Integrated Resource Plan

Prepared for

Grand Island Utilities Department
Grand Island, Nebraska

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Introduction

In 1995, Western Area Power Administration (Western) instituted a program called the Energy Planning and Management Program (EPAMP). The EPAMP includes a provision that requires its customers to prepare and submit an Integrated Resource Plan (IRP) to Western to maintain their current allocations of power and energy it receives from Western. This IRP is intended to meet the requirements of the EPAMP.

The Grand Island Utilities Department (GIUD) is responsible for serving the City of Grand Island, Nebraska (City), and nearby areas with electricity and water services. The purpose of this IRP is to develop two- and five-year supply-side resource and demand side management (DSM) measures to serve the City's power supply requirements at the lowest reasonable cost consistent with prudent financial and technical principles.

Overview of Past IRPs

This is the sixth IRP that has submitted by GIUD to Western since the EPAMP was implemented in 1995. The most recent IRP was submitted in 2017. Among the key findings in that report were:

1. No additional capacity was needed until beyond 2034 (the end of the study period).
2. Because GIUD has abundant excess capacity and regional market prices are relatively low, the demand side measure evaluated were not cost effective.

Approach to 2022 IRP

The 2022 IRP was prepared by completing the tasks required by the EPAMP. This approach is consistent with prior IRPs submitted by GIUD. The tasks completed to prepare this IRP are summarized below:

- Prepared GIUD's peak demand and energy requirements forecast.
- Compared forecasted peak demand and energy requirements to existing power supply resources to estimate future resource needs.
- Reviewed power supply resource options, including necessary transmission facilities, to identify economical resources to include in the integration analysis.
- Identified potential DSM measures and assessed their economic and technical feasibility.
- Integrated DSM measures with supply resources to develop preferred plan.
- Considered environmental impacts and costs of each IRP option.
- Developed two-year and five-year action plans.
- Solicited public participation and incorporated comments into the IRP.

Goals and Objectives

GIUD's goals are to provide reliable service to its customers at low rates and ensure there is sufficient capacity for future growth and development. To achieve these goals, GIUD focused on the following objectives when developing the 2022 IRP:

- Ensure adequate capacity resources to serve projected loads, including SPP-required planning reserves.

- Ensure adequate low-cost energy is available to mitigate risks associated with the SPP Integrated Marketplace, particularly during events like the February 2021 Winter Weather Event.
- Maintain rates that are competitive with neighboring utilities.
- Maintain financial and rate stability.

Overview of Utility Profile

GIUD is a not-for-profit municipally-owned electric utility located in central Nebraska. Retail sales in 2021 were approximately 705,000 MWh and the electric customers were segmented into the following customer classes:

Table 1
2021 Retail Customer Data

Customer Class	Number of Customers	Energy Sales (MWh)
Residential	21,700	222,260
Commercial	5,850	184,188
Large Power	95	298,467
TOTAL	**27,645**	**704,915**

In 2021, GIUD had a system peak of 162 MW and annual energy usage of 743,275 MWh (including distribution losses), representing an annual load factor of 52%. The system peak typically occurs during the summer season and is driven largely by air conditioning load. The system load factor is somewhat above average for municipal utilities in Nebraska. There are several high load factor industrial customers on the system that help improve the system load factor.

Load Forecast

Introduction

Since 2010, annual energy sales have been essentially flat. The forecast is presented in Table 2 (see page 5). In recent years, most peak demand and energy fluctuation is related to weather patterns and specific events, such as changes associated with individual large customers, or the impact seen in 2020 with the COVID-19 pandemic.

A weather-normalized energy forecast was developed. Historical data for cooling and heating degree days was compiled and a normalized forecast was developed. Between 2010 and 2020, the population of the City grew by approximately 9%; however, growth that would normally be caused by population growth was offset by changes in the customer base, energy conservation resulting from changes in energy efficiency standards for appliances and heating/cooling equipment, and other factors such as replacement of street lighting with high-efficiency LED fixtures. The generally flat load growth projection is typical of utilities in the upper Midwest in recent years.

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Table 2
Historical and Projected Demand and Energy Requirements

Year	Net System Peak MW	Percent Change	Net System Energy MWh	Percent Change	Load Factor %
2007	160		718,974		51%
2008	152	-4.89%	724,922	0.83%	55%
2009	154	1.19%	714,788	-1.40%	53%
2010	166	8.14%	744,672	4.18%	51%
2011	168	1.08%	749,417	0.64%	51%
2012	171	1.67%	763,967	1.94%	51%
2013	161	-5.68%	760,298	-0.48%	54%
2014	162	0.62%	758,979	-0.17%	53%
2015	158	-2.47%	745,207	-1.81%	54%
2016	170	7.59%	757,718	1.68%	51%
2017	162	-4.59%	759,591	0.25%	53%
2018	165	1.54%	784,114	3.23%	54%
2019	161	-2.19%	750,187	-4.33%	53%
2020	153	-5.28%	734,425	-2.10%	55%
2021	162	6.03%	743,275	1.21%	52%
2022	162	0.01%	743,366	0.01%	52%
2023	162	0.03%	743,593	0.03%	52%
2024	162	0.03%	743,820	0.03%	52%
2025	162	0.03%	744,047	0.03%	52%
2026	162	0.03%	744,274	0.03%	52%
2027	162	0.03%	744,501	0.03%	52%
2028	162	0.03%	744,727	0.03%	52%
2029	162	0.03%	744,954	0.03%	52%
2030	162	0.03%	745,181	0.03%	52%
2031	162	0.03%	745,408	0.03%	52%

Note: Projected peak demand was rounded to nearest 1 MW for this table.

Supply Side Resources

Table 3 reflects GIUD's existing supply side resources.

Table 3
Existing Capacity Resources with Associated Energy Production

Source	In-Service	Primary Fuel	Capacity (MW)	FY 2021 Energy (MWh)
Platte Generating Station	1982	Coal	100.0	375,301
Burdick Station Combustion Turbine 1	1968	Natural Gas	13.0	1,304
Burdick Station Combustion Turbine 2	2003	Natural Gas	34.0	1,107
Burdick Station Combustion Turbine 3	2003	Natural Gas	34.0	2,788
Nebraska City Unit 2	2009	Coal	33.0	202,315
Whelan Energy Center 2	2011	Coal	15.0	54,289
Western Area Power Administration	1991	Hydro	9.0	33,694
Ainsworth Wind Farm	2005	Wind	1.0	1,595
Elkhorn Ridge Wind Farm	2009	Wind	1.0	1,989
Laredo Ridge Wind Farm (1)	2011	Wind	1.0	2,627
Broken Bow Wind Farm (1)	2012	Wind	1.0	3,606
Prairie Breeze III Wind Farm (1)	2015	Wind	26.8	95,693
Sub E Solar Farm	2018	Solar	1.0	2,026
TOTAL			269.8	778,334

Notes:
(1) Nameplate capacity. These projects do not provide accredited capacity.

- Platte Generating Station (PGS). PGS was placed into commercial service in 1982 and is the largest single source of electrical energy for the electric system. PGS is a 100 MW coal-fired, sub-critical steam unit that is typically operated in baseload fashion. PGS is offered into the SPP market and is typically operated at a high capacity factor during summer and winter seasons. In recent years, the capacity factor has decreased as increasing amounts of wind are added to the broader SPP region.

- Burdick Station. Burdick Station consists of three gas turbine generators with total accredited capacity site capacity of 81 MW. Unit 1 is a 13 MW simple cycle combustion turbine that was placed into commercial service in 1968. Units 2 and 3 are 34 MW simple cycle combustion turbines that were placed into commercial service in

2003. Burdick Station is dispatched by the SPP market in a peaking fashion, with quick-start capability of the units being increasingly utilized in recent years to follow load during periods of changes in wind generation in the broader region.

In the 2017 IRP, GIUD showed the continued operation of one steam unit at Burdick Station with a total rated capability of 54 MW. That unit has since been retired. Two other steam units at Burdick Station were retired in 2015. The reasons for retiring those units included low utilization in the SPP Integrated Marketplace, relatively high non-fuel fixed and variable operating costs, the age of the generating units, and the fact those units were not needed to meet resource adequacy requirements.

- Nebraska City Unit 2 (NC 2). GIUD purchases approximately 33 MW of capacity and 34 MW of energy from Omaha Public Power District's (OPPD) NC 2, a 660 MW sub-critical coal-fired steam generating unit located near Nebraska City, Nebraska. This generating unit was placed into commercial service in 2009. The capacity allocation is less than the energy allocation because GIUD has not procured firm transmission for the full 34 MW so it cannot claim the full 34 MW share as capacity for resource adequacy purposes.

