City of Helena

Citizens Conservation Board
May 9, 2024 – 4:30-6:00 PM
City/County Building, Room 426

[Online Meeting Link]

1. Call to Order and Roll Call
2. Approval of Minutes 8 February and 14 March Meeting
3. Public Comment
4. Updates from City Staff
5. Officer's Report
6. Unfinished Business
   I. Officer elections
   II. Report on CCB Presentation to City Commission
   III. CCB Strategic Plan 2024 Discussion
7. New Business
8. Member Communications/Proposals for Next Agenda
9. Public Communications
10. Announcements
11. Adjournment

Meeting Minutes Draft

City of Helena

Citizens Conservation Board
February 8, 2024 – 4:30-6:00 PM Zoom
Online Meeting:
[CCB Monthly Meeting - Zoom]
County Building, Room 426

1. **Call to Order and Roll Call [07:15 minutes]**

Members Present by zoom or in person:

Betsy Adams
Peter Dudley
Devon Malizia
Brian Murphy
Jason Selong

Members Absent:

Richard Sloan
Robert Jones
Mark Juedeman
Nora-Paige McFadden

Staff present:

Miranda Griffiths
Leea Anderson

2. **Introduction of New Members** [07:52]
   Current members and staff welcomed new members B. Adams, B. Murphy, and P. Dudley

3. **Approval of Minutes 1/14/24 Meeting** [10:00]
   Devon Made motion to approve 1/14/24 minutes with no changes. Betsy seconded motion. Passed unanimously.

4. **Public Comment** [11:20] -none noted
5. **Updates from City Staff [11:50]**

Miranda explained compost and food waste grant city received to examine feasibility of composting waste $68k grant.

Leea explained fee structure for public electric vehicle charging stations at Bill Robert's golf course and Jackson St. garage. Fees to cover costs of units during planned life and electricity costs of charging. A time and electricity charge structure used to prevent vehicles from prolonged parking without charging.

6. Officer's Report [35:52]

No current elected officers on the board pending appointment of interim officers and plan for elections

7. Unfinished Business

Appointment of interim officers and plan for officer elections [44:15]

Motion to table discussion of interim and officer elections until March made by Brian and seconded by Betsy. Passed unanimously.

CCB Presentation to City Commission 57:45]

Not scheduled by city, possibly 2/26 or 3/6. Motion to appoint alternate speaker of Jason Selong if Mark unavailable made by Brian and seconded by Betsy. Passed unanimously [59:13]

Discussion of presentation [1:00:05]

CCB Strategic Plan 2024 Discussion [1:20:22]

Discussion on this document and future preparation of strategic plan and presentations to city commission. Historically has been a comprehensive document including all things CCB is monitoring and recommends promoting. Should be regular agenda item during the year to prepare future plans and presentations.

Designation of replacement on the City's Integrated Solid Waste Master Plan Committee starting in March

Betsy Adams agreed to serve as designated replacement for Richard Sloan. Brian Murphy made motion and Peter seconded. Passed unanimously [1:26:04].

8. **New Business [1:27:15]** -none noted

9. Member Communications/Proposals for Next Agenda [1:27:34]

Appointment of interim officers and plan for officer elections
CCB presentation to city commission/report on presentation
Review and Questions on CCB strategic plan

10. **Public Communications [1:33:15]** -none noted

11. **Announcements** **[1:33:30]** -Next CCB meeting 3/14/24

12. **Adjournment [1:34:40]**

City of Helena Sustainability Energy Audits - Level II Energy Audits

Helena, MT

March 20, 2024

Submitted by Iconergy, LTD

1905 Sherman St. Suite 1040,
Denver, CO 80203
Iconergy.com

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Summary Page

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Site Visit Date(s):	November 27-30, 2023

Executive Summary

The City of Helena has established the goal of increased sustainability for all municipal facilities. Iconergy has been selected to perform energy audits at select facilities to determine current energy use and provide recommendations to facility assets to achieve increased sustainability goals. In support of these goals, ASHRAE Level II audits were performed to evaluate energy users, equipment, and building operations. Energy savings opportunities were then assessed and have been compiled in this report to provide the City of Helena with a potential roadmap towards increased sustainability.

These opportunities are described as energy conservation measures (ECMs) to further reduce energy consumption at each location. The recommendations are unique to each building, though some measures apply to several of the surveyed buildings. Energy savings calculations were performed either through spreadsheet calculations or whole building energy modeling with a goal of providing a realistic view of the costs and benefits of these upgrades. Below is a list and brief summary of the findings. The City of Helena can then use these results in the development of an informed roadmap towards sustainability.

A feasibility study of solar photovoltaic (PV) potential was also performed for ten buildings, including those that received energy audits. From this analysis, three potential systems were designed at two sites – Bill Roberts Golf Course and Wastewater Treatment Facility (WWTF).

Table 1: Savings and Cost Summary

	Baseline EUI (kBtu/sf)	Total Energy Savings (%)	Total Utility Cost Savings ($/yr)	Utility Cost Reduction (%)	GHG emissions savings[1] (%)	Implementation Cost[2] ($)	SPB (yrs)
City and County Admin	80.7	84%	$73,863	62%	80%	$2,622,350	35
Civic Center	91.2	96%	$64,783	75%	90%	$3,445,970	71
Law and Justice Center	95.2	63%	$42,727	35%	56%	$1,130,850	26
Tenmile Treatment Facility[3]	54.6	58%	$59,383	60%	58%	$211,410	3.0
Wastewater Treatment Facility	418.7	19%	$96,804	23%	22%	$496,690	8.0

Notes:

[1] The calculations may not consider the interactive effects of several ECMs acting together, and estimates for each measure assume the same baseline condition. As such, the savings represent a combined total of all measures, that is higher than actually achievable.

[2] Not including utility incentives.

[3] Savings include measures at Missouri River plant and pumphouses.

Project Description

The city of Helena has the goal of creating a sustainability roadmap to reduce energy use at municipal facilities. The goal of this project is to analyze the data collected during the site audits and present ECM opportunities to reduce energy consumption within the selected facilities. Additionally, this project will detail the current state of the selected facilities.

To establish these data, Iconergy conducted energy audits at five municipal buildings throughout the City. The purpose of an energy audit is to determine where, when, why, and how energy is used in a facility, and to identify opportunities to improve efficiency. The energy auditor leads the audit process but works closely with building owners, staff and other key participants throughout to ensure accuracy of data collection and appropriateness of energy efficiency, and renewable energy.

Energy Audits Identify:

- Action plans for capital measures that significantly improve the facility through utility savings, greenhouse gas (GHG) emission reductions, improved comfort, reduced maintenance costs, or some combination of these factors
- No-cost operational or maintenance adjustments that will save energy or reduce emissions
- Short-term, low-cost energy efficiency retrofit recommendations, as well as long-term capital improvements
- Opportunities for better adherence to lighting and comfort standards
- Comfort and code issues that should be addressed

The results of this audit will lay the foundation for establishing a sustainability roadmap within the City of Helena.

Table 2 Building List

Building Name	Address	Area (Square Foot)	Building Uses
City County Admin Building	316 North Park	92,702	Office and meeting rooms for city functions
Helena Civic Center	340 Neil Avenue	69,407	Event center
Law and Justice Center	406 Fuller Avenue	66,892	Office, Police Services, Courtroom
Ten Mile Water Treatment Plant	1115 Rimini Road	50,622	Water Treatment plant
Wastewater Treatment Facility	2108 Custer Avenue	200,346	Wastewater Treatment

On-site Auditing

On-site efforts were conducted between November 27-30, 2023 and met the requirements of an ASHRAE Level II audit. The team toured the interior and exterior of each facility, including the roof, as appropriate. Major building systems were analyzed including heating, ventilating, and air-conditioning (HVAC), lighting, domestic hot water (DHW), envelope systems, and process equipment where applicable. Building personnel were also interviewed, when possible, to gather information on typical building operations and any recurring issues.

Data Analysis

Energy audit efforts continued post site visit with a detailed review of all information provided to Iconergy. In this study, utility bills were provided for each building for all electric, water, and natural gas meters. Other information was requested including a list of existing equipment, as-built drawings, and operations and maintenance plans. All data were compiled and analyzed to provide a full picture of each facility and its individual energy consumption. This information and the data gathered on site are used to inform the energy efficiency recommendations found in this report.

Energy Savings Calculations

As noted above, energy savings calculations were performed through either spreadsheet calculations or whole building energy modeling. There are advantages and disadvantages to both methods which were weighed when deciding which approach to use. Spreadsheet calculations are simpler and less labor-intensive and are best used when one or few variables are changing, such as with an upgrade to a more efficient unit or a lighting replacement. Energy modeling is time consuming and often relies on a number of assumptions, though it can more accurately evaluate more complicated measures such as whole system replacements or changes to system operations.

Cost Estimating

Economic evaluation will be shown for each energy conservation measure (ECM) in the form of a simple payback (SPB). The SPB describes the estimated amount of time it will require for that ECM to begin surpassing the costs of the initial investment. These values are estimates and may include the cost of equipment and installation, but are based on the experience Iconergy has as a retrofitter of commercial and industrial facilities. Savings values will also be estimated based on utility rates determined from provided utility bills, potential maintenance savings, and rebate savings if possible.

Energy Conservation Measures

ECMs have been identified at each building and are presented in this section. These ECMs aim to encompass all potential pathways for achieving energy reductions and sustainability. The sections below describe each of the ECMs in detail with building-specific details and information. A summary table is also provided to highlight the key energy, GHG, and cost metrics for each of the ECMs and each of the buildings.

The sections below add additional detail to the ECMs recommended for each building. General summaries are provided for most ECMs, as the systems in question are similar in each of the buildings included in the project. Where necessary, additional detail has been provided for a building-specific situation or system that requires further explanation. Some of the same opportunities were found at multiple buildings. In a few cases, the ECMs proposed at a single building present an "either-or" scenario where the recommendations cannot be installed together. An example would be existing HVAC system upgrades to different system types such as heat pumps or traditional roof top units (RTUs). Implementation costs are rough-order-of-magnitude estimates, based on industry data or past projects. ECMs range from low-cost (controls programming or in-house labor) to long-term capital projects. Utility incentives from Northwestern Energy are included where applicable.

