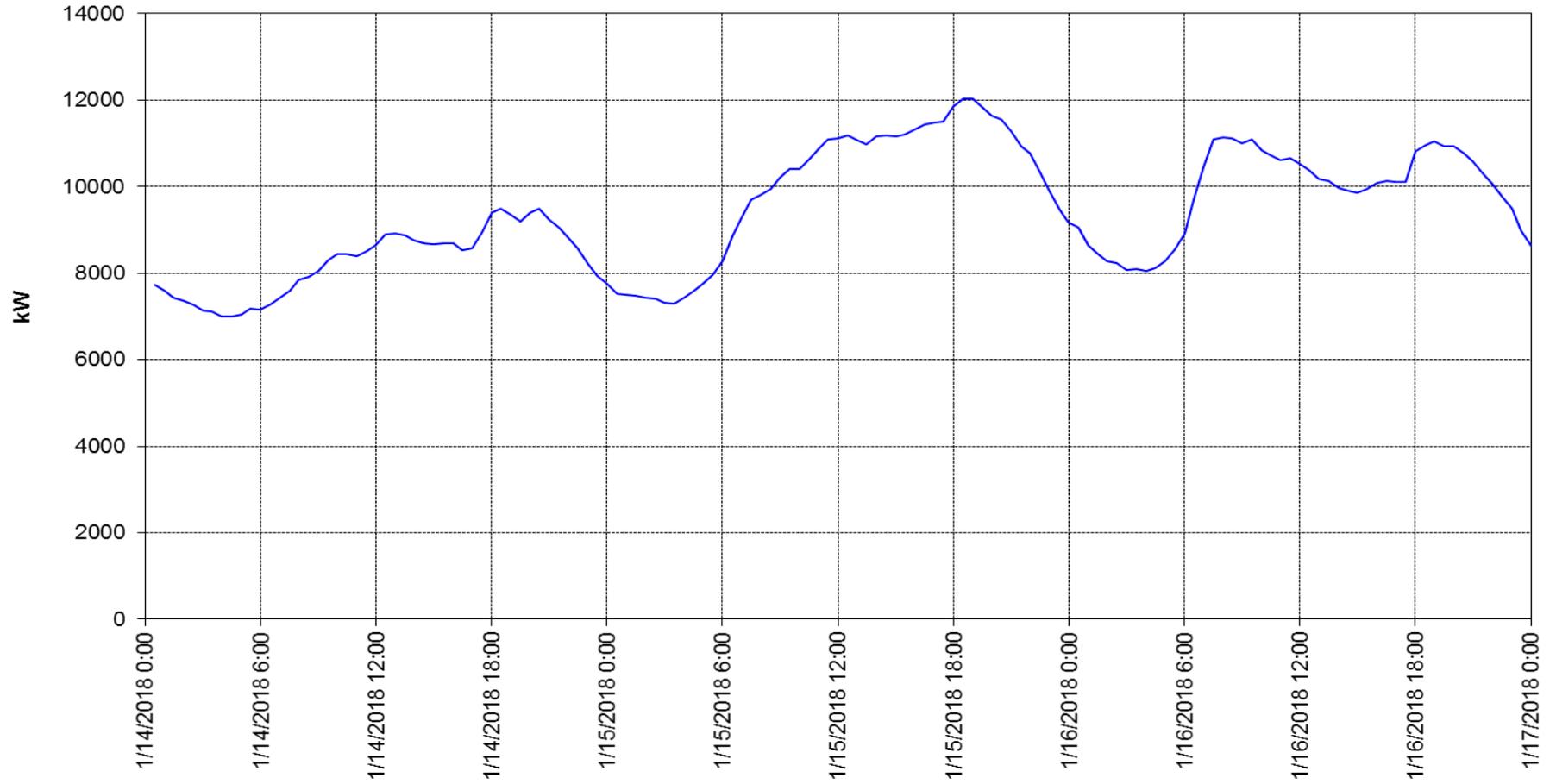
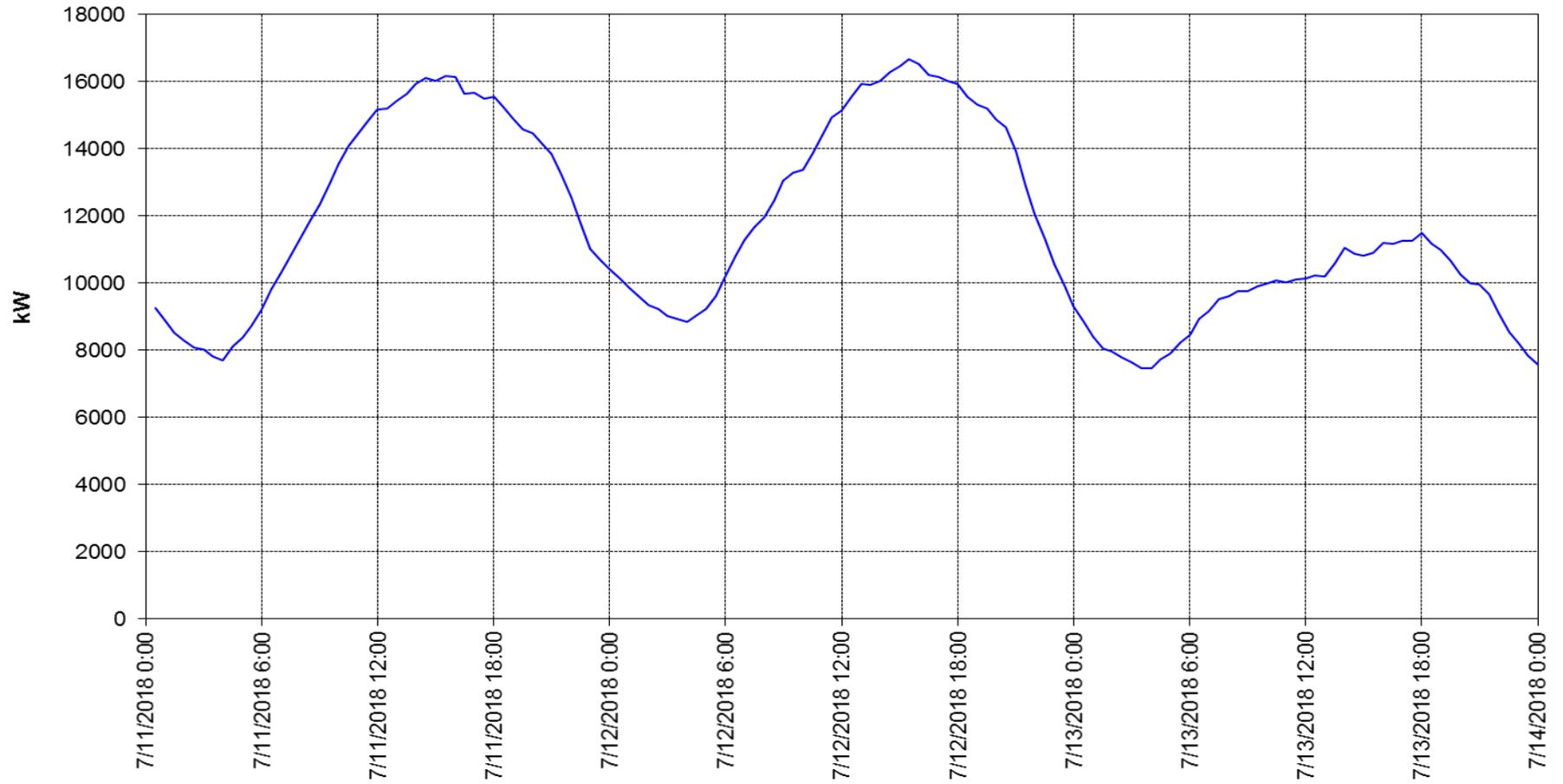


Exhibit 8

Vermillion, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 16669 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Vermillion is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Vermillion to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Vermillion has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Vermillion			
Program/Measure	Quan	Incentive	kW	kWh
2014	446	\$ 24,000	59.1	227523
C&I HVAC	43	\$ 7,268	11.2	79178
Commercial Refrigeration	1	\$ 150	0.1	790
Energy Star Appliances	77	\$ 1,966	2.0	8179
Food Service	6	\$ 740	0.7	6408
Lighting New Construction	150	\$ 5,011	13.9	45606
Lighting Retrofit	102	\$ 1,240	4.2	15891
Residential HVAC	65	\$ 6,425	21.3	42736
VFDs and Pumps	2	\$ 1,200	5.7	28735
2015	2807	\$ 100,591	249.7	1115232
C&I HVAC	21	\$ 11,150	34.4	72590
Compressed Air System	1	\$ 684	7.7	38408
Custom Electric Program	2	\$ 383	1.2	5175
Energy Star Appliances	396	\$ 3,203	3.1	19343
Lighting New Construction	1138	\$ 34,140	74.5	507095
Lighting Retrofit	1029	\$ 16,782	34.6	165679
Res HVAC Quality Installation	36	\$ 7,450	21.7	33164
Residential HVAC	180	\$ 20,800	42.1	115165
VFDs and Pumps	4	\$ 6,000	30.4	158613
2016	3454	\$ 47,914	123.0	423912
C&I HVAC	7	\$ 987	1.5	4333
Custom Electric Program	0	\$ 6,810	23.9	55295
Energy Star Appliances	1687	\$ 6,145	8.9	76804
Lighting New Construction	11	\$ 600	1.2	8437
Lighting Retrofit	1058	\$ 8,122	22.5	141271
Res HVAC Quality Installation	45	\$ 10,450	33.3	28852
Residential HVAC	96	\$ 13,150	29.2	86753
Residential Lighting	550	\$ 1,650	2.5	22167
2017	5480	\$ 61,075	168.9	576540
C&I Compressed Air	2	\$ 1,531	4.6	20309
C&I Custom (non-lighting)	0	\$ 4,441	17.4	16740
C&I HVAC	19	\$ 13,830	38.7	55670
C&I Pumps & VFDs	2	\$ 1,200	3.9	17040
Comm HVAC Quality Install	2	\$ 700	1.6	1443
Energy Star Appliances	104	\$ 275	0.5	4357
Lighting New Construction	663	\$ 4,860	13.3	92524
Lighting Retrofit	8	\$ 187	0.4	3536

Lighting Retrofit	2635	\$ 9,146	30.3	186079
Residential Energy Star Products	1929	\$ 5,080	9.7	84939
Residential HVAC	2	\$ 175	0.3	907
Residential HVAC	114	\$ 19,650	48.2	92996
2018	1427	\$ 34,664	83.8	505025
C&I Compressed Air	1	\$ 588	2.1	13515
Lighting New Construction	343	\$ 4,095	14.2	100922
Lighting Retrofit	300	\$ 14,373	43.4	321264
Residential Energy Star Products	711	\$ 1,928	4.1	32191
Residential HVAC	72	\$ 13,680	19.9	37133
Grand Total	13614	\$ 268,244	684.5	2848233

- **Load Management Program**

Description: Vermillion Municipal Utilities operates load management switches on 3,456 central AC units (including residential, commercial, industrial, and municipal AC units), 442 electric water heaters (load management switches are mandatory on all water heaters by city ordinance), and five humidifiers in city buildings. Additional load management measures include voltage control during peak times and manually shutting down all non-essential operations at the city water plant while the load management system is in operation. The city continues to invest in the system by purchasing new hardware and software as necessary, and tests 25% of all control devices annually for proper operation.

Energy Savings: Approximately 3.6 MW on peak

Cost: Approximate annual average of \$42,000

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Vermillion was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Vermillion will continue to participate in the Bright Energy Solutions program. Vermillion would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Vermillion will participate in the all of the Bright Energy Solutions programs to

the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Vermillion plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, Vermillion is successfully operating their own Load Management program, and it is unknown if they will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Vermillion will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

E. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions.

Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

F. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 5th and July 12th, 2019. The public hearing on the IRP was held at the July 15, 2019 City Council meeting. No comments or responses were made during the meeting. The City Council approved the resolution on June 15, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	7/5/2019 and 7/12/2019
Public Hearing Date	7/15/2019
Date Approved by City Council	7/15/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Vermillion			
Program/Measure	Quan	Incentive	kW	kWh
2014	446	\$ 24,000	59.1	227523
C&I HVAC	43	\$ 7,268	11.2	79178
Air Cooled Chillers w-Condenser	1	\$ 2,972	3.6	20112
ECM in Res Style Furnace	5	\$ 750	1.2	2000
Mini Split Ductless Air Source HP	1	\$ 200	0.4	6470
Setback/Programmable Thermostats	24	\$ 1,200	2.3	44348
Split System Air Source HP <65k Btuh (3ph)	4	\$ 725	2.0	4016
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	4	\$ 575	0.8	991
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)				
+18 SEER	2	\$ 540	0.4	497
Unitary Single Pkgd AC <65k Btuh (3ph)	1	\$ 250	0.4	414
Window Film	1	\$ 56	0.1	330
Commercial Refrigeration	1	\$ 150	0.1	790
ES Comm Solid Door Refrigerators	1	\$ 150	0.1	790
Energy Star Appliances	77	\$ 1,966	2.0	8179
Energy Star Ceiling Fan w/ Light Kit	33	\$ 825	0.5	3993
Energy Star Clothes Washer	6	\$ 300	0.1	786
Energy Star Decorative Lights	6	\$ 21	0.0	469
ENERGY STAR Dehumidifier	3	\$ 30	0.3	270
Energy Star Dishwasher	24	\$ 600	0.6	1512
Energy Star Refrigerator	1	\$ 50	0.0	405
Energy Star Room AC	4	\$ 140	0.5	744
Food Service	6	\$ 740	0.7	6408
ES Comm Dishwasher_Gas WH-Elec Boost	1	\$ 90	0.3	2600
ES Comm Glass Door Refrigerators	2	\$ 200	0.2	1336
ES Comm Solid Door Freezers	1	\$ 100	0.1	869
ES Comm Solid Door Refrigerators	2	\$ 350	0.2	1603
Lighting New Construction	150	\$ 5,011	13.9	45606
CEE Qual T8 4ft Low Wattage System	19	\$ 171	0.6	2191
LED Energy Star Recessed Downlight	90	\$ 2,250	5.1	18196
T5HO 4ft Hi Bay Fixture	41	\$ 2,590	8.2	25219
Lighting Retrofit	102	\$ 1,240	4.2	15891
LED & Induction Tech	65	\$ 960	3.4	13289
T8 4ft w/Elec Bal	37	\$ 280	0.7	2602
Residential HVAC	65	\$ 6,425	21.3	42736
HVAC Central AC unit	19	\$ 1,900	13.8	7546
HVAC Central AC unit 18+ SEER	1	\$ 225	0.0	0

HVAC HE Furnace with ECM	24	\$ 3,600	5.1	16640
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
Programmable Thermostat - Elec Heat w/AC	4	\$ 100	0.4	9088
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	16	\$ 400	1.6	2992
VFDs and Pumps	2	\$ 1,200	5.7	28735
Variable Freq Drives	2	\$ 1,200	5.7	28735
2015	2807	\$ 100,591	249.7	1115232
C&I HVAC	21	\$ 11,150	34.4	72590
Air Cooled Chillers w-Condenser	1	\$ 8,000	29.4	39410
ECM in Res Style Air Handler _ Fan Coil	1	\$ 450	0.6	2160
ECM in Res Style Furnace	2	\$ 300	0.5	800
Mini Split Ductless Air Source HP	2	\$ 500	0.9	12940
Setback/Programmable Thermostats	10	\$ 500	1.2	15843
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	4	\$ 1,150	1.5	1006
Unitary Air Cooled Split Sys AC <65k Btuh (3ph)	1	\$ 250	0.4	431
Compressed Air System	1	\$ 684	7.7	38408
Compressed Air System Leak Survey	1	\$ 684	7.7	38408
Custom Electric Program	2	\$ 383	1.2	5175
Lighting: Custom 4 lamp F54T5 high bay replacing 250 W MH	1	\$ 174	0.6	2352
Lighting: Replace 12 250W metal halide with 4 lamp T5HO.	1	\$ 209	0.7	2823
Energy Star Appliances	396	\$ 3,203	3.1	19343
Energy Star Clothes Washer	22	\$ 1,100	0.4	2882
ENERGY STAR Dehumidifier	1	\$ 10	0.0	135
Energy Star Dishwasher	35	\$ 875	0.8	1330
Energy Star Refrigerator	1	\$ 50	0.0	405
Energy Star Room AC	3	\$ 75	0.2	102
ES Res Lighting - LED Recessed Can	74	\$ 296	0.4	3856
ES Res Lighting - LED Screw-in Lamp	259	\$ 777	1.2	10446
Programmable Thermostat	1	\$ 20	0.1	187
Lighting New Construction	1138	\$ 34,140	74.5	507095
Hi Bay Occupancy Sensor Control	569	\$ 5,690	12.5	85821
T8 4ft Hi Bay Fixture	569	\$ 28,450	62.0	421274
Lighting Retrofit	1029	\$ 16,782	34.6	165679
LED & Induction Tech	99	\$ 1,475	4.0	16805
LED Reach-in Refrigerated Case Vertical Ltg	4	\$ 300	0.6	5148
Othr Eff Ltg Tech - per Unit	75	\$ 2,125	5.5	28682
Reduced Wattage T8 Fluorescent Systems	749	\$ 6,777	14.3	63871
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	51	\$ 3,795	6.5	28357
T8 4ft w/Elec Bal	21	\$ 210	0.7	2740
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	30	\$ 2,100	3.0	20076

Res HVAC Quality Installation	36	\$ 7,450	21.7	33164
Air Handler _ Fan Coil with ECM	6	\$ 900	1.3	4320
HVAC Central AC unit	15	\$ 5,250	16.0	10068
HVAC Central AC unit 18+ SEER	1	\$ 450	2.5	1516
HVAC HE Furnace with ECM	4	\$ 600	0.9	2880
Programmable Thermostat - Elec Heat w/AC	6	\$ 150	0.6	13632
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	4	\$ 100	0.4	748
Residential HVAC	180	\$ 20,800	42.1	115165
Air Handler _ Fan Coil with ECM	27	\$ 4,050	5.8	19440
Desuperheater	1	\$ 250	0.4	1221
HVAC Air_Source HP - 14.5 SEER	1	\$ 250	0.3	4517
HVAC Central AC unit	38	\$ 9,500	22.3	12535
HVAC Closed Loop Water to Water GS HP	1	\$ 800	1.1	17406
HVAC HE Furnace with ECM	16	\$ 2,400	3.4	11520
HVAC Mini Split_Ductless Air_Source HP	4	\$ 1,000	1.8	18352
Programmable Thermostat - AC Only	20	\$ 500	1.9	3740
Programmable Thermostat - Elec Heat w/AC	8	\$ 200	0.8	18176
Programmable Thermostat - Geothermal	2	\$ 50	0.2	1764
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	12	\$ 300	1.2	2244
Summer AC Tune-Up	50	\$ 1,500	3.0	4250
VFDs and Pumps	4	\$ 6,000	30.4	158613
Variable Freq Drives	4	\$ 6,000	30.4	158613
2016	3454	\$ 47,914	123.0	423912
C&I HVAC	7	\$ 987	1.5	4333
ECM in Res Style Furnace	2	\$ 300	0.4	1440
Setback/Programmable Thermostats	3	\$ 137	0.4	2466
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	2	\$ 550	0.7	427
Custom Electric Program	0	\$ 6,810	23.9	55295
Lighting: Custom - LED 2x4 troffers	0	\$ 6,324	21.9	46798
xxx	0	\$ 486	2.0	8497
Energy Star Appliances	1687	\$ 6,145	8.9	76804
Energy Star Clothes Dryer	2	\$ 160	0.1	366
Energy Star Clothes Washer	2	\$ 100	0.0	262
ENERGY STAR Dehumidifier	2	\$ 20	0.1	270
Energy Star Dishwasher	15	\$ 375	0.4	570
Energy Star Refrigerator	5	\$ 100	0.1	660
ES Res Lighting - CFL Screw-in Lamp	4	\$ 6	0.0	130
ES Res Lighting - LED Recessed Can	658	\$ 2,632	3.8	34283
ES Res Lighting - LED Screw-in Lamp	999	\$ 2,752	4.5	40263
Lighting New Construction	11	\$ 600	1.2	8437
Hi Bay Occupancy Sensor Control	1	\$ 100	0.2	1508

T5HO 4ft Hi Bay Fixture	10	\$ 500	1.0	6929
Lighting Retrofit	1058	\$ 8,122	22.5	141271
4' LED Linear Lamps DCL Qual	431	\$ 1,491	4.1	21369
LED & Induction Tech	580	\$ 5,749	16.2	106924
LED 2 or 4 Pin-Based Repl Lamps	2	\$ 10	0.0	145
Othr Eff Ltg Tech - per Unit	31	\$ 620	1.5	9578
Reduced Wattage T8 Fluorescent Systems	14	\$ 252	0.7	3255
Res HVAC Quality Installation	45	\$ 10,450	33.3	28852
HVAC Central AC unit	23	\$ 7,550	24.9	15709
HVAC Central AC unit 18+ SEER	2	\$ 900	5.0	3007
HVAC HE Furnace with ECM	12	\$ 1,800	2.6	8640
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	8	\$ 200	0.8	1496
Residential HVAC	96	\$ 13,150	29.2	86753
Air Handler _ Fan Coil with ECM	20	\$ 3,000	4.3	14400
HVAC Central AC unit	27	\$ 6,750	16.0	8982
HVAC Central AC unit 18+ SEER	1	\$ 350	2.5	1365
HVAC HE Furnace with ECM	13	\$ 1,950	2.8	9360
HVAC Mini Split_Ductless Heat Pump	1	\$ 250	0.4	4588
Programmable Thermostat - AC Only	8	\$ 200	0.8	1496
Programmable Thermostat - Elec Heat w/AC	20	\$ 500	1.9	45440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	6	\$ 150	0.6	1122
Residential Lighting	550	\$ 1,650	2.5	22167
ES Res Lighting - LED Screw-in Lamp	550	\$ 1,650	2.5	22167
2017	5480	\$ 61,075	168.9	576540
C&I Compressed Air	2	\$ 1,531	4.6	20309
Cyclng Refrigerated Dryers	1	\$ 131	0.4	1509
VFD Air Compressor <= 200-HP Replacing Load/No-Load	1	\$ 1,400	4.2	18800
C&I Custom (non-lighting)	0	\$ 4,441	17.4	16740
Lighting: Custom	0	\$ 4,441	17.4	16740
C&I HVAC	19	\$ 13,830	38.7	55670
Air Cooled Chillers w-Condenser	2	\$ 11,000	32.3	45690
ECM in Res Style Furnace	1	\$ 150	0.2	720
Programmable Thermostat (Natural Gas Furnace With/AC)	4	\$ 200	0.4	748
Res StyleFurnace w/ECM	5	\$ 750	1.1	3600
Setback/Programmable Thermostats	1	\$ 50	0.1	822
Split System Air Conditioning < 65000 BTUH - 15 SEER or Higher	3	\$ 700	0.9	628
Split System Air Conditioning Quality Install < 65,000 BTUH (1ph)	2	\$ 700	3.1	2885
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	1	\$ 280	0.6	577