- Whelan Energy Center Unit 2 (WEC 2). In 2011, GIUD began receiving 15 MW of power from the Public Power Generation Agency's (PPGA) WEC 2. This unit is a 220 MW coal-fired sub-critical steam unit located in Hastings, Nebraska. This unit is dispatched in a baseload fashion by the SPP region, though in recent years the capacity factor has decreased, particularly in the spring and fall seasons.

- Western. Under a long-term purchase power arrangement with Western, GIUD purchases a maximum of 9 MW of hydro capacity and energy in the summer and a

minimum of 5 MW in the winter. Firm transmission service has been secured to deliver this capacity and energy to the GIUD system. The agreement with Western expires in 2050. This resource is firm and includes planning reserves.

- Wind and Solar. GIUD purchases wind and solar energy participation from several projects located in Nebraska. Wind energy purchases include:

  Ainsworth Wind Energy Farm: This wind farm was constructed in 2005 and consists of 36 1.65 MW turbines for a total project output of 59.4 MW. GIUD has a 1 MW participation level in the Ainsworth project. This joint project is operated by Nebraska Public Power District (NPPD) and includes participation by OPPD, the Municipal Energy Agency of Nebraska, GIUD and JEA of Jacksonville, Florida.

  Elkhorn Ridge Wind, LLC: Elkhorn Ridge is an 80 MW wind farm located near the town of Bloomfield, Nebraska. It consists of 27 3 MW turbines. It began commercial operation in January 2009. Unlike the Ainsworth project, Elkhorn Ridge is a privately-owned facility. NPPD entered into a power purchase agreement with Elkhorn Ridge to purchase all power produced by the facility. GIUD then signed a power sales agreement with NPPD to purchase a 1 MW share of the power produced at Elkhorn Ridge.

  Laredo Ridge Wind, LLC: Laredo Ridge Wind is an 80 MW wind farm located near the town of Petersburg in northeast Nebraska. It consists of 54 1.5 MW turbines. It began commercial operation in February 2011. Like Elkhorn Ridge, Laredo Ridge is a privately-owned facility. NPPD entered into a power purchase agreement with Laredo Ridge to purchase all power produced by the facility. GIUD then signed a power sales agreement with NPPD to purchase a 1 MW share of the power produced at Laredo Ridge.

  Broken Bow Wind, LLC: Broken Bow Wind is an 80 MW wind farm located near the city of Broken Bow, Nebraska. It consists of 50 1.6 MW turbines. It began commercial operation in December 2021. Like Elkhorn Ridge and Laredo Ridge, Broken Bow Wind is a privately-owned facility. NPPD entered into a power purchase agreement with Broken Bow Wind to purchase all power produced by the facility. GIUD signed a power sales agreement with NPPD to purchase a 1 MW share of the power produced at Broken Bow Wind.

  Prairie Breeze III: This project is a privately-owned wind farm located near the town of Elgin in north central Nebraska. The wind farm consists of 20 1.7 MW turbines. Commercial operation began in 2016. GIUD entered into a power purchase agreement directly with the developer. Since that agreement was approved, subsequent sub-lease agreements for off-take have been signed with

the City of Nebraska City for 7 MW and the City of Neligh for 2 MW, leaving GIUD with 26.8 MW.

Solar: A solar energy project was developed on the GIUD distribution system and began operation in late 2018. GIUD purchases 1 MW of solar power from the privately-owned facility.

Transmission and Distribution

GIUD's transmission system consists of several looped 115 kV transmission lines providing service to nine substations. GIUD has 115 kV transmission lines transmitting power to the distribution system throughout the City. GIUD has a looped system with five connections between four of the utilities substations and the regional transmission system. GIUD is directly interconnected to the NPPD transmission system. Transmission service over the NPPD system is primarily governed by transmission service agreements executed prior to NPPD joining the SPP. Transmission service entered into subsequent to 2009 is governed by the SPP Open Access Transmission Tariff (OATT).

GIUD's Overhead Division, part of the Transmission and Distribution Department, is responsible for the operation and maintenance of existing overhead lines as well as the construction of new overhead lines. The primary distribution system voltage is a 13.8 kV wye configuration. As of September 30, 2018, GIUD's distribution system has approximately 388 miles of overhead distribution.

GIUD's Underground Division, also part of the Transmission and Distribution Department, is responsible for the operation and maintenance of underground distribution facilities. GIUD routinely evaluates the feasibility of replacing overhead lines with underground lines to improve reliability and reduce long-term maintenance costs. Distribution facilities associated with new services are almost always installed

underground. As of September 30, 2018, GIUD's distribution system has approximately 172 miles of underground distribution lines.

Engineering and other information systems are used to ensure that the distribution system is planned in a manner consistent with good utility practice. GIUD uses a distribution feeder modeling system to assess the adequacy of its distribution system and identify areas where upgrades or new capacitor banks may be necessary. A geographic information system (GIS) is also employed to identify the location of distribution feeders, transformers, and other equipment.

Comparison of Loads and Resources

Peak demand and energy usage is projected to remain stable through 2031, excluding the impact of any large load additions in the local industrial park. Table 4 (see page 11) compares GIUD's existing and committed capacity resources to the projected capacity requirements. Table 4 is based on SPP's resource adequacy policy that requires a reserve margin of 12% for load not served by firm resources (Western).

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Table 4
Projected Capacity Requirements and Resources
Grand Island Utilities Department
(MW)

Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Peak Demand	162	162	162	162	162	162	162	162	162	162	162
Transmission Losses (1)	-	-	-	-	-	-	-	-	-	-	-
Total System Demand + Losses	162	162	162	162	162	162	162	162	162	162	162
Capacity Sales	0	7	7	0	0	0	0	0	0	0	0
Reserves (2)	18	18	18	18	18	18	18	18	18	18	18
Total Capacity Requirements	180	187	187	180	180	180	180	180	180	180	180
Firm Purchase											
Western Area Power Administration	9	9	9	9	9	9	9	9	9	9	9
Generation Resources											
Platte Generating Station	100	100	100	100	100	100	100	100	100	100	100
Burdick Station GT-1	14	14	14	14	14	14	14	14	14	14	14
Burdick Station GT-2	34	34	34	34	34	34	34	34	34	34	34
Burdick Station GT-3	34	34	34	34	34	34	34	34	34	34	34
Prairie Breeze III (3)	7	7	7	7	7	7	7	7	7	7	7
Capacity Purchases											
Nebraska City Unit 2	33	33	33	33	33	33	33	33	33	33	33
Whelan Energy Center Unit 2	15	15	15	15	15	15	15	15	15	15	15
Total Capacity Resources	246	246	246	246	246	246	246	246	246	246	246
Surplus / (Deficit)	65	58	58	65	65	65	65	65	65	65	65

Note:
(1) Transmission losses not applicable. All resources are delivered amounts to GIUD system.
(2) 12% of system demand not served by firm resources (Western).
(3) Summer-only capacity. GIUD does not have firm transmission to deliver Praire Breeze III so it can only be used to meet the 12% reserve requirement.

Based on the Projected Capacity Requirements and Resources, GIUD has sufficient capacity resources through 2031. If all existing generating capacity were kept in service, surplus capacity of 58 MW would be available through 2031.

Table 5 (see page 12) compares projected energy requirements to existing energy resources. In general, NC 2, WEC 2, Western and local generation provide sufficient energy to hedge most of the City's energy requirements. Without a significant load addition, there is sufficient energy available from existing resources. In 2021, having excess energy available from resources with on-site fuel storage enabled GIUD to make it through the February 2021 Winter Weather Event without adverse economic impacts.

Table 5
Projected Energy Requirements and Resources
Grand Island Utilities Department
(GWh)

Description	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Energy For Native Load (1)	743	743	743	743	743	743	743	743	743	743	743
Off-System Sales (2)	-	-	-	-	-	-	-	-	-	-	-
Total Energy Requirements	743	743	743	743	743	743	743	743	743	743	743
Energy Resources (3)											
Platte GS	745	745	745	745	745	745	745	745	745	745	745
Burdick GS	5	5	5	5	5	5	5	5	5	5	5
NC 2	231	231	231	231	231	231	231	231	231	231	231
Whelan 2	105	105	105	105	105	105	105	105	105	105	105
WAPA Billings	34	34	34	34	34	34	34	34	34	34	34
Wind	106	106	106	106	106	106	106	106	106	106	106
Solar	2	2	2	2	2	2	2	2	2	2	2
Total Energy Resources	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,227
Surplus / (Deficit)	484	484	484	484	484	484	484	484	484	484	484

Note:
(1) Includes transmission and distribution losses.
(2) Includes only committed energy sales; does not include SPP Integrated Marketplace transactions.
(3) Potential energy production using 80% capacity factor for coal and actual production for other resources. Excludes SPP Integrated Marketplace transactions.