City & County Administration Building ECMs

#	Measure Description	Electrical Energy Savings (kWh/yr)	Electrical Demand Savings (kW/yr)*	Gas Energy Savings (therm/yr)	Water Savings (kgal/yr)	GHG Savings Scope 1 MTCO2e	GHG Savings Scope 2 MTCO2e	Utility Cost Savings ($/yr)	Implementation Costs ($)	Incentives ($)	Simple Payback (yr)
ECM-1	Steam to HHW Conversion	(9,861)	(39)	26,570	-	141.0	(2.7)	$ 18,728	$ 2,246,000	$ -	119.9
ECM-2	MZ AHU to VAV AHU Upgrade	83,645	375	1,968	-	10.4	22.8	$ 13,508	$ 168,000	$ -	12.4
ECM-3	MZ AHU Schedule Implementation	22,044	-	8,299	-	44.0	6.0	$ 8,187	$ 1,000	$ -	0.1
ECM-4	Economizer for MZ and Chambers AHU	32,065	146	(2,545)	-	(13.5)	8.7	$ 2,716	$ 3,000	$ -	1.1
ECM-5	Zone Setbacks	15,880	26	8,408	-	44.6	4.3	$ 8,068	$ 1,000	$ -	0.1
ECM-6	Air Sealing for Leaky Windows	52,331	115	12,550	-	66.6	14.2	$ 15,492	$ 132,000	$ -	8.5
ECM-7	LED Lighting Upgrade	51,573	176	(578)	-	(3.1)	14.0	$ 6,272	$ 70,350	$ 7,035	10.1
ECM-8	Low-flow Bathroom Fixtures	-	-	-	76	-	-	$ 890	$ 1,000	$ -	1.1
Total		**247,677**	**799**	**54,671**	**76**	**290**	**67**	**$ 73,863**	**2,622,350**	**7,035**	**35**
Baseline Utility Bills		**523,493**	**1,460.0**	**56,924**	**NA**	**302**	**142**	**$119,073**			
Percent Savings		**47%**	**55%**	**96%**	**0%**	**96%**	**47%**	**62%**			

Notes:
*Sum of the monthly peak electrical demand savings for the full year expressed in units of kW/yr.
1 MMBtu = 1,000,000 Btu, 1 kWh = 3,412 Btu, 1 therm = 100,000 Btu

Steam to Hot Water Conversion

It was found at the City and County Admin building that steam boilers were in use for heating purposes. It was also found that these boilers were beyond their useful life. It is recommended that these steam boilers be replaced with gas-fired condensing hot water boilers. Hot water boilers have better efficiencies than steam boilers, and this is likely compounded by the age of the existing steam boilers. Upgrading to hot water boilers would also require the installation of pumps to circulate the hot water as well as new distribution piping. Air handling unit coils would need to be converted to hot water coils, and steam radiators would need to be replaced with hot water baseboard radiators or cabinet unit heaters. Currently, Northwestern Energy offers rebates on variable frequency drives (VFDs), which can be installed with the new hot water pumps.

Multizone AHU Upgrade to VAV

The City and County Admin building was found to use a muti-zone (MZ) AHU for the first floor. These systems can result in significant simultaneous heating and cooling, which is inefficient. It is recommended that these units be replaced with variable air volume (VAV) units so that either heating or cooling can be prioritized and airflow to spaces can be modulated as needed. Savings for this measure are based on reduced fan energy, and eliminating simultaneous heating and cooling.

MZ AHU Scheduling

The MZ AHU was observed to be running continuously, including when spaces such as offices and meeting areas are unoccupied. This is causing unnecessary energy use; it is recommended that the AHU schedule be programmed to operate on a schedule according to their expected occupancy or operating hours. This measure assumed a Monday to Friday schedule of 6am to 6pm to cover a morning warmup, business hours, and custodial activities. Outside of these times the unit's fan should shut off, and if there is a call for heating or cooling, the outdoor air damper should remain closed.

Economizer on MZ and Chambers AHU

The MZ and chambers AHU appeared to have non-functioning economizers – the outdoor air damper was commanded to 20% at all times, and did not modulate. Economizers function to bring in outside air for free cooling when conditions allow. During the site visit it was found that the old pneumatic systems controlling the economizers had failed. It is recommended that these economizer functions be repaired and use differential dry bulb sequence be programmed so that outside air can be used optimally for energy use reduction.

Zone Temperature Setbacks

The City and County Admin building uses pneumatic thermostats and controllers for temperature control throughout the building. However, these controls are overridden and set to maintain a constant temperature in their spaces, rather than setting back during unoccupied times. This leads to excess energy use, as spaces are being heated or cooled when no one is in them. It is recommended that the override on the pneumatic controller be fixed, so the zone temperatures are automatically setback. The heating and cooling setpoints should be set back to 68°F and 80°F, respectively.

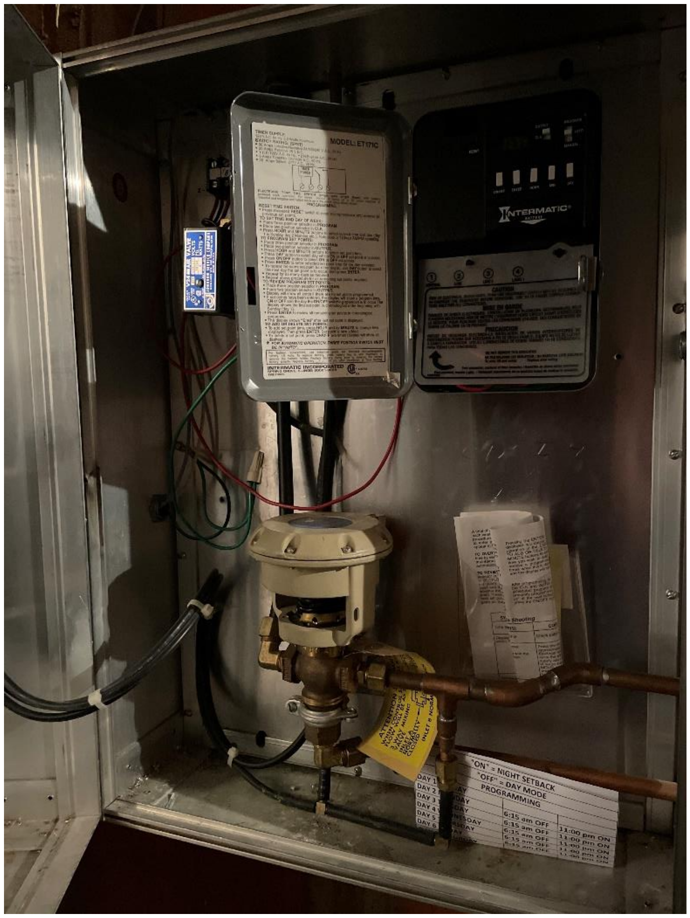


Figure 1 - Pneumatic Zone Setback Controller

Air Seal or Replace Leaky Windows

The windows on the first floor are single-pane wood-frame, and believed to be original to the building. Large amounts of outdoor air was observed to be infiltrating into the interior through gaps and openings in the windows. This results in extra energy use by the HVAC systems to combat the more additional heating and cooling loads introduced from these leaks. At the City and County building it is recommended to weatherize and air-seal the existing windows, and possibly also install a secondary window. Products are available which cost less than full window replacement, but add insulation and seal gaps for existing windows. One option is offered by Alpen Windows: https://thinkalpen.com/products/winsert-window-inserts/.

LED Lighting Upgrade

During the audit of this building the existing lighting was observed to be a mix of LEDs primarily on the first floor, with T5 and T8 fluorescent lighting in most other locations. Fluorescent lights consume a significantly higher amount of energy than LED alternatives. It is recommended that all older lighting be replaced with LED lamps. The costs for this measure assume that the fixtures will be completely replaced with a new equivalent LED fixture, as city staff has already identified a proper replacement. The local utility company, Northwestern Energy offers lighting rebates for energy-efficient LED lighting, which were factored into the simple payback. The rebate amount varies depending on the LED wattage.

Bathroom Sink Aerators

The faucets at the bathroom sinks in the City and County Admin building use separate taps for hot and cold water, and are not low-flow fixtures. This will lead to excess water consumption while the sinks are in use. It is recommended that these sinks be converted to use a single low-flow faucet, ideally rated to 0.5 gallons per minute (GPM).

Civic Center ECMs

#	Measure Description	Electrical Energy Savings (kWh/yr)	Electrical Demand Savings (kW/yr)*	Gas Energy Savings (therm/yr)	GHG Savings Scope 1 MTCO2e	GHG Savings Scope 2 MTCO2e	Utility Cost Savings ($/yr)	Implemen-tation Costs ($)	Incentives ($)	Simple Payback (yr)
ECM-1	Ballroom RTU with ERV	16,377	1	6,494	34.5	4.5	$ 6,342	$ 176,000	$ -	27.8
ECM-2	Auditorium RTU and Mini-splits	23,442	60	3,277	17.4	6.4	$ 5,276	$ 157,000	$ -	29.8
ECM-3	Auditorium Heat Pump RTU	15,147	13	4,140	22.0	4.1	$ 4,604	$ 140,000	$ -	30.4
ECM-4	Steam to HHW Conversion	(7,383)	(29)	20,792	110.3	(2.0)	$ 14,702	$ 1,388,140	$ -	94.4
ECM-5	HHW Conversion + Ballroom & Auditorium WSHP	(22,745)	(115)	24,979	132.5	(6.2)	$ 15,439	$ 1,579,140	$ -	102.3
ECM-6	Lighting Upgrade	14,789	75	(166)	(0.9)	4.0	$ 2,115	$ 15,690	$ 7,845	3.7
Total		**39,626**	**5**	**59,517**	**316**	**11**	**$ 48,478**	**$3,455,970**	**$ 7,845**	**71**
Baseline Utility Bills		**295,280**	**1,176.0**	**53,190**	**282**	**80**	**$ 64,783**			
Percent Savings		**13%**	**0%**	**112%**	**112%**	**13%**	**75%**			

Notes:
*Sum of the monthly peak electrical demand savings for the full year expressed in units of kW/yr.
1 MMBtu = 1,000,000 Btu, 1 kWh = 3,412 Btu, 1 therm = 100,000 Btu

Ballroom RTU with Energy Recovery Ventilator (ERV)

The HVAC system for the ballroom and auditorium is unique. Rather than traditional AHUs or roof top units (RTUs), the civic center uses a large supply fan and doors that act as dampers to move air through the channels of the basement and into the ballroom and auditorium. This system is original to the building and uses inefficient equipment well past their useful life. This ECM proposes to replace this system with a traditional RTU for the auditorium. This would allow for more efficient fan motors, gas furnace heating, and more automated controls. It should be noted that energy savings will be reduced for this and any other design that replaces the basement fan system, by the fact that RTUs will be required to bring in outdoor air for ventilation. To mitigate this, it is recommended that the RTU also be equipped with an ERV, further reducing energy by allowing ventilation air to the space to be pre-heated or pre-cooled by the exhaust air.

Auditorium RTU and Mini-splits

Similarly, it is recommended that a gas-fired RTU replace the basement system to heat and cool the auditorium. This ECM is based on a potential design provided to the City, and also includes the addition of cooling through mini-split heat pumps.