C&I Pumps & VFDs	2	\$ 1,200	3.9	17040
Variable Freq Drives	2	\$ 1,200	3.9	17040
Comm HVAC Quality Install	2	\$ 700	1.6	1443
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	2	\$ 700	1.6	1443
Energy Star Appliances	104	\$ 275	0.5	4357
ENERGY STAR Dehumidifier	1	\$ 10	0.0	135
ES Res Lighting - LED Recessed Can	6	\$ 24	0.0	313
ES Res Lighting - LED Screw-in Lamp	97	\$ 241	0.4	3909
Lighting New Construction	663	\$ 4,860	13.3	92524
LED Energy Star Recessed Downlight	18	\$ 450	0.9	6307
LED Troffer DLC Qualified	606	\$ 4,059	11.5	80648
LED Troffer, 3000 - 5799Lumens, DLC Premium	39	\$ 351	0.9	5569
Lighting Retrofit	8	\$ 187	0.4	3536
LED & Induction Tech	8	\$ 187	0.4	3536
Lighting Retrofit	2635	\$ 9,146	30.3	186079
4 Ft. LED Linear Lamps Repl T8 Fluorescent	2514	\$ 7,542	23.4	138488
4' LED Linear Lamps DCL Qual	4	\$ 24	0.1	489
Custom - Lighting	0	\$ 114	0.3	4670
LED & Induction Tech	42	\$ 191	1.9	10561
LED 2 or 4 Pin-Based Repl Lamps	24	\$ 120	0.3	2222
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	40	\$ 280	1.5	8903
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	7	\$ 595	2.1	15257
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	4	\$ 280	0.8	5488
Residential Energy Star Products	1929	\$ 5,080	9.7	84939
Energy Star Clothes Dryer	2	\$ 160	0.1	366
ENERGY STAR Clothes Dryer (Electric)	1	\$ 80	0.0	183
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	1	\$ 50	0.0	198
ENERGY STAR Dehumidifier	4	\$ 60	0.2	799
Energy Star Refrigerator	2	\$ 70	0.1	537
ENERGY STAR Refrigerator No Recycling	8	\$ 160	0.1	1059
ENERGY STAR Refrigerator With Recycling	1	\$ 50	0.0	405
Energy Star Room AC	2	\$ 50	0.1	68
ES Res Lighting - LED Recessed Can	145	\$ 580	0.8	7555
ES Res Lighting - LED Screw-in Lamp	710	\$ 1,377	3.2	28616
Lighting Equipment LED Lamps	823	\$ 1,523	3.7	33170
Lighting Equipment LED Recessed Can	230	\$ 920	1.3	11983
Residential HVAC	2	\$ 175	0.3	907
HVAC HE Furnace with ECM	1	\$ 150	0.2	720
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	1	\$ 25	0.1	187
Residential HVAC	114	\$ 19,650	48.2	92996
Central AC 15 SEER	1	\$ 250	0.3	175

Furnace W/ECM	17	\$ 2,550	3.6	12240
HVAC Air_Source HP - 15.0 SEER	1	\$ 350	1.2	18484
HVAC Central AC unit	20	\$ 6,700	23.4	14471
HVAC Central AC unit 18+ SEER	1	\$ 450	3.3	1971
HVAC HE Furnace with ECM	20	\$ 3,000	4.3	14400
HVAC HP Water Heater	1	\$ 250	0.9	5727
HVAC Mini Split_Ductless Heat Pump	1	\$ 250	0.4	5361
Mini-Split / Ductless Air Source Heat Pump	1	\$ 250	0.4	5361
Programmable Thermostat - AC Only	2	\$ 50	0.2	82
Programmable Thermostat - Elec Heat w/AC	2	\$ 50	0.2	4544
Programmable Thermostat - Propane, Fuel Oil,				
Boiler w/AC	17	\$ 425	1.6	2741
Programmable Thermostat (Natural Gas Boiler				
With/AC)	4	\$ 100	0.4	748
Programmable Thermostat (Natural Gas Furnace				
With/AC)	13	\$ 325	1.3	2431
Quality Installation - Central AC 15 SEER	12	\$ 4,200	6.0	3758
Quality Installation - Central AC 18+ SEER	1	\$ 450	0.8	502
2018	1427	\$ 34,664	83.8	505025
C&I Compressed Air	1	\$ 588	2.1	13515
Compressor Air Leak Survey	1	\$ 588	2.1	13515
Lighting New Construction	343	\$ 4,095	14.2	100922
LED ENERGY STAR Screw-In Lamp < 600 Lumens	18	\$ 54	0.5	3991
LED High Bay Fixtures <= 75 W	3	\$ 45	0.1	1037
LED Recessed Downlight	177	\$ 3,105	10.9	78746
LED Troffer < 3000 Lumens	9	\$ 36	0.1	691
LED Troffer 3000 - 5799 Lumens	123	\$ 738	2.1	12901
LED Troffer, 3000 - 5799Lumens, DLC Premium	13	\$ 117	0.5	3556
Lighting Retrofit	300	\$ 14,373	43.4	321264
4 Ft. LED Linear Lamps Repl T12 Fluorescent	62	\$ 372	0.9	5747
4 Ft. LED Linear Lamps Repl T8 Fluorescent	48	\$ 144	0.6	3224
Custom - Lighting	0	\$ 12,237	34.2	279085
LED ENERGY STAR Screw-In Lamp < 600 Lumens	4	\$ 12	0.1	478
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	72	\$ 504	3.2	12951
LED Exit Sign	22	\$ 264	0.5	2977
LED Recessed Downlight	6	\$ 90	0.2	1455
LED Screw-In Flood/Reflector Lamp >= 420				
Lumens	56	\$ 480	3.0	12570
Reduced Wattage T8 Fluorescent Systems 4 Ft.				
2-Lamp	30	\$ 270	0.7	2775
Residential Energy Star Products	711	\$ 1,928	4.1	32191
ENERGY STAR Clothes Dryer (Electric)	2	\$ 105	0.1	365
ENERGY STAR Clothes Washer W/ Elec WH and				
Elec Dryer	4	\$ 125	0.1	792

ENERGY STAR Dehumidifier	7	\$ 175	0.3	1397
ENERGY STAR Refrigerator No Recycling	2	\$ 45	0.0	176
Energy Star Room AC	1	\$ 25	0.1	94
Lighting Equipment LED Lamps	8	\$ 16	0.0	322
Lighting Equipment LED Lamps EStar	576	\$ 930	2.6	23215
Lighting Equipment LED Recessed Can EStar	108	\$ 432	0.6	5627
Smart Thermostat (Natural Gas Furnace With/AC)	3	\$ 75	0.2	203
Residential HVAC	72	\$ 13,680	19.9	37133
Air Handler/Fan Coil W/ECM	1	\$ 150	0.2	720
Central AC 15 SEER	12	\$ 3,000	3.7	2097
Central AC/ASHP Tune-Up	1	\$ 30	0.1	74
Furnace W/ECM	23	\$ 3,450	4.9	16560
Mini-Split / Ductless Air Source Heat Pump	1	\$ 250	0.3	6524
Mini-Split Air Conditioner	1	\$ 250	0.3	390
Quality Installation - Air-Source Heat Pump 15+ SEER 8.2 HSPF	1	\$ 350	0.3	2616
Quality Installation - Central AC 15 SEER	14	\$ 4,900	7.0	4384
Quality Installation - Central AC 18+ SEER	2	\$ 900	1.7	1005
Smart Thermostat (Electric Furnace W/ AC)	1	\$ 25	0.1	1509
Smart Thermostat (Natural Gas Furnace With/AC)	15	\$ 375	1.2	1253
Grand Total	13614	\$ 268,244	684.5	2848233

Appendix 2 – Vermillion Resolution

RESOLUTION ADOPTING INTEGRATED RESOURCE PLAN FOR SUBMITTAL TO WESTERN AREA POWER ADMINISTRATION

WHEREAS, the City of Vermillion purchases a significant portion of its power supply from the Western Area Power Administration (Western); and

WHEREAS, Western has published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and

WHEREAS, the City of Vermillion with assistance from our supplemental power supplier Missouri River Energy Services has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, utility customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and

WHEREAS, any public comments received have been addressed in order to strengthen the City's Integrated Resource Plan; and

WHEREAS, the IRP Summary Report includes 5-year and 2-year action plans outlining actions to be taken by the municipal utility during the next several years.

NOW, THEREFORE, BE IT RESOLVED, by the Governing Body of the City of Vermillion, South Dakota as follows:

That the "*Integrated Resource Plan Summary Report For the City of Vermillion*" dated June 2019 shall be approved for filing with Western under the Energy Planning and Management Program.

Dated at Vermillion, South Dakota this 15th day of July, 2019.

THE GOVERNING BODY OF THE
CITY OF VERMILLION, SOUTH DAKOTA

By John E. Powell
John E. (Jack) Powell, Mayor

ATTEST:

By Michael D. Carlson
Michael D. Carlson, Finance Officer



IX. Watertown, SD Resource Planning

A. *City Information*

Watertown, located in Codington County, is a community of more than 21,400 individuals located in northeastern South Dakota. Municipal services include electricity, water, and natural gas distribution. In 2010, the residential sector included 10,050 occupied housing units. The median age of the population is 36.6 years. About 15.4% of the population is 65 years of age or older and about 24.2% are under 18 years old.

In 2017, the municipal utility had 10,470 residential customers, 2,407 commercial customers, and 97 industrial customers. The residential sector's yearly usage averaged 10,701 kWh per customer in 2017. Commercial customers averaged 54,668 kWh, and industrial customers averaged 1,258,196 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

WATERTOWN, SOUTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$11.50
	\$/kWh Jun-Aug	\$.0900
	\$/kWh Sep-May	\$.0730
Small Commercial	Customer Charge	\$16.00
	\$/kWh Jun-Aug	\$.0960
	\$/kWh Sep-May	\$.0780
Large Commercial	Customer Charge	\$34.00
	\$/kW Jun-Aug	\$15.63
	\$/kW Sep-May	\$11.22
	\$/kWh	\$.03528

Exhibit 2 WATERTOWN, SD

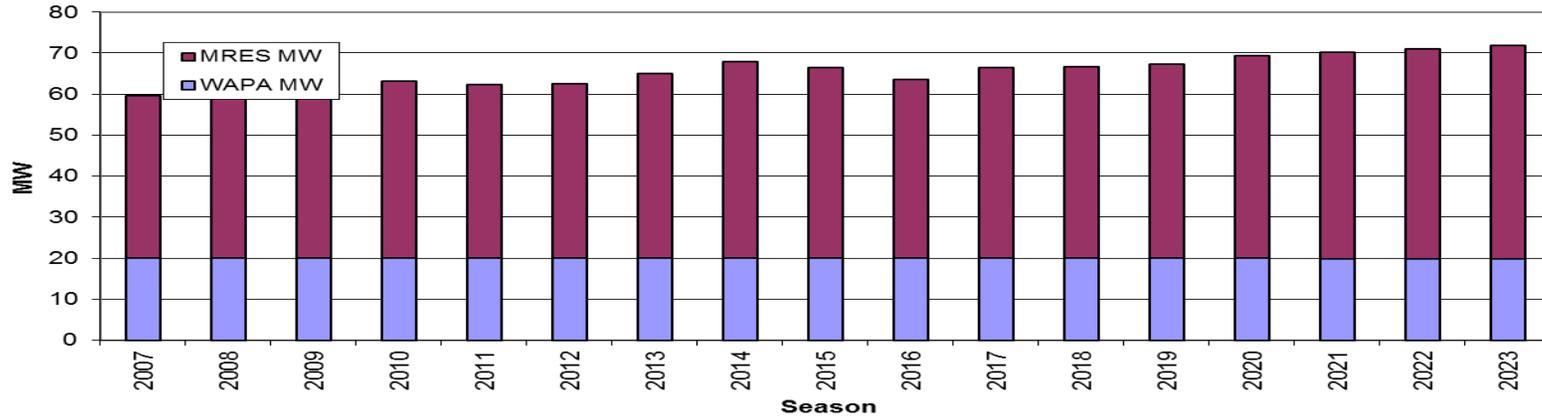
MRES Seasonal Load
Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	Total	WAPA	MRES	Summer	Total	WAPA	MRES
2006	71,677	24,897	46,780	2006	176,238,513	63,953,000	112,285,513
2007	70,769	24,897	45,872	2007	175,504,470	63,953,000	111,551,470
2008	68,643	24,897	43,746	2008	180,909,965	63,953,000	116,956,965
2009	63,809	24,897	40,800	2009	170,007,122	63,953,000	106,054,122
2010	71,521	24,897	46,624	2010	183,681,829	63,953,000	119,728,829
2011	76,635	24,897	51,738	2011	187,240,569	63,953,000	123,287,569
2012	74,581	24,897	49,684	2012	192,325,290	63,953,000	128,372,290
2013	75,283	24,897	50,386	2013	193,763,550	63,953,000	129,810,550
2014	71,192	24,897	46,295	2014	189,108,200	63,953,000	125,155,200
2015	72,849	24,897	47,952	2015	191,808,089	63,953,000	127,855,089
2016	72,806	24,897	47,909	2016	191,393,078	63,953,000	127,440,078
2017	72,938	24,897	48,041	2017	187,761,255	63,953,000	123,808,255
2018	72,342	24,897	47,445	2018	194,855,590	63,953,000	130,902,590
2019	71,121	24,897	46,224	2019	189,348,059	63,953,000	125,395,059
2020	74,833	24,897	49,936	2020	197,216,448	63,953,000	133,263,448
2021	75,771	24,648	51,123	2021	199,688,102	63,313,000	136,375,102
2022	76,699	24,648	52,051	2022	202,133,532	63,313,000	138,820,532
2023	77,615	24,648	52,967	2023	204,548,153	63,313,000	141,235,153
Demand (kW)				Energy (kWh)			
Winter	Total	WAPA	MRES	Winter	Total	WAPA	MRES
2007	58,926	20,055	39,565	2007	179,770,805	59,992,000	119,778,805
2008	63,474	20,055	43,419	2008	195,660,326	60,381,000	135,279,326
2009	64,444	20,055	45,224	2009	191,180,316	59,992,000	131,188,316
2010	62,347	20,055	43,127	2010	187,973,620	59,992,000	127,981,620
2011	61,545	20,055	42,320	2011	197,903,980	59,992,000	137,911,980
2012	62,479	20,055	42,424	2012	187,358,138	60,381,000	126,977,138
2013	65,001	20,055	44,946	2013	201,267,651	59,992,000	141,275,651
2014	68,026	20,055	47,971	2014	209,639,808	59,992,000	149,647,808
2015	66,479	20,055	46,424	2015	203,498,478	59,992,000	143,506,478
2016	63,516	20,055	43,461	2016	194,142,703	60,381,000	133,761,703
2017	65,609	20,055	46,389	2017	194,441,192	59,992,000	134,449,192
2018	66,647	20,055	46,592	2018	202,960,816	59,992,000	142,968,816
2019	67,269	20,055	47,214	2019	204,283,317	59,992,000	144,291,317
2020	69,293	20,055	49,238	2020	205,146,021	60,381,000	144,765,021
2021	70,162	19,854	50,308	2021	209,540,303	59,582,000	149,958,303
2022	71,021	19,854	51,167	2022	212,126,540	59,391,000	152,735,540
2023	71,869	19,854	52,015	2023	214,681,944	59,391,000	155,290,944

Exhibit 3

Watertown, SD
Winter Demand - Town Gate



Watertown, SD
Winter Energy - Town Gate

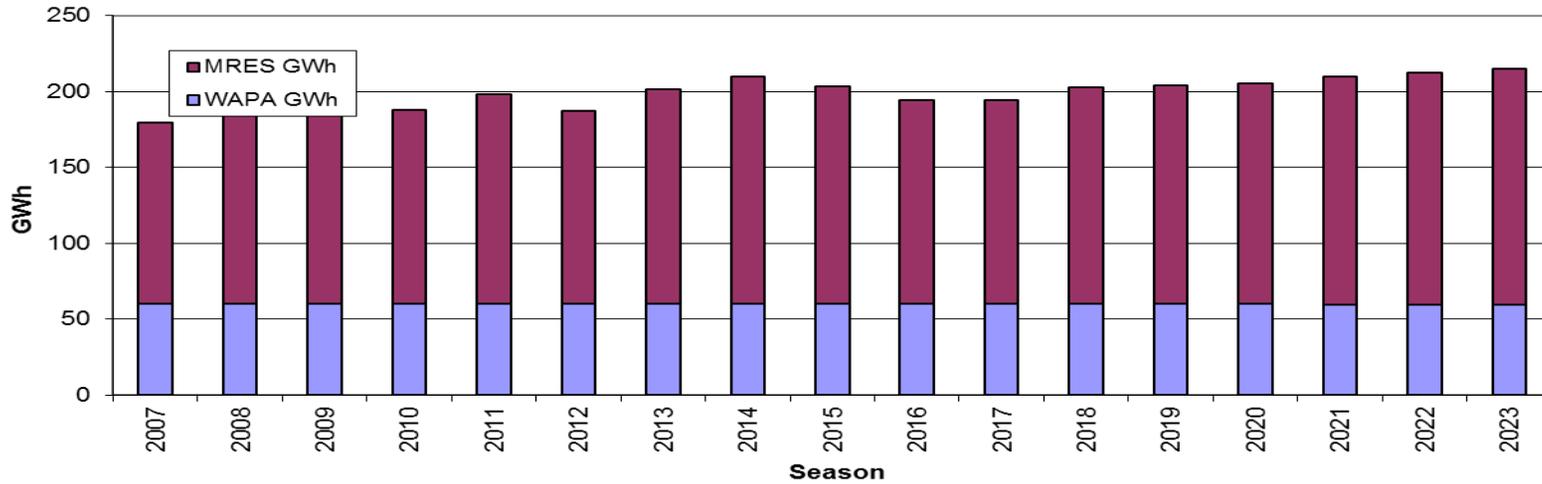
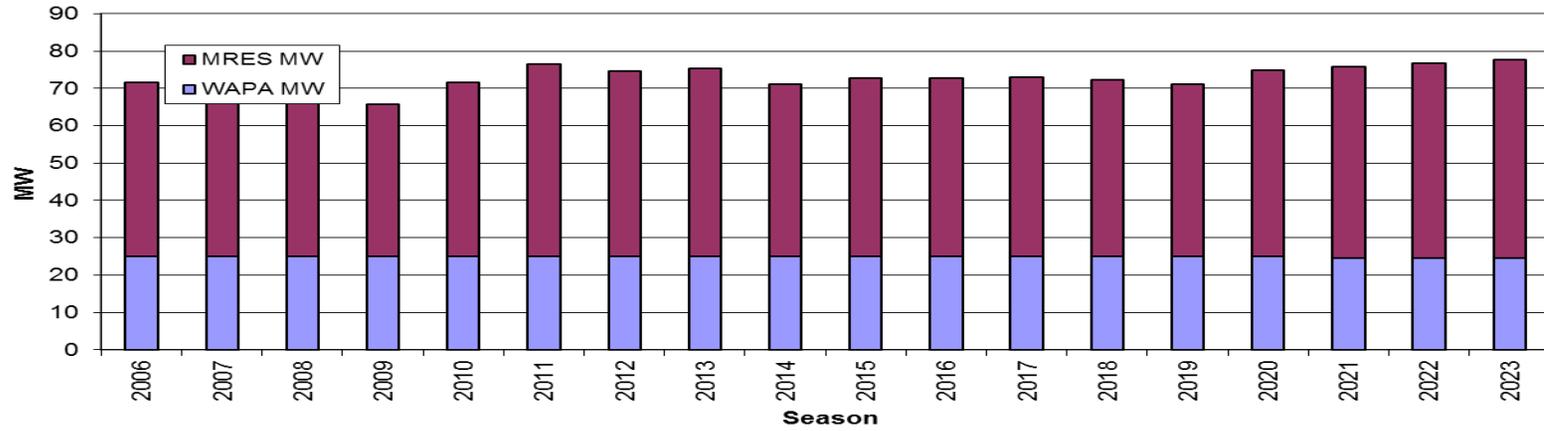