Future Supply Side Resources

Since GIUD has sufficient capacity and energy resources, there was no need to complete an analysis of additional power supply options. Provided there is no significant change in loads from industrial growth, GIUD should not need to construct or procure additional capacity resources throughout the next 10 years. One action that may be taken is to sell short-term excess capacity to other SPP load-responsible entities since there will be significant excess capacity through 2031. There is a limited market for capacity-only products since there is a region-wide surplus of capacity; however, it may be possible to sell capacity to neighboring utilities that may have capacity needs. By selling capacity short-term, the capacity can be recalled to serve significant load growth or if there is a long-term outage of a particular resource.

GIUD regularly prepares technical assessments of its generating units, including assessments of useful life, expected capital improvement needs, and potential compliance requirements under existing and potential environmental regulations. These assessments are completed as circumstances dictate and their completion schedules do not always correspond to the required schedules for the completion of the Western IRP. As an example, the decision to retire Burdick Steam Unit 3 was made between IRPs based on a condition assessment of the generating unit and an economic assessment that considered operating costs and the value of the generator in the SPP Integrated Marketplace. While that generator retirement was not explicitly recommended in the IRP, it was consistent with the findings of the 2017 IRP that showed GIUD had excess capacity and sufficient energy resources without relying on the Burdick steam unit.

GIUD will continue to prepare technical assessments of generating units as necessary in the future. To the extent resource decisions are made outside the normal IRP process, those decisions will be consistent with the findings of the IRP process.

Renewable Resources

GIUD purchases renewable energy from five different wind energy projects and one solar project. In 2021, over 107,000 MWh of energy was produced from these six projects and represented 14.8% of the total energy production from GIUD's resource mix. GIUD is not required to meet a renewable portfolio standard and has undertaken these purchases voluntarily. Under Nebraska law, the City has developed a net metering rate schedule. There has been limited interest on the part of retail customers to participate in net metering, with a total of 10 net metering customers. With no identified resource deficit,

any additional renewable energy purchases in the next five years will be undertaken based on an economic assessment and not to meet any specific resource need.

Conclusions – Supply-Side Resources

Based on the analyses completed, the following conclusions and recommendations were reached regarding supply-side resources:

1. GIUD has sufficient resources to meet its capacity and energy needs for the foreseeable future.
2. Short-term capacity sales may provide some economic benefits without affecting GIUD's ability to meet its resource adequacy requirements under the SPP OATT.
3. Periodic engineering and economic assessments of generating resources have occurred between IRP cycles, based on an identified technical or economic need. GIUD has undertaken purchases of renewable energy and retirement of generating units as a result of these reviews. These decisions have been consistent with the findings of prior IRPs.

Demand Side Analysis

Existing Programs

Historically, GIUD has implemented limited active DSM measures. The low cost of GIUD's resource mix and low market prices in the SPP Integrated Marketplace are the key reasons why DSM measures have not been economically viable. The primary measure that was implemented was to convert street lighting fixtures from metal halide, mercury vapor or high-pressure sodium lighting to LED fixtures. This program has proven

to be cost-effective and has reduced energy usage by approximately 30,000 kWh per year based on the most recent IRP annual report to Western. GIUD also provides links to energy cost calculators, appliance energy usage calculators, and other energy efficiency information on the City's website.

One other key activity that has been recently undertaken is the implementation of a project to replace its customer information system (CIS). This system was installed in 2015 and is no longer supported in full by the vendor. With the upgrade, the new platform should seamlessly integrate with the Landis+Gyr Command Center, which will be used to collect from GIUD's Advanced Metering Infrastructure (AMI) system. The new system will facilitate time of day billing in the future. Additionally, as part of the request for proposals, GIUD is taking proposals for a Meter Data Management system. Amongst operational and analytical benefits, this platform will also allow customers real-time information regarding their usage.

Review of Load Shape Objectives

The Electric Power Research Institute (EPRI) developed six industry accepted load shape objectives:

1. Strategic Load Growth – involves promoting increased loads in all hours for utilities with surplus capacity for all periods of the year.
2. Peak Clipping – the reduction of system peak loads in order to reduce the reliance on peaking units with high fuel costs. Air conditioning load cycling is an example of a peak clipping program.
3. Strategic Conservation – directed at reducing end-use consumption through the conservation of energy and environmental resources. Strategic

conservation has a levelized effect on end-use consumption; thus, has a minimal effect on peak load. An example of strategic conservation is an appliance efficiency program.

4. Valley Filling – a load management program that involves increasing off-peak loads. Street lighting is an example of a program that may build evening loads that are normally off-peak.
5. Load Shifting – involves shifting load from peak to off-peak periods. Irrigation load control and thermal energy storage systems are examples of load shifting.
6. Flexible Load Shape – involves modifying the load shape on short notice to meet demand requirements without modifying load during periods when it is not needed. Interruptible rates are an example of flexible load shape.

Based on GIUD's resources and load profile, the types of DSM most suitable are:

- Strategic conservation (summer season) to reduce end-use consumption during peak periods.
- Strategic load building (winter season) to build loads during periods of surplus capacity.
- Peak clipping (summer season) to reduce peaking energy needs.

Several of the DSM programs that were evaluated in past IRPs have been rendered obsolete by changes in energy efficiency standards at the federal level. In addition, GIUD has already commenced a program to convert its street lighting inventory from high-pressure sodium to LED fixtures at a cost of more than $100,000.

Implementation of the SPP Integrated Marketplace, decreasing natural gas prices and increasing development of wind energy resources have decreased energy prices in

the SPP Integrated Marketplace over the last five years. The marginal energy cost for GIUD in most periods is less than $20/MWh. These low market prices during most periods of the year have rendered a majority of the DSM programs unviable from an economic standpoint.

Screening Analysis

The screening analysis consisted of two steps:

1. Qualitative Screening. This step ranked the potential DSM measures according to subjective criteria, such as customer preference, market potential, and ease of implementation. A score was assigned to each DSM measure and the measures were ranked. This narrowed the list of measures to be economically evaluated.
2. Economic Feasibility. Avoided costs for capacity and energy were calculated in the supply side resource evaluation and used to calculate the costs and benefits of each DSM measure.

Qualitative Screening

The DSM technologies that satisfy GIUD's load shape objectives were reviewed by qualitative screening. The qualitative screening involved the use of six criteria to identify those technologies most relevant to GIUD's objectives. The criteria evaluated included:

1. Costs. Costs include start-up, marketing, and equipment.
2. Customer Preferences. A customer's acceptance of a technology is determined by such factors as the customer's cost perspective, comfort level with the technology, and willingness to use the measure.

3. Environmental Impacts. DSM technologies can postpone the need to add supply-side resources that emit pollutants into the environment, but some DSM measures also have environmental impacts. For example, hazardous waste disposal will be an issue when disposing old refrigerator compressors containing CFCs and old ballasts with PCBs.

4. Market Potential. In order for the program to realize its maximum potential, intended markets and end-uses must be identified.

5. Ease of Implementation. The success of a program is heavily dependent on the relative ease of implementation. Some programs may require the simple replacement of lights or appliances, while others require major changes in the building structure.

6. Availability. The DSM technology must be commercially available and reliable. Since GIUD has a relatively small utility staff, it would be difficult to manage a program with high administrative burdens.

All technologies were scored from 0 to 3 according to their ability to satisfy each of the preceding criteria. Those technologies with higher total scores were considered to be more successful in achieving GIUD's load shape objectives than those with lower scores. Tables 6 and 7 (see page 19) show the scores for each technology applicable to a particular customer class.