Auditorium Heat Pump RTU

An alternative to the gas-fired RTU for the auditorium would be a heat pump RTU for both heating and cooling. This would have increased implementation costs, but would lower heating energy and GHG emissions. A backup gas furnace can be included in the heat pumps, which may be necessary for the coldest days in Helena's climate. Northwestern Energy offers rebates of $100 per ton for high-efficiency air-source heat pumps. To qualify, for the rebate the heat pumps must have a seasonal energy efficiency ratio (SEER) of 15.0 or greater and a heating seasonal performance factor (HSPF) of 8.5 or greater.

Steam to HHW Conversion

The Civic Center uses steam boilers for heating purposes, which are likely beyond their useful life. It is recommended that these steam boilers be replaced with gas-fired condensing hot water boilers. Hot water boilers have better efficiencies than steam boilers, and this is likely compounded by the age of the existing steam boilers. Upgrading to hot water boilers would also require the installation of a pump to circulate the hot water as well as new distribution piping, and air handling unit coils would need to be converted to hot water coils, and steam radiators would need to be replaced with hot water baseboard radiators or cabinet unit heaters. Currently, Northwestern Energy offers rebates on VFDs which can be installed with the new hot water pumps.

Steam to HHW Conversion + Water-source Heat Pumps

The civic center utilizes steam radiators for perimeter heating with steam boilers to provide space heating in the ballroom and auditorium. The site is also experiencing an increased demand for cooling as summer temperatures rise and the size and frequency of events increase. This recommendation investigates replacing the perimeter radiators with hydronic hot water heating (baseboards, radiators, cabinet heaters), installing WSHPs, and adding a cooling loop. All of the existing piping infrastructure will require replacement, and a cooling tower would need to be installed to support the cooling loop. The high efficiency of the WSHPs would result in reduced energy use and provide additional cooling to these spaces. This measure expands on the previous boiler replacement, so its savings include that, and additional savings for completely replacing the basement loop. It is intended to provide a “best-of” option.

LED Lighting Upgrade

The majority of the lighting at the civic center is already LED. However, there are still incandescent lamps in both ballroom and auditorium chandeliers. These are relatively small, but there are a considerable number of them. It is recommended that these older inefficient bulbs be replaced with LED lamps. The costs for this project assume that only the lamps would be replaced, not the entire fixture. Northwestern Energy offers lighting rebates for energy-efficient LED lighting. The rebate amount varies depending on the LED size and rated power consumption.

Law and Justice Center ECMs

#	Measure Description	Electrical Energy Savings (kWh/yr)	Electrical Demand Savings (kW/yr)*	Gas Energy Savings (therm/yr)	GHG Savings Scope 1 MTCO2e	GHG Savings Scope 2 MTCO2e	Total Cost Savings ($/yr)	Implemen-tation Costs ($)	Incentives ($)	Simple Payback (yr)
ECM-1	LED Lighting Upgrade	80,062	85	(694)	(3.7)	21.8	$ 7,519	$ 19,850	$ 3,861	2.1
ECM-2	AHU-1 Economizer Repair	1,392	10	2,437	12.9	0.4	$ 2,087	$ 1,500	$ -	0.7
ECM-3	AHU-2 Supply Fan VFD	18,329	21	-	-	5.0	$ 1,861	$ 11,000	$ 563	5.6
ECM-4	MZ to VAV Conversion and DDC Upgrade	74,996	37	14,455	76.7	20.4	$ 17,913	$ 420,000	$ 1,125	23.4
ECM-5	Boiler Upgrade	-	-	13,414	71.2	-	$ 10,136	$ 671,000	$ 1,125	66.1
ECM-6	Air Sealing and Weatherization	245	-	4,222	22.4	0.1	$ 3,211	$ 7,500	$ -	2.3
Total		**175,023**	**153**	**33,834**	**179**	**48**	**$ 42,727**	**$1,130,850**	**$ 6,674**	**26**
Baseline Utility Bills		**741,040**	**1,689.6**	**38,405**	**204**	**202**	**$121,939**			
Percent Savings		**24%**	**9%**	**88%**	**88%**	**24%**	**35%**			

Notes:
*Sum of the monthly peak electrical demand savings for the full year expressed in units of kW/yr.
1 MMBtu = 1,000,000 Btu, 1 kWh = 3,412 Btu, 1 therm = 100,000 Btu

LED Lighting Upgrade

Four-foot T8 linear fluorescents were the primary lighting observed at the Law and Justice Center. These consume more energy than equivalent LED alternatives. It is recommended that all older lighting be replaced with LED lighting. The costs for this project assume that only the fluorescent tubes will be replaced with “plug-and-play” LED tubes, as opposed to replacement of the whole fixture.

Many of the spaces visited during the audit have manual switch controls, and lights were observed to be on in several areas that were unoccupied. Thus, this measure also recommends installing occupancy sensors, particularly in any spaces that do not have regular occupancy, such as the basement. Northwestern Energy offers lighting rebates for energy-efficient LED lighting and $15 rebates for switch-mounted occupancy sensors.

AHU-1 Economizer Repair

AHU-1 at the Law and Justice building has a faulty economizer system due to a broken damper leakage and the return and outside air dampers have been set to fully open. Economizers function to bring in outside air for free cooling when conditions allow. During the site visit it was found that the old pneumatic systems controlling the economizers had failed. It is recommended that the damper be repaired and use a differential dry bulb sequence programmed, so that outside air can be used optimally for energy use reduction.

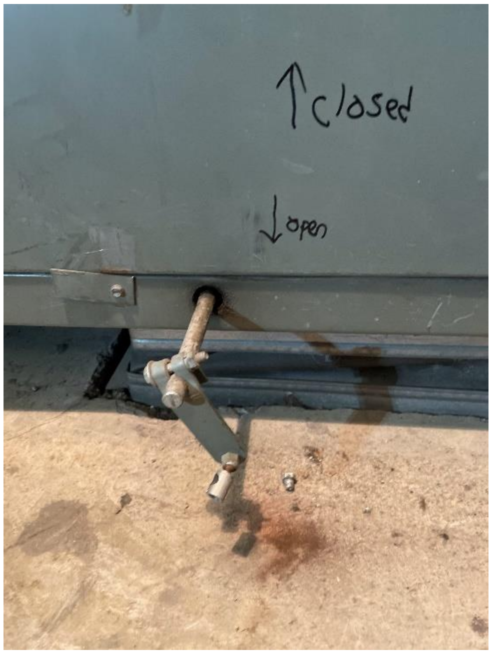


Figure 2 - Broken Damper Linkage

AHU-2 Supply Fan VFD

The supply fan on AHU-2 is beyond its useful life and uses inlet guide vanes, an outdated technology for VAV control. It is recommended that this supply fan be replaced and provided with a VFD to more efficiently modulate VAV air flow. This will result in more efficient energy use from this supply fan. Northwestern Energy offers a rebate on VFDs at a rate of $75 per motor horsepower. The estimated rebate amount would be $562.50.

MZ to VAV Conversion and DDC Controls Upgrade

There are three muti-zone (MZ) AHUs at the Law and Justice Center. These systems can result in significant simultaneous heating and cooling, which is inefficient. It is recommended that these units be replaced with variable air volume (VAV) units so that either heating or cooling can be prioritized and airflow to spaces can be modulated as needed. Additionally, the pneumatic controls should be replaced with DDC.

All three AHUs were observed to be running 24/7. One of the AHUs serves police spaces and it is expected to run constantly, but it is recommended that the others be programmed to operate on a schedule that matches the rest of the building's occupancy. This was assumed to be Monday to Friday, 8am to 5pm. A pneumatic to DDC conversion would include a full building automation system (BAS) that would make programming schedules very easy.

The McQuay RTU was observed to not be connected to the DDC system. This makes the unit unable to be monitored and controlled directly. Additionally, the VAV terminal units served by this RTU are also not on a DDC system. Bringing the RTU and terminal units onto the DDC system would allow for better control and monitoring of the system and their served spaces.

Savings and costs for this measure include all the above recommendations, and are based on reduced fan runtime, eliminating simultaneous heating and cooling, and increased unoccupied operation.

Boiler Upgrade

The Law and Justice Center uses steam boilers for heating which are scheduled to be replaced with high-efficiency condensing boilers in 2024. The design is complete, and includes four 850 MBH boilers and three new hot water pumps. Iconergy has analyzed the potential savings and payback for this project based on the city's available budget and permit drawings.

Air Sealing and Weatherization

Large gaps in exterior doors and windows were observed on site. This leads to unnecessary infiltration of outdoor air, resulting in extra heating and cooling loads on the HVAC systems. It is recommended that these gaps be sealed to reduce infiltration, by adding door seals or sweeps, and repairing operable windows.

Ten Mile Water Treatment Plant

#	Measure Description	Electrical Energy Savings (kWh/yr)	Electrical Demand Savings (kW/yr)*	GHG Savings Scope 2 MTCO2e	Utility Cost Savings ($/yr)	Implemen-tation Costs ($)	Incentives ($)	Simple Payback (yr)
ECM-1	Backwash Pump VFDs	84,793	77	23.1	$ 8,342	$ 46,410	$ 15,000	3.8
ECM-2	MO River High Zone Pump Control	325,735	904	88.6	$ 39,772	$ 5,000	$ -	0.1
ECM-3	Distribution Pump House VFDs	62,680	459	17.1	$ 11,269	$ 160,000	$ 19,125	12.5
Total		**473,208**	**1,440**	**129**	**$ 59,383**	**$ 211,410**	**$ 34,125**	**3.0**
Baseline Utility Bills		**822,128**	**1,912.3**	**224**	**$ 98,396**			
Percent Savings		**58%**	**75%**	**58%**	**60%**			

Notes:
*Sum of the monthly peak electrical demand savings for the full year expressed in units of kW/yr.
1 MMBtu = 1,000,000 Btu, 1 kWh = 3,412 Btu, 1 therm = 100,000 Btu
Savings are shown for equipment at Tenmile, MO River, and pump houses. Baseline utility data is only shown for Tenmile electrical meter.

Backwash Pump VFDs

The backflush pumps at Tenmile were observed to be constant speed, using a control valve for variable demand, preventing the pumps from reducing speed when demand is reduced. Installing VFDs and opening the control valve would allow for the pump speed to vary with demand and reduce the amount of energy consumed by pumping water. Northwestern Energy offers rebates on VFDs at a rate of $75 per motor horsepower.

Missouri River High Zone Pump Control

The 600 HP high zone pumps have VFDs but do not have trending data, which makes it difficult to determine if the pumps are running optimally. It was found that the pumps are being staged instead of operating multiple pumps in parallel, potentially causing excess energy use. It is recommended that these pumps be run in parallel at slower speeds instead of being staged in series. It is also recommended that these pumps be trended and monitored for retro-commissioning to better determine their performance. Collecting trends for retro-commissioning would also assist in making future recommendations to adjust pump functionality for energy savings.