Exhibit 4

Watertown, SD Summer Demand - Town Gate



Watertown, SD Summer Energy - Town Gate

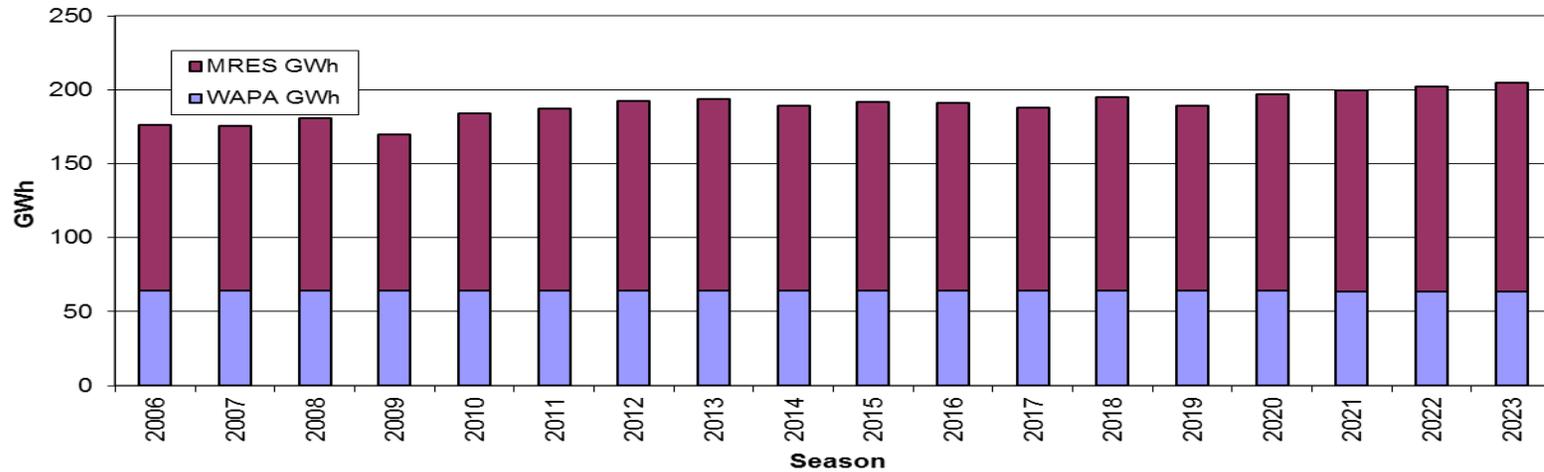


Exhibit 5

Watertown, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 66647 kW

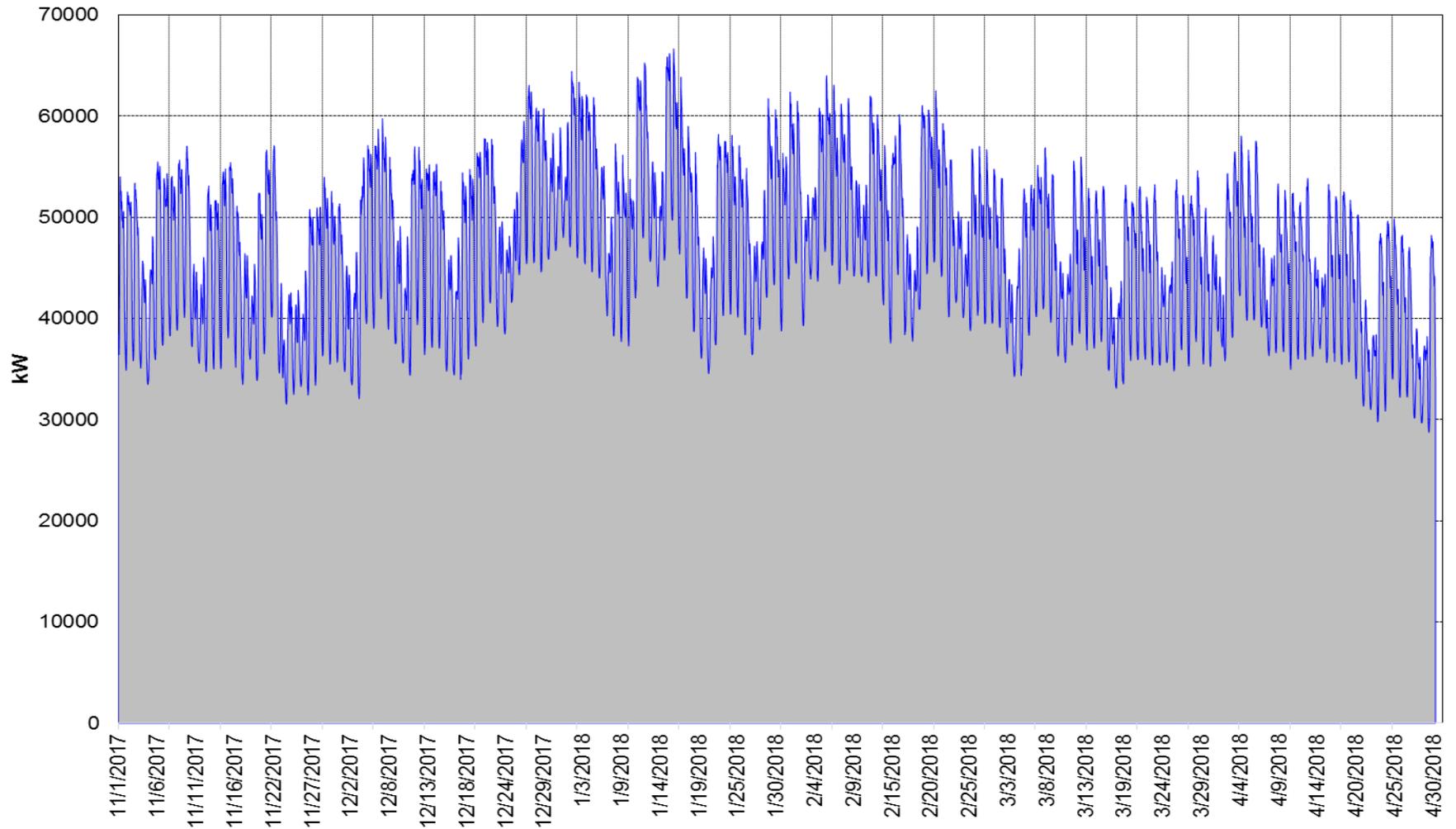


Exhibit 6

Watertown, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 72342 kW

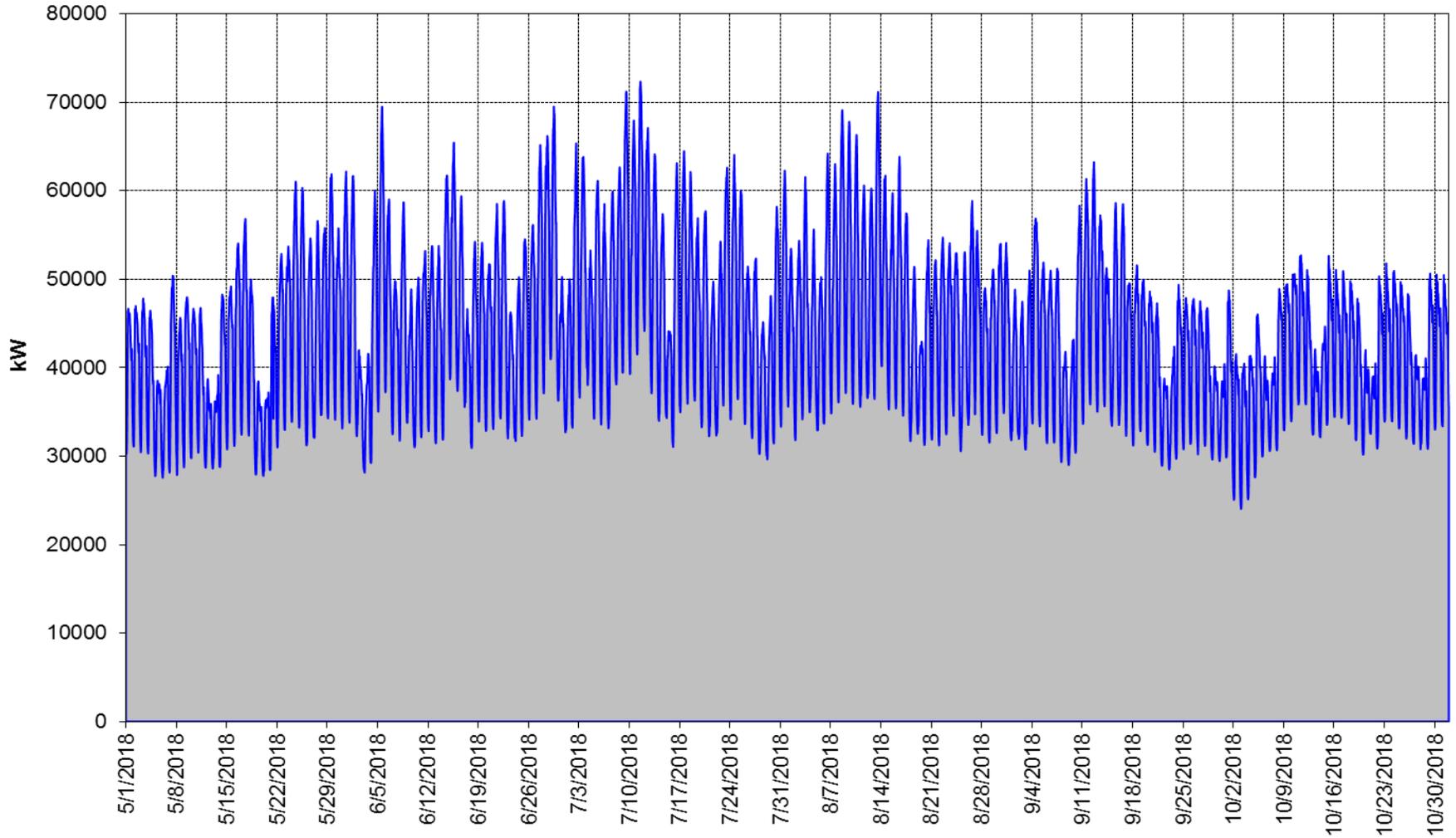


Exhibit 7

Watertown, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 66647 kW

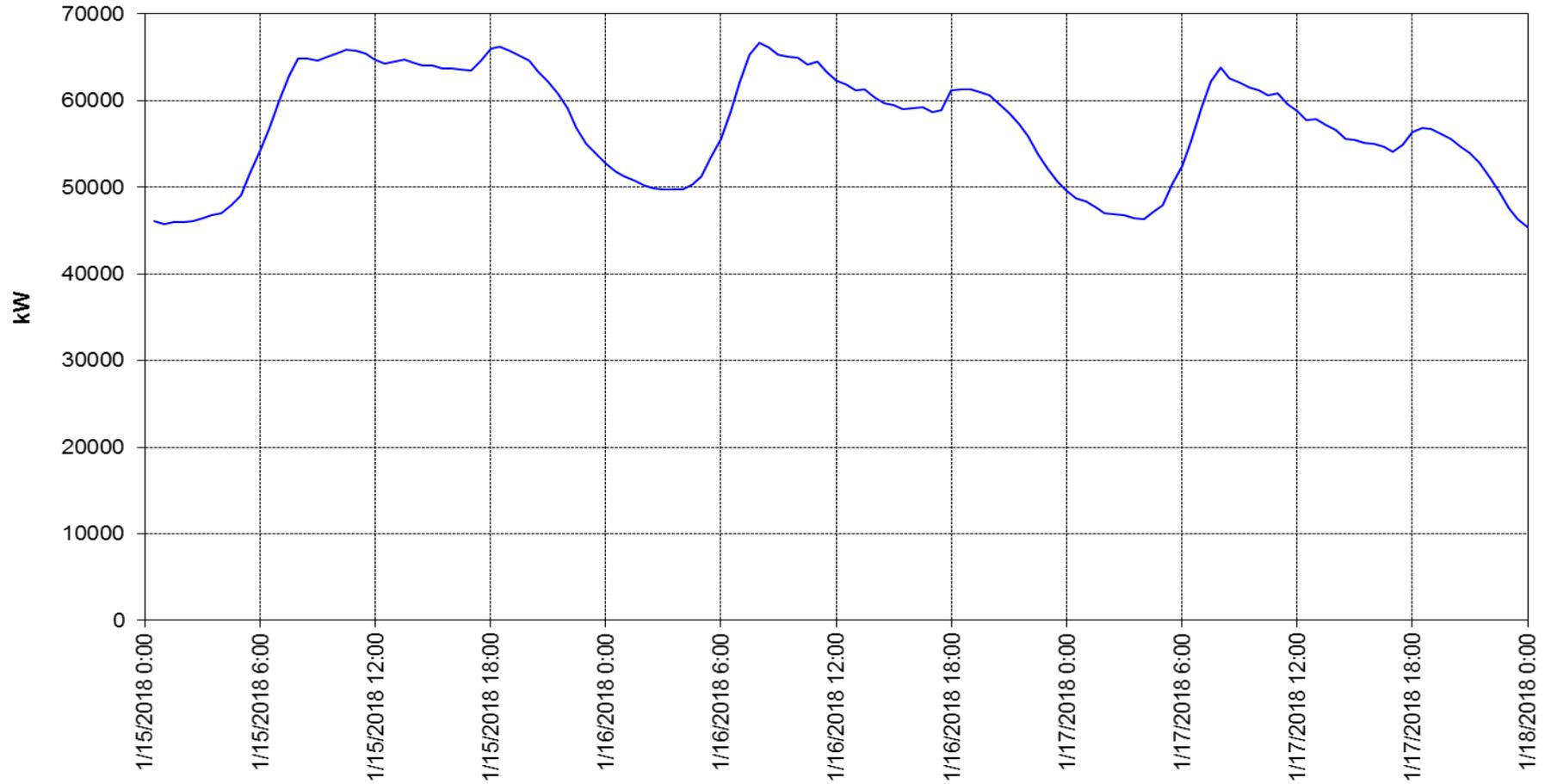
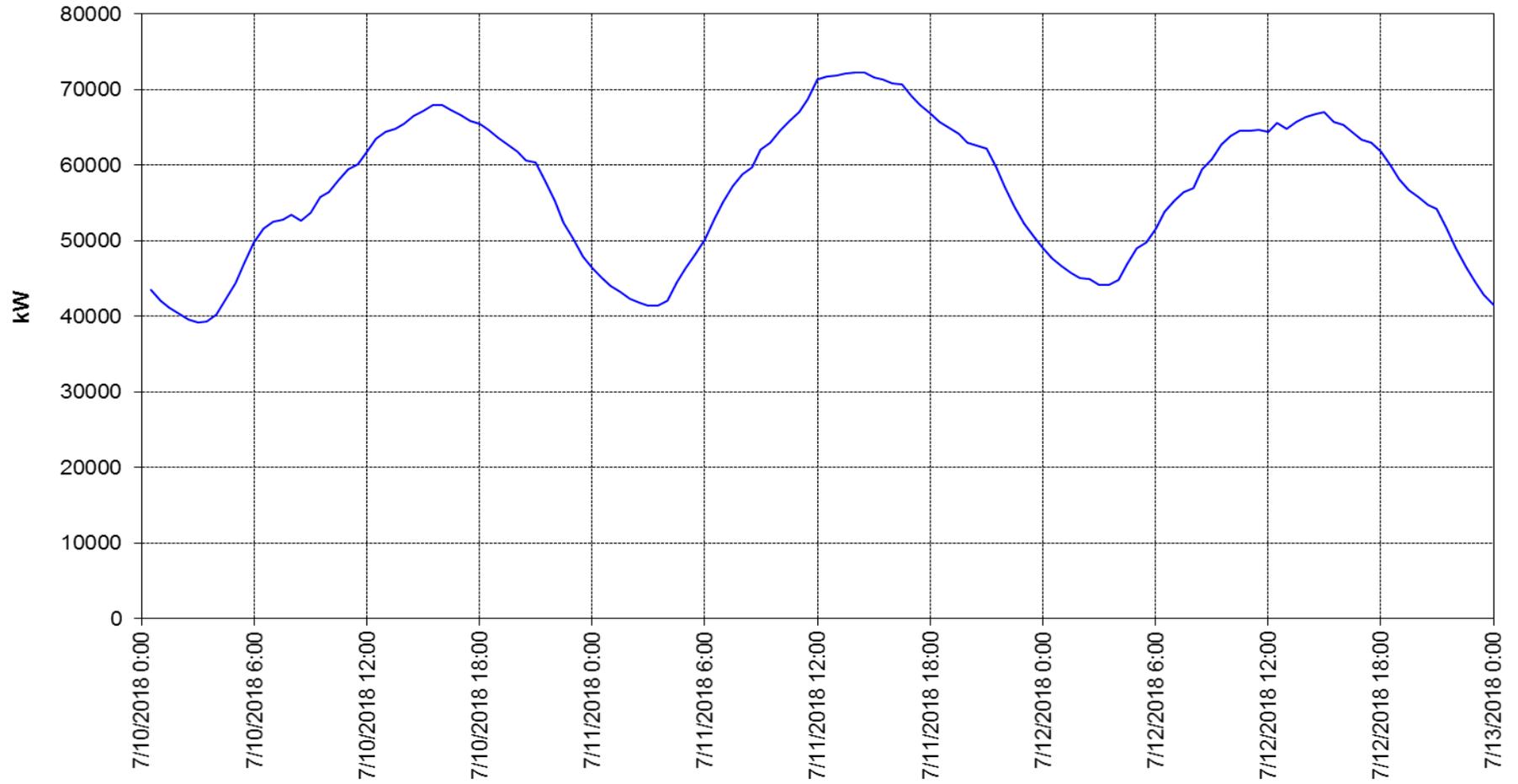


Exhibit 8

Watertown, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 72342 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Watertown is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Watertown to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Watertown has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Watertown			
Program/Measure	Quan	Incentive	kW	kWh
2014	2286	\$ 80,730	236.7	842051
C&I HVAC	35	\$ 22,103	60.1	67250
Compressed Air System	5	\$ 4,780	16.8	73444
Custom Electric Program	3	\$ 1,451	4.8	34912
Energy Star Appliances	103	\$ 3,168	2.8	16656
Lighting New Construction	56	\$ 2,800	9.0	32746
Lighting Retrofit	2007	\$ 38,680	119.9	545004
Residential HVAC	77	\$ 7,750	23.4	72039
2015	5998	\$ 214,952	621.1	2566218
C&I HVAC	47	\$ 2,400	5.3	12094
Compressed Air System	4	\$ 3,505	34.6	311777
Custom Electric Program	2	\$ 76,733	245.4	615898
Energy Star Appliances	96	\$ 1,134	1.3	8264
Food Service	11	\$ 2,175	4.2	27244
Lighting New Construction	2056	\$ 36,875	106.8	552277
Lighting Retrofit	3555	\$ 64,770	159.4	915317
Res HVAC Quality Installation	18	\$ 5,250	17.0	12101
Residential HVAC	209	\$ 22,110	46.9	111246
2016	13051	\$ 196,651	516.5	2750516
C&I HVAC	11	\$ 1,750	2.8	18419
Compressed Air System	1	\$ 1,129	9.3	80534
Custom Electric Program	0	\$ 38,091	138.6	535389
Direct Installation at Customer Location	3	\$ -	0.1	648
Energy Star Appliances	1307	\$ 5,500	7.6	59331
Food Service	2	\$ 450	1.0	5873
Lighting New Construction	1548	\$ 32,397	86.9	461743
Lighting Retrofit	10043	\$ 95,229	217.9	1482773
Res HVAC Quality Installation	25	\$ 6,050	18.2	16043
Residential HVAC	111	\$ 16,055	34.1	89763
2017	7691.52	\$ 212,169	687.1	3167401
C&I Compressed Air	4	\$ 6,993	32.0	243147
C&I Custom (non-lighting)	0	\$ 79,726	345.0	1328276
C&I HVAC	10	\$ 4,375	9.7	5941
C&I HVAC	20	\$ 3,545	6.1	41743
C&I Pumps & VFDs	6	\$ 1,740	4.8	17700
Commercial Refrigeration	10	\$ 405	1.1	8545

Compressed Air System	1	\$ 1,465	10.3	97905
Energy Star Appliances	125	\$ 419	0.8	5545
Lighting New Construction	63	\$ 1,765	6.6	31151
Lighting New Construction	1099	\$ 31,134	74.1	426205
Lighting Retrofit	514	\$ 6,582	16.6	96261
Lighting Retrofit	2256	\$ 33,707	99.9	541227
Residential Energy Star Products	3385.52	\$ 10,989	20.1	171845
Residential HVAC	7	\$ 775	1.8	3202
Residential HVAC	191	\$ 28,550	58.2	148708
2018	7698	\$ 143,329	412.4	2081789
C&I Compressed Air	5	\$ 4,386	44.3	384833
C&I Custom (non-lighting)	0	\$ 125	0.0	1
C&I HVAC	7	\$ 2,550	5.3	7130
Commercial Refrigeration	18	\$ 365	1.2	10881
Lighting New Construction	955	\$ 14,415	32.0	198586
Lighting Retrofit	5840	\$ 91,370	286.6	1307771
Residential Energy Star Products	717	\$ 3,589	5.5	39631
Residential HVAC	156	\$ 26,530	37.6	132956
Grand Total	36724.52	\$ 847,831	2473.9	11407975

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Watertown was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Watertown will continue to participate in the Bright Energy Solutions program. All MRES members pay for the cost of the Bright Energy Solutions program through their rates. However, Watertown would have virtually no direct costs to implement these programs, as MRES will be paying the incentive costs for all of these activities. It is planned that Watertown will participate in the all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Watertown plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, it is unknown if Watertown will participate in the MRES Coordinated Demand Response (CDR) program in the future. That decision will be evaluated in years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Watertown will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on Jun 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 10, 2019. The public hearing on the IRP was held at the July 29, 2019 Watertown Municipal Utilities Board meeting. No comments or responses were made during the meeting. The Watertown Municipal Utilities Board approved the resolution on July 20, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	7/10/2019
Public Hearing Date	7/29/2019
Date Approved by Utilities Board	7/29/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Watertown			
Program/Measure	Quan	Incentive	kW	kWh
2014	2286	\$ 80,730	236.7	842051
C&I HVAC	35	\$ 22,103	60.1	67250
ECM in Res Style Air Handler _ Fan Coil	2	\$ 300	0.5	800
ECM in Res Style Furnace	7	\$ 1,050	1.6	2800
Energy Recovery Ventilator (ERV)	1	\$ 13,508	45.0	7204
Energy Star Wall Sleeve AC	3	\$ 105	1.2	1916
GS HP_Closed Loop Water to Water	1	\$ 2,000	1.5	36990
Setback/Programmable Thermostats	15	\$ 750	1.8	13964
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	2	\$ 300	0.4	497
Unitary Single Pkgd AC 065k - 135k Btuh	1	\$ 600	1.3	434
Unitary Single Pkgd AC 241k - 760k Btuh	3	\$ 3,490	6.8	2645
Compressed Air System	5	\$ 4,780	16.8	73444
Cycling Refrigerated Dryers	1	\$ 750	2.1	8620
No Loss Air Drains	2	\$ 320	1.1	5040
VFD Air Compressor	2	\$ 3,710	13.6	59784
Custom Electric Program	3	\$ 1,451	4.8	34912
Custom Lighting - LEDs in new construction	1	\$ 56	0.2	1313
Lighting: Custom lighting	2	\$ 1,395	4.7	33599
Energy Star Appliances	103	\$ 3,168	2.8	16656
Energy Star Ceiling Fan w/ Light Kit	2	\$ 50	0.0	242
Energy Star Clothes Washer	27	\$ 1,350	0.5	3537
Energy Star Decorative Lights	25	\$ 88	0.0	1954
ENERGY STAR Dehumidifier	7	\$ 70	0.7	630
Energy Star Dishwasher	19	\$ 475	0.5	1197
Energy Star Refrigerator	22	\$ 1,100	1.0	8910
Energy Star Room AC	1	\$ 35	0.1	186
Lighting New Construction	56	\$ 2,800	9.0	32746
T8 4ft Hi Bay Fixture	56	\$ 2,800	9.0	32746
Lighting Retrofit	2007	\$ 38,680	119.9	545004
Compact Fluorescent Fixtures & Lamps	294	\$ 491	13.2	58581
High Bay Fluorescent Occ Sensors	1	\$ 450	1.4	24161
LED & Induction Tech	118	\$ 2,052	6.1	20489
Othr Eff Ltg Tech - per Unit	61	\$ 967	2.2	11450
Reduced Wtg T8 4ft CEE Qual	978	\$ 11,327	40.7	146162
T5HO Hi Bay Fixtures w/ 4ft Lamps	99	\$ 6,930	8.5	52685
Replacing  T8 2ft w/Elec Bal	15	\$ 90	0.2	717

T8 4ft w/ Bal and Reflectors / Delamping	10	\$ 194	0.8	2228
T8 4ft w/ Bal Repl 8ft T12 HO	79	\$ 2,370	7.9	21523
T8 4ft w/Elec Bal	214	\$ 2,080	8.3	22585
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	138	\$ 11,730	30.6	184423
Residential HVAC	77	\$ 7,750	23.4	72039
HVAC Central AC unit	13	\$ 1,300	12.1	6576
HVAC HE Furnace with ECM	34	\$ 5,100	7.3	23840
HVAC HP Water Heater	1	\$ 300	0.3	2830
HVAC Mini Split_Ductless Air_Source HP	1	\$ 200	0.4	6470
HVAC Mini-Split/Ductless AC	2	\$ 200	0.9	356
Programmable Thermostat - Elec Heat w/AC	13	\$ 325	1.3	29536
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	13	\$ 325	1.3	2431
2015	5998	\$ 214,952	621.1	2566218
C&I HVAC	47	\$ 2,400	5.3	12094
ECM in Res Style Furnace	1	\$ 150	0.2	720
Mini Split Ductless Air Source HP	1	\$ 250	0.4	6470
Pkgd Terminal AC (PTAC)	40	\$ 1,350	3.8	2791
Setback/Programmable Thermostats	2	\$ 100	0.2	1644
Unitary Air Cooled Split Sys AC <65k Btuh				
(1ph)	1	\$ 250	0.3	242
Unitary Air Cooled Split Sys AC <65k Btuh				
(3ph)	2	\$ 300	0.3	227
Compressed Air System	4	\$ 3,505	34.6	311777
Compressed Air System Leak Survey	3	\$ 3,345	34.0	309257
No Loss Air Drains	1	\$ 160	0.6	2520
Custom Electric Program	2	\$ 76,733	245.4	615898
Ice storage for Cooling at Watertown Middle School. this pulls the Demand off-	0	\$ 38,560	128.5	11000
Lighting: Custom	0	\$ 3,293	11.5	44145
Lighting: Custom - New Construction - 32 LED HB instead of 32 MH 7 LED Dock Lig	0	\$ 2,384	10.1	32924
Lighting: Custom LED Lighting - Savings Calculated by Kurt	1	\$ 2,625	11.2	25253
Lighting: Custom Lighting. Replaced 250 watt MH with 6-lamp t8 highbays	1	\$ 1,020	4.3	10009
Motor - VFD - Pump: Custom -50 hp inlet modulated compressor to a 75 hp VSDd co	0	\$ 8,477	23.1	155168
Motor - VFD - Pump: Custom--replaced existing 75hp load/no load compressor with	0	\$ 7,836	21.1	152174
Other : Custom- replaced 2 C02 lasers with one fiber laser	0	\$ 12,538	35.6	185225
Energy Star Appliances	96	\$ 1,134	1.3	8264
Energy Star Clothes Dryer	1	\$ 80	0.0	183
Energy Star Clothes Washer	1	\$ 50	0.0	131

Energy Star Decorative Lights	9	\$ 32	0.0	704
ENERGY STAR Dehumidifier	1	\$ 10	0.0	135
Energy Star Dishwasher	7	\$ 175	0.2	266
Energy Star Refrigerator	13	\$ 500	0.4	3900
Energy Star Room AC	2	\$ 50	0.1	68
ES Res Lighting - CFL Screw-in Lamp	11	\$ 17	0.0	357
ES Res Lighting - LED Recessed Can	2	\$ 8	0.0	104
ES Res Lighting - LED Screw-in Lamp	46	\$ 138	0.2	1855
Programmable Thermostat	3	\$ 75	0.3	561
Food Service	11	\$ 2,175	4.2	27244
ES Comm Dishwasher_Gas WH-Elec Boost	1	\$ 175	0.6	5040
ES Comm Solid Door Freezers	1	\$ 150	0.2	1728
ES Comm Solid Door Refrigerators	5	\$ 600	0.3	2990
ES Holding Cabinets	3	\$ 1,200	2.9	15834
ES Ice Machines	1	\$ 50	0.2	1652
Lighting New Construction	2056	\$ 36,875	106.8	552277
Hi Bay Occupancy Sensor Control	1	\$ 420	1.6	7704
LED Energy Star Recessed Downlight	430	\$ 10,750	18.6	85132
LED Troffer DLC Qualified	1258	\$ 6,290	11.3	49284
T5HO 4ft Hi Bay Fixture	307	\$ 18,420	72.2	394392
T8 4ft Hi Bay Fixture	15	\$ 750	2.4	12092
T8 4ft Reduced Wattage System	45	\$ 245	0.6	3673
Lighting Retrofit	3555	\$ 64,770	159.4	915317
Compact Flourescent Fixtures & Lamps	42	\$ 189	1.0	5852
High Bay Flourescent Occ Sensors	1	\$ 140	0.4	2314
LED & Induction Tech	2590	\$ 39,851	85.6	498587
Othr Eff Ltg Tech - per Unit	4	\$ 80	0.2	1414
Rducd Wtg T8 Lamps ONLY	312	\$ 312	0.9	5388
Reduced Wattage T8 Fluorescent Systems	206	\$ 3,708	8.4	44712
T8 4ft w/ Bal and Reflectors / Delamping	72	\$ 720	2.2	12800
T8 4ft w/ Bal Repl 8ft T12 HO	15	\$ 375	1.1	5348
T8 4ft w/Elec Bal	95	\$ 865	2.4	13887
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	218	\$ 18,530	57.1	325015
Res HVAC Quality Installation	18	\$ 5,250	17.0	12101
HVAC Central AC unit	14	\$ 4,900	16.4	10287
HVAC HE Furnace with ECM	2	\$ 300	0.4	1440
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	2	\$ 50	0.2	374
Residential HVAC	209	\$ 22,110	46.9	111246
Air Handler_ Fan Coil with ECM	2	\$ 300	0.4	1440
Desuperheater	1	\$ 250	0.4	1221
HVAC Air_Source HP - 14.5 SEER	1	\$ 250	0.3	4517
HVAC Central AC unit	36	\$ 9,000	24.3	13644