Table 6
Qualitative Screening
Residential Demand Side Measures

Technology Alternative	Cost	Customer Preference	Environmental Impact	Market Potential	Ease of Implementation	Commercial Availability/Reliability	Total
High Efficiency Air Conditioners	3	2	2	2	2	3	14
Whole-House Audits	2	3	2	3	2	2	14
Air Conditioning Load Cycling	3	1	2	3	2	3	14
Water Heater Load Shedding	3	2	2	2	2	3	14
HVAC Replacement Loans	3	1	3	2	2	2	13
Energy-Efficient New Home	2	2	3	1	2	2	12
Room Air Conditioner Rebates	1	2	2	1	1	2	9

Table 7
Qualitative Screening
Commercial/Industrial Demand Side Measures

Technology Alternative	Cost	Customer Preference	Environmental Impact	Market Potential	Ease of Implementation	Commercial Availability/Reliability	Total
High Efficiency Air Conditioners	2	3	3	2	2	2	14
HVAC Efficiency Improvement	2	3	3	2	2	2	14
Interruptible Rates	3	1	3	2	2	1	12
Customized Rebate Program	1	2	3	1	2	2	11
Process Improvement	1	1	2	1	2	2	9
Compressed Air Efficiency	1	2	2	1	1	2	9

All applicable technologies were ranked from high to low for each customer class. Any measure with a score greater than 10 was deemed to have passed the qualitative screening. Six residential measures and four commercial/industrial measures passed the qualitative screening and were assessed for economic feasibility.

Selected DSM Programs

The following DSM programs were selected through the screening analysis and assessed for economic feasibility.

1. Residential High Efficiency Central Air Conditioners. For customers needing to replace their existing air conditioner, this program would provide rebates or incentives. Rebates are typically applied provided that the unit design meets requirements of local housing codes and provides for a minimum SEER of 16, which is more efficient than current DOE established standards.
2. Residential Energy Audits. Energy efficient improvements, including additional insulation, reduction of infiltration, and full basement insulation, would be assessed by a trained energy audit specialist. Cost-effective energy efficiency measures would be identified for the homeowner.
3. Residential Central Air Conditioning Load Cycling. This DSM program requires the installation of a load-control device that will cycle off the air conditioner during summer peak load periods. The customer incentive is estimated to be $20/year with an average load reduction of .85 kW. This type of measure reduces peak energy consumption.
4. Residential Electric Water Heater Load Shedding. This measure would be implemented in conjunction with an air conditioning load cycling program and

would involve a customer incentive for customers to also have their electric water heater cycled off for periods of time during summer peak load hours.

5. Improved Home Loan Program for Furnace and Air Conditioning Replacement. This program would typically provide a loan subsidy to customers installing properly sized high-efficiency equipment. This would be achieved by GIUD providing loan funds or by making a payment directly to a third party (typically a local bank) granting the loan.

6. Energy-Efficient New Home (ENERGY STAR®). Customers would receive an incentive in the form of a rebate, rate discount or a loan subsidy from GIUD for building a new home that meets certain energy efficiency standards. This program requires a central air conditioner and furnace that are more efficient than DOE minimum standards and not oversized. This program also requires additional insulation beyond minimum codes, reduction of infiltration, and reduction of heat gain or loss.

7. Commercial High-Efficiency Air Conditioners. Small commercial customers would receive incentives for installing high-efficiency air conditioners when replacing their existing units. Examples of qualifying equipment are room air conditioners, packaged terminal units, rooftop units, and split systems.

8. Commercial HVAC Efficiency Improvement Program. Commercial and industrial customers with large cooling systems would be eligible for incentives, rebates or loans when they reduce their electrical energy consumption of their HVAC systems. Adding cooling towers, higher efficiency cooling equipment, and energy management controls are examples of eligible improvements.

9. Interruptible Rates. Large industrial customers would receive a credit for interrupting all or part of their load during summer peak periods when asked to do so by GIUD. The customer signs a contract before summer begins and is obligated to interrupt a certain amount of their load up to 10 times during a year for periods of eight hours or less.

10. Large Customer Customized Rebate Program. This program would provide incentives to commercial and industrial customers who save energy in ways that are not covered by other DSM programs. Examples of eligible energy-efficiency improvements include energy-efficient motors and energy management systems as long as the energy savings would be lasting.

Economic Evaluation

Once the technical data for each DSM measure was collected, an economic evaluation was completed. The projected annual cost for each measure was compared to the projected power cost savings to calculate the net present value of the cost or savings of each measure.

The following parameters were used in the economic evaluation:

- The evaluation was done on a system-wide basis, meaning the analysis evaluated system-wide installation of the given measure.
- Technical information for the measures was based on past experience, when possible. When information from past experience was not available, updated information from local vendors was collected.
- Avoided demand and energy costs from GIUD's existing supply side resources were used. The avoided capacity rate was $30/kW-year and the annual

avoided energy rate was $25/MWh. For measures where the predominant avoided energy would occur in the summer season, the avoided energy rate was $50/MWh. It was assumed that summer peak demand savings were used to make excess capacity available for sale, with the summer season being defined as June-September and the winter season as October-May.

- A discount rate of 4.5% was used.
- The Total Resource Cost test was used. This compared the total costs of the measure, including costs incurred by GIUD or the end-user, to the total cost savings realized by GIUD.

The economic evaluation considered the installation, operation and maintenance, and administrative and general expenses that would be incurred over the life of the measure. DSM expenses were compared to GIUD's avoided capacity and energy cost, and the net cost or savings to GIUD was calculated on an annual basis and discounted to 2022 dollars. Measures with a positive net present value were considered economically feasible.

A summary of the economic evaluations is shown in Tables 8 and 9 (see page 24). The analysis of each individual DSM measure is shown in Appendix A.

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Table 8
Impact of Demand Side Measures Alternatives - Residential

Impact of DSM Alternatives	Net Present Value 2022 $		
	5-Year	10-Year	Life
Air Conditioning Load Cycling	$ (244,017.58)	$ (214,483.96)	$ (183,196.47)
Water Heater Load Shedding	$ (182,285.80)	$ (186,909.57)	$ (190,501.08)
High Efficiency Air Conditioners	$ (574,806.17)	$ (478,111.32)	$ (304,481.62)
HVAC Replacement Loans	$ (155,081.92)	$ (170,608.04)	$ (191,555.54)
Whole-House Audits	$ (226,365.40)	$ (184,843.59)	$ (146,217.48)

Table 9
Impact of Demand Side Measures Alternatives - Commercial/Industrial

Impact of DSM Alternatives	Net Present Value 20122 $		
	5-Year	10-Year	Life
Interruptible Rates	$ (16,280.52)	$ (3,248.82)	$ (3,248.82)
High Efficiency Air Conditioners	$ (246,269.20)	$ (200,936.84)	$ (119,536.00)
HVAC Efficiency Improvement	$ (246,070.59)	$ (195,902.19)	$ (105,817.51)
Customized Rebate Program	$ (49,326.18)	$ (41,515.71)	$ (33,579.43)

It appears that none of the DSM measures evaluated are economically feasible at this time. Power supply costs in the SPP Integrated Marketplace are relatively low, eliminating many DSM measures that have been implemented in other regions. The completion of the LED street lighting conversion project will provide a significant reduction in energy usage by that sector. GIUD should continue low-cost DSM options, such as promoting energy efficiency via the City's website and customer newsletters.

Conclusions – Demand-Side Management

Based on the analyses completed, the following conclusions and recommendations were reached regarding demand-side management measures:

1. The existing LED streetlighting replacement project has provided energy savings and economic benefits.
2. GIUD offers low-cost energy efficiency information via the City's website.
3. Excess capacity and low marginal energy costs in the SPP Integrated Marketplace rendered the DSM measures that were evaluated to be uneconomical.
4. Replacement of the CIS system and implementation of a new Meter Data Management system may enable GIUD to offer time-of-day rates and other rate incentives to customers to reduce use in high cost and/or high usage periods.

Supply/Demand Side Resource Integration

Development of Integrated Resource Plan

The only DSM measure that was integrated with the resource plan was LED street lighting. The estimated reduction in energy usage was built into the forecast. Because the city peaks in the summer season, the LED street lighting program will have no impact on the forecast peak demand. The preferred plan includes existing supply-side resources as noted in the supply-side resource section. GIUD will continue to provide information via the City's website, including rate calculators, energy usage information for appliances and energy efficiency information.

Implementation of the new CIS system is also included in GIUD's capital budget going forward, but will likely have minimal impact on energy usage over the five-year action plan period. This measure may enable GIUD to offer time-of-use rates or other rate incentives in the future.

Preferred Alternative

Based on the analyses prepared, it appears GIUD should take the following steps:

- Maintain existing generating capacity.
- Consider short-term sales of excess capacity.
- Complete LED street lighting conversion.
- Continue offering energy efficiency information via the City's website.
- Continue implementation of the new CIS and Meter Data Management system.

Environmental Impact

GIUD complies with all applicable provisions of the State and Federal environmental regulations at its power plant and substation facilities. Proposed projects would include emissions control technology as required to help reduce environmental impacts. Encouraging DSM through no cost or low cost methods would reduce energy usage and emissions. Implementing energy audits would reduce future energy usage.