Distribution Pump House VFDs

It was also found that the pumps in the Tenmile plant's distribution pump houses were at constant speed with only one pump running. Adding VFDs and changing the pumping strategy to run both pumps at slower speeds will reduce the amount of energy consumed for pumping water. This measure includes costs and savings at Dahlhausen and Eureka stations, as utility data was available for those meters, and Eureka is already scheduled for a pump and VFD upgrade. There may be potential savings at other sites.

Wastewater Treatment Facility

#	Measure Description	Electrical Energy Savings (kWh/yr)	Electrical Demand Savings (kW/yr)*	Gas Energy Savings (therm/yr)	GHG Savings Scope 1 MTCO2e	GHG Savings Scope 2 MTCO2e	Utility Cost Savings ($/yr)	Implemen-tation Costs ($)	Incentives ($)	Simple Payback (yr)
ECM-1	Lighting Upgrade	58,178	67	(652)	(3.5)	15.8	$ 5,001	$ 22,579	$ 1,690	4.2
ECM-2	Modulating UV Disinfection system	45,377	5	-	-	12.3	$ 3,935	$ 25,000	$ -	6.4
ECM-3	Secondary pump control	46,113	63	-	-	12.5	$ 4,426	$ 1,000	$ -	0.2
ECM-4	Mixer motor upgrades	372,889	492	-	-	101.5	$ 35,663	$ 385,000	$ 75,000	8.7
ECM-5	Blower motor VFDs	504,800	500	-	-	137.4	$ 47,050	$ 840,000	$ 420,000	8.9
Total		1,027,357	1,127	(652)	(3)	280	$ 96,075	$1,273,579	$496,690	8.1
Baseline Utility Bills		3,358,000	5,388.0	70,928	376	914	$ 424,345			
Percent Savings		31%	21%	-1%	-1%	31%	23%			

Notes:
*Sum of the monthly peak electrical demand savings for the full year expressed in units of kW/yr.
1 MMBtu = 1,000,000 Btu, 1 kWh = 3,412 Btu, 1 therm = 100,000 Btu

LED Lighting Upgrade

The majority of the lighting at the WWTF 4-foot linear fluorescent T8s. These consume more energy than equivalent LED alternatives. It is recommended that all older lighting be replaced with LED lighting. The facility indicated that lighting is currently replaced with LED on burnout. The costs for this project assume that only the fluorescent tubes will be replaced with "plug-and-play" LED tubes, as opposed to replacement of the whole fixture. Northwestern Energy offers lighting rebates for energy-efficient LED lighting.

Modulating UV Disinfection System

The UV disinfection system currently runs the 65W lamps on/off whenever there is wastewater running through the facility. The facility is considering replacing this a with a system that modulates the lamp power based on the flow of wastewater so that less power is used during lower flows, reducing energy consumption. This measure was evaluated using trend data on influent/effluent flows, and assumes the new system would run lamps at 50% power, on average.

Secondary Pump Control

There are four secondary pumps in the IMP building that operate with VFDs at constant speed. However, only three of the pumps are currently being used. For this process it is necessary to keep the pumps operating at a constant speed, but it is recommended that all four pumps operate in parallel, at a decreased speed.

Mixer Motor Upgrade

The current mixer motors are operating at 4 horsepower. It has been determined that new VFD-equipped mixers operating at 1.3 horsepower could be used instead. The facility has plans to perform this upgrade. The reduction in power and use of VFDs will allow for less energy consumption at the mixers. Northwestern Energy offers rebates on VFDs. The estimated rebate amount would be $75,000, per facility staff.

Blower Motor VFDs

The older 200 horsepower motors and blowers run at full speed and use throttle valves to maintain a specific flow and pressure. They have been identified to be beyond their useful life and cannot modulate their speed. It Is recommended that the motors be replaced with new VFDs and VFD compatible motors. This will reduce energy consumption by allowing the motors to operate at a lower speed. The facility has already replaced one blower motor, the cost and rebates for that were used as the basis for this measure. The estimated rebate amount would be $140,000, per facility staff.

Summary of Facility Improvement Measures and Other Measures Considered

Facility Improvement Measures (FIMs) are recommended actions that aim to improve the operations, functions or comfort quality of the facility or its systems. These measures may result in energy reductions or performance improvement, but these values are believed to be small and therefore have not been analyzed for any potential energy of financial savings. Other Measures Considered (OMC) includes measures that may save energy, but were not fully evaluated – either because they are not fully recommended, or there is not currently enough information to analyze them fully. The FIMs and OMCs identified during the auditing process are described below.

FIM-1 AHU Damper Modulating

Buildings evaluated: City and County Admin

The damper on the AHU serving the Chambers space has been found to modulate while the unit is off. This occurs often as the unit only operates when there is a call for heating and is enabled by a condensate temperature less than 80°F. It is recommended that the damper motor on this unit be re-wired or controlled in a manner that allows for it to only be enabled when the unit is also enabled as to avoid any trace power use towards modulating the damper when not needed.

FIM-2 Methane Boiler Flaring

Buildings evaluated: Wastewater Treatment Facility

The methane boiler will occasionally flare of excess gas at times. This causes excess greenhouse gas emissions. The facility will be replacing it with a dual-fuel boiler that will reduce, but not eliminate, the pressure issues that require flaring.

OMC-1 MO River Transfer Pumps

Buildings evaluated: Ten Mile Treatment Plant

The transfer pumps at Missouri water treatment plant were observed to be constant speed. Installing VFDs on all transfer pumps would allow for multiple pumps to run together at low speed and the pump speed to vary with demand which reduces the amount of energy consumed by pumping water. This measure was not evaluated, as there was not sufficient information on pump size or operation to produce a savings estimate. Energy savings are likely to be similar to the other VFD measures.

OMC-2 RAS Pump Control

Buildings evaluated: Ten Mile Treatment Plant

There are four return activated sludge (RAS) pumps equipped with VFDs. Three of these pumps are on a single circuit in which only two pumps are active at any given time. It was initially recommended that the control scheme be changed to run all three at a lower speed, however further investigation showed that this was not feasible. The pumps share a common header, which pulls from two separate clarifiers. Currently, each clarifier uses one RAS pump at a time, and they are likely to have different flows based on the volume in each, which would make it difficult to run all three in parallel. There is the possibility to program a sequence which automatically rotates the pumps, but due to their smaller size (15 HP), it is not likely to be cost-effective.

Solar PV Analysis

Ten sites were visited and analyzed for the potential of rooftop or ground-mount PV installations. They were evaluated for roof condition, meter location, panel size, ground area, and other considerations that would impact installation cost and energy generation of the panels. These sites were then narrowed down to two potential candidates, for which conceptual designs were created. The detailed designs can be found in Appendix B.

1	Bill Roberts Golf Course
2	Wastewater Treatment Facility
3	Capital Transit Office Building
4	Centennial/Bausch/Memorial Park and Pool
5	City County Admin Building
6	Helena Civic Center
7	Law and Justice Center
8	Solid Waste Transfer Station
9	Missouri River Water Treatment Plant
10	Ten Mile Water Treatment Plant

WWTF has large amounts of open space with easy access to electrical infrastructure, and thus large generation potential for ground-mount systems. The design for the northwest field (north of clarifier #1) has good access to the meter, and is under the limit for net metering, although it would offset only a small portion of the facility's total usage, which is very high.

In order to increase the offset, two additional designs were provided for the large field to the east of the main facility. These would exceed the net metering limit, meaning that the city would not get paid for any excess generation beyond the facility's usage – although this is unlikely to occur, given the very high energy usage there. Two system sizes were evaluated, and as shown in the table below, there are diminishing returns on the investment for simply increasing the number of panels – the savings does not increase linearly with installation cost.

There are two options for the Golf Course, and both are different from the earlier tentative design plans which targeted the open field north of the cart building. The two meters which had substantial energy consumption (i.e. Well #2 and the New Pro Shop), were not located near the open field north of the cart building. The Well #2 meter is located in the southeast region of the property, leaving the New Pro Shop meter as the best option. Therefore, two designs were provided to interconnect to the Pro Shop meter - one rooftop design, and one ground mount design (which would require the golf course to relocate the tee boxes for the driving range).

	Bill Roberts Golf Course (Roof Mount)	Bill Roberts Golf Course (Ground Mount)
Capacity (DC)	18.4 kW	60.0 kW
Capacity (AC)	15.3 kW	49.8 kW
Production (kWh)	22,879 kWh	83,199 kWh
Energy use offset (%)	80%	80%
Installed Cost Estimate ($)	$51,313	$176,086
$/W	$2.78	$2.93
Investment Tax Credit ($)	$15,394	$52,826
Payback (years)	16.4 years	15.5 years

	Wastewater Treatment Plant (NW Field)	Wastewater Treatment Plant (East Field Full)	Wastewater Treatment Plant (East Field Partial)
Capacity (DC)	60.0 kW	1,780 kW	900 kW
Capacity (AC)	49.8 kW	1,483 kW	750 kW
Production (kWh)	82,217 kWh	2,462,724 kWh	1,252,214 kWh
Energy use offset (%)	7%	73%	37%
Installed Cost Estimate ($)	$173,800	$4,013,786	$2,068,222
$/W	$2.90	$2.25	$2.30
Investment Tax Credit ($)	$52,140	$1,204,136	$620,467
Payback (years)	15.5 years	24.9 years	18.2 years

Appendix A: Facility Descriptions

City and County Admin Building

Building Use

The City and County Admin Building is a 92,702 sq ft facility constructed in 1901. It was renovated in 1931, 2007, and 2009. It is used primarily as office space for the city and county government.

Occupancy

The building is open Monday through Friday 7:00 am – 5:00 pm. The number of occupants varies, but there are 140 full time employees that work in the offices, and with additional occupants as residents come in to use the government services.

Building Envelope

The exterior walls are comprised of concrete integral with concrete masonry units (CMU) and brick finish. The roof construction primarily consists of gable construction with clay/concrete tiles. The roof also has sections that consist of a flat construction with a modified bituminous finish and sections that consist of a flat construction with single-ply thermoplastic polyolefin (TPO)/polyvinyl chloride (PVC) membrane. Windows on floors 2, 3, and 4 are double paned vinyl windows, with single-pane wood frame windows on the first floor.

Lighting

Interior lighting is made up of a mix of light emitting diode (LED) lamps on the first floor, with linear fluorescent and compact fluorescent lamps (CFL) elsewhere. The fluorescent lighting is a mix of T5 and T8 lamps. Lighting is controlled primarily through manual wall switches. Exterior lighting is made up of incandescent bulbs that are either pole-mounted or building-mounted.

Domestic Hot Water

Domestic hot water (DHW) is produced by a gas water heater with integral tanks. There is also a gas glycol boiler for the existing snowmelt system.