HVAC Closed Loop Water to Air GS HP	1	\$ 600	1.9	25181
HVAC HE Furnace with ECM	49	\$ 7,350	10.4	35280
HVAC Mini Split_Ductless Air_Source HP	4	\$ 1,000	1.8	18352
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	18	\$ 450	1.7	3366
Summer AC Tune-Up	97	\$ 2,910	5.7	8245
2016	13051	\$ 196,651	516.5	2750516
C&I HVAC	11	\$ 1,750	2.8	18419
ECM in Res Style Furnace	2	\$ 300	0.4	1440
Mini Split Ductless AC	1	\$ 250	0.4	315
Mini Split Ductless Air Source HP	2	\$ 500	0.9	12940
Setback/Programmable Thermostats	4	\$ 200	0.5	3288
Unitary Air Cooled Split Sys AC <65k Btuh				
(1ph)	2	\$ 500	0.6	436
Compressed Air System	1	\$ 1,129	9.3	80534
Compressed Air System Leak Survey	1	\$ 1,129	9.3	80534
Custom Electric Program	0	\$ 38,091	138.6	535389
24 Metal Halide replaced 458W for LED 103W				
- outdoor 24/7 lighting	0	\$ 2,550	8.0	74635
Lighting: Custom	0	\$ 30,969	116.4	331786
Lighting: Custom -360 Watt outdoor lighting				
to 104 watt LED lights -24 total	0	\$ 1,836	5.8	53611
Lighting: Custom32 360 watt canopy lights				
11,520 watts 11.52 kW --32 105 wat	0	\$ 2,448	7.7	70747
Other : Custom	0	\$ 288	0.8	4610
Direct Installation at Customer Location	3	\$ -	0.1	648
LED Screw-in Replacement Lamp	3	\$ -	0.1	648
Energy Star Appliances	1307	\$ 5,500	7.6	59331
Energy Star Clothes Dryer	6	\$ 480	0.2	1098
Energy Star Clothes Washer	8	\$ 400	0.1	1048
ENERGY STAR Dehumidifier	6	\$ 60	0.2	810
Energy Star Refrigerator	18	\$ 600	0.5	4560
Energy Star Room AC	8	\$ 200	0.4	270
ES Res Lighting - CFL Screw-in Lamp	14	\$ 21	0.1	454
ES Res Lighting - LED Recessed Can	95	\$ 380	0.6	4950
ES Res Lighting - LED Screw-in Lamp	1146	\$ 3,209	5.0	45019
Programmable Thermostat	6	\$ 150	0.6	1122
Food Service	2	\$ 450	1.0	5873
ES Comm Solid Door Freezers	1	\$ 50	0.1	595
ES Holding Cabinets	1	\$ 400	1.0	5278
Lighting New Construction	1548	\$ 32,397	86.9	461743
LED Energy Star Recessed Downlight	372	\$ 9,300	17.3	94677
LED Energy Star Screw-in Replacement Lamp	92	\$ 684	2.7	15699
LED Troffer DLC Qualified	18	\$ 90	0.2	760

T8 4ft Hi Bay Fixture	314	\$ 15,700	47.5	255260
T8 4ft Reduced Wattage System	752	\$ 6,623	19.2	95347
Lighting Retrofit	10043	\$ 95,229	217.9	1482773
4' LED Linear Lamps DCL Qual	117	\$ 414	1.2	6057
Compact Fluorescent Fixtures & Lamps	8	\$ 12	0.2	1057
LED & Induction Tech	4784	\$ 69,567	141.6	982881
LED 2 or 4 Pin-Based Repl Lamps	508	\$ 2,540	6.5	39112
LED Hi Bay or Low Bay Occ Sensor Ctl	1	\$ 480	2.7	14976
LED HiBay or LoBay Repl HID or Inc	103	\$ 9,785	24.8	178416
LED Reach-in Refrigerated Case Vertical Ltg	2	\$ 725	1.1	11208
Othr Eff Ltg Tech - per Unit	14	\$ 280	0.6	4459
Rducd Wtg T8 4ft w Reflector/Delamping	183	\$ 3,415	12.9	103040
Reduced Wattage T8 and T5HO Lamps ONLY	3982	\$ 3,982	13.6	69060
Reduced Wattage T8 Fluorescent Systems	111	\$ 999	3.4	24841
T8 4ft w/ Bal and Reflectors / Delamping	34	\$ 850	2.3	11894
T8 4ft w/Elec Bal	192	\$ 1,840	5.6	29100
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	4	\$ 340	1.4	6672
Res HVAC Quality Installation	25	\$ 6,050	18.2	16043
Air Handler _ Fan Coil with ECM	2	\$ 300	0.4	1440
HVAC Central AC unit	14	\$ 4,900	16.4	10255
HVAC HE Furnace with ECM	5	\$ 750	1.1	3600
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	4	\$ 100	0.4	748
Residential HVAC	111	\$ 16,055	34.1	89763
HVAC Central AC unit	25	\$ 6,250	17.9	10040
HVAC HE Furnace with ECM	44	\$ 6,600	9.4	31680
HVAC HP Water Heater	1	\$ 100	0.2	1889
HVAC Mini Split_Ductless Air_Source HP	1	\$ 250	0.4	4588
HVAC Mini Split_Ductless Heat Pump	8	\$ 2,000	3.5	36704
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	21	\$ 525	2.0	3927
Summer AC Tune-Up	11	\$ 330	0.6	935
2017	7691.52	\$ 212,169	687.1	3167401
C&I Compressed Air	4	\$ 6,993	32.0	243147
Compressed Air System Leak Survey	2	\$ 3,136	20.4	192044
Cycling Refrigerated Dryers	1	\$ 357	1.0	4103
VFD Air Compressor	1	\$ 3,500	10.6	47000
C&I Custom (non-lighting)	0	\$ 79,726	345.0	1328276
Lighting: Custom	0	\$ 66,208	297.5	1292370
Lighting: Custom - 300W to 26W - rebate				
would be \$1233.00 but product cost 424.	0	\$ 424	3.9	35905
Other : CustomIce Storage	0	\$ 13,093	43.6	1
C&I HVAC	10	\$ 4,375	9.7	5941

Unitary Single Pkgd AC 065k - 135k Btuh	10	\$ 4,375	9.7	5941
C&I HVAC	20	\$ 3,545	6.1	41743
Mini Split Ductless AC	1	\$ 250	0.4	315
Mini Split Ductless Air Source HP	2	\$ 500	0.8	12940
Mini-Split / Ductless Air Source Heat Pump	3	\$ 750	1.2	19410
Mini-Split Air Conditioner	1	\$ 250	0.6	0
Pkgd Terminal HP (PTHP)	8	\$ 270	0.7	5530
Setback/Programmable Thermostats	3	\$ 150	0.4	2466
Unitary Air Cooled Split Sys AC 065k - 135k Btuh	1	\$ 375	0.4	324
Unitary Air Cooled Split Sys AC 241k - 760k Btuh	1	\$ 1,000	1.6	758
C&I Pumps & VFDs	6	\$ 1,740	4.8	17700
Hi_Eff Pumps	6	\$ 1,740	4.8	17700
Commercial Refrigeration	10	\$ 405	1.1	8545
ECM Fan Motor for Cooler-Freezer	9	\$ 180	0.5	4434
Replace LED Vertical Reach-in Refrig Case	1	\$ 225	0.6	4111
Lighting	1	\$ 225	0.6	4111
Compressed Air System	1	\$ 1,465	10.3	97905
Compressed Air System Leak Survey	1	\$ 1,465	10.3	97905
Energy Star Appliances	125	\$ 419	0.8	5545
Energy Star Clothes Dryer	1	\$ 80	0.0	183
ES Res Lighting - LED Recessed Can	6	\$ 24	0.0	313
ES Res Lighting - LED Screw-in Lamp	116	\$ 265	0.5	4675
Programmable Thermostat	2	\$ 50	0.2	374
Lighting New Construction	63	\$ 1,765	6.6	31151
CEE Qual T8 4ft Hi Performance System	32	\$ 215	0.7	3238
T8 4ft Hi Bay Fixture	31	\$ 1,550	5.9	27913
Lighting New Construction	1099	\$ 31,134	74.1	426205
4' LED Linear Lamps DCL Qual	58	\$ 174	0.6	3177
CEE Qual T8 4ft Hi Performance System	8	\$ 32	0.1	528
LED Energy Star Recessed Downlight	151	\$ 3,775	7.0	40650
LED Energy Star Screw-in Replacement Lamp	5	\$ 40	0.2	1128
LED Hi Bay or Low Bay Fixtures	321	\$ 19,710	44.7	259448
LED High Bay Fixtures 276-400 W	48	\$ 4,800	14.3	80870
LED Troffer DLC Qualified	83	\$ 468	1.4	8194
LED Troffer, >= 5800 Lumens, DLC Premium	15	\$ 210	0.5	2969
T8 4ft Reduced Wattage System	410	\$ 1,925	5.2	29241
Lighting Retrofit	514	\$ 6,582	16.6	96261
4' LED Linear Lamps DCL Qual	232	\$ 696	2.4	11516
LED & Induction Tech	60	\$ 480	2.3	13537
LED HiBay or LoBay Repl HID or Inc	40	\$ 3,800	9.1	52419
Reduced Wattage T8 Fluorescent Systems	182	\$ 1,606	2.7	18789

Lighting Retrofit	2256	\$ 33,707	99.9	541227
4 Ft. LED Linear Lamps Repl T8 Fluorescent	1069	\$ 3,207	11.1	58632
4' LED Linear Lamps DCL Qual	114	\$ 684	0.8	7674
Custom - Lighting	0	\$ 15,239	51.1	244735
Fluorescent T8 4 Ft. Lamps W/ Ballast 4 Ft. 4-Lamp	4	\$ 40	0.1	813
LED & Induction Tech	692	\$ 8,335	21.0	137100
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	6	\$ 42	0.2	1295
LED Recessed Downlight	51	\$ 1,275	2.2	13544
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	120	\$ 1,080	5.5	33071
Othr Eff Ltg Tech - per Unit	17	\$ 340	0.4	3714
Reduced Wattage T8 Fluorescent Systems	173	\$ 2,616	5.4	27424
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	10	\$ 850	1.9	13225
Residential Energy Star Products	3385.52	\$ 10,989	20.1	171845
Energy Star Clothes Dryer	11	\$ 880	0.3	2013
ENERGY STAR Clothes Dryer (Electric)	7	\$ 560	0.2	1279
Energy Star Clothes Washer	13	\$ 650	0.3	2574
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	8	\$ 400	0.2	1584
ENERGY STAR Dehumidifier	3	\$ 45	0.1	600
Energy Star Refrigerator	15	\$ 390	0.3	2799
ENERGY STAR Refrigerator No Recycling	5	\$ 100	0.1	662
ENERGY STAR Refrigerator With Recycling	4	\$ 200	0.2	1620
ES Res Lighting - LED Recessed Can	1030	\$ 4,120	6.0	53663
ES Res Lighting - LED Screw-in Lamp	852	\$ 2,213	3.8	34340
Lighting Equipment LED Lamps	469	\$ 873	2.1	18903
Lighting Equipment LED Recessed Can	958.52	\$ 308	5.6	49939
Programmable Thermostat	5	\$ 125	0.5	935
Programmable Thermostat (Natural Gas Furnace With/AC)	5	\$ 125	0.5	935
Residential HVAC	7	\$ 775	1.8	3202
HVAC Central AC unit	1	\$ 250	0.9	481
HVAC HE Furnace with ECM	3	\$ 450	0.6	2160
Programmable Thermostat - Propane, Fuel Oil, Boiler w/AC	3	\$ 75	0.3	561
Residential HVAC	191	\$ 28,550	58.2	148708
Air-Source Heat Pump (15 SEER)	1	\$ 250	0.2	5327
Central AC 15 SEER	17	\$ 4,250	5.3	2971
Furnace W/ECM	28	\$ 4,200	6.0	20160
Heat Pump Water Heater <= 55 Gallons	1	\$ 250	0.9	5727
HVAC Central AC unit	26	\$ 8,000	24.3	14728
HVAC HE Furnace with ECM	30	\$ 4,500	6.4	21600

HVAC HP Water Heater	1	\$ 250	0.9	5727
HVAC Mini Split_Ductless Heat Pump	5	\$ 1,250	2.0	26805
Mini-Split / Ductless Air Source Heat Pump	7	\$ 1,750	2.8	37527
Programmable Thermostat - Propane, Fuel				
Oil, Boiler w/AC	51	\$ 1,275	4.9	2529
Programmable Thermostat (Heat Pump)	1	\$ 25	0.1	1114
Programmable Thermostat (Natural Gas				
Boiler With/AC)	6	\$ 150	0.6	1122
Programmable Thermostat (Natural Gas				
Furnace With/AC)	6	\$ 150	0.6	1122
Quality Installation - Central AC 15 SEER	6	\$ 2,100	3.0	1879
Summer AC Tune-Up	5	\$ 150	0.3	370
2018	7698	\$ 143,329	412.4	2081789
C&I Compressed Air	5	\$ 4,386	44.3	384833
Compressor Air Leak Survey	5	\$ 4,386	44.3	384833
C&I Custom (non-lighting)	0	\$ 125	0.0	1
Custom	0	\$ 125	0.0	1
C&I HVAC	7	\$ 2,550	5.3	7130
Mini-Split / Ductless Air Source Heat Pump	2	\$ 500	0.7	3030
Res Style Fancoil/Air Handler w/ECM	1	\$ 150	0.2	720
Res StyleFurnace w/ECM	1	\$ 150	0.2	720
Roof Top Unit A/C < 65000 BTUH (1ph)	1	\$ 200	0.1	89
Roof Top Unit A/C > 240000- 760000 BTUH	1	\$ 1,250	3.6	2270
Split System Air Conditioning < 65000 BTUH -				
15 SEER or Higher	1	\$ 300	0.4	302
Commercial Refrigeration	18	\$ 365	1.2	10881
ENERGY STAR Commercial Glass Door				
Freezers < 15 Cu Ft	1	\$ 50	0.2	1603
Low Heat Reach-In Freezer Door	6	\$ 150	0.5	4572
No Heat Reach-In Cooler Door	11	\$ 165	0.5	4706
Lighting New Construction	955	\$ 14,415	32.0	198586
LED High Bay Fixture-Mounted Occ. Sensor	14	\$ 140	0.6	3965
LED High Bay Fixtures <= 75 W	16	\$ 240	0.7	5529
LED High Bay Fixtures > 400 W	35	\$ 3,675	6.1	39636
LED High Bay Fixtures 111-160 W	5	\$ 150	0.4	2880
LED High Bay Fixtures 161-275 W	62	\$ 2,790	4.2	28219
LED High Bay Fixtures 76-110 W	13	\$ 520	0.9	6146
LED Recessed Downlight	111	\$ 1,665	5.1	28514
LED Troffer >= 5800 Lumens	347	\$ 3,123	7.8	43010
LED Troffer 3000 - 5799 Lumens	352	\$ 2,112	6.3	40688
Lighting Retrofit	5840	\$ 91,370	286.6	1307771
4 Ft. LED Linear Lamps Repl T12 Fluorescent	102	\$ 612	1.9	16541
4 Ft. LED Linear Lamps Repl T8 Fluorescent	5131	\$ 15,393	55.7	336368
Custom - Lighting	0	\$ 69,898	208.9	812256

LED ENERGY STAR Screw-In Lamp < 600 Lumens	6	\$ 36	0.1	854
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	454	\$ 2,246	11.1	80675
LED Exit Sign	2	\$ 24	0.1	405
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	29	\$ 261	1.2	7681
Vertical LED Reach in Case Lighting - Retrofit	116	\$ 2,900	7.7	52991
Residential Energy Star Products	717	\$ 3,589	5.5	39631
ENERGY STAR Clothes Dryer (Electric)	16	\$ 455	0.4	2923
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	18	\$ 450	0.5	3564
ENERGY STAR Dehumidifier	11	\$ 275	0.5	2195
ENERGY STAR Refrigerator No Recycling	17	\$ 415	0.1	912
Energy Star Room AC	1	\$ 25	0.1	94
Lighting Equipment LED Lamps	155	\$ 257	0.7	6247
Lighting Equipment LED Lamps EStar	226	\$ 452	1.0	9109
Lighting Equipment LED Recessed Can	30	\$ 120	0.2	1563
Lighting Equipment LED Recessed Can EStar	235	\$ 940	1.4	12244
Programmable Thermostat (Natural Gas Furnace With/AC)	3	\$ 75	0.3	442
Smart Thermostat (Natural Gas Boiler With/AC)	1	\$ 25	0.1	68
Smart Thermostat (Natural Gas Furnace With/AC)	4	\$ 100	0.3	271
Residential HVAC	156	\$ 26,530	37.6	132956
Air Handler/Fan Coil W/ECM	1	\$ 150	0.2	720
Central AC 15 SEER	23	\$ 5,750	7.2	4020
Central AC/ASHP Tune-Up	26	\$ 780	1.4	1926
Furnace W/ECM	65	\$ 9,750	13.8	46800
Mini-Split / Ductless Air Source Heat Pump	11	\$ 2,750	3.8	71764
Programmable Thermostat (Natural Gas Furnace With/AC)	4	\$ 100	0.4	748
Quality Installation - Central AC 15 SEER	19	\$ 6,650	9.5	5950
Quality Installation - Central AC 18+ SEER	1	\$ 450	0.8	502
Smart Thermostat (Natural Gas Boiler With/AC)	1	\$ 25	0.1	187
Smart Thermostat (Natural Gas Furnace With/AC)	5	\$ 125	0.4	338
Grand Total	36724.52	\$ 847,831	2473.9	11407975

Appendix 2 – Watertown Resolution

RESOLUTION NO. 7229

RESOLUTION PROVIDING FOR THE ADOPTION OF AN INTEGRATED RESOURCE PLAN (IRP) AS REQUIRED BY WESTERN AREA POWER ADMINISTRATION TO COMPLY WITH LONG-TERM POWER SUPPLY AGREEMENT

WHEREAS the Watertown Municipal Utilities purchases a significant portion of its power supply from the Western Area Power Administration (Western); and

WHEREAS Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing an Integrated Resource Plan (IRP); and

WHEREAS the Municipal Utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumption used to develop the IRP; and

WHEREAS our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and

WHEREAS any public comments received have been addressed in order to strengthen the Utility's Integrated Resource Plan; and

WHEREAS the IRP Summary Report included 5-year and 2-year action plans outlining actions to be taken by the Watertown Municipal Utilities during the next several years

NOW THEREFORE BE IT RESOLVED by the Watertown Municipal Utilities as follows:

That the "Integrated Resource Plan Summary Report for the Watertown Municipal Utilities dated September 1, 2019 shall be approved for filing with Western under the Energy Planning and Management Program"

Dated at Watertown, South Dakota, this 29th Day of July 2019

WATERTOWN MUNICIPAL UTILITIES



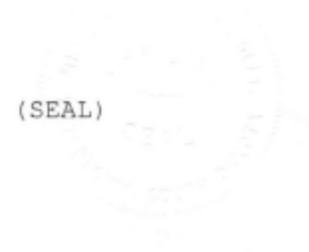
Michael V. Luken, President
Watertown Municipal Utilities

ATTEST:



Lisa Pahl, Secretary
Watertown Municipal Utilities

(SEAL)



X. Winner, SD Resource Planning

A. *City Information*

Winner, located in Tripp County, is a community of more than 2,800 individuals located in south central South Dakota. The residential sector included 1,547 housing units, and the median age of the population is 45.6 years. About 24.6% of the population is 65 years of age or older and about 21.4% are under 18 years old.

In 2017, the municipal utility had 1,447 residential customers and 473 commercial customers. The residential sector's yearly usage averaged 12,710 kWh per customer in 2017. Commercial customers averaged 42,784 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

**WINNER, SOUTH DAKOTA
CURRENT RETAIL ELECTRIC RATE SCHEDULE**

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$15.50
	\$/kWh	\$.0980
Small Commercial	Customer Charge	\$22.00
	\$/kWh	\$.1000
Large Commercial	Customer Charge	\$40.00
	\$/kW	\$13.10
	\$/kWh	\$.0490

**Exhibit 2
WINNER, SD**

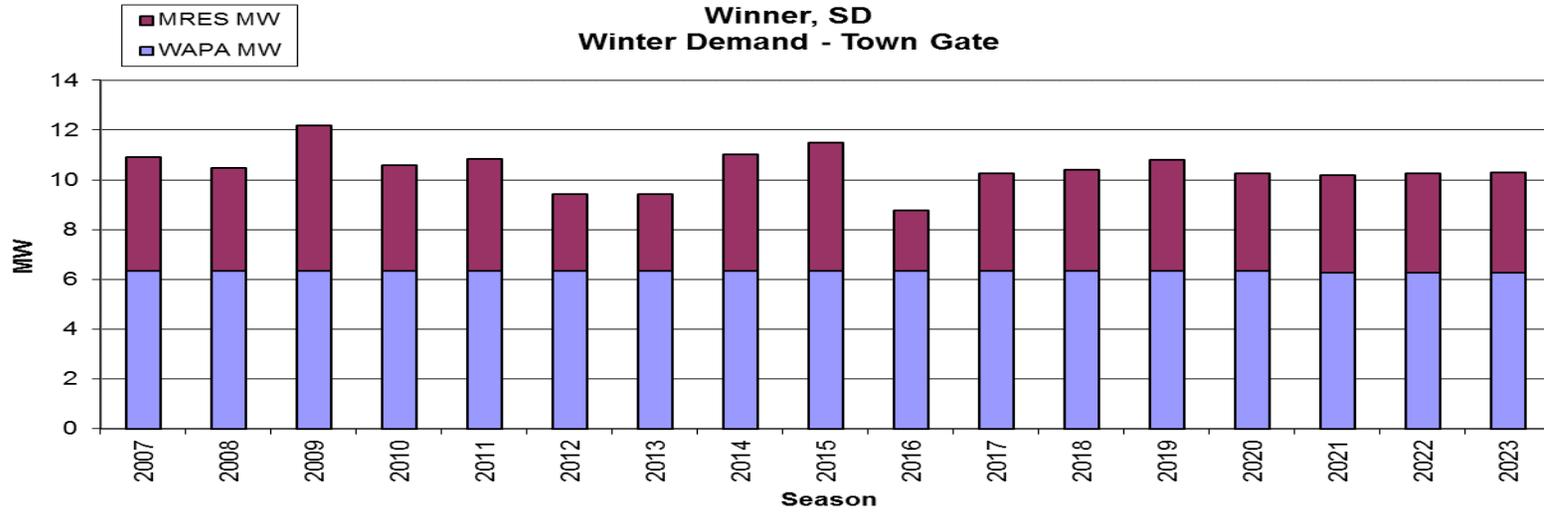
MRES Seasonal Load Report
Town Gate Load
BASE Forecast