In 2021, GIUD purchased 108 GWh, or approximately 14%, of its energy from wind and solar generating facilities. Based on an estimated state-wide CO_2 emissions factor for Nebraska of 1,200 lbs/MWh, these renewable energy purchases resulted in a reduction in CO_2 emissions of approximately 58,800 metric tons.

Action Plans

To the extent that costs for power supply resources, DSM and transmission change, GIUD should review and modify this action plan accordingly. Based on the assumptions used, analyses completed, and conclusions reached in this study, the

following action plans are recommended. The plans outline near-term and longer-term recommendations.

Two-Year

- Maintain existing generating capacity.
- Consider short-term sales of excess capacity.
- Consider changes in resources, including additional renewable energy purchases, based on economic factors, engineering assessments of existing resources and customer interest.
- Complete LED street lighting conversion.
- Continue providing energy information via the City's website.
- Implement the planned CIS and Meter Data Management system.

Five-Year

- Continue actions from Two-Year action plan.
- Assess economic and technical feasibility of implementing time-of-day rates or other retail rate incentives with the new CIS system.

Public Participation

The solicitation of public participation is an integral part of the IRP process. GIUD has involved the public in developing the IRP and will continue to solicit public participation as it implements the IRP.

A draft of the IRP was presented to the Grand Island Utilities Department for review prior to being submitted to the City Council for approval. The IRP was presented to the City Council on April 12, 2022, for review and comment prior to being presented at a

public hearing on April 26, 2022. The purpose of the hearing was to provide information to and gather input from groups and individuals with an interest in GIUD's Integrated Resource Plan. Notice of the public hearing and the agenda (see Appendix B) were posted at the City office one week prior to the hearing and City Council meeting. At the conclusion of the public hearing, the City Council approved the IRP.

Validation of Predicted Performance

GIUD compares its load forecasts to actual usage on an annual and monthly basis. This comparison will be continually updated in the future. In addition, GIUD will continue to verify the effectiveness of demand side measures in its annual progress reports to this IRP.

Annual Progress Reports

GIUD has prepared annual progress reports as required by EPAMP and will continue to do so in the future using reporting forms provided by Western.

Appendix A: Economic Analysis of Demand Side Measures

DSM Program Name: High Efficiency Air Conditioners
Customer Class: Residential

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	0.60	-	
Annual Energy Usage			
Energy Savings (%)			0%
Energy Savings (kWh per unit)			500

Program Costs	Amount
Admin Cost (total $/year)	-
Capital Cost ($/unit)	1,250.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Annual Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	20
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Residential Customers	21700
Estimated Application Saturation	50%
Market Eligibility	5%
Feasibility	100%
Estimated Units	543

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-mon)	Annual Energy Charge ($/MWh)	Power Cost Savings ($)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	326	-	271,500	24.00	-	50.00	21,394.20	678,750.00	-	(657,355.80)	(657,355.80)
2023	326	-	271,500	24.72	-	51.50	22,036.03	-	-	22,036.03	21,087.11
2024	326	-	271,500	25.46	-	53.05	22,697.11	-	-	22,697.11	20,784.42
2025	326	-	271,500	26.23	-	54.64	23,378.02	-	-	23,378.02	20,486.08
2026	326	-	271,500	27.01	-	56.28	24,079.36	-	-	24,079.36	20,192.02
2027	326	-	271,500	27.82	-	57.96	24,801.74	-	-	24,801.74	19,902.18
2028	326	-	271,500	28.66	-	59.70	25,545.79	-	-	25,545.79	19,616.51
2029	326	-	271,500	29.52	-	61.49	26,312.17	-	-	26,312.17	19,334.93
2030	326	-	271,500	30.40	-	63.34	27,101.53	-	-	27,101.53	19,057.39
2031	326	-	271,500	31.31	-	65.24	27,914.58	-	-	27,914.58	18,783.84
2032	326	-	271,500	32.25	-	67.20	28,752.02	-	-	28,752.02	18,514.22
2033	326	-	271,500	33.22	-	69.21	29,614.58	-	-	29,614.58	18,248.46
2034	326	-	271,500	34.22	-	71.29	30,503.01	-	-	30,503.01	17,986.52
2035	326	-	271,500	35.24	-	73.43	31,418.10	-	-	31,418.10	17,728.35
2036	326	-	271,500	36.30	-	75.63	32,360.65	-	-	32,360.65	17,473.87
2037	326	-	271,500	37.39	-	77.90	33,331.47	-	-	33,331.47	17,223.05
2038	326	-	271,500	38.51	-	80.24	34,331.41	-	-	34,331.41	16,975.83
2039	326	-	271,500	39.67	-	82.64	35,361.35	-	-	35,361.35	16,732.16
2040	326	-	271,500	40.86	-	85.12	36,422.19	-	-	36,422.19	16,491.98
2041	326	-	271,500	42.08	-	87.68	37,514.86	-	-	37,514.86	16,255.26

NPV in 2022 $		
	Five Year	(574,806.17)
	Ten Year	(478,111.32)
	Life	(304,481.62)

DSM Program Name: Whole-House Audits
Customer Class: Residential

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	0.50	0.50	
Annual Energy Usage			
Energy Savings (%)			0%
Energy Savings (kWh per unit)			876

Program Costs	Amount
Admin Cost (total $/year)	-
Capital Cost ($/unit)	1,000.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Annual Energy Cost ($/MWh)	25.00
Rate Escalation (%/yr)	3.00%
Measure Life	15
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Residential Customers	21700
Estimated Application Saturation	50%
Market Eligibility	25%
Feasibility	10%
Estimated Units	271

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-mon)	Annual Energy Charge ($/MWh)	Power Cost Savings ($)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	136	136	237,396	24.00	-	25.00	9,186.90	271,000.00	-	(261,813.10)	(261,813.10)
2023	136	136	237,396	24.72	-	25.75	9,462.51	-	-	9,462.51	9,055.03
2024	136	136	237,396	25.46	-	26.52	9,746.38	-	-	9,746.38	8,925.05
2025	136	136	237,396	26.23	-	27.32	10,038.77	-	-	10,038.77	8,796.94
2026	136	136	237,396	27.01	-	28.14	10,339.94	-	-	10,339.94	8,670.67
2027	136	136	237,396	27.82	-	28.98	10,650.13	-	-	10,650.13	8,546.21
2028	136	136	237,396	28.66	-	29.85	10,969.64	-	-	10,969.64	8,423.54
2029	136	136	237,396	29.52	-	30.75	11,298.73	-	-	11,298.73	8,302.63
2030	136	136	237,396	30.40	-	31.67	11,637.69	-	-	11,637.69	8,183.45
2031	136	136	237,396	31.31	-	32.62	11,986.82	-	-	11,986.82	8,065.98
2032	136	136	237,396	32.25	-	33.60	12,346.43	-	-	12,346.43	7,950.21
2033	136	136	237,396	33.22	-	34.61	12,716.82	-	-	12,716.82	7,836.09
2034	136	136	237,396	34.22	-	35.64	13,098.32	-	-	13,098.32	7,723.61
2035	136	136	237,396	35.24	-	36.71	13,491.27	-	-	13,491.27	7,612.74
2036	136	136	237,396	36.30	-	37.81	13,896.01	-	-	13,896.01	7,503.47

NPV in 2022 $		
	Five Year	(226,365.40)
	Ten Year	(184,843.59)
	Life	(146,217.48)

DSM Program Name: Air Conditioning Load Cycling
Customer Class: Residential

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	0.85	-	
Annual Energy Usage			
Energy Savings (%)			0%
Energy Savings (kWh per unit)			-

Program Costs	Amount
Admin Cost (total $/year)	10,000.00
Capital Cost ($/unit)	125.00
Maintenance Cost ($/year/unit)	13.38
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Annual Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	15
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Residential Customers	21700
Estimated Application Saturation	50%
Market Eligibility	40%
Feasibility	50%
Estimated Units	2170