Mechanical Systems & Controls

The City and County Admin building uses steam boilers, a chiller, AHUs, steam radiators, and mini-splits to supply HVAC to the spaces. Two natural gas steam boilers are used to provide heat to radiators and coils within the AHUs. These boilers are believed to be beyond their useful life and very inefficient. It was also found that these boilers may be oversized as it was reported that the building generally only uses one of the boilers at a time at an 11% fire rate. This is likely due to the HVAC heating systems being able to keep the building at a steady state. The boiler controller automates a 24 hour lead-lag patter between the two boilers.

The air-cooled chiller provides chilled water to coils in the AHUs to support cooling. The chiller is nearing the end of its useful life and should be considered for replacement in the next 5 years if chilled water is still being used at the facility. A 55°F lockout is used to enable the chiller.

There are two AHUs at this site. One serves the chambers meeting room. This AHU only runs when there is a call for heating based on the zone temperature and the condensate temperature is above 80°F. This space, and its AHU, are estimated to only be in use for a few hours a day or less. The other AHU is a multizone unit and serves four zones on the first floor. This multizone unit operates based on a hot-deck cold-deck scheme to be able to provide heating and cooling to different zones as needed. It is likely that this is causing inefficient simultaneous heating and cooling scenarios. It was found that the economizer function on both of these units was not working correctly, as they are both stuck at a 20% outside air position.

Steam radiators and ductless split systems are used in the remainder of the buildings spaces for heating and cooling, respectively. The radiators are considered to be inefficient due to their use of steam generated by the boilers.

Exhaust fans located in the attic, boiler room, and roof are used to maintain building pressures and ventilation air flows.

Historical Utility Data

Electricity

There are 2 electric meters located at this building. One is for the parking lot, and one is for the building itself. Data was provided for all meters from May 2022 through April 2023. The total electric consumption for the 12 months of data was 523,493 kilowatt-hours (kWh) with a total cost of $63,102. The combined monthly peak demand was 144 kilowatts (kW). The data provided did not separate electricity and demand costs.

The figure below shows the electric usage over this period. The building data shows a steady load year-round with slight peaks during the summer. The summer peak is likely due to the increased demand for space cooling during the summer months.

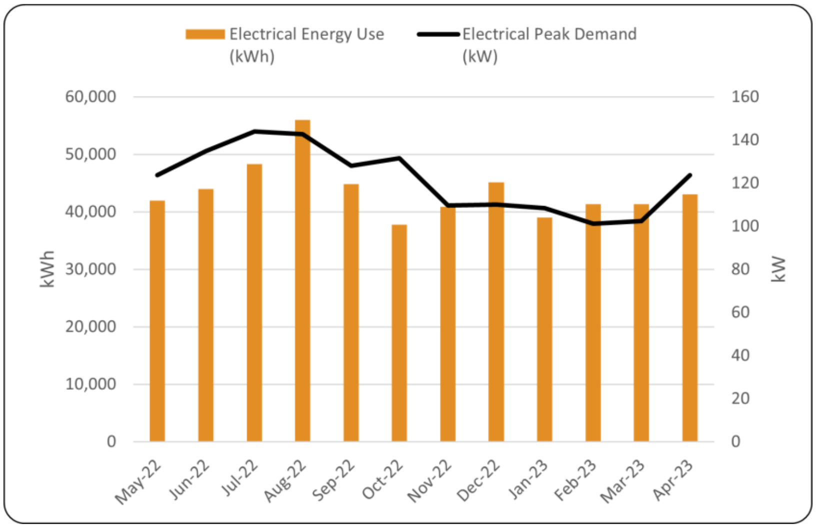


Figure 3 Monthly Electric Consumption

Natural Gas

One natural gas meter serves the facility. Data from May 2022 through April 2023 was used in this analysis. Annual gas usage for the entire facility over the 12 months of data was determined to be 56,924 therms. The annual cost of natural gas is $55,972.

The figure below compares the natural gas usage to the heating degree days (HDD) for Helena. There is a strong correlation between natural gas usage and HDD, which is expected as natural gas is used for space heating during colder months. There is a very small base load observed in the summer months that can be attributed to the DHW loads of the facility.

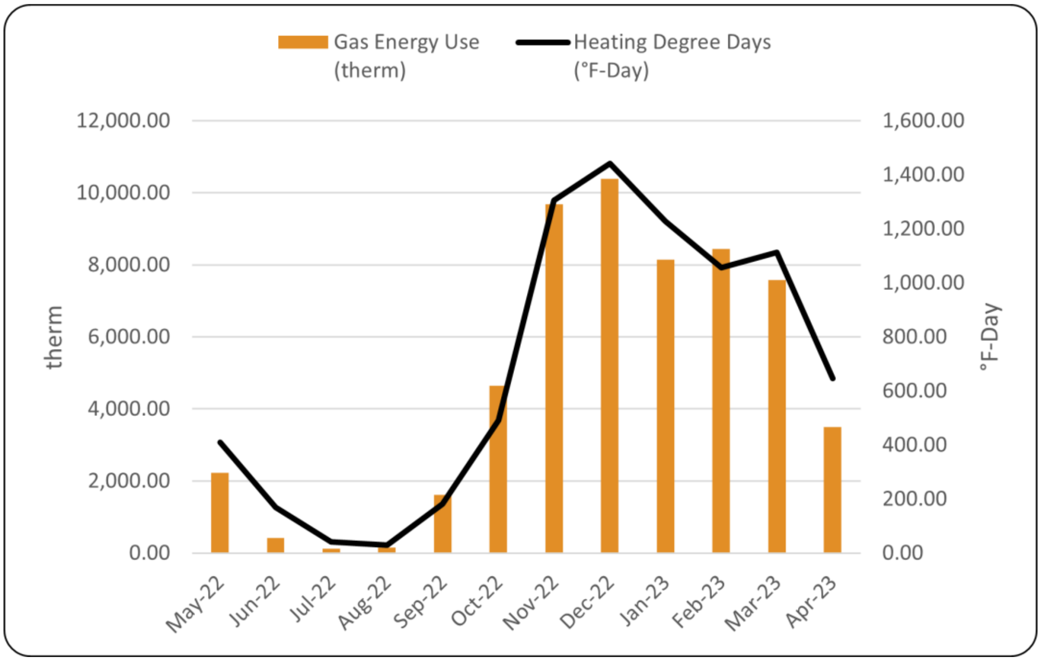


Figure 4 Monthly Natural Gas Consumption & HDD

Total Annual Energy Expense

The total utility costs for all electric and gas meters are shown in the figures below shown in thousand British thermal units (kBtu). On average, gas accounts for 47% of the overall energy utility cost, but 76% of the usage. Conversely, electricity on average accounts for 53% of energy utility costs, but only 24% of the usage. This highlights the discrepancy in per-unit utility costs for electric versus natural gas. These are important metrics when considering site decarbonization and electrification.

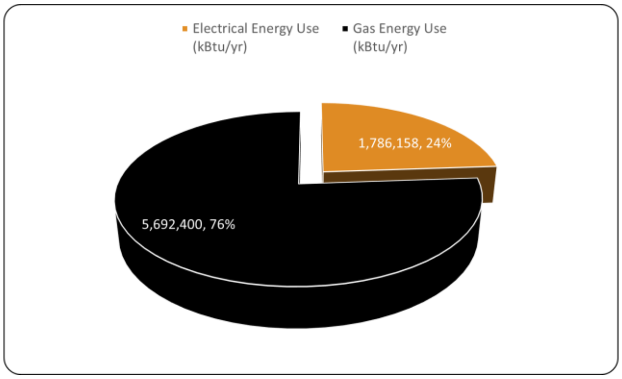


Figure 3 Annual Energy Usage

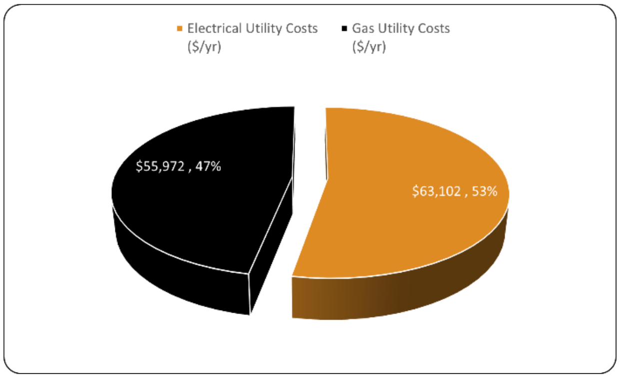
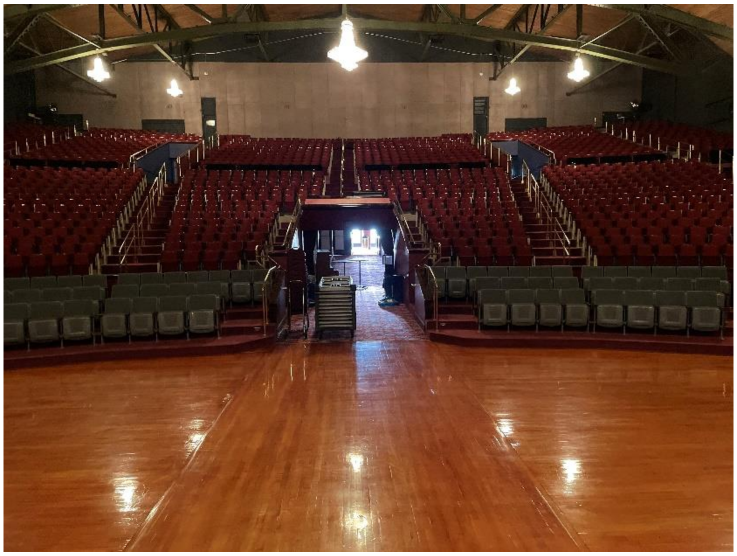