Monthly Splits
Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	Total	WAPA	MRES	Summer	Total	WAPA	MRES
2006	9,528	6,961	3,428	2006	20,845,901	16,517,000	4,328,901
2007	9,138	6,961	3,038	2007	20,168,698	16,411,293	3,757,405
2008	8,422	6,961	2,322	2008	19,409,759	16,490,262	2,919,497
2009	7,710	6,961	1,402	2009	18,933,350	16,517,000	2,416,350
2010	8,281	6,961	2,181	2010	19,539,707	16,219,452	3,320,255
2011	8,813	6,961	2,713	2011	18,988,819	16,216,686	2,772,133
2012	8,937	6,961	2,837	2012	20,027,693	16,365,674	3,662,019
2013	8,646	6,961	1,994	2013	19,485,763	16,466,339	3,019,424
2014	8,236	6,961	2,136	2014	18,330,956	16,112,690	2,218,266
2015	8,049	6,961	1,949	2015	18,578,678	16,129,278	2,449,400
2016	8,509	6,961	2,409	2016	18,801,216	16,012,087	2,789,129
2017	8,360	6,874	2,260	2017	18,413,158	16,200,026	2,213,132
2018	8,111	6,961	2,011	2018	18,655,452	16,322,709	2,332,743
2019	8,256	6,961	2,156	2019	18,832,347	16,276,157	2,556,190
2020	8,269	6,961	2,169	2020	18,861,318	16,280,708	2,580,610
2021	8,279	6,891	2,240	2021	18,885,462	16,151,500	2,733,962
2022	8,288	6,891	2,249	2022	18,906,478	16,154,801	2,751,677
2023	8,296	6,891	2,257	2023	18,924,092	16,157,568	2,766,524
Winter	Total	WAPA	MRES	Winter	Total	WAPA	MRES
2007	10,289	6,334	4,569	2007	24,856,588	16,024,000	8,832,588
2008	10,309	6,334	4,143	2008	25,882,157	16,126,000	9,756,157
2009	11,294	6,334	5,859	2009	26,361,332	16,024,000	10,337,332
2010	10,496	6,334	4,263	2010	25,280,812	16,024,000	9,256,812
2011	10,299	6,334	4,492	2011	25,834,637	16,024,000	9,810,637
2012	9,158	6,334	3,098	2012	21,999,859	16,126,000	5,873,859
2013	9,421	6,334	3,087	2013	24,298,839	16,024,000	8,274,839
2014	10,450	6,334	4,688	2014	25,780,690	16,024,000	9,756,690
2015	10,600	6,334	5,165	2015	23,650,713	16,024,000	7,626,713
2016	8,776	6,334	2,442	2016	22,332,815	16,126,000	6,206,815
2017	9,420	6,334	3,915	2017	22,641,053	16,024,000	6,617,053
2018	10,050	6,334	4,083	2018	24,554,477	16,024,000	8,530,477
2019	10,176	6,334	4,456	2019	24,685,776	16,024,000	8,661,776
2020	9,677	6,334	3,912	2020	23,828,174	16,126,000	7,702,174
2021	9,690	6,271	3,927	2021	23,860,813	15,915,000	7,945,813
2022	9,700	6,271	3,993	2022	23,888,750	15,864,000	8,024,750
2023	9,709	6,271	4,003	2023	23,912,507	15,864,000	8,048,507

Exhibit 3

Winner, SD
Winter Demand - Town Gate



Winner, SD
Winter Energy - Town Gate

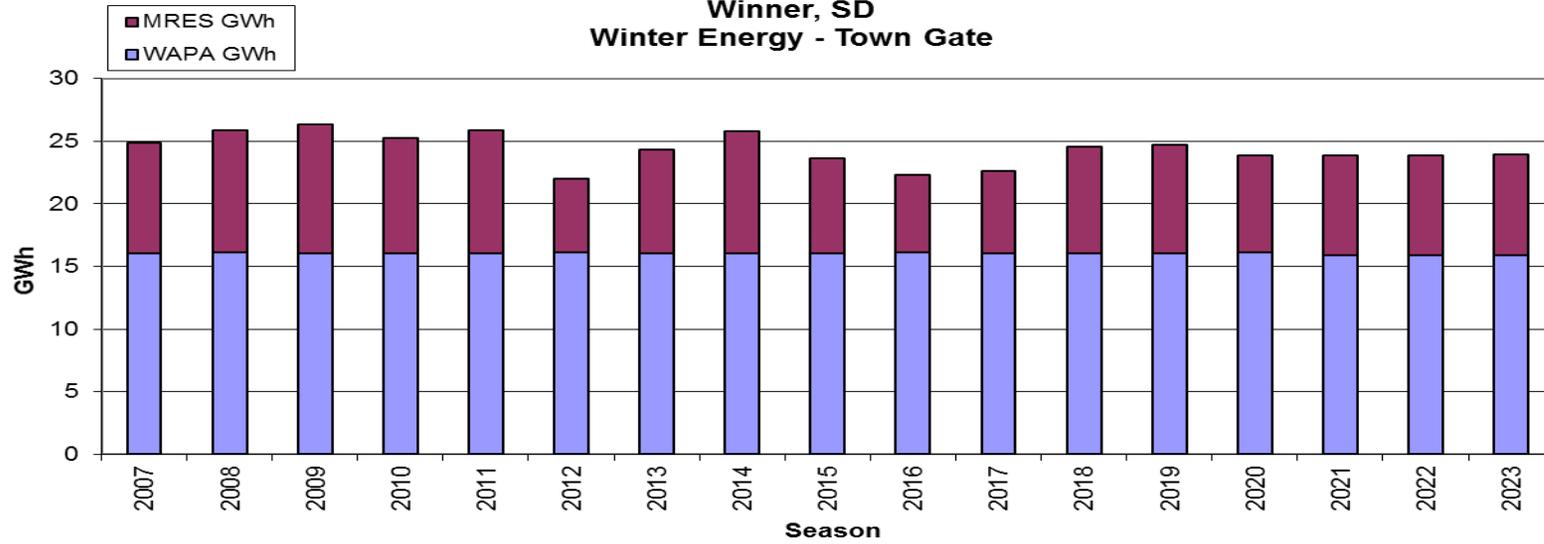
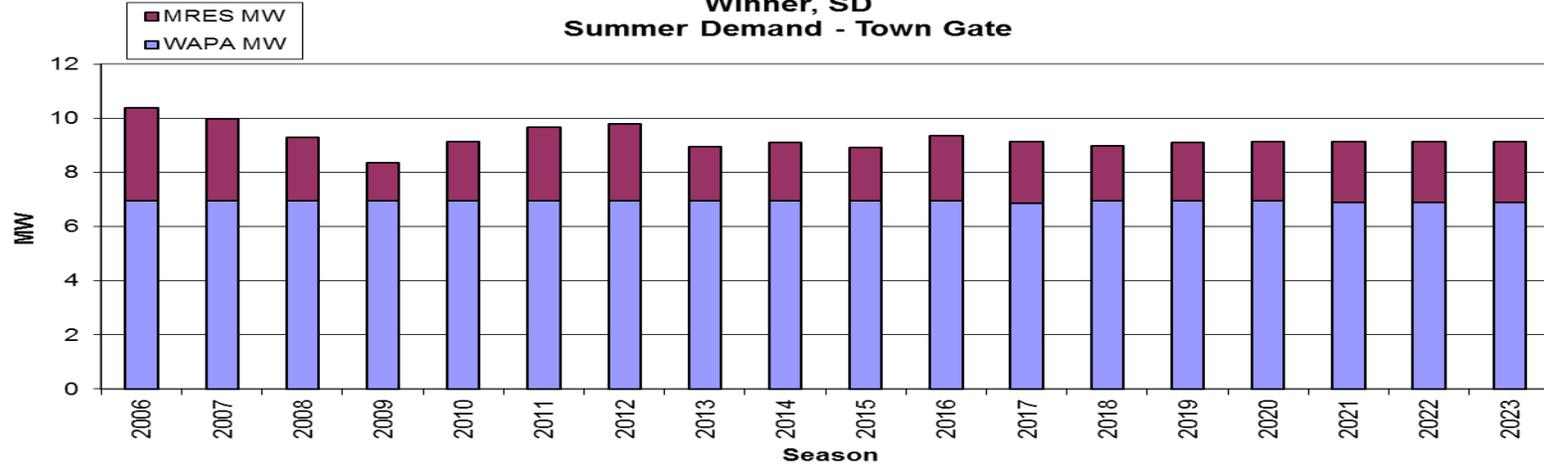


Exhibit 4

Winner, SD Summer Demand - Town Gate



Winner, SD Summer Energy - Town Gate

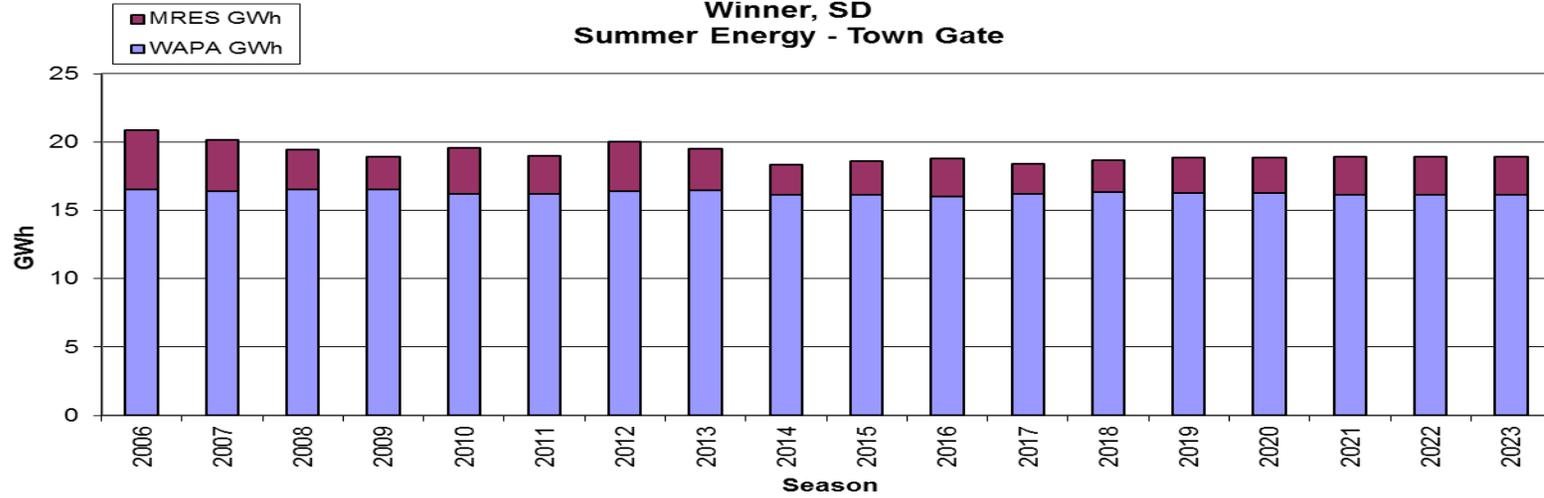


Exhibit 5

Winner, SD Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 10050 kW

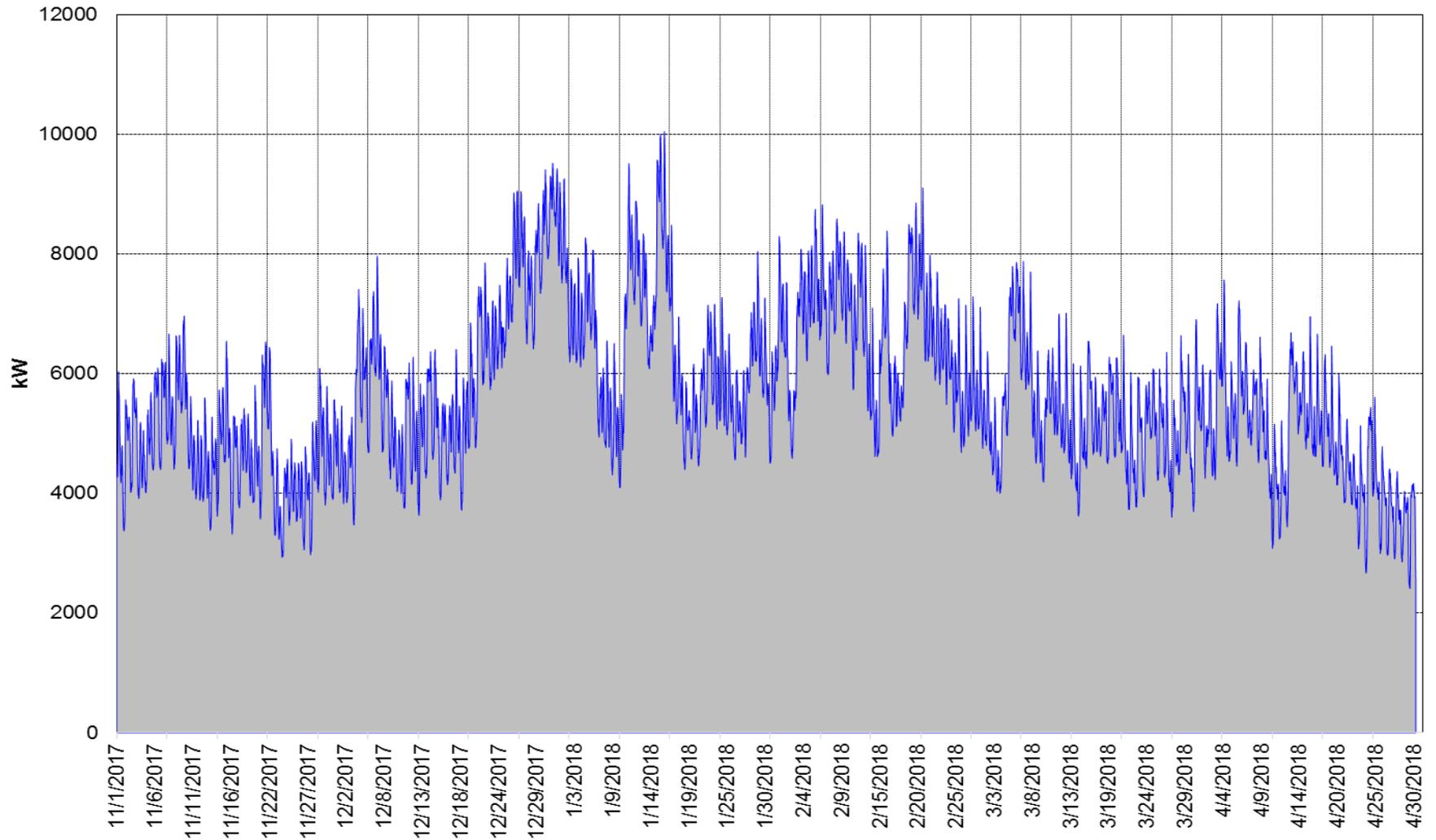


Exhibit 6

Winner, SD Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 8111 kW

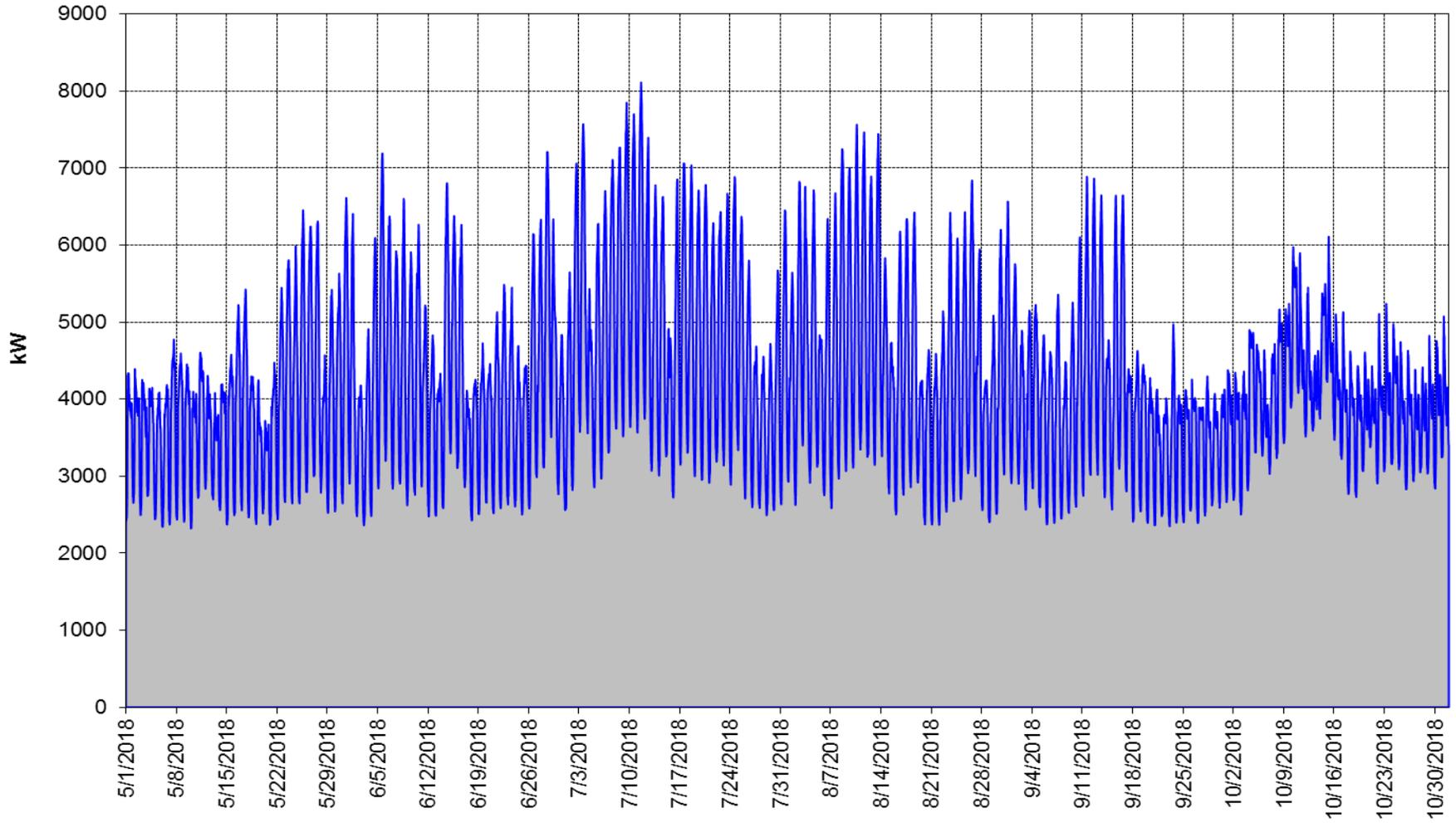


Exhibit 7

Winner, SD Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 10050 kW

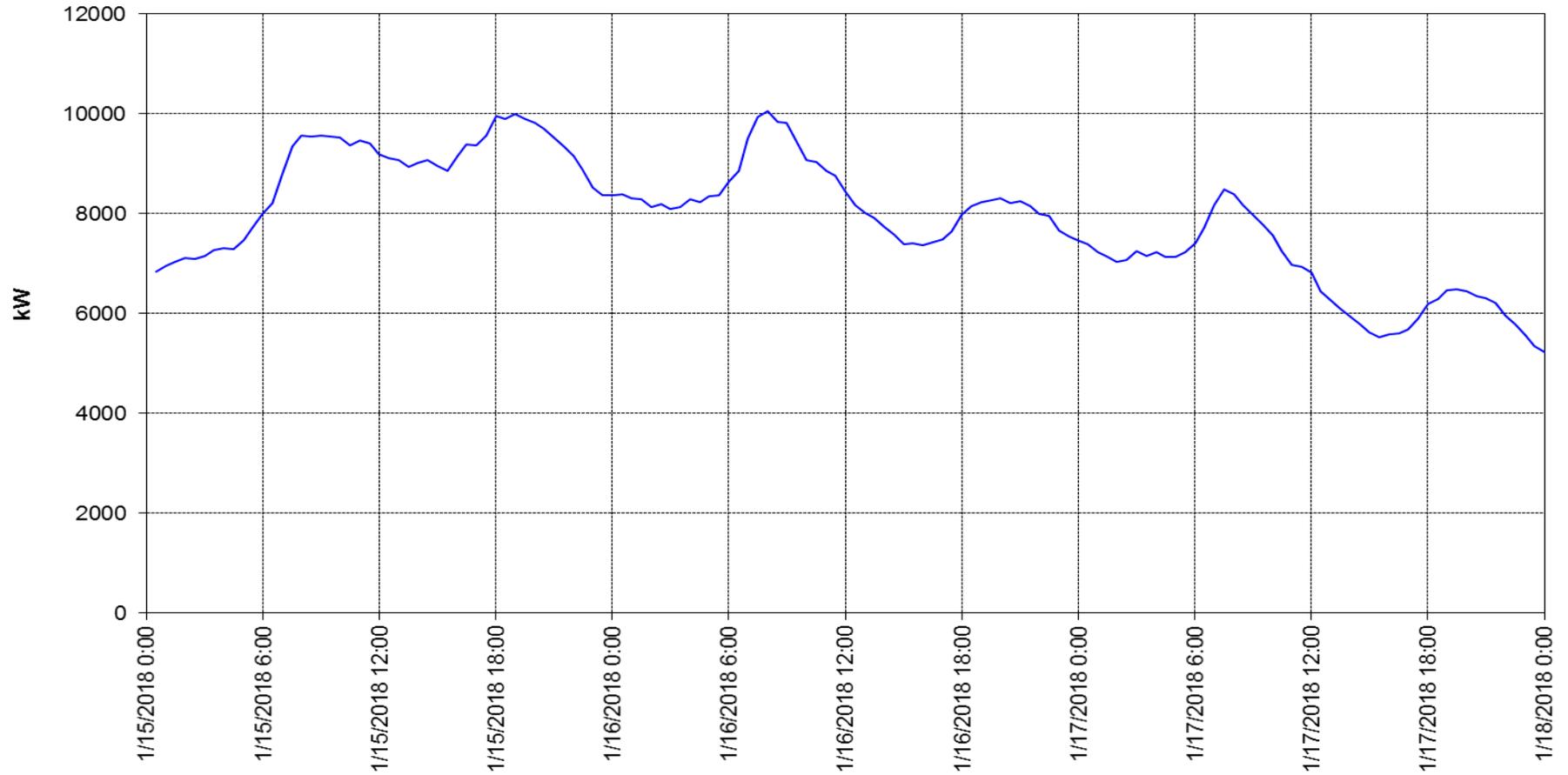
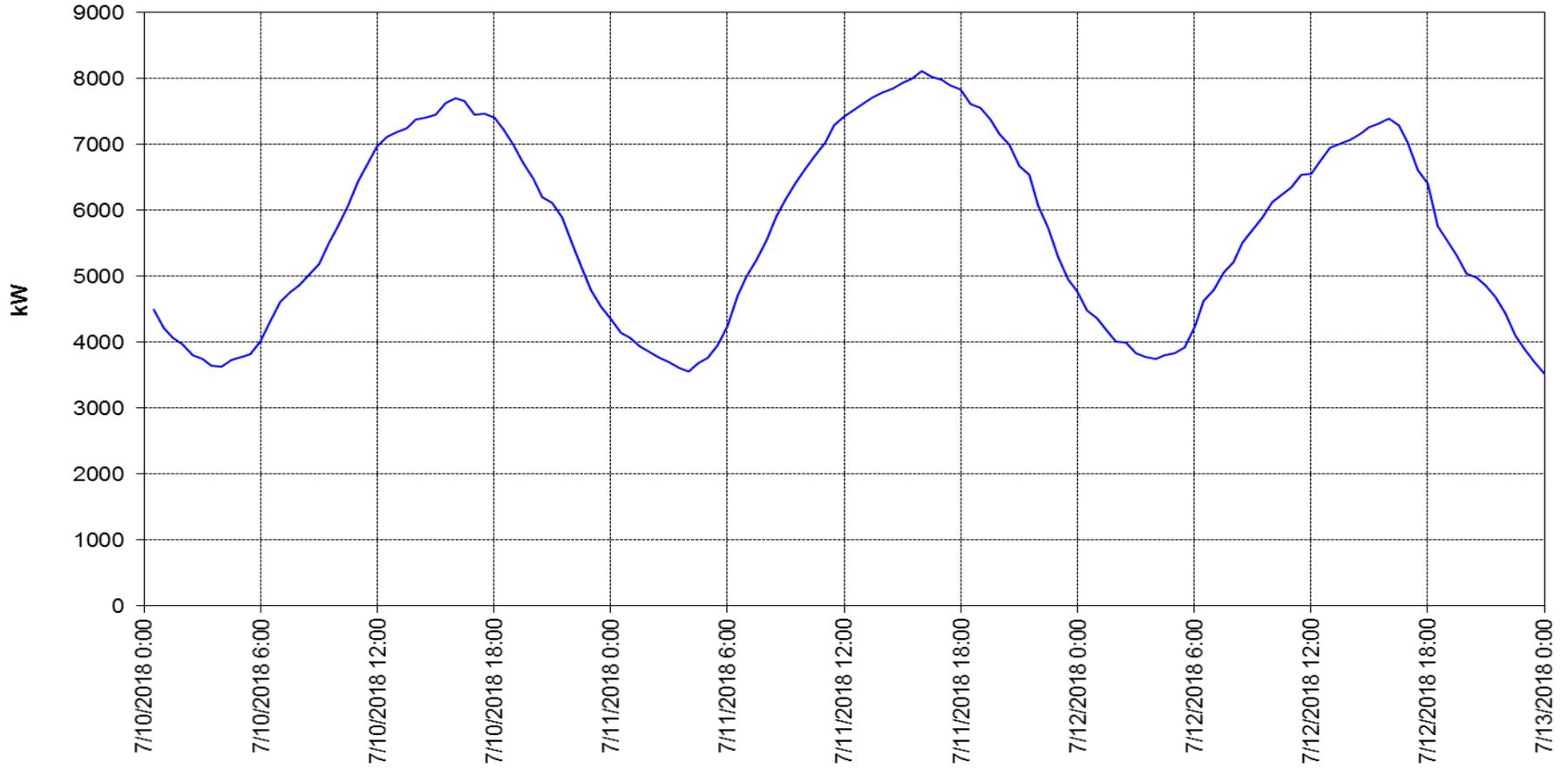


Exhibit 8

Winner, SD Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 8111 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Winner is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Winner to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Winner has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Winner				
Program/Measure	Quan	Incentive	kW	kWh	
2014	19	\$ 1,045	1.1	6052	
Energy Star Appliances	17	\$ 670	0.6	2695	
Residential HVAC	2	\$ 375	0.6	3357	
2015	61	\$ 487	0.4	3550	
Energy Star Appliances	61	\$ 487	0.4	3550	
2016	1917	\$ 8,071	11.9	108124	
C&I HVAC	4	\$ 850	0.8	595	
Commercial Refrigeration	30	\$ 1,000	2.4	29535	
Energy Star Appliances	1883	\$ 6,221	8.7	77994	
2017	1575	\$ 36,262	99.5	360427	
C&I Custom (non-lighting)	0	\$ 4,978	15.5	32275	
Commercial Refrigeration	5	\$ 1,150	0.7	6545	
Lighting New Construction	692	\$ 9,350	23.9	119346	
Lighting Retrofit	809	\$ 20,319	58.9	197661	
Residential Energy Star Products	69	\$ 465	0.5	4600	
2018	42	\$ 6,067	13.7	61233	
C&I HVAC	8	\$ 2,000	2.7	12120	
Commercial Refrigeration	1	\$ 150	0.1	983	
Lighting Retrofit	18	\$ 3,076	10.2	39936	
Residential Energy Star Products	13	\$ 441	0.3	2148	
Residential HVAC	2	\$ 400	0.4	6047	
Grand Total	3614	\$ 51,931	126.7	539386	

- **Load Management Program**

Description: Load management control boxes are on 442 electric water heaters, and 459 central air conditioners. The load management program began in 2011, and has been ramping up since that time. Estimated energy savings are 1,150 kW on peak, with an approximate annual cost of \$76,500.