Year	Summer Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-mon)	Annual Energy Charge ($/MWh)	Power Cost Savings ($)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	1,845	-	24.00	-	50.00	44,268.00	271,250.00	39,034.60	(266,016.60)	(266,016.60)
2023	1,845	-	24.72	-	51.50	45,596.04	-	40,010.47	5,585.58	5,345.05
2024	1,845	-	25.46	-	53.05	46,963.92	-	41,010.73	5,953.19	5,451.52
2025	1,845	-	26.23	-	54.64	48,372.84	-	42,035.99	6,336.84	5,552.95
2026	1,845	-	27.01	-	56.28	49,824.02	-	43,086.89	6,737.13	5,649.50
2027	1,845	-	27.82	-	57.96	51,318.74	-	44,164.07	7,154.68	5,741.28
2028	1,845	-	28.66	-	59.70	52,858.31	-	45,268.17	7,590.14	5,828.43
2029	1,845	-	29.52	-	61.49	54,444.06	-	46,399.87	8,044.18	5,911.09
2030	1,845	-	30.40	-	63.34	56,077.38	-	47,559.87	8,517.51	5,989.39
2031	1,845	-	31.31	-	65.24	57,759.70	-	48,748.87	9,010.83	6,063.43
2032	1,845	-	32.25	-	67.20	59,492.49	-	49,967.59	9,524.90	6,133.35
2033	1,845	-	33.22	-	69.21	61,277.26	-	51,216.78	10,060.49	6,199.26
2034	1,845	-	34.22	-	71.29	63,115.58	-	52,497.20	10,618.39	6,261.28
2035	1,845	-	35.24	-	73.43	65,009.05	-	53,809.63	11,199.42	6,319.52
2036	1,845	-	36.30	-	75.63	66,959.32	-	55,154.87	11,804.45	6,374.08

NPV in 2022 $		
	Five Year	(244,017.58)
	Ten Year	(214,483.96)
	Life	(183,196.47)

DSM Program Name: Water Heater Load Shedding
Customer Class: Residential

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	0.45	-	
Annual Energy Usage			
Energy Savings (%)			0%
Energy Savings (kWh per unit)			5

Program Costs	Amount
Admin Cost (total $/year)	-
Capital Cost ($/unit)	325.00
Maintenance Cost ($/year/unit)	13.38
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Annual Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	15
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Residential Customers	21700
Estimated Application Saturation	5%
Market Eligibility	50%
Feasibility	100%
Estimated Units	543

Year	Summer Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-mon)	Annual Energy Charge ($/MWh)	Power Cost Savings ($)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	244	2,715	24.00	-	50.00	6,000.15	176,475.00	7,265.34	(177,740.19)	(177,740.19)
2023	244	2,715	24.72	-	51.50	6,180.15	-	7,446.97	(1,266.82)	(1,212.27)
2024	244	2,715	25.46	-	53.05	6,365.56	-	7,633.15	(1,267.59)	(1,160.77)
2025	244	2,715	26.23	-	54.64	6,556.53	-	7,823.98	(1,267.45)	(1,110.66)
2026	244	2,715	27.01	-	56.28	6,753.22	-	8,019.58	(1,266.35)	(1,061.92)
2027	244	2,715	27.82	-	57.96	6,955.82	-	8,220.07	(1,264.25)	(1,014.50)
2028	244	2,715	28.66	-	59.70	7,164.49	-	8,425.57	(1,261.07)	(968.37)
2029	244	2,715	29.52	-	61.49	7,379.43	-	8,636.21	(1,256.78)	(923.52)
2030	244	2,715	30.40	-	63.34	7,600.81	-	8,852.11	(1,251.30)	(879.90)
2031	244	2,715	31.31	-	65.24	7,828.83	-	9,073.41	(1,244.58)	(837.48)
2032	244	2,715	32.25	-	67.20	8,063.70	-	9,300.25	(1,236.55)	(796.25)
2033	244	2,715	33.22	-	69.21	8,305.61	-	9,532.76	(1,227.14)	(756.17)
2034	244	2,715	34.22	-	71.29	8,554.78	-	9,771.07	(1,216.30)	(717.21)
2035	244	2,715	35.24	-	73.43	8,811.42	-	10,015.35	(1,203.93)	(679.34)
2036	244	2,715	36.30	-	75.63	9,075.77	-	10,265.74	(1,189.97)	(642.55)

NPV in 2022 $		
	Five Year	(182,285.80)
	Ten Year	(186,909.57)
	Life	(190,501.08)

DSM Program Name: HVAC Replacement Loans
Customer Class: Residential

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	1.00	1.00	
Annual Energy Usage			
Energy Savings (%)			0%
Energy Savings (kWh per unit)			1,500

Program Costs	Amount
Admin Cost (total $/year)	25,000.00
Capital Cost ($/unit)	500.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Annual Energy Cost ($/MWh)	35.00
Rate Escalation (%/yr)	3.00%
Measure Life	20
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Residential Customers	21700
Estimated Application Saturation	100%
Market Eligibility	5%
Feasibility	25%
Estimated Units	271

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-mon)	Annual Energy Charge ($/MWh)	Power Cost Savings ($)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	271	271	406,500	24.00	-	35.00	20,731.50	135,500.00	25,000.00	(139,768.50)	(139,768.50)
2023	271	271	406,500	24.72	-	36.05	21,353.45	-	25,625.00	(4,271.55)	(4,087.61)
2024	271	271	406,500	25.46	-	37.13	21,994.05	-	26,265.63	(4,271.58)	(3,911.61)
2025	271	271	406,500	26.23	-	38.25	22,653.87	-	26,922.27	(4,268.40)	(3,740.38)
2026	271	271	406,500	27.01	-	39.39	23,333.49	-	27,595.32	(4,261.84)	(3,573.81)
2027	271	271	406,500	27.82	-	40.57	24,033.49	-	28,285.21	(4,251.71)	(3,411.79)
2028	271	271	406,500	28.66	-	41.79	24,754.50	-	28,992.34	(4,237.84)	(3,254.22)
2029	271	271	406,500	29.52	-	43.05	25,497.13	-	29,717.14	(4,220.01)	(3,100.99)
2030	271	271	406,500	30.40	-	44.34	26,262.04	-	30,460.07	(4,198.03)	(2,951.99)
2031	271	271	406,500	31.31	-	45.67	27,049.91	-	31,221.57	(4,171.67)	(2,807.13)
2032	271	271	406,500	32.25	-	47.04	27,861.40	-	32,002.11	(4,140.71)	(2,666.32)
2033	271	271	406,500	33.22	-	48.45	28,697.24	-	32,802.17	(4,104.92)	(2,529.45)
2034	271	271	406,500	34.22	-	49.90	29,558.16	-	33,622.22	(4,064.06)	(2,396.43)
2035	271	271	406,500	35.24	-	51.40	30,444.91	-	34,462.78	(4,017.87)	(2,267.17)
2036	271	271	406,500	36.30	-	52.94	31,358.25	-	35,324.35	(3,966.09)	(2,141.58)
2037	271	271	406,500	37.39	-	54.53	32,299.00	-	36,207.45	(3,908.45)	(2,019.58)
2038	271	271	406,500	38.51	-	56.16	33,267.97	-	37,112.64	(3,844.67)	(1,901.07)
2039	271	271	406,500	39.67	-	57.85	34,266.01	-	38,040.46	(3,774.45)	(1,785.98)
2040	271	271	406,500	40.86	-	59.59	35,293.99	-	38,991.47	(3,697.48)	(1,674.22)
2041	271	271	406,500	42.08	-	61.37	36,352.81	-	39,966.25	(3,613.44)	(1,565.71)

NPV in 2022 $		
	Five Year	(155,081.92)
	Ten Year	(170,608.04)
	Life	(191,555.54)

DSM Program Name: High Efficiency Air Conditioners
Customer Class: Commercial/Industrial

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	5	-	
Annual Energy Usage			
Energy Savings (%)			
Energy Savings (kWh per unit)			1,000

Program Costs	Amount
Admin Cost (total $/year)	-
Capital Cost ($/unit)	5,000.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Avoided Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	20
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Commercial/Industrial Customers	5,945.00
Estimated Appliance Saturation	100%
Market Eligibility	10%
Feasibility	10%
Estimated Units	59