Figure 4 Annual Energy Cost

Equipment Inventory

Component Description	Manufacturer	Model	Serial	Qty	Location Detail	Capacity	Attributes	Dataplate Yr
Boiler [B-1]	Weil-McLain	H-1794SF	Illegible		Boiler room	17800 MBH	Dual Fuel, HVAC	
Boiler [B-2]	Weil-McLain	Illegible	Illegible		Boiler room	17800 MBH	Dual Fuel, HVAC	
Radiator				92	Throughout building		Hydronic, Column/CabinetStyle (per EA)	
Chiller	McQuay	AGZ0700HSNN-ER10	STNU080600183		Roof	70 TON	Air-Cooled	2008
Split System Ductless	Daikin Industries	4MXS36RMVJU	G000616		Site	3 TON	Single Zone	2018
Split System Ductless	Daikin Industries	RMXS48LVJU	E003202		Site	4 TON	Single Zone	2016
Split System Ductless	Daikin Industries	4MXS36RMVJU	G010237		Lower roof	3 TON	Single Zone	2018
Split System Ductless	Daikin Industries	4MXS36RMVJU	G001199		Site	3 TON	Single Zone	2018
Split System Ductless	Daikin Industries	RXYMQ48PVJU	E002573		Lower roof	4 TON	Single Zone	2012
Split System Ductless	Daikin Industries	3MXS24RMVJU	G000737		Lower roof	2 TON	Single Zone	2018
Fan Coil Unit	Inaccessible	Inaccessible	Inaccessible	98	Throughout building	550 CFM	Hydronic Terminal, 401 to 800CFM	
Pump [CWP1]	Grundfos	Illegible	Illegible		Attic	7.5 HP	Distribution, HVAC Chilled orCondenser Water	
Pump [CWP2]	Grundfus	Illegible	Illegible		Attic	7.5 HP	Distribution, HVAC Chilled orCondenser Water	
Air Handler	Inaccessible	Inaccessible	Inaccessible		First floor	400 CFM	Exterior AHU	
Air Handler	MUNTER	EZA0970	68116		East attic	100 CFM	Interior AHU, Easy/ModerateAccess	2010
Air Handler	Trane	10	M2325		East attic	1000 CFM	Interior AHU, Easy/ModerateAccess	2012
Axial Flow Fan	Ruskin	No tag/plate found	No tag/plate found		Attic	25000 CFM	In-Line, 7.5 HP Motor	
Exhaust Fan	Greenheck	CSP-A1410	Illegible		East attic	1400 CFM	Centrifugal, 16" Damper	1997
Exhaust Fan	Greenheck	CSP-A1410	11977969		East attic	1400 CFM	Centrifugal, 16" Damper	1997
Exhaust Fan	Cook	Illegible	Illegible		Boiler room	15000 CFM	Centrifugal, 36"Damper	
Exhaust Fan	No tag/plate found	No tag/plate found	No tag/plate found		East attic	20000 CFM	Centrifugal, 42" Damper	
Exhaust Fan	No tag/plate found	No tag/plate found	No tag/plate found		Roof	500 CFM	Roof or Wall-Mounted, 10"Damper	

Helena Civic Center



Building Use

The Civic Center is a 70,517 sqft facility built in 1920. The building has three stories and serves as an event center for Helena. Events such as weddings, industry events, plays, and sporting events occur in the two main spaces of this building, the ballroom and auditorium.

Occupancy

This building's occupancy varies, depending on what events are occurring at the time. There are typically several events per week in both the auditorium and ballroom, that may extend throughout the daytime and evening hours.

Building Envelope

The building is a masonry wall construction with brick façade on the exterior. The roof is primarily a barrel construction with a modified bituminous finish. The roof also has sections that are a flat construction with single-ply thermoplastic polyolefin (TPO)/polyvinyl chloride (PVC) membrane. The windows are aluminum frame windows.

Lighting

The lighting in the Civic Center is primarily LED except for the lighting in the ballroom and auditorium chandeliers, which use 25W incandescent lamps.

Domestic Hot Water

Domestic hot water (DHW) is produced by natural gas water heaters with integral tanks.

Mechanical Systems & Controls

The Civic Center uses two steam boilers, steam radiators, and a unique AHU system to provide heating to the facility. These boilers are considered to be inefficient and beyond their useful life. The building would likely benefit from a conversion to use hot water boilers rather than steam boilers. There is also a fire department attached to this facility. This space uses an RTU system equipped with mechanical cooling and gas fired heat.

The air-side system for this facility is located in the basement, and consists of a series of tunnels made of the basement corridors themselves. This design is original to the buildings construction and uses heat derived from the steam boilers to provided heated air to the Auditorium and Ballroom. Currently, the basement system does not provide mechanical cooling to these spaces. Facility personnel also demonstrated that airflow is adjusted by opening and closing doors in the basement, which act like dampers to manipulate airflow to the spaces. These doors are powered by actuators which can be controlled from a panel near the fans. It was also found that much of the equipment used to operate this system is beyond its useful life, including some fans and motors found to be part of the original construction. The facility would likely benefit from a conversion to new AHU systems that utilize modern efficient technologies such as heat pumps, energy recovery ventilators, airflow dampers and full DDC controls.

Historical Utility Data

Electricity

The building is served by a single electric meter. Utility data used in this analysis is based on monthly electric data from May 2022 through April 2023. Annual electric consumption for the entire facility over the 12 months of data was determined to be 221,460 kilowatt-hours (kWh) with a combined monthly peak demand of 119 kilowatts (kW). The annual cost of electricity is $29,638. The data provided did not separate electricity and demand costs.

The figure below shows the usage and demand graph. Electricity use is very steady and does not follow seasonal trends. This shows that the building energy load is consistent year-round.

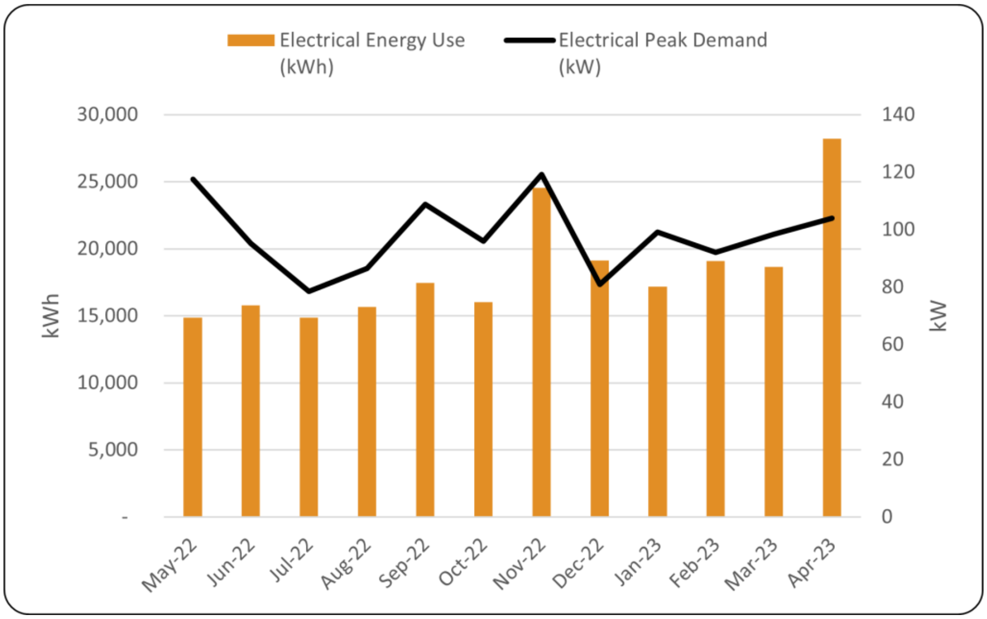


Figure 1: Monthly Electric Consumption

Natural Gas

One natural gas meter serves the facility. Data from November 2022 through October 2023 was used in this analysis. Annual gas usage for the entire facility over the 12 months of data was determined to be 53,190 therms. The annual cost of natural gas is $35,146.

The figure below compares the natural gas usage to the HDD for Helena. There is a strong correlation between natural gas usage and heating degree days (HDD), which is expected, reflecting the boiler usage for space heating. The summer baseload reflects the DHW usage year-round.

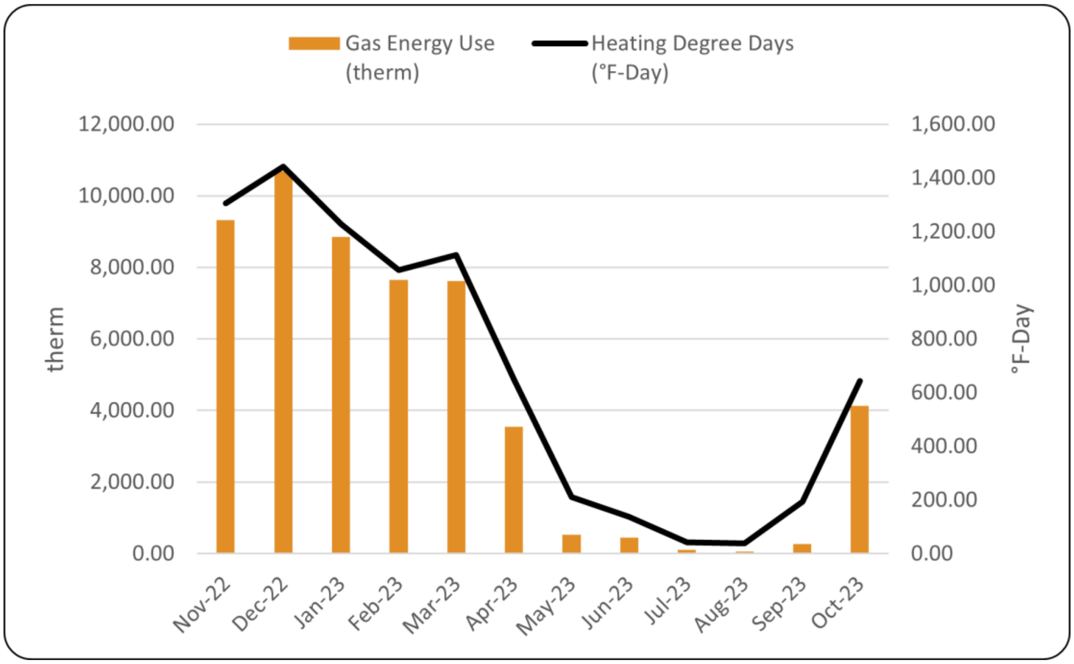


Figure 2: Monthly Natural Gas Consumption & HDD

Total Annual Energy Expense

The total utility costs for all electric and gas meters is shown in the figures below shown in thousand British thermal units (kBtu). On average gas accounts for 54% of the overall energy utility cost, but 88% of the usage. Conversely electricity on average accounts for 46% of energy utility costs, but only 12% of the usage. This highlights the discrepancy in per-unit utility costs for electric versus natural gas. These are important metrics when considering site decarbonization and electrification.