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Winner was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Winner will continue to participate in the Bright Energy Solutions program. Winner would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Winner will participate in all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Winner plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, Winner is successfully operating their own Load Management program, and it is unknown if they will participate in the MRES Coordinated Demand Response (CDR) program in the future. Winner will continue to evaluate that decision in the years to come.

ii. Milestones

As part of the annual WAPA IRP updates, Winner will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An

engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 3 and July 10, 2019. The public hearing on the IRP was held at the July 15, 2019 City Council meeting. No comments or responses were made during the meeting. The City Council approved the resolution on July 15, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
Date Published in Paper	7/3/2019, 7/10/2019
Public Hearing Date	7/15/2019
Date Approved by Utilities Board	7/15/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Winner			
Program/Measure	Quan	Incentive	kW	kWh
2014	19	\$ 1,045	1.1	6052
Energy Star Appliances	17	\$ 670	0.6	2695
Energy Star Clothes Washer	8	\$ 400	0.1	1048
ENERGY STAR Dehumidifier	2	\$ 20	0.2	180
Energy Star Dishwasher	4	\$ 100	0.1	252
Energy Star Refrigerator	3	\$ 150	0.1	1215
Residential HVAC	2	\$ 375	0.6	3357
HVAC Air_Source HP - 18.0 SEER	1	\$ 350	0.5	2243
Programmable Thermostat - Heat Pump	1	\$ 25	0.1	1114
2015	61	\$ 487	0.4	3550
Energy Star Appliances	61	\$ 487	0.4	3550
Energy Star Clothes Washer	4	\$ 200	0.1	524
Energy Star Dishwasher	1	\$ 25	0.0	38
Energy Star Refrigerator	2	\$ 100	0.1	810
ES Res Lighting - LED Screw-in Lamp	54	\$ 162	0.2	2178
2016	1917	\$ 8,071	11.9	108124
C&I HVAC	4	\$ 850	0.8	595
Unitary Air Cooled Split Sys AC <65k Btuh (3ph)	4	\$ 850	0.8	595
Commercial Refrigeration	30	\$ 1,000	2.4	29535
Anti-Sweat Heater Controls	1	\$ 60	0.0	1820
ECM Fan Motor for Cooler-Freezer	29	\$ 940	2.3	27715
Energy Star Appliances	1883	\$ 6,221	8.7	77994
Energy Star Clothes Dryer	4	\$ 320	0.1	732
Energy Star Clothes Washer	2	\$ 100	0.0	262
Energy Star Refrigerator	4	\$ 170	0.2	1347
ES Res Lighting - CFL Screw-in Lamp	3	\$ 5	0.0	96
ES Res Lighting - LED Recessed Can	16	\$ 64	0.1	833
ES Res Lighting - LED Screw-in Lamp	1854	\$ 5,562	8.3	74724
2017	1575	\$ 36,262	99.5	360427
C&I Custom (non-lighting)	0	\$ 4,978	15.5	32275
Custom	0	\$ 4,978	15.5	32275
Commercial Refrigeration	5	\$ 1,150	0.7	6545
ES Comm Glass Door Refrigerators	5	\$ 1,150	0.7	6545
Lighting New Construction	692	\$ 9,350	23.9	119346
LED Energy Star Recessed Downlight	16	\$ 400	0.7	3126
LED Hi Bay or Low Bay Fixtures	30	\$ 2,160	4.6	21100
LED Recessed Downlight	61	\$ 1,525	3.0	18037

LED Troffer >= 5800 Lumens	585	\$ 5,265	15.5	77083
Lighting Retrofit	809	\$ 20,319	58.9	197661
4 Ft. LED Linear Lamps Repl T8 Fluorescent	775	\$ 2,325	7.3	21787
Custom - Lighting	0	\$ 17,291	50.3	170816
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	7	\$ 49	0.3	825
LED Exit Sign	17	\$ 204	0.4	1668
Occupancy Sensor Over 500 W Controlled	10	\$ 450	0.6	2566
Residential Energy Star Products	69	\$ 465	0.5	4600
Energy Star Clothes Washer	1	\$ 50	0.0	198
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	2	\$ 100	0.1	396
ENERGY STAR Dehumidifier	1	\$ 15	0.0	200
Energy Star Refrigerator	3	\$ 120	0.1	942
ENERGY STAR Refrigerator With Recycling	1	\$ 50	0.0	405
ES Res Lighting - LED Screw-in Lamp	60	\$ 128	0.3	2419
Lighting Equipment LED Lamps	1	\$ 2	0.0	40
2018	42	\$ 6,067	13.7	61233
C&I HVAC	8	\$ 2,000	2.7	12120
Mini-Split / Ductless Air Source Heat Pump	8	\$ 2,000	2.7	12120
Commercial Refrigeration	1	\$ 150	0.1	983
ENERGY STAR Commercial Solid Door Refrigerators 30-50 Cu Ft	1	\$ 150	0.1	983
Lighting Retrofit	18	\$ 3,076	10.2	39936
Custom - Lighting	0	\$ 2,716	9.0	36614
Occupancy Sensor Under 500 W Controlled	18	\$ 360	1.1	3323
Residential Energy Star Products	13	\$ 441	0.3	2148
ENERGY STAR Clothes Dryer (Electric)	3	\$ 185	0.1	548
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	5	\$ 200	0.1	990
ENERGY STAR Refrigerator No Recycling	1	\$ 25	0.0	43
ENERGY STAR Refrigerator With Recycling	1	\$ 25	0.1	446
Lighting Equipment LED Lamps	3	\$ 6	0.0	121
Residential HVAC	2	\$ 400	0.4	6047
Air Handler/Fan Coil W/ECM	1	\$ 150	0.2	720
Air-Source Heat Pump (15 SEER)	1	\$ 250	0.2	5327
Grand Total	3614	\$ 51,931	126.7	539386

Appendix 2 – Winner Resolution

RESOLUTION

- WHEREAS,** the City of Winner purchases a significant portion of its power supply from the Western Area Power Administration (Western); and
- WHEREAS,** Western has recently published its Energy Planning and Management Program Rules specifying the requirements for preparing and filing of an Integrated Resource Plan (IRP); and
- WHEREAS,** the municipal utility staff has prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and
- WHEREAS,** our customers were informed of our IRP and resulting Action Plans through various means including a public meeting where public questions and comments were encouraged; and
- WHEREAS,** any public comments received have been addressed in order to strengthen the city’s Integrated Resource Plan; and
- WHEREAS,** the IRP Summary Report included 5-year and 2-year action plans outlining actions to be taken by the Municipal utility during the next several years

NOW THEREFORE BE IT RESOLVED BY the City of Winner City Council as follows:

That the “Integrated Resource Plan Summary Report for the City of Winner dated September 2019 shall be approved for filing with Western under the Energy Planning and Management Program.”

Passed and approved this 15th day of July, 2019.



Jody Brozik, Mayor

(Attest)

Chandra Cudmore, Finance Officer

XI. Valley City, ND Resource Planning

A. *City Information*

Valley City, located in Barnes County, is a community of more than 6,500 individuals located in southeastern North Dakota. The residential sector included 3,307 housing units, and the median age of the population is 42.1 years. About 22% of the population is 65 years of age or older and about 18.7% percent are under 18 years old. In 2012, the municipal utility had 3,299 residential customers, 783 commercial customers, and one industrial customer.

In 2017, the municipal utility had 3,174 residential customers, 807 commercial customers, and 1 industrial customer. The residential sector's yearly usage averaged 14,219 kWh per customer in 2017, commercial customers averaged 67,767 kWh, and industrial customers averaged 5,873,000 kWh.

The rates for each type of customer are shown in Exhibit 1. Exhibit 2 contains the numerical values used to generate the seasonal graphs in Exhibits 3 and 4, which show the winter and summer peak demand and energy for the seasons 2006 through 2023 with forecasted values after 2018. Exhibits 5 and 6 show the total power purchases on a half hour basis, for the 2017-2018 winter season and the 2018 summer season, respectively.

Exhibits 7 and 8 each show the peak day (along with the day before and the day after) for the summer and winter seasons.

Exhibit 1

VALLEY CITY, NORTH DAKOTA CURRENT RETAIL ELECTRIC RATE SCHEDULE

Customer Class	Rate Component	Current Rate
Residential	Customer Charge	\$16.50
	\$/kWh (June-Aug)	
	First 1,000 kWh	\$.0720
	Over 1,000 kWh	\$.0640
	\$/kWh (Sept-May)	
	First 1,000 kWh	\$.0670
Over 1,000 kWh	\$.0520	
Small Commercial - Single Phase	Customer Charge	\$22.50
	Three Phase Customer Charge	\$50.00
	\$/kWh (Jun-Aug)	
	First 2,000 kWh	\$.0820
	Over 2,000 kWh	\$.0580
	\$/kWh (Sep-May)	
First 2,000 kWh	\$.0790	
Over 2,000 kWh	\$.0540	
Large Commercial	Customer Charge	\$68.00
	\$/kW (Jun-Aug)	\$19.30
	\$/kW (Sep-May)	\$17.70
	\$/kWh	\$.0300

Exhibit 2

VALLEY CITY, ND

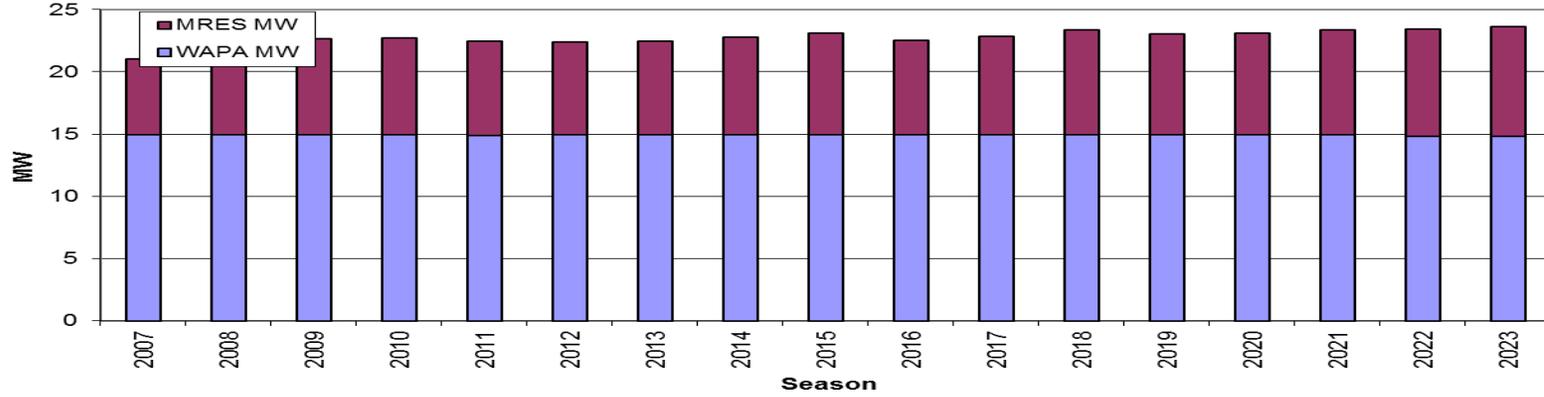
MRES Seasonal Load Report
 Town Gate Load
 BASE Forecast

Monthly Splits
 Historic Through 4/2019

Demand (kW)				Energy (kWh)			
Summer	Total	WAPA	MRES	Summer	Total	WAPA	MRES
2006	17,655	10,962	6,852	2006	45,544,800	28,221,033	17,323,767
2007	19,278	11,214	8,064	2007	45,030,600	26,923,503	18,107,097
2008	17,133	11,075	6,981	2008	44,908,800	27,530,287	17,378,513
2009	17,973	11,214	6,759	2009	45,001,200	28,741,842	16,259,358
2010	17,865	11,147	6,718	2010	44,836,200	28,029,071	16,807,129
2011	18,264	11,214	7,050	2011	44,987,400	27,818,395	17,169,005
2012	18,390	11,214	7,176	2012	46,325,400	28,308,321	18,017,079
2013	18,525	11,214	7,311	2013	46,260,000	28,104,232	18,155,768
2014	18,060	11,104	7,127	2014	44,912,780	27,420,009	17,492,771
2015	18,960	11,214	8,224	2015	46,070,098	27,400,000	18,670,098
2016	18,371	11,214	7,400	2016	45,201,962	27,400,000	17,801,962
2017	17,920	11,214	8,527	2017	44,451,306	27,400,000	17,051,306
2018	18,078	11,214	7,458	2018	46,784,246	27,400,000	19,384,246
2019	17,064	11,214	7,557	2019	44,367,780	27,400,000	16,967,780
2020	17,199	11,214	7,692	2020	44,719,631	27,400,000	17,319,631
2021	17,333	11,102	7,918	2021	45,067,305	27,125,000	17,942,305
2022	17,465	11,102	8,050	2022	45,411,604	27,125,000	18,286,604
2023	17,596	11,102	8,180	2023	45,752,267	27,125,000	18,627,267
Demand (kW)				Energy (kWh)			
Winter	Total	WAPA	MRES	Winter	Total	WAPA	MRES
2007	21,045	14,944	6,101	2007	65,375,400	46,528,375	18,847,025
2008	22,245	14,944	7,301	2008	69,264,000	47,412,399	21,851,601
2009	22,647	14,944	7,703	2009	71,761,200	47,559,079	24,202,121
2010	22,713	14,944	7,769	2010	66,678,000	43,888,502	22,789,498
2011	22,395	14,862	7,613	2011	69,666,600	46,104,696	23,561,904
2012	22,374	14,930	7,444	2012	60,874,200	40,638,188	20,236,012
2013	22,473	14,944	7,529	2013	69,369,600	46,196,344	23,173,256
2014	22,794	14,944	7,850	2014	73,311,000	48,309,283	25,001,717
2015	23,131	14,944	8,187	2015	67,706,130	46,856,322	20,849,808
2016	22,521	14,944	7,577	2016	61,549,280	49,669,722	11,879,558
2017	22,825	14,944	7,881	2017	62,480,046	48,845,550	13,634,496
2018	22,715	14,944	8,423	2018	66,508,012	50,069,000	16,439,012
2019	23,019	14,944	8,075	2019	66,747,942	50,069,000	16,678,942
2020	23,074	14,944	8,130	2020	65,659,433	50,105,000	15,554,433
2021	23,253	14,926	8,458	2021	66,173,383	49,755,000	16,418,383
2022	23,431	14,795	8,636	2022	66,681,963	49,566,000	17,115,963
2023	23,606	14,795	8,811	2023	67,185,318	49,566,000	17,619,318

Exhibit 3

Valley City, ND
Winter Demand - Town Gate



Valley City, ND
Winter Energy - Town Gate

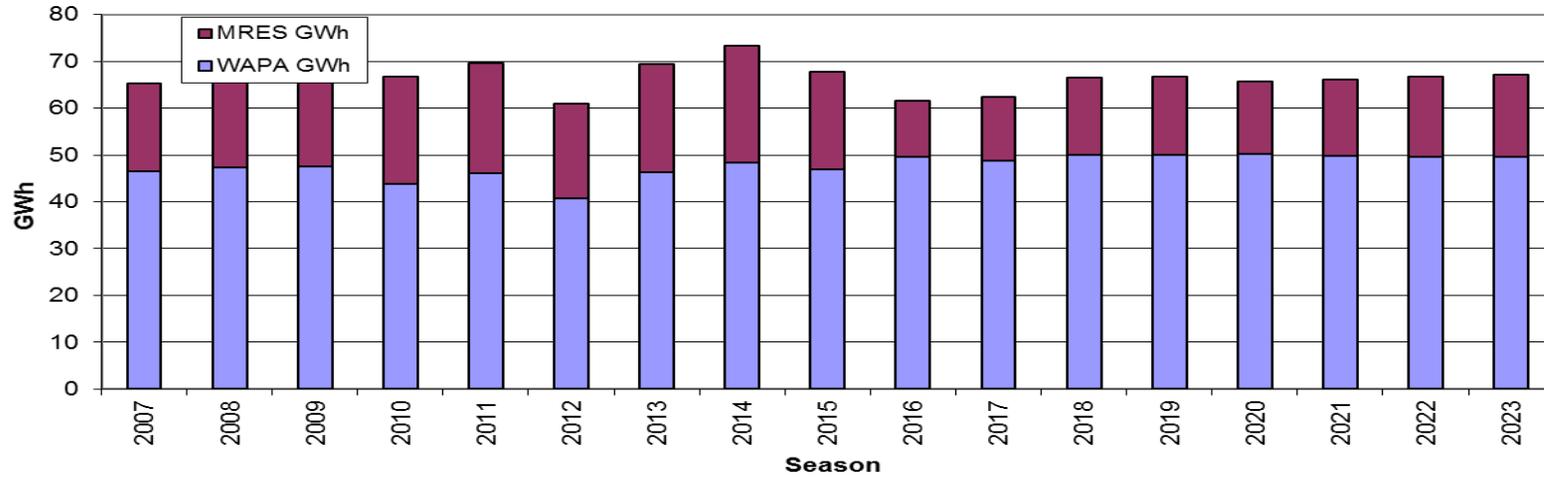
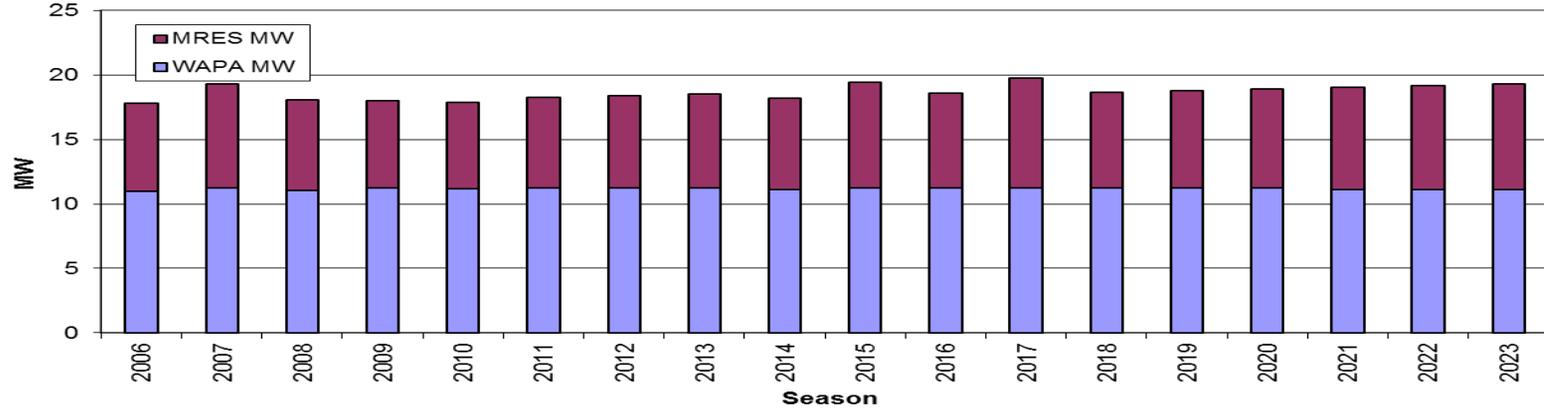