Year	Summer Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-yr)	Annual Energy Charge ($/MWh)	Power Cost Savings ($/unit)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	295	59,000	24.00	-	50.00	10,030.00	295,000.00	-	(284,970.00)	(284,970.00)
2023	295	59,000	24.72	-	51.50	10,330.90	-	-	10,330.90	9,886.03
2024	295	59,000	25.46	-	53.05	10,640.83	-	-	10,640.83	9,744.12
2025	295	59,000	26.23	-	54.64	10,960.05	-	-	10,960.05	9,604.26
2026	295	59,000	27.01	-	56.28	11,288.85	-	-	11,288.85	9,466.40
2027	295	59,000	27.82	-	57.96	11,627.52	-	-	11,627.52	9,330.51
2028	295	59,000	28.66	-	59.70	11,976.34	-	-	11,976.34	9,196.58
2029	295	59,000	29.52	-	61.49	12,335.63	-	-	12,335.63	9,064.58
2030	295	59,000	30.40	-	63.34	12,705.70	-	-	12,705.70	8,934.46
2031	295	59,000	31.31	-	65.24	13,086.88	-	-	13,086.88	8,806.22
2032	295	59,000	32.25	-	67.20	13,479.48	-	-	13,479.48	8,679.81
2033	295	59,000	33.22	-	69.21	13,883.87	-	-	13,883.87	8,555.22
2034	295	59,000	34.22	-	71.29	14,300.38	-	-	14,300.38	8,432.42
2035	295	59,000	35.24	-	73.43	14,729.39	-	-	14,729.39	8,311.38
2036	295	59,000	36.30	-	75.63	15,171.27	-	-	15,171.27	8,192.08
2037	295	59,000	37.39	-	77.90	15,626.41	-	-	15,626.41	8,074.49
2038	295	59,000	38.51	-	80.24	16,095.21	-	-	16,095.21	7,958.59
2039	295	59,000	39.67	-	82.64	16,578.06	-	-	16,578.06	7,844.35
2040	295	59,000	40.86	-	85.12	17,075.40	-	-	17,075.40	7,731.75
2041	295	59,000	42.08	-	87.68	17,587.67	-	-	17,587.67	7,620.77

NPV in 2022 $		
	Five Year	(246,269.20)
	Ten Year	(200,936.84)
	Life	(119,536.00)

DSM Program Name: HVAC Efficiency Improvement
Customer Class: Commercial/Industrial

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	5	5	
Annual Energy Usage			
Energy Savings (%)			
Energy Savings (kWh per unit)			5,000

Program Costs	Amount
Admin Cost (total $/year)	-
Capital Cost ($/unit)	10,000.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Avoided Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	20
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Commercial/Industrial Customers	5,945.00
Estimated Appliance Saturation	100%
Market Eligibility	5%
Feasibility	10%
Estimated Units	30

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-yr)	Annual Energy Charge ($/MWh)	Power Cost Savings ($/unit)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	150	150	150,000	24.00	-	50.00	11,100.00	300,000.00	-	(288,900.00)	(288,900.00)
2023	150	150	150,000	24.72	-	51.50	11,433.00	-	-	11,433.00	10,940.67
2024	150	150	150,000	25.46	-	53.05	11,775.99	-	-	11,775.99	10,783.63
2025	150	150	150,000	26.23	-	54.64	12,129.27	-	-	12,129.27	10,628.84
2026	150	150	150,000	27.01	-	56.28	12,493.15	-	-	12,493.15	10,476.27
2027	150	150	150,000	27.82	-	57.96	12,867.94	-	-	12,867.94	10,325.89
2028	150	150	150,000	28.66	-	59.70	13,253.98	-	-	13,253.98	10,177.68
2029	150	150	150,000	29.52	-	61.49	13,651.60	-	-	13,651.60	10,031.58
2030	150	150	150,000	30.40	-	63.34	14,061.15	-	-	14,061.15	9,887.59
2031	150	150	150,000	31.31	-	65.24	14,482.98	-	-	14,482.98	9,745.66
2032	150	150	150,000	32.25	-	67.20	14,917.47	-	-	14,917.47	9,605.77
2033	150	150	150,000	33.22	-	69.21	15,365.00	-	-	15,365.00	9,467.89
2034	150	150	150,000	34.22	-	71.29	15,825.95	-	-	15,825.95	9,331.99
2035	150	150	150,000	35.24	-	73.43	16,300.72	-	-	16,300.72	9,198.04
2036	150	150	150,000	36.30	-	75.63	16,789.75	-	-	16,789.75	9,066.01
2037	150	150	150,000	37.39	-	77.90	17,293.44	-	-	17,293.44	8,935.87
2038	150	150	150,000	38.51	-	80.24	17,812.24	-	-	17,812.24	8,807.61
2039	150	150	150,000	39.67	-	82.64	18,346.61	-	-	18,346.61	8,681.18
2040	150	150	150,000	40.86	-	85.12	18,897.01	-	-	18,897.01	8,556.57
2041	150	150	150,000	42.08	-	87.68	19,463.92	-	-	19,463.92	8,433.75

NPV in 2022 $		
	Five Year	(246,070.59)
	Ten Year	(195,902.19)
	Life	(105,817.51)

DSM Program Name: Interruptible Rates
Customer Class: Commercial

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	100	100	
Annual Energy Usage			
Energy Savings (%)			
Energy Savings (kWh per unit)			5,000

Program Costs	Amount
Admin Cost (total $/year)	2,500.00
Capital Cost ($/unit)	10,000.00
Maintenance Cost ($/year/unit)	-
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Avoided Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	10
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Industrial Customers	95
Estimated Appliance Saturation	100%
Market Eligibility	50%
Feasibility	5%
Estimated Units	2

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-yr)	Annual Energy Charge ($/MWh)	Power Cost Savings ($/unit)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	200	200	10,000	24.00	-	50.00	5,300.00	30,000.00	2,500.00	(27,200.00)	(27,200.00)
2023	200	200	10,000	24.72	-	51.50	5,459.00	-	2,562.50	2,896.50	2,771.77
2024	200	200	10,000	25.46	-	53.05	5,622.77	-	2,626.56	2,996.21	2,743.72
2025	200	200	10,000	26.23	-	54.64	5,791.45	-	2,692.23	3,099.23	2,715.84
2026	200	200	10,000	27.01	-	56.28	5,965.20	-	2,759.53	3,205.66	2,688.15
2027	200	200	10,000	27.82	-	57.96	6,144.15	-	2,828.52	3,315.63	2,660.63
2028	200	200	10,000	28.66	-	59.70	6,328.48	-	2,899.23	3,429.24	2,633.30
2029	200	200	10,000	29.52	-	61.49	6,518.33	-	2,971.71	3,546.62	2,606.16
2030	200	200	10,000	30.40	-	63.34	6,713.88	-	3,046.01	3,667.87	2,579.19
2031	200	200	10,000	31.31	-	65.24	6,915.30	-	3,122.16	3,793.14	2,552.42

NPV in 2022 $		
	Five Year	(16,280.52)
	Ten Year	(3,248.82)
	Life	(3,248.82)

DSM Program Name: Customized Rebate Program
Customer Class: Commercial/Industrial

DSM Measure Effectiveness	Summer Demand	Winter Demand	Annual Energy
Load Reduction (kW per Unit)	5	5	
Annual Energy Usage			
Energy Savings (%)			
Energy Savings (kWh per unit)			8,750

Program Costs	Amount
Admin Cost (total $/year)	5,000.00
Capital Cost ($/unit)	3,795.22
Maintenance Cost ($/year/unit)	124.21
Cost Escalation (%/year)	2.50%

Power Cost and Economic Parameters	
Summer Capacity ($/kW-season)	24.00
Winter Capacity ($/kW-season)	-
Avoided Energy Cost ($/MWh)	50.00
Rate Escalation (%/yr)	3.00%
Measure Life	15
Discount Rate	4.50%

Estimated Applicability	Amount
Estimated Commercial/Industrial Customers	5,945.00
Estimated Appliance Saturation	100%
Market Eligibility	5%
Feasibility	5%
Estimated Units	15

Year	Summer Capacity Savings (kW)	Winter Capacity Savings (kW)	Annual Energy Savings (kWh/unit)	Summer Capacity Charge ($/kW-yr)	Winter Capacity Charge ($/kW-yr)	Annual Energy Charge ($/MWh)	Power Cost Savings ($/unit)	Capital Costs ($)	O&M Costs ($)	Annual Savings / (Costs) ($)	Present Value ($)
2022	75	75	131,250	24.00	-	50.00	8,362.50	56,928.30	6,863.15	(55,428.95)	(55,428.95)
2023	75	75	131,250	24.72	-	51.50	8,613.38	-	7,034.73	1,578.65	1,510.67
2024	75	75	131,250	25.46	-	53.05	8,871.78	-	7,210.60	1,661.18	1,521.19
2025	75	75	131,250	26.23	-	54.64	9,137.93	-	7,390.86	1,747.07	1,530.95
2026	75	75	131,250	27.01	-	56.28	9,412.07	-	7,575.63	1,836.43	1,539.96
2027	75	75	131,250	27.82	-	57.96	9,694.43	-	7,765.02	1,929.41	1,548.25
2028	75	75	131,250	28.66	-	59.70	9,985.26	-	7,959.15	2,026.11	1,555.84
2029	75	75	131,250	29.52	-	61.49	10,284.82	-	8,158.13	2,126.69	1,562.75
2030	75	75	131,250	30.40	-	63.34	10,593.36	-	8,362.08	2,231.28	1,569.00
2031	75	75	131,250	31.31	-	65.24	10,911.17	-	8,571.13	2,340.03	1,574.62
2032	75	75	131,250	32.25	-	67.20	11,238.50	-	8,785.41	2,453.09	1,579.61
2033	75	75	131,250	33.22	-	69.21	11,575.66	-	9,005.05	2,570.61	1,584.01
2034	75	75	131,250	34.22	-	71.29	11,922.93	-	9,230.17	2,692.75	1,587.82
2035	75	75	131,250	35.24	-	73.43	12,280.61	-	9,460.93	2,819.69	1,591.07
2036	75	75	131,250	36.30	-	75.63	12,649.03	-	9,697.45	2,951.58	1,593.77

NPV in 2022 $		
	Five Year	(49,326.18)
	Ten Year	(41,515.71)
	Life	(33,579.43)

Appendix B: Public Notice and Meeting Agenda

Proof of Publication

State of Nebraska)
County of Hall) SS.