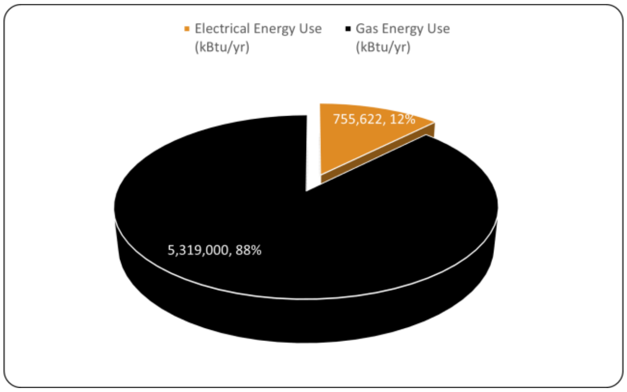


Figure 3 Annual Energy Usage

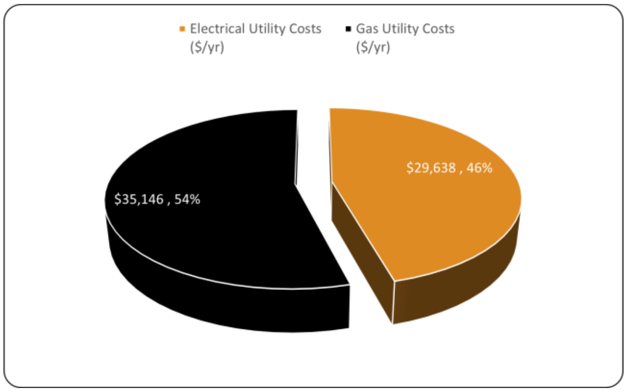


Figure 4 Annual Energy Cost

Equipment Inventory

Component Description	Manufacturer	Model	Serial	Qty	Location Detail	Capacity	Attributes	Dataplate Yr
Boiler	Hurst	LPE-G-80-15	LPE33615-20		Mechanical room	3300 MBH	Gas, HVAC	1998
Boiler	Hurst	LPE-G-80-15	LP ES336-15-19		Mechanical room	3360 MBH	Gas, HVAC	1998
Radiator				112	Throughout building		Hydronic, Baseboard (per LF) 1	
Unit Heater	Inaccessible	Inaccessible	Inaccessible		Throughout building	37 - 85 MBH	Hydronic	
Unit Heater	No tag/plate found	No tag/plate found	No tag/plate found	8	Mechanical room	401 - 800 MBH	Hydronic	
Unit Heater	Sterling	HS-120	B1801579321001001		Garage	13 - 36 MBH	Hydronic	
Unit Heater	Modine Manufacturing	446	111645		Theater	37 - 85 MBH	Hydronic	
Unit Heater	Modine Manufacturing	446	111644		Theater	13 - 36 MBH	Hydronic	
Split System Ductless	Mitsubishi Electric	MXZ-2A20NA-2	No tag/plate found		Site	2 TON	Single Zone	
Air Handler [CAP-1]	Pace	A 11 FC DWDI	94-75557-0		Mechanical room	3410 CFM	Interior AHU, Easy/ModerateAccess	1994
Packaged Unit	Carrier	50DA003300	D022466		Site	2.5 TON	Duct-Mounted, 2.5 TON	
Axial Flow Fan	Airking	No tag/plate found	No tag/plate found		Throughout building	5000 CFM	In-Line, up to 1 HP Motor,1000 to 3000 CFM	

Law and Justice Center

Building Use

The Law and Justice Center is a 4-story 66,892 sf building built in 1928 and renovated from 1972-1980. It serves as the municipal court for Helena, office space, and the police/sheriff department.

Occupancy

The court and office spaces are open Monday through Friday 8:00 am – 5:00 pm. The sections of the building used by law enforcement are occupied at all times.

Building Envelope

The building is masonry bearing walls and a metal roof deck with open-web steel joists. The primary wall façade is concrete masonry units (CMU), and the secondary wall façade is Stucco. The roof is primarily flat construction with a single-ply membrane and stone ballast. There are also sections that are flat construction with single-ply thermoplastic polyolefin (TPO)/polyvinyl chloride (PVC) membrane. The windows are aluminum frame double-pane windows.

Lighting

Most of the interior lighting at this facility is T8 fluorescent lighting with some compact fluorescent lighting (CFL). Both linear and U-shape variants are present in the spaces. Lighting is controlled by manual switching. Exterior lighting is a mix of building-mounted halogen and building-mounted incandescent bulbs with pole-mounted high-pressure sodium (HPS) bulbs.

Domestic Hot Water

The domestic hot water (DHW) is produced by electric water heaters in tandem with integral tanks for storage.

Mechanical Systems & Controls

The Law and Justice Center uses natural gas boilers, MZ AHUs, newer VAV RTUs, and radiators. The “Pillar” building uses steam from the boiler, the rest of the facility uses hot water from heat exchangers fed by the steam. The steam/hot water serves radiators and coils within the AHUs and VAVs. Boiler replacements are planned for this spring which will convert everything to hot water.

There are three air-cooled chillers that provide chilled water to coils in the AHUs in order to support space cooling. The chillers have an outdoor air temperature lockout set by an analog thermostat.

There are three AHUs at this site. The “Pillar” AHU serves the pillar section of the building, AHU-1 serves all floors on one third of the building, AHU-2 serves all floors on a different third of the building. There are also three RTUs. Two were being installed at the time of the audit to serve a newly renovated area The McQuay RTU serves the third floor of the building, but was found to be off during the site visit. Currently all AHUs run 24 hours per day regardless of whether the building is occupied or not. Furthermore, the economizer on AHU-1 is broken resulting in both the outside air and return air dampers being fully open. The MZ AHUs are past their useful lifetime and should be considered for replacement.

The rest of the space cooling is performed by the CRAC, PTAC, FCUs, and window air conditioning units. Exhaust fans are located around the building to maintain building pressure and ventilation air flow.

Historical Utility Data

Electricity

The Law & Justice Center is served by two electric meters. Utility data used in this analysis is based on monthly electric data from May 2022 through April 2023, which was the data provided to Iconergy. The bills provided did not include information on demand costs. Electric consumption in the past 12 months for the entire facility was determined to be 741 thousand kilowatt-hours (kWh) with a cost of $84,385, or 69% of overall utility costs. The combined monthly peak demand was 185 kilowatts (kW). The data used did not separate electricity costs and demand costs.

The figure below shows the electrical data provided. The building load is very stable, with slight peaks during the summer months. This is to be expected given the building's current operation. The summer peak can be explained by increased space cooling demands.

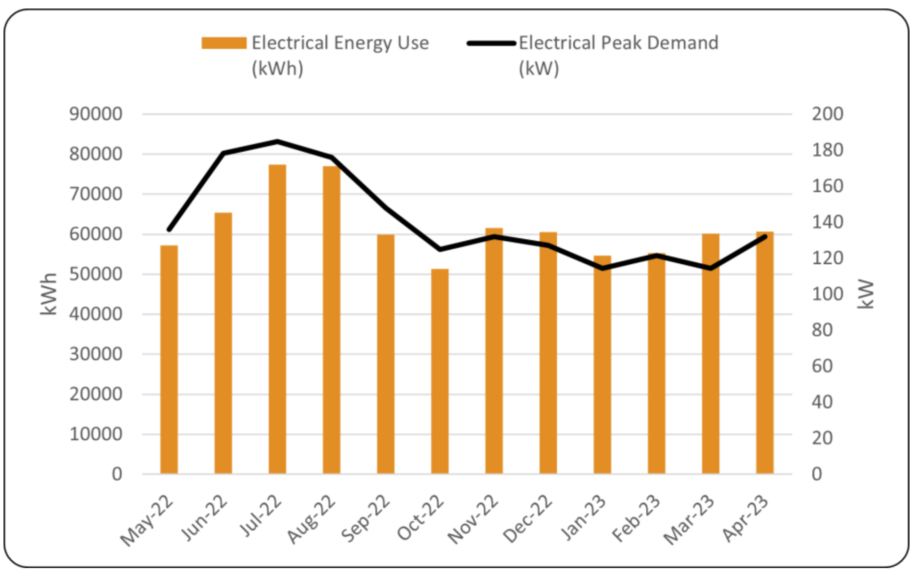


Figure 1: Monthly Electric Consumption

Natural Gas

One natural gas meter serves the facility. Data from May 2023 through April 2023 was used in this analysis. The natural gas usage over the 12 months of data was 38,405 therms with a cost of $37,553 or 31% of the total utility charges.

The figure below compares the natural gas usage to the heating degree days (HDD) for Helena. There is a strong correlation between natural gas usage and HDD, which is expected. The figure also shows that gas use peaks in the winter. This is expected as gas is used for space heating.

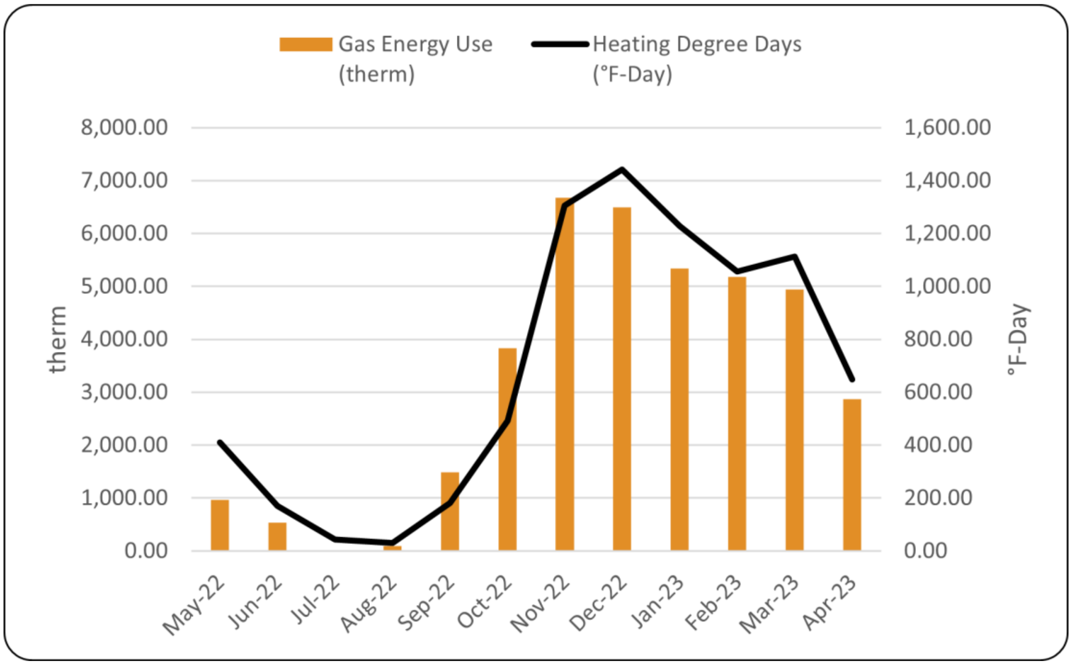


Figure 2: Monthly Natural Gas Consumption & HDD

Total Annual Energy Expense

The total utility costs for all electric and gas meters is shown in the figures below shown in thousand British thermal units (kBtu). On average gas accounts for 31% of the overall energy utility cost, but 60% of the usage. Conversely electricity on average accounts for 69% of energy utility costs, but only 40% of the usage. This highlights the discrepancy in per-unit utility costs for electric versus natural gas. These are important metrics when considering site decarbonization and electrification.