Exhibit 4

Valley City, ND Summer Demand - Town Gate



Valley City, ND Summer Energy - Town Gate

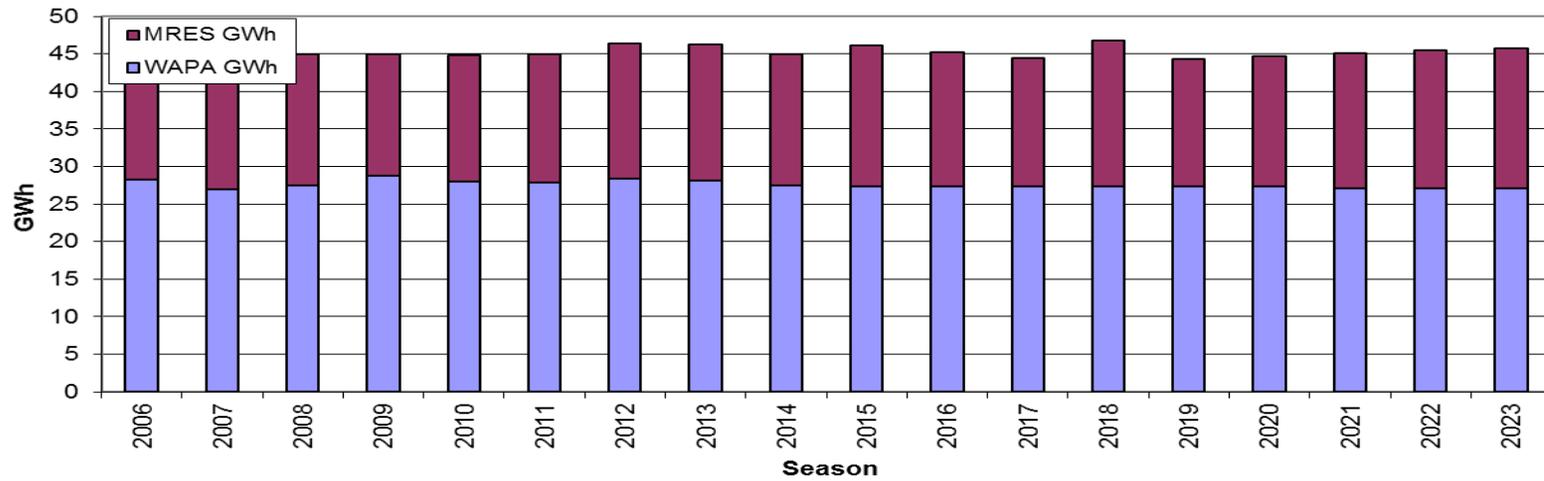


Exhibit 5

Valley City, ND Winter 2017-2018 Half-Hour Load Shape - Town Gate

Peak - 22715 kW

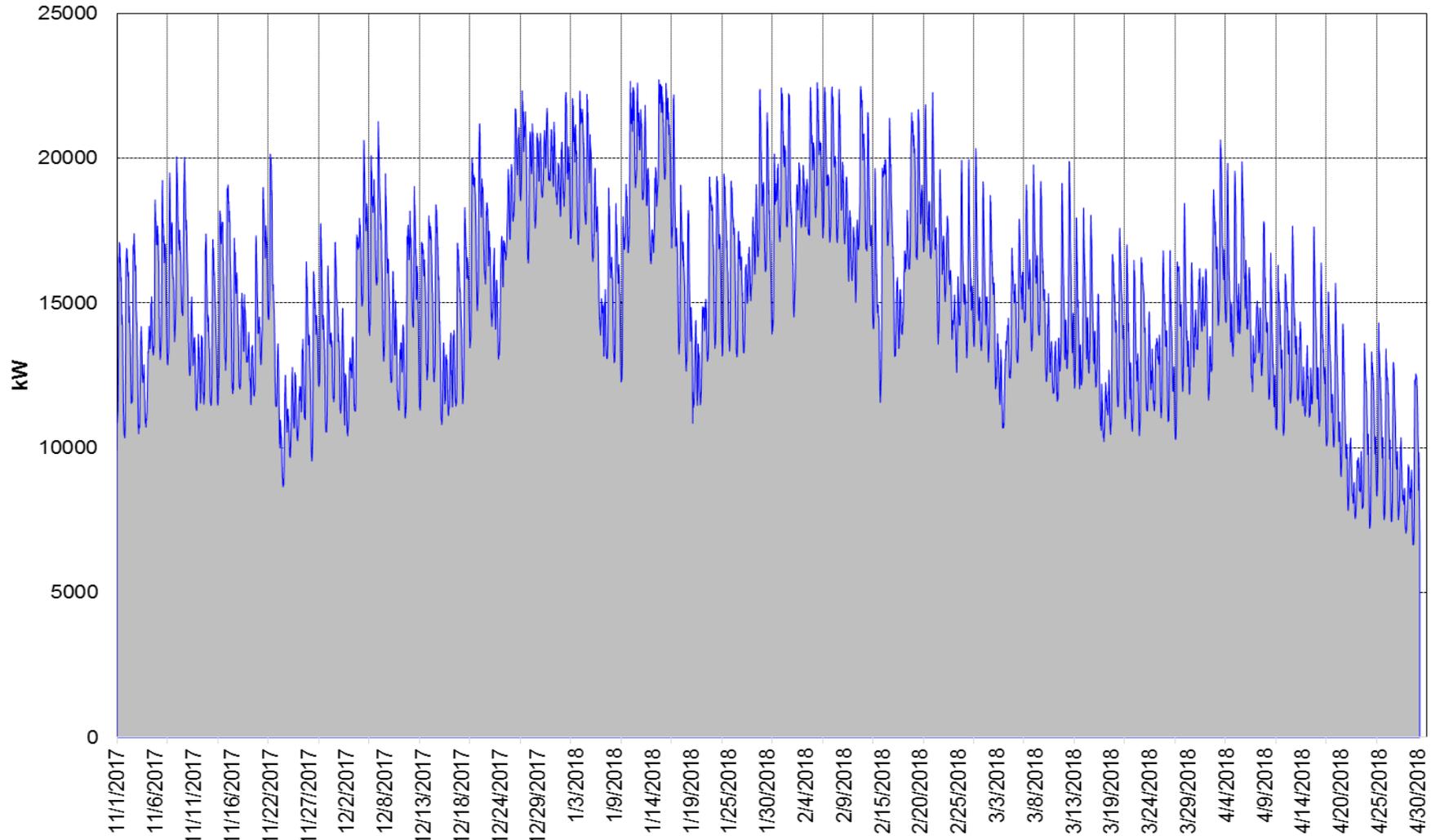


Exhibit 6

Valley City, ND Summer 2018 Half-Hour Load Shape - Town Gate

Peak - 18078 kW

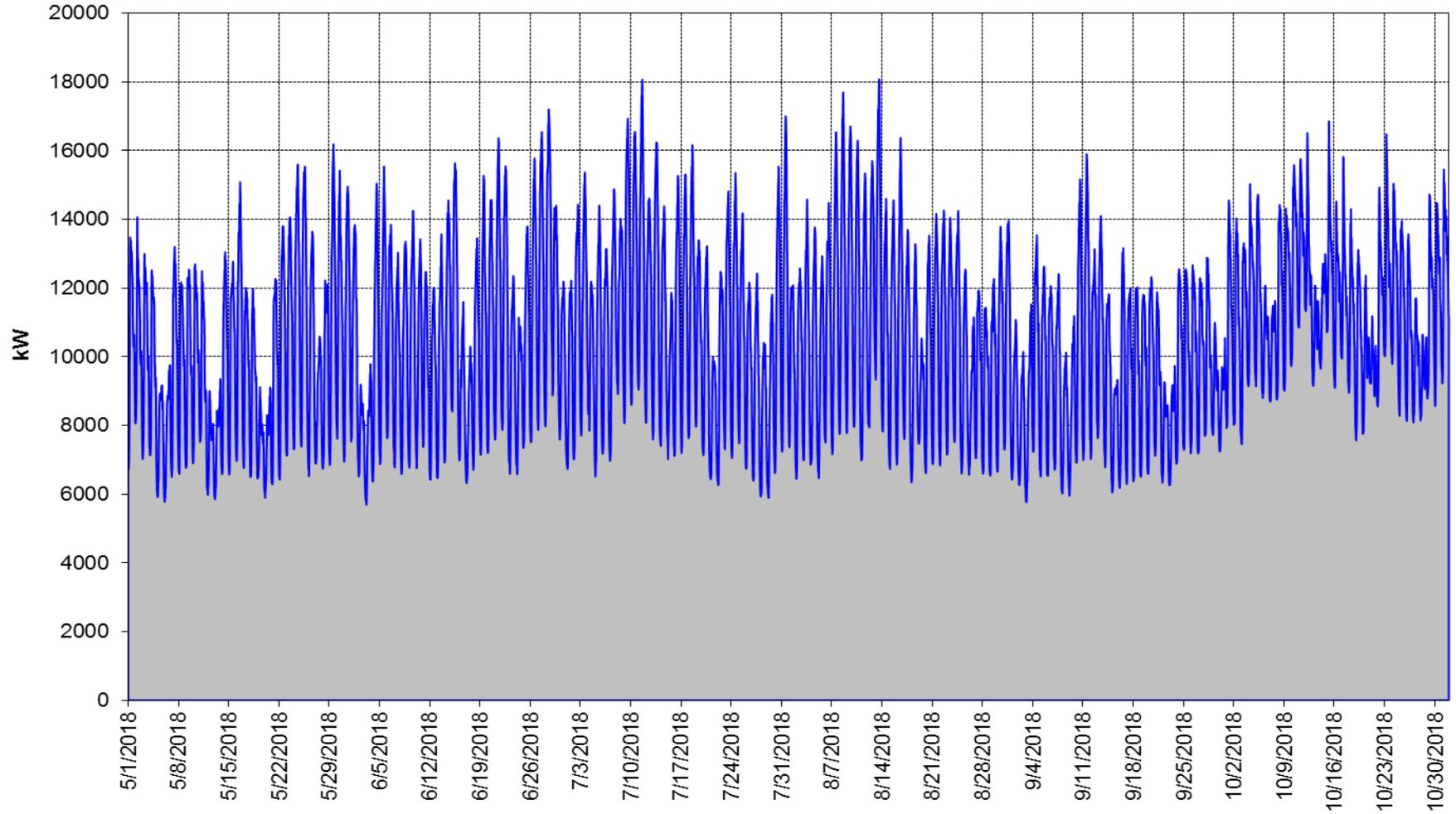


Exhibit 7

Valley City, ND Peak Half-Hour Load Shape, Winter 2017-2018, Town Gate

Peak: 22715 kW

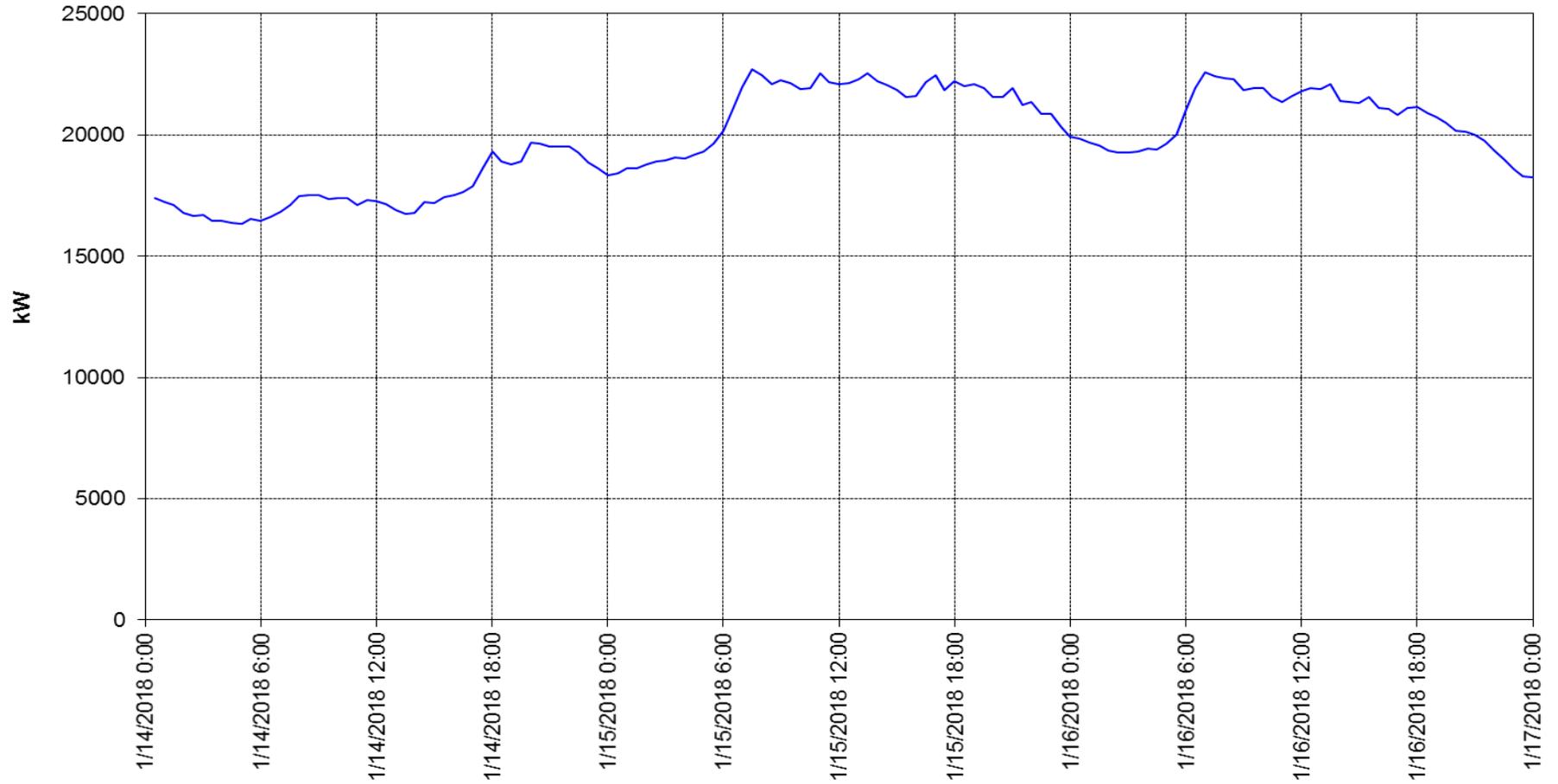
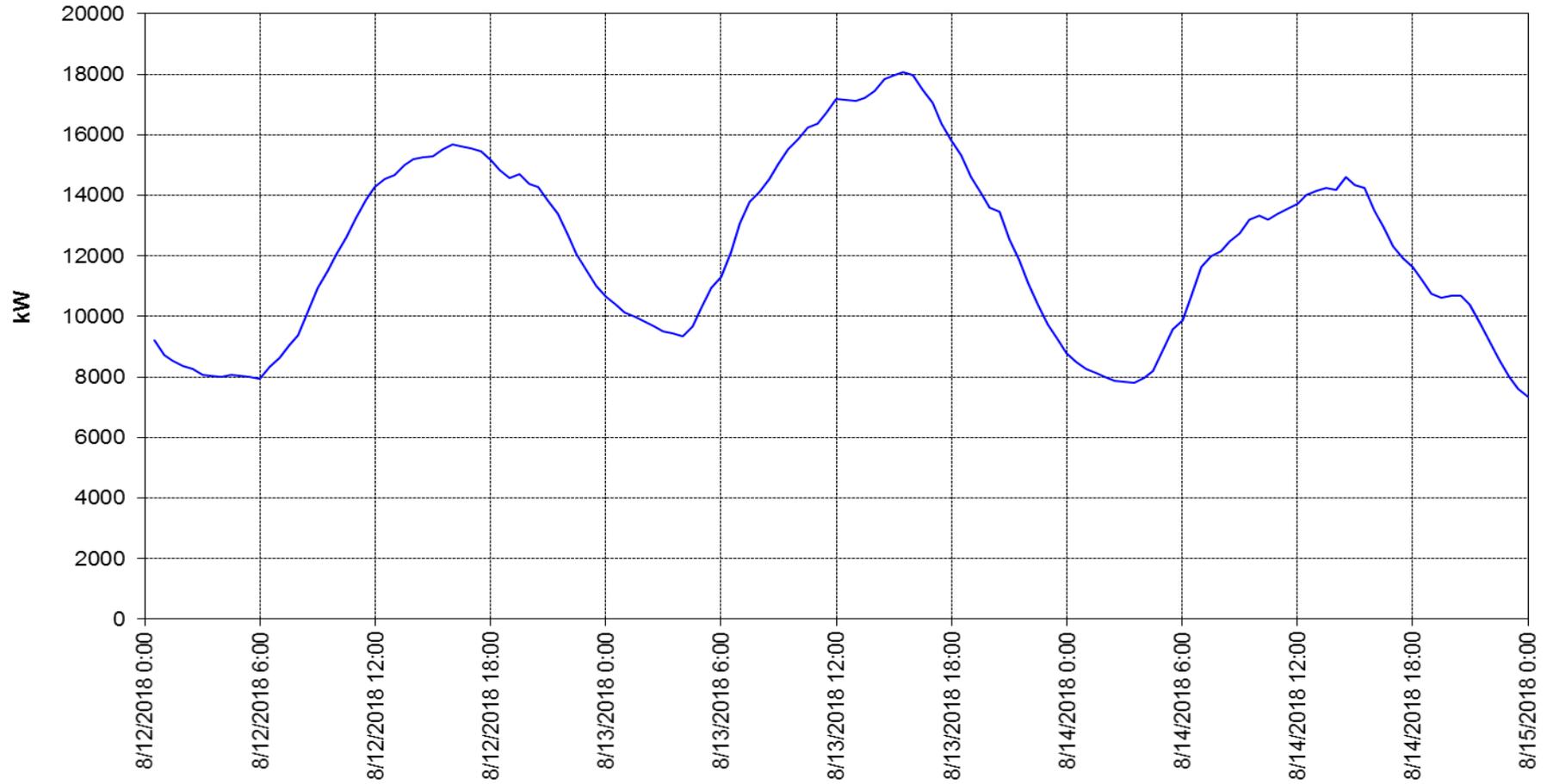


Exhibit 8

Valley City, ND Peak Half-Hour Load Shape, Summer 2018, Town Gate

Peak: 18078 kW



B. Supply-side Efforts

As explained in the section detailing MRES Resource Planning activities, MRES conducts all supply-side resource planning for its members. MRES studied traditional, as well as renewable, energy sources in its resource plan.

All supplemental power for Valley City is supplied through its joint S-1 agreement with other MRES members. All MRES resources are used to supply all of its S-1 members as a group. Therefore, it is neither possible nor necessary for Valley City to individually study supply-side resources as part of this IRP.

C. Historic DSM Efforts

Valley City has been active in pursuing new DSM programs, and participates in the Bright Energy Solutions (BES) Program through MRES. The BES Program offerings were developed after considering the major markets, the saturation of electric and gas appliances, and the characteristics of the customers. The information was analyzed to determine both the technical and cost-saving potential of energy management improvements, any barriers that might be encountered to implementing the improvements, the realistic expectation for program participation, and any net savings that would result from the programs.

The table shown in Exhibit 9 below is a summary of the DSM activities that were installed between 2014 and 2018. DSM activities installed before 2014 can be found in the 2014 IRP filing. The first column indicates the year of installation. The second column indicates the program category. The third column shows the number of measures installed. The fourth column shows the total incentives paid by MRES. The last two columns show the kW and kWh saved on an annual basis by the new installations. For more detailed information showing exact types of measures installed, please see the end of this section.

Exhibit 9 - Summary of DSM Activities 2014-2018

Utility Name	Valley City			
Program/Measure	Quan	Incentive	kW	kWh
2014	2064	\$ 55,288	179.9	951246
C&I HVAC	1	\$ 100	0.4	178
Direct Installation at Customer Location	14	\$ -	1.2	6054
Energy Star Appliances	43	\$ 1,835	1.4	9490
Food Service	8	\$ 1,850	4.0	25273
Lighting New Construction	514	\$ 21,041	79.0	597555
Lighting Retrofit	1483	\$ 30,312	93.6	311976
Residential HVAC	1	\$ 150	0.2	720
2015	5203	\$ 76,491	219.6	1177376
C&I HVAC	6	\$ 2,447	4.1	12172
Commercial Refrigeration	50	\$ 8,715	26.0	209841
Custom Electric Program	4	\$ 21,388	82.6	311699
Direct Installation at Customer Location	6	\$ -	0.5	3777
Energy Star Appliances	337	\$ 2,789	2.8	22629
Food Service	4	\$ 800	0.7	3916
Lighting New Construction	277	\$ 6,784	20.0	115671
Lighting Retrofit	1208	\$ 22,658	65.3	355070
Residential Lighting	3300	\$ 9,900	14.9	133003
VFDs and Pumps	11	\$ 1,010	2.7	9598
2016	2205	\$ 86,227	289.3	1286442
C&I HVAC	139	\$ 8,853	19.6	118243
Custom Electric Program	0	\$ 48,451	206.7	766182
Direct Installation at Customer Location	78	\$ -	4.1	20005
Energy Star Appliances	275	\$ 1,825	1.9	15595
Food Service	1	\$ 100	0.1	869
Lighting New Construction	306	\$ 4,626	16.1	86906
Lighting Retrofit	1401	\$ 21,162	35.2	254308
Specialty Measures	1	\$ 50	0.1	1293
VFDs and Pumps	4	\$ 1,160	5.6	23041
2017	4401	\$ 132,436	406.6	2400431
C&I Compressed Air	2	\$ 430	1.5	6554
C&I Custom (non-lighting)	0	\$ 35,872	149.0	996852
C&I HVAC	12	\$ 23,982	53.7	69571
C&I Pumps & VFDs	8	\$ 2,520	10.6	42780
Commercial Refrigeration	2	\$ 100	0.1	540
Custom Electric Program	0	\$ 383	1.6	6623
Energy Star Appliances	69	\$ 767	0.5	4484
Lighting New Construction	197	\$ 5,303	20.1	148592
Lighting New Construction	2540	\$ 44,182	119.2	773047

Lighting Retrofit	713	\$ 8,688	15.5	109361
Lighting Retrofit	381	\$ 7,102	30.3	197074
Residential Energy Star Products	473	\$ 2,228	2.9	24292
Residential HVAC	2	\$ 825	1.5	19759
Residential HVAC	2	\$ 55	0.2	902
2018	12408	\$ 88,267	299.5	1728735
C&I Compressed Air	3	\$ 1,307	13.3	81531
C&I HVAC	21	\$ 2,750	3.8	8092
Commercial Refrigeration	53	\$ 1,330	3.2	38471
Food Service	12	\$ 2,600	4.9	46555
Lighting New Construction	79	\$ 474	1.5	7552
Lighting Retrofit	3859	\$ 62,025	230.7	1181221
Residential Energy Star Products	8379	\$ 17,281	41.4	352265
Residential HVAC	2	\$ 500	0.7	13048
Grand Total	26281	\$ 438,708	1394.9	7544230

- **Load Management/CDR Program**

Valley City recently migrated their load management system to the MRES hosted CDR program. The interruptible loads include numerous dual-fuel heating systems, 350 water heaters, and other miscellaneous loads. The utility will control any load that the customer is willing to have controlled. During the winter peak the estimated load reduction is between 7,000 and 12,500 kW. Annual costs are estimated to be \$18,700.

The load management system is marketed through the use of interruptible rates. Interruptible rates consist of billing adjustments or credits that may apply to one or more rate schedules. The type of billing adjustment varies with the type of interruptible load; such as water heater credit, energy credit, and demand credit. Interruptible rates promote the efficient use of electrical energy by shifting energy use to times with lower demand without increasing the need for more capacity.

D. Evaluation of Alternatives

As explained in the section detailing MRES Resource Planning activities, PA Consulting performed a DSM Potential Study for MRES and its members. In this study, many different DSM measures were evaluated for technical, market and economic potential. Once this list of programs and incentives was made available by MRES, Valley City was free to choose from the list of Bright Energy Solutions programs and incentives, or to pursue other measures on their own and without any incentives from MRES.

E. Options Chosen – Development of Action Plan

i. Future Actions

It is assumed that Valley City will continue to participate in the Bright Energy Solutions program. Valley City would have virtually no out-of-pocket costs, as MRES will be paying the incentives for all of these programs. It is planned that Valley City will participate in all of the Bright Energy Solutions programs to the extent possible. This assumption was made only to obtain more realistic expectations for the five-year plan, and is certainly not considered to be a cap on participation in the event that the program attracts more participants than anticipated.

Representatives from Valley City plan to utilize the MRES marketing materials for all the programs made available in the Bright Energy Solutions program, and take advantage of MRES assistance when possible, and will be working closely with their assigned MRES field representative.

At this time, Valley City has successfully migrated their Load Management program to the MRES hosted CDR program. The overall participation and load reduction amounts are anticipated to be approximately the same as before.

ii. Milestones

As part of the annual WAPA IRP updates, Valley City will evaluate the progress on these programs. The success will be measured against this 5-year plan, with adjustments made for actual customer participation, and any changes or additions to the Bright Energy Solutions programs.

Measurement and validation of the Bright Energy Solutions programs will be ongoing. Quality control, measurement of savings, verification tracking, and program evaluation are important components of a successful DSM program and they are critical to MRES if DSM is to be relied upon as a power resource. For verification purposes, all incentive applications receive a calculation review. An engineering review of savings calculations is conducted on all custom installations, except for custom lighting. Field inspections are completed on a minimum of 5% of all installations and on 100% of installations over \$20,000 in total incentives and on 100% of custom projects.

For custom projects, MRES requires detailed estimates of kW and kWh savings that will be achieved as a result of the project, along with the sources and references for all values used. This may include certification of savings calculations by a qualified engineer. For projects with estimated savings larger than 1,000,000 kWh per year, or for projects involving new technology, MRES may require that energy savings be verified through metering or energy testing of kW and kWh before and after installation of the proposed equipment.

F. Environmental Effects

The environmental benefits of the DSM programs were not calculated specifically. However, any program that decreases energy consumption will, by definition, decrease the amount of energy generated. Given that a majority of generation is from non-renewable sources, DSM programs will serve to decrease emissions. Additionally, DSM programs that reduce electric demand will mean fewer new generation facilities will need to be constructed in the future.

G. Public Participation

A preliminary draft of this report was produced on June 14, 2019. A notice of public hearing on IRP was published in the local newspaper on July 3 and July 10, 2019. The public hearing on the IRP was held at the July 16, 2019 Board of City Commissioners meeting. No comments or responses were made during the meeting. The Board of City Commissioners approved the resolution on July 16, 2019. A copy of the approved resolution is included in Appendix 2.