CITY OF GRAND ISLAND
CITY CLERK
PO BOX 1968
GRAND ISLAND, NE 68802

ORDER NUMBER 1068847

Kim Swets, being first duly sworn on oath, says that he/she is employed by The GRAND ISLAND INDEPENDENT, a newspaper printed and published in Grand Island, in Hall County, Nebraska, and of general circulation in Hall County, Nebraska, and as such has charge of the records and files of the GRAND ISLAND INDEPENDENT, and affiant knows of his/her own personal knowledge that said newspaper has a bonafide circulation of more than 500 copies of each issue, has been published at Grand Island, Nebraska, for more than 52 weeks successively prior to the first publication of the annexed printed notice, and is a legal newspaper under the statutes of the State of Nebraska; that the annexed printed notice was published on the dates listed below.

CITY OF GRAND ISLAND NOTICE OF PUBLIC HEARING

The City Council of the City of Grand Island, Nebraska, announces the following Public Hearing to be held on Tuesday, April 26, 2022 at 7:00 p.m. in the Council Chambers of City Hall, 100 East 1st Street, Grand Island, Nebraska:

The City of Grand Island is in the process of preparing an Integrated Resource Plan (IRP), as required by the Western Area Power Administration (WAPA) under its Energy Planning and Management Program (EPAMP). The IRP will consider all practicable energy efficiency and energy supply resource options to meet future needs. The IRP must adhere to several criteria, which are listed on the WAPA website under the IRP section. The City is working with an outside consultant to complete the IRP and submit it to WAPA in May 2022. One of the requirements of EPAMP is to "provide ample opportunity for full public participation." A draft of the IRP is posted on the City's website for review/inspection. A public hearing will be held at the April 26, 2022, City Council meeting and public comment will be solicited. At the conclusion of the public hearing, all comments received from the public will be reviewed and, if necessary, changes will be incorporated into the IRP. A hard copy of the draft IRP is available for inspection at the City office.

RaNae Edwards
City Clerk
20 ZNEZ

Section: Class Legals
Category: 0099 LEGALS
PUBLISHED ON: 04/20/2022

TOTAL AD COST: 33.42
FILED ON: 4/20/2022

Subscribed in my presence and sworn to before me this 20 day of April, 2022

My commission expires November 8, 2025

Casey Harvey
Notary Public

State of Nebraska – General Notary
CASEY HARVEY
My Commission Expires
November 8, 2025

CITY OF GRAND ISLAND

City Council Meeting Agenda

Council Chambers
City Hall
100 East First Street

Regular Meeting of April 26, 2022
7:00 p.m.

CALL TO ORDER

INOVATION – Pastor Ray Stone, First Faith United Methodist Church, 4190 West Capital Avenue

PLEDGE OF ALLEGIANCE

ROLL CALL

A - SUBMITTAL OF REQUESTS FOR FUTURE AGENDA ITEMS

Individuals who have appropriate items for City Council consideration should complete the Request for Future Agenda Items form located at the Information Booth. If the issue can be handled administratively without Council action, notification will be provided. If the item is scheduled for a meeting or study session, notification of the date will be given.

B - RESERVE TIME TO SPEAK ON AGENDA ITEMS

This is an opportunity for individuals wishing to provide input on any of tonight's agenda items to reserve time to speak. Please come forward, state your name and address, and the Agenda topic on which you will be speaking.

C – PRESENTATIONS AND PROCLAMATIONS

C-1. Presentation of Tree Board Report.

C-2. Presentation Regarding the Hall County Veteran's Warriors Memorial.

E – PUBLIC HEARINGS

A public hearing is a formal process intended to solicit public comment. A public hearing is structured, in part, to meet legal requirements. After a brief presentation on the item, any public comments will be heard. Questions and discussion from the Council will take place under the

respective action items.

E-1. Public Hearing on Acquisition of Utility Easement - 3732 W. Husker Highway (Innate Development 2, LLC)

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E-2. Public Hearing on Acquisition of Utility Easement - 5620 Quandt Rd Well #103 (Jared Leiser).

E-3. Public Hearing on Electric Utility Integrated Resource Plan.

F – ORDINANCES

F-1. #9879 - Consideration of Vacation of Public Utility Easement in Lot 2 of Pedcor Subdivision-(City of Grand Island).

F-2. #9880 - Consideration of Approving Salary Ordinance.

G – CONSENT AGENDA

G-1. Approving Minutes of April 12, 2022 City Council Regular Meeting.

G-2. Receipt of Official Documents – Pawnbroker's Official Bonds for G.I. Loan Shop, 1004 West 2nd Street and Express Pawn, 645 South Locust Street.

G-3. Approving Appointment of Tom Barnes to the Zoning Board of Adjustment Board.

G-4. Approving Appointment of Gail Yenny to the Animal Advisory Board.

G-5. #2022-106 - Approving Final Plat and Subdivision Agreement for Copper Creek Estates 21st Subdivision.

G-6. #2022-107 - Approving Final Plat and Subdivision Agreement for Sargent Subdivision.

G-7. #2022-108 - Approving Final Plat and Subdivision Agreement for Eynetich Subdivision.

G-8. #2022-109 - Approving Amendment to McCoy Meadows Subdivision Agreement.

G-9. #2022-110 - Approving Acquisition of Utility Easement - 3732 W. Husker Highway (Innate Development 2, LLC).

G-10. #2022-111 - Approving Acquisition of Utility Easement - 5620 Quandt Rd Well #103 (Jared Leiser).

G-11. #2022-112 - Approving PGS Coal Combustion Residual (CCR) Groundwater Services Task 19 with HDR.

G-12. #2022-113 - Approving Electric Utility Integrated Resource Plan.

G-13. #2022-114 - Approving Renewal of Coal Market Services with Western Fuels Association.

G-14. #2022-115 - Approving Termination Agreement with Prairie Hills Wind, LLC.

G-15. #2022-116 - Approving Purchase of Motorola CommandCentral Analytics Software under 5-year Contract for Police Department.

G-16. #2022-117 - Approving Purchase of Braun Type I Ambulance.

G-17. #2022-118 - Approving Bid Award for Moores Creek Storm Sewer Improvements; Project No. 2021-D-2(B).

G-18. #2022-119 - Approving Bid Award for Diffuser Replacement; Project No. 2022-WWTP-2.

G-19. #2022-120 - Approving Change Order #1 for Stolley Park Wading Pool Demo.

G-20. #2022-121 - Approving Bid Award for Construction of Stolley Park Splash Pad.

G-21. #2022-122 - Approving Change Order #1 for Island Oasis Water Slides Project.

G-22. #2022-123 - Approving Change Order #2 for Heartland Public Shooting Park Baffle Project.

H – REQUEST AND REFERRALS

None Scheduled.

I – RESOLUTIONS

None Scheduled.

J – PAYMENT OF CLAIMS

J-1. Approving Payment of Claims for the Period of April 13, 2022 through April 26, 2022.

The City Council may vote to go into Closed Session on any agenda item as allowed by state law.

A continuously current agenda is maintained in the office of the City Clerk. Inquiries and correspondence concerning the City Council Agenda may be addressed to:

RaNae Edwards, City Clerk
P.O. Box 1968
Grand Island, NE 68802-1968
www.grand-island.com

Telephone
(308) 385-5444 Ext. 111