<i>IRP Approval Process</i>	
Preliminary Draft Date	6/14/2019
	7/3/2019
	&
Date Published in Paper	7/10/2019
Public Hearing Date	7/16/2019
Date Approved by City Council	7/16/2019

Appendix 1 – Detailed DSM Measures Installed

Utility Name	Valley City				
Program/Measure	Quan	Incentive	kW	kWh	
2014	2064	\$ 55,288	179.9	951246	
C&I HVAC	1	\$ 100	0.4	178	
Mini Split Ductless AC	1	\$ 100	0.4	178	
Direct Installation at Customer Location	14	\$ -	1.2	6054	
LED Screw-in Replacement Lamp	14	\$ -	1.2	6054	
Energy Star Appliances	43	\$ 1,835	1.4	9490	
Energy Star Clothes Washer	14	\$ 700	0.2	1834	
ENERGY STAR Dehumidifier	1	\$ 10	0.1	90	
Energy Star Dishwasher	11	\$ 275	0.3	681	
Energy Star Refrigerator	12	\$ 600	0.6	4860	
Energy Star Refrigerators	5	\$ 250	0.2	2025	
Food Service	8	\$ 1,850	4.0	25273	
ES Comm Dishwasher_Gas WH-Elec					
Boost	1	\$ 250	0.8	7160	
ES Comm Solid Door Freezers	1	\$ 100	0.1	869	
ES Comm Solid Door Refrigerators	3	\$ 300	0.2	1410	
ES Holding Cabinets	3	\$ 1,200	2.9	15834	
Lighting New Construction	514	\$ 21,041	79.0	597555	
CEE Qual T8 4ft Hi Performance System	184	\$ 736	2.2	16817	
LED Energy Star Recessed Downlight	55	\$ 1,375	3.1	15146	
T5HO 4ft Hi Bay Fixture	219	\$ 15,330	54.3	476057	
T8 4ft Hi Bay Fixture	56	\$ 3,600	19.4	89535	
Lighting Retrofit	1483	\$ 30,312	93.6	311976	
Compact Fluorescent Fixtures & Lamps	84	\$ 902	5.1	17792	
Hi Performance T8 4ft CEE Qual	103	\$ 1,428	4.7	28950	
LED & Induction Tech	365	\$ 5,866	15.4	57886	
Othr Eff Ltg Tech - per Unit	2	\$ 40	0.1	579	
Reduced Wtg T8 4ft CEE Qual	745	\$ 12,493	46.1	121271	
T5HO Hi Bay Fixtures w/ 4ft Lamps					
Replacing	66	\$ 4,620	7.5	38987	
T8 4ft w/ Bal and Reflectors /					
Delamping	17	\$ 425	1.5	4110	
T8 4ft w/Elec Bal	52	\$ 374	1.4	4737	
T8 Hi Bay Fixtures w/ 4ft Lamps					
Replacing	49	\$ 4,165	11.8	37664	
Residential HVAC	1	\$ 150	0.2	720	
HVAC HE Furnace with ECM	1	\$ 150	0.2	720	
2015	5203	\$ 76,491	219.6	1177376	
C&I HVAC	6	\$ 2,447	4.1	12172	

Air Cooled Chillers w-Condenser	1	\$ 1,908	2.3	10430
CO2 Demand Controlled Ventilation	1	\$ 89	0.3	488
ECM in Res Style Furnace	1	\$ 150	0.2	720
Mini Split Ductless AC	3	\$ 300	1.3	534
Commercial Refrigeration	50	\$ 8,715	26.0	209841
ECM Fan Motor for Cooler-Freezer	43	\$ 1,100	2.9	34073
LED Horizontal Reach-in Refrigerated Case Lighting	2	\$ 1,440	4.9	29149
LED Vertical Reach-in Refrigerated Case Lighting	2	\$ 2,040	3.9	36837
Low Heat Reach-In Freezer Door	1	\$ 325	1.1	9906
No Mullion Reach-in Cooler	1	\$ 450	1.3	15540
Replace Open Multi-Deck Cases w Glass Display	1	\$ 3,360	12.0	84336
Custom Electric Program	4	\$ 21,388	82.6	311699
baseline of 18 highbays at 350w each, 6 of 8'6-lamp T8 at 170w each, 6 of 4' 4-l	0	\$ 1,140	4.8	14039
EXTERIOR LIGHTINGbaseline of 7 of 1000w HPS and 3 of 150w for 7450watts install	1	\$ 0	0.0	21672
Lighting: Baseline of 15 of 60w 2x2; 8 of 94w; 14 of 320w and 12 of 75w floods	1	\$ 1,329	5.7	15345
Lighting: baseline of 40 of 320w MH, 7 of 3-lamp T8 at 85w each, 1 at 123w and	0	\$ 2,454	10.1	27972
Lighting: Construction of new shop; code is high by 400wHID at 429 each for 36	0	\$ 2,632	8.4	25536
Lighting: Customremoval of T12 and T8 lighting at 32.718kW and installation of	0	\$ 6,154	25.7	127872
Lighting: re3moval of T8 6-lamp in shop highbay fixtures and 3-lamp troffers in	1	\$ 328	1.4	3543
Lighting: removal 8 of 8' 2-lamp T12 and 4 of 500w halogen and 1 of 250w HID fo	0	\$ 735	3.1	5661
Lighting: removal of 183 T12 4-lamps at 41w each with ballast = 7503 watts remo	0	\$ 1,153	4.8	9324
Lighting: removal of T8 lamps in highbay fixtures in show and fixtures in offic	0	\$ 2,819	9.8	30370
Lighting: removed 8 of 175w MH garage fixtures at 208w for 1664 wattsinstalled	1	\$ 365	1.1	10625
Lighting: See attached documentation from lighting retrofit savings form from o	0	\$ 2,280	7.9	19740
Direct Installation at Customer Location	6	\$ -	0.5	3777
LED Screw-in Replacement Lamp	6	\$ -	0.5	3777
Energy Star Appliances	337	\$ 2,789	2.8	22629
Energy Star Clothes Dryer	5	\$ 400	0.1	915
Energy Star Clothes Washer	5	\$ 250	0.1	655
ENERGY STAR Dehumidifier	1	\$ 10	0.0	135
Energy Star Dishwasher	6	\$ 150	0.1	228

Energy Star Refrigerator	23	\$ 1,000	0.9	7950
Energy Star Room AC	1	\$ 25	0.1	34
ES Res Lighting - LED Recessed Can	66	\$ 264	0.4	3439
ES Res Lighting - LED Screw-in Lamp	230	\$ 690	1.0	9273
Food Service	4	\$ 800	0.7	3916
ES Convection Ovens _ Electric Only	4	\$ 800	0.7	3916
Lighting New Construction	277	\$ 6,784	20.0	115671
CEE Qual T8 4ft Hi Performance System	84	\$ 420	1.3	7680
LED Energy Star Recessed Downlight	36	\$ 900	1.7	9696
T5HO 4ft Hi Bay Fixture	59	\$ 4,130	13.6	79116
T8 4ft Hi Bay Fixture	12	\$ 600	1.2	8566
T8 4ft Reduced Wattage System	86	\$ 734	2.1	10613
Lighting Retrofit	1208	\$ 22,658	65.3	355070
Hi Performance T8 4ft CEE Qual	46	\$ 623	1.6	10226
High Bay Fluorescent Occ Sensors	1	\$ 640	2.8	19791
LED & Induction Tech	465	\$ 5,793	18.4	89140
Othr Eff Ltg Tech - per Unit	24	\$ 730	2.0	13550
Rducd Wtg T8 4ft w				
Reflector/Delamping	22	\$ 594	1.9	9296
Rducd Wtg T8 Lamps ONLY	93	\$ 93	0.3	1603
Reduced Wattage T8 and T5HO Lamps ONLY	128	\$ 128	0.5	2249
Reduced Wattage T8 Fluorescent Systems	198	\$ 3,330	8.1	41868
T5HO Hi Bay Fixtures w/ 4ft Lamps Replacing	36	\$ 3,060	7.1	40960
T8 4ft w/ Bal and Reflectors / Delamping	64	\$ 1,152	4.1	20600
T8 4ft w/ Bal Repl 8ft T12 HO	60	\$ 1,800	4.6	24577
T8 4ft w/Elec Bal	17	\$ 125	0.3	1942
T8 Hi Bay Fixtures w/ 4ft Lamps Replacing	54	\$ 4,590	13.7	79268
Residential Lighting	3300	\$ 9,900	14.9	133003
ES Res Lighting - LED Screw-in Lamp	3300	\$ 9,900	14.9	133003
VFDs and Pumps	11	\$ 1,010	2.7	9598
Hi_Eff Pumps	6	\$ 370	0.6	2242
Variable Freq Drives	5	\$ 640	2.1	7356
2016	2205	\$ 86,227	289.3	1286442
C&I HVAC	139	\$ 8,853	19.6	118243
ECM in Res Style Furnace	11	\$ 1,650	2.3	7920
Guest Room Energy Management (GREM)	58	\$ 2,030	5.8	95932
Mini Split Ductless Air Source HP	1	\$ 250	0.4	6470
Pkgd Terminal AC (PTAC)	65	\$ 2,194	6.2	4535
Unitary Air Cooled Split Sys AC <65k Btuh (1ph)	3	\$ 1,000	1.2	693

Unitary Single Pkgd AC 241k - 760k				
Btuh	1	\$ 1,729	3.5	2693
Custom Electric Program	0	\$ 48,451	206.7	766182
Lighting: code for church design was				
17,066 watts; installed custom LED fixture	0	\$ 4,227	18.0	34152
Lighting: New construction COMCheck				
done - code was 37,967 watts for facility.	0	\$ 8,305	18.8	179594
Lighting: removal of 85,532 watts and				
installation of 28,714 watts for a saving	0	\$ 17,045	55.2	196772
Lighting: Removed 16 - 500 Watt				
Incandescent and 10 - 150 Watt				
Incandescent and	0	\$ 2,250	9.6	14885
removal of 2295 bulbs/fixtures at				
116141 watts; isntalled all LED Energy Star				
or	0	\$ 16,624	105.2	340779
Direct Installation at Customer Location	78	\$ -	4.1	20005
LED Screw-in Replacement Lamp	78	\$ -	4.1	20005
Energy Star Appliances	275	\$ 1,825	1.9	15595
Energy Star Clothes Dryer	5	\$ 400	0.1	915
Energy Star Clothes Washer	3	\$ 150	0.1	393
ENERGY STAR Dehumidifier	2	\$ 20	0.1	270
Energy Star Refrigerator	12	\$ 480	0.4	3768
Energy Star Room AC	1	\$ 25	0.1	34
ES Res Lighting - CFL Screw-in Lamp	3	\$ 5	0.0	97
ES Res Lighting - LED Recessed Can	7	\$ 28	0.0	365
ES Res Lighting - LED Screw-in Lamp	242	\$ 717	1.1	9753
Food Service	1	\$ 100	0.1	869
ES Comm Solid Door Freezers	1	\$ 100	0.1	869
Lighting New Construction	306	\$ 4,626	16.1	86906
CEE Qual T8 4ft Hi Performance System	106	\$ 685	1.7	9645
LED Energy Star Recessed Downlight	27	\$ 675	1.4	6658
T8 4ft Hi Bay Fixture	38	\$ 2,660	11.2	63459
T8 4ft Reduced Wattage System	135	\$ 606	1.9	7144
Lighting Retrofit	1401	\$ 21,162	35.2	254308
4' LED Linear Lamps DCL Qual	2	\$ 12	0.0	133
LED & Induction Tech	1257	\$ 18,222	27.4	214263
Reduced Wattage T8 Fluorescent				
Systems	135	\$ 2,403	6.1	30706
T8 4ft w/ Bal Repl 8ft T12 HO	1	\$ 15	0.0	189
T8 Hi Bay Fixtures w/ 4ft Lamps				
Replacing	6	\$ 510	1.6	9017
Specialty Measures	1	\$ 50	0.1	1293
Energy Star Clothes Washer	1	\$ 50	0.1	1293
VFDs and Pumps	4	\$ 1,160	5.6	23041
Variable Freq Drives	4	\$ 1,160	5.6	23041
2017	4401	\$ 132,436	406.6	2400431
C&I Compressed Air	2	\$ 430	1.5	6554

Cycling Refrigerated Dryers	1	\$ 80	0.2	914
VFD Air Compressor	1	\$ 350	1.3	5640
C&I Custom (non-lighting)	0	\$ 35,872	149.0	996852
Lighting: removal of 11287 watts of MH, incandescent, T12 and T8 lighting and i	0	\$ 2,156	9.2	34836
Lighting: removal of 21 of 4'4-lamp T12 at 144w for 3024 watts removed; install	0	\$ 693	2.2	13067
Lighting: removal of 3253 watts of T12HO, T12 and incandescent lighting per lis	0	\$ 782	3.3	12631
Lighting: removal of 4 4'4-lamp T8 at 107w for 428 watts removed and installed	0	\$ 80	0.3	1114
Lighting: Removal of 426 of 400wMH at 456w each for 194,256 watts removed; inst	0	\$ 27,605	115.0	894727
Lighting: removal of 9 of 4' 2-lamp T12 wrap at 72w each and 2 of 4' 4-lam pT12	0	\$ 118	0.5	2047
Lighting: removal of T12 and incandescent lighting: 108 at 144w, 18 at 72w, 24	0	\$ 4,184	17.4	36228
removal of 6 of 8' 2-lamp T12 HO at 237w each and 2 at 75w for 1738 watts remove	0	\$ 254	1.1	2202
C&I HVAC	12	\$ 23,982	53.7	69571
Air Cooled Chillers w-Condenser	1	\$ 6,500	19.1	15161
Energy Recovery Ventilator (ERV)	2	\$ 2,772	9.3	1478
GS HP_Closed Loop Water to Air	3	\$ 1,410	2.5	29013
Mini Split Ductless Air Source HP	1	\$ 250	0.4	6470
Unitary Air Cooled Split Sys AC > 760k Btuh	3	\$ 10,350	17.9	12459
Unitary Air Cooled Split Sys AC 241k - 760k Btuh	1	\$ 2,250	3.5	1584
VRF Air Cooled Multisplit HP 065k - 135k Btuh	1	\$ 450	1.0	3406
C&I Pumps & VFDs	8	\$ 2,520	10.6	42780
Hi_Eff Pumps	4	\$ 1,000	2.9	10620
Variable Freq Drives	4	\$ 1,520	7.7	32160
Commercial Refrigeration	2	\$ 100	0.1	540
ES Comm Solid Door Refrigerators	2	\$ 100	0.1	540
Custom Electric Program	0	\$ 383	1.6	6623
Lighting: removal of 25 of 8'2lamp and 18 of 8' 4lamp T8 vapor tights for 3471	0	\$ 383	1.6	6623
Energy Star Appliances	69	\$ 767	0.5	4484
Energy Star Clothes Dryer	3	\$ 240	0.1	549
Energy Star Clothes Washer	5	\$ 250	0.1	655
Energy Star Refrigerator	3	\$ 120	0.1	942
ES Res Lighting - LED Screw-in Lamp	58	\$ 157	0.3	2338
Lighting New Construction	197	\$ 5,303	20.1	148592
CEE Qual T8 4ft Hi Performance System	72	\$ 468	1.7	12513

LED Energy Star Screw-in Replacement Lamp	69	\$ 1,035	4.1	29823
LED Hi Bay or Low Bay Fixtures	55	\$ 3,400	11.1	82903
LED Hi Bay or Low Bay Occ Sensor Ctl	1	\$ 400	3.2	23353
Lighting New Construction	2540	\$ 44,182	119.2	773047
CEE Qual T8 4ft Hi Performance System	5	\$ 35	0.1	471
Hi Bay Occupancy Sensor Control	2	\$ 1,020	4.0	28136
LED Energy Star Recessed Downlight	886	\$ 22,150	47.1	314955
LED ENERGY STAR Screw-In Lamp < 600 Lumens	91	\$ 546	2.9	14618
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	19	\$ 133	0.9	4361
LED Hi Bay or Low Bay Fixtures	105	\$ 4,045	10.2	39179
LED Hi Bay or Low Bay Occ Sensor Ctl	2	\$ 270	1.4	7993
LED High Bay Fixtures <= 75 W	34	\$ 1,190	3.8	28720
LED Recessed Downlight	137	\$ 3,425	8.9	66174
LED Troffer < 3000 Lumens	5	\$ 20	0.1	384
LED Troffer 3000 - 5799 Lumens	99	\$ 594	2.3	17580
LED Troffer DLC Qualified	504	\$ 3,289	9.6	60446
T5HO 4ft Hi Bay Fixture	22	\$ 1,980	6.7	37000
T8 4ft Hi Bay Fixture	80	\$ 2,500	11.1	81540
T8 4ft Reduced Wattage System	549	\$ 2,985	10.1	71491
Lighting Retrofit	713	\$ 8,688	15.5	109361
4' LED Linear Lamps DCL Qual	140	\$ 492	1.3	6023
LED & Induction Tech	570	\$ 8,061	13.8	101586
LED HiBay or LoBay Repl HID or Inc	3	\$ 135	0.3	1752
Lighting Retrofit	381	\$ 7,102	30.3	197074
4' LED Linear Lamps DCL Qual	138	\$ 828	2.9	16220
Custom - Lighting	0	\$ 333	1.0	7778
High Bay Fluorescent Occ Sensors	1	\$ 4,260	18.0	131731
LED & Induction Tech	198	\$ 995	6.7	31136
LED Reach-in Refrigerated Case Vertical	1	\$ 200	0.4	3292
Ltg LED Screw-In Flood/Reflector Lamp >= 420 Lumens	6	\$ 54	0.3	1604
Reduced Wattage T8 Fluorescent Systems	37	\$ 432	1.0	5313
Residential Energy Star Products	473	\$ 2,228	2.9	24292
Energy Star Clothes Dryer	4	\$ 320	0.1	732
Energy Star Clothes Washer	8	\$ 400	0.2	1584
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	3	\$ 150	0.1	594
Energy Star Refrigerator	8	\$ 310	0.3	2421
ENERGY STAR Refrigerator With Recycling	1	\$ 50	0.0	405
Energy Star Room AC	1	\$ 25	0.1	34

ES Res Lighting - LED Recessed Can	27	\$ 108	0.2	1407
ES Res Lighting - LED Screw-in Lamp	305	\$ 610	1.4	12293
Lighting Equipment LED Lamps	115	\$ 230	0.5	4635
Programmable Thermostat	1	\$ 25	0.1	187
Residential HVAC	2	\$ 825	1.5	19759
HVAC Closed Loop Water to Air GS HP Programmable Thermostat -	1	\$ 800	1.4	18877
Geothermal	1	\$ 25	0.1	882
Residential HVAC	2	\$ 55	0.2	902
Programmable Thermostat - Elec Heat w/AC	1	\$ 25	0.1	828
Summer AC Tune-Up	1	\$ 30	0.1	74
2018	12408	\$ 88,267	299.5	1728735
C&I Compressed Air	3	\$ 1,307	13.3	81531
Compressor Air Leak Survey	3	\$ 1,307	13.3	81531
C&I HVAC	21	\$ 2,750	3.8	8092
Res Style Furnace w/ECM	8	\$ 1,200	1.7	5760
Smart Thermostat (Natural Gas Furnace With/AC)	6	\$ 300	0.6	1122
Split System Air Conditioning < 65000 BTUH - 15 SEER or Higher	7	\$ 1,250	1.6	1210
Commercial Refrigeration	53	\$ 1,330	3.2	38471
Anti-Sweat Heater Controls	18	\$ 540	0.8	16380
ECM Evaporator Motor in Reach-In Cooler and Freezer Cases	17	\$ 340	0.9	8375
Low Heat Reach-In Freezer Door	18	\$ 450	1.6	13716
Food Service	12	\$ 2,600	4.9	46555
ENERGY STAR Commercial Glass Door Freezers > 50 Cu Ft	3	\$ 750	2.4	23778
ENERGY STAR Commercial Glass Door Refrigerators > 50 Cu Ft	3	\$ 750	0.4	4164
ENERGY STAR Commercial Glass Door Refrigerators 30-50 Cu Ft	2	\$ 300	0.2	1987
ENERGY STAR Ice Machines < 500 lbs Per Day	2	\$ 100	0.1	976
ENERGY STAR Ice Machines 500 - 1000 lbs Per Day	1	\$ 200	0.2	2121
ES Commercial Dishwasher (Electric Water Heat / Elec Boost) - Door Type	1	\$ 500	1.5	13530
Lighting New Construction	79	\$ 474	1.5	7552
LED Troffer 3000 - 5799 Lumens	79	\$ 474	1.5	7552
Lighting Retrofit	3859	\$ 62,025	230.7	1181221
4 Ft. LED Linear Lamps Repl T12 Fluorescent	801	\$ 4,806	13.3	68755
4 Ft. LED Linear Lamps Repl T8 Fluorescent	2314	\$ 6,942	28.3	151619
Custom - Lighting	0	\$ 40,846	146.1	668302

LED ENERGY STAR Screw-In Lamp < 600 Lumens	6	\$ 36	0.2	935
LED ENERGY STAR Screw-In Lamp >= 600 Lumens	235	\$ 1,589	9.5	46580
LED Exit Sign	8	\$ 96	0.3	1838
LED High Bay Fixture-Mounted Occ. Sensor	18	\$ 180	0.7	5491
LED Recessed Downlight	428	\$ 6,650	28.1	210940
LED Screw-In Flood/Reflector Lamp >= 420 Lumens	24	\$ 120	1.3	6720
Occupancy Sensor Under 500 W Controlled	21	\$ 420	1.8	14030
T8 High-Bay Fixtures Repl Specific Watt HID 4 Ft. 6-Lamp 400-749 W	4	\$ 340	1.1	6011
Residential Energy Star Products	8379	\$ 17,281	41.4	352265
ENERGY STAR Clothes Dryer (Electric)	7	\$ 285	0.2	1279
ENERGY STAR Clothes Washer W/ Elec WH and Elec Dryer	9	\$ 300	0.2	1782
ENERGY STAR Dehumidifier	3	\$ 75	0.1	599
ENERGY STAR Refrigerator No Recycling	40	\$ 815	0.6	5030
ENERGY STAR Refrigerator With Recycling	4	\$ 200	0.2	1620
Energy Star Room AC	37	\$ 925	2.1	1308
Lighting Equipment LED Lamps	7608	\$ 12,167	34.2	306633
Lighting Equipment LED Lamps EStar	80	\$ 160	0.4	3224
Lighting Equipment LED Recessed Can	586	\$ 2,344	3.4	30531
Lighting Equipment LED Recessed Can EStar	5	\$ 10	0.0	261
Residential HVAC	2	\$ 500	0.7	13048
Mini-Split / Ductless Air Source Heat Pump	2	\$ 500	0.7	13048
Grand Total	26281	\$ 438,708	1394.9	7544230

Appendix 2 – Valley City Resolution

RESOLUTION NO. 2213

RESOLUTION APPROVING UPDATED INTEGRATED RESOURCE PLAN SUMMARY REPORT

WHEREAS, the City of Valley City through Valley City Public Works purchases a significant portion of its power supply from Western Area Power Administration (WAPA); and

WHEREAS, WAPA publishes Energy Planning and Management Program Rules specifying the requirements for preparing and filing an Integrated Resource Plan (IRP); and

WHEREAS, Missouri River Energy Services (MRES) and Valley City Public Works staff have prepared an IRP Summary Report describing the IRP process used and the information and assumptions used to develop the IRP; and

WHEREAS, Valley City Public Works customers were informed of our IRP and resulting action plans through various means including a public hearing where public comments and questions were encouraged; and

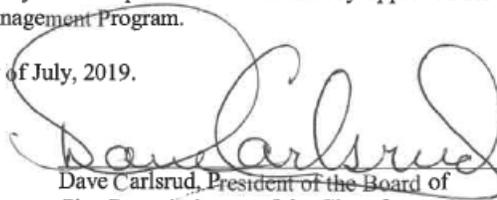
WHEREAS, any public comments received have been addressed in order to strengthen the city's IRP; and

WHEREAS, the City of Valley City approved its initial IRP on August 15, 2014, and is required to submit an updated IRP every five years pursuant to the program rules; and

WHEREAS, the updated IRP includes resource plan goals and action plans for the efficient distribution of power to customers of Valley City Public Works.

NOW THEREFORE BE IT RESOLVED BY THE BOARD OF CITY COMMISSIONERS OF THE CITY OF VALLEY CITY, BARNES COUNTY, NORTH DAKOTA, that the Integrated Resource Plan Summary Report for the City of Valley City dated September 2019 is hereby approved for filing with WAPA under the Energy Planning and Management Program.

Passed, adopted and approved this 16th day of July, 2019.



Dave Carlsrud, President of the Board of
City Commissioners of the City of
Valley City, Barnes County, North Dakota

ATTEST:



Avis Richter, Auditor of the City of
Valley City, Barnes County, North Dakota