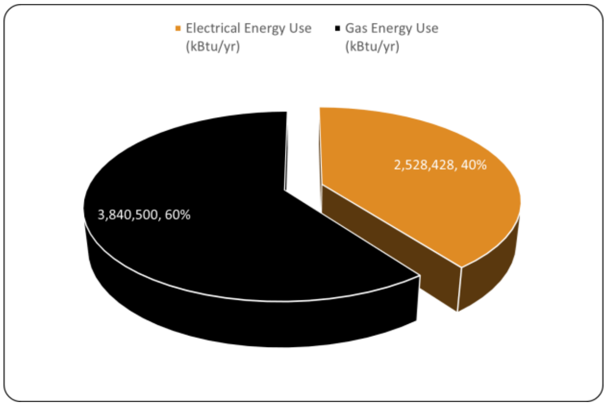


Figure 3 Annual Energy Usage

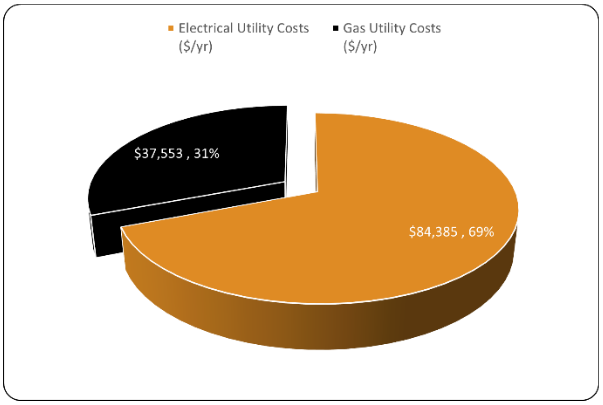


Figure 4 Annual Energy Cost

Equipment Inventory

Component Description	Manufacturer	Model	Serial	Qty	Location Detail	Capacity	Attributes	Dataplate Yr
Storage Tank	No tag/plate found	No tag/plate found	No tag/plate found		Site	276 - 500 GAL	Fuel, Interior	
Boiler [1]		421275	0-315 8		Mechanical room-S. Building American Standard Inc.	1938 MBH	Gas, HVAC	
Boiler [2]		421273	0-3155		Mechanical room-S. Building American Standard Inc.	1938 MBH	Gas, HVAC	
Heat Exchanger		No tag/plate found	No tag/plate found		Mechanical room-S. Building No tag/plate found	131 - 260 GPM	Shell & Tube, HVAC	
Heat Exchanger		No tag/plate found	No tag/plate found		Mechanical room-S. Building No tag/plate found	261 - 380 GPM	Shell & Tube, HVAC	
Radiator				74	Throughout-S. Building		Hydronic, Baseboard (per LF)	
Radiator				66	Throughout-N. Building		Hydronic, Column/CabinetStyle (per EA)	
Chiller	Trane	RAUCC20EBU0300D000019	C01D47501		South roof	20 TON	Air-Cooled	2001
Chiller	York	YCAL0050EB17XCBBXTXX	RDSM018448		North roof	50 TON	Air-Cooled	2007
Chiller	Carrier	38 -054 - - - 501DA	4303F61108		Site	50 TON	Air-Cooled, 50 TON	2003
Computer Room AC Unit	Liebert	No tag/plate found	No tag/plate found		IT room-basement -N.Building	7.5 TON	Air-Cooled, CRAC Cabinet, 6to 10 TON	
Packaged Terminal AirConditioner [AC1]	Carrier	50BT006500	0565006492		Basement -S. Building	5 TON	PTAC	1985
Packaged Terminal AirConditioner [AC4]	Carrier	50BT006500	4784690 821.		Basement -S. Building	5 TON	PTAC	1985
Split System	Electro-Air	No tag/plate found	No tag/plate found		Basement-S. Building	7.5 TON	Air Ceaner	2002
Split System	Rheem	RAWE-090CAZ949	6680F370211409		Site	7.5 TON	Condensing Unit/Heat Pump	2002
Fan Coil Unit				4	Throughout-S. Building	1350 CFM	Hydronic Terminal	
Fan Coil Unit				3	Throughout-S. Building	450 CFM	Hydronic Terminal	
Pump		215-11702-17	No tag/plate found		Mechanical room-S. Building Wagner	5 HP	Distribution, HVAC Chilled orCondenser Water	
HVAC Steam Components	Paco	LBD LRU	S2DEP11B8		Electrical room-S. Building	1 HP	Pump, Condensate WaterReturn	
Air Handler	No tag/plate found	No tag/plate found	No tag/plate found		Mechanical room-basement-N. Building	4000 CFM	Interior AHU, Easy/ModerateAccess	
Air Handler [2-P]	Mcquay	RPS018CSY	38J00453 00		Roof-S. Building	8001 - 10000 CFM	Exterior AHU	1998
Air Handler		Inaccessible	Inaccessible		Mechanical room-S. Building Inaccessible	1201 - 2400 CFM	Interior AHU, Easy/ModerateAccess	
Air Handler		No tag/plate found	No tag/plate found		Mechanical room-S. Building No tag/plate found	10001 - 15000 CFM	Interior AHU, Easy/ModerateAccess	1978
Air Handler	McQuay	LHD103CH	3KA00329		Basement-S. Building	1201 - 2400 CFM	Interior AHU, Easy/ModerateAccess	
Air Handler [S-1]		CF-33-4-2-SW-3-GW-TAU-S-H	K81-D22674		Mechanical room-N. Building Trane	4000 CFM	Interior AHU, Easy/ModerateAccess	
Exhaust Fan	Trane	GRB16	170975		Roof-S. Building	2001 - 5000 CFM	Centrifugal, 24" Damper	
Exhaust Fan	No tag/plate found	No tag/plate found	No tag/plate found		Middle roof	1000 CFM	Roof or Wall-Mounted, 12"Damper	
Exhaust Fan	Greenheck	CBE104	606445		North roof	1000 CFM	Roof or Wall-Mounted, 12"Damper	

Ten Mile Water Treatment Plant

Building Use

The Ten Mile plant is a 2-story building built in 1991. The plant occupies 50,622 sqft. and is used to treat water used in the city's water system.

Operation

The plant operates 24/7 year-round. The volume of treated water is determined by the demand for water in the city. In May-September, the Missouri River treatment plant is also brought online to meet the increased demand due to irrigation.

Building Envelope

The walls are masonry bearing walls with a metal roof deck supported by open-web steel joists. The wall façade is primarily exterior insulation finishing systems (EIFS) with sections that are concrete integral. The roof is a flat construction with ballasted ethylene propylene diene terpolymer (EPDT) single-ply membrane. The windows are aluminum frame windows.

Lighting

Interior lighting is provided by a mix of linear fluorescent, compact fluorescent lamps (CFL), and LEDs. The lighting is controlled manually through switches. Exterior lighting is a mix of building-mounted and pole-mounted high pressure sodium (HPS) and metal halide bulbs. There is also accent lighting on pedestrian walkways and landscaping.

Mechanical Systems & Controls

The treatment process takes place in several stages using different pumps and blowers, including pretreatment, clarification, backwash, and filtration. The equipment is controlled by an industrial PLC control system. The overall power usage at Tenmile itself is relatively low, although when Missouri River is brought online, both plants push into the town's water system, increasing load on the pumps. Due to the size of the pumps and the system's head pressure, Missouri River uses significantly more energy in the short period it is operational.

There are large pumps at several pumphouses and reservoirs located in the city. The distribution system is split into a "high zone" and "low zone", which are controlled to flow and pressure, respectively. Motors at the two plants and in the system range from 30 to 600 HP, with the larger ones on VFDs.

Historical Utility Data

Electricity

The Ten Mile facility is served by one electric meter. Utility data used in this analysis is based on monthly electric data from June 2022 through May 2023. Electric consumption for the entire facility over the 12 months of data was determined to be 822 thousand kilowatt-hours (kWh), with a combined peak demand of 217 kilowatts (kW). The annual cost of electricity for the 12 months of data was $98,396. The figure below shows the electrical data provided. There is lower electrical use during the summer months, likely due to the MO River plant coming online.

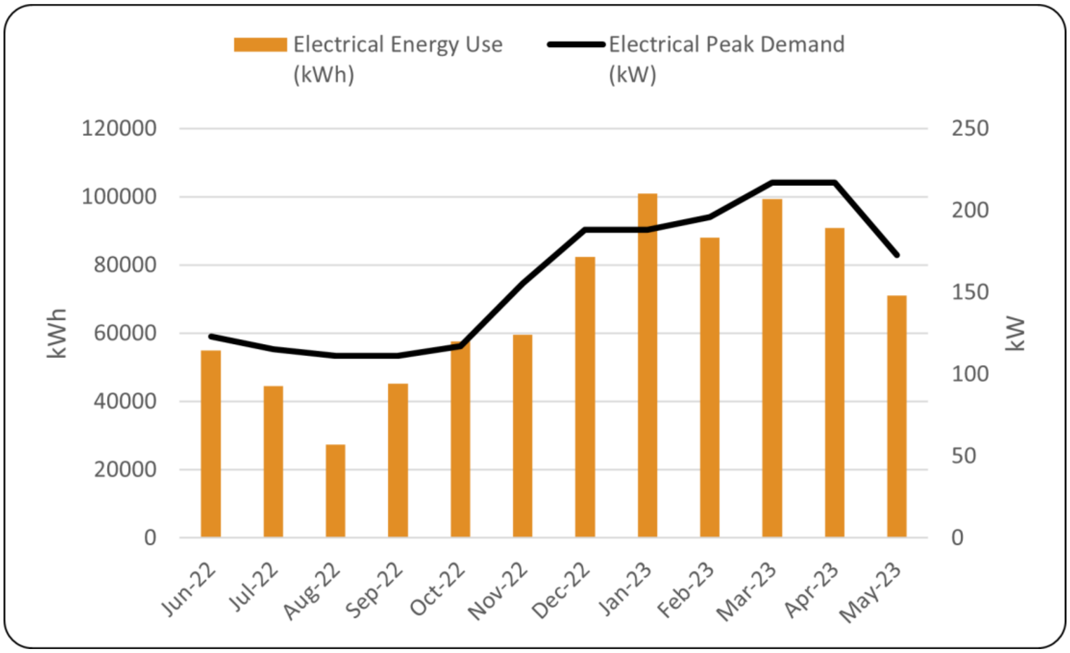


Figure 1: Monthly Electric Consumption

Natural Gas

This facility does not use natural gas.

Total Annual Energy Expense

The total annual energy use is solely made up of electricity usage because this facility does not use natural gas. The energy use for the facility in thousand British thermal units (kBtu) is 2,805,101. As mentioned above, this costs $98,396 annually.

HVAC Equipment Inventory

Component Description	Manufacturer	Model	Serial	Qty	Location Detail	Capacity	Attributes	Dataplate Yr
Unit Heater	Chromalox	LUH-D-04-43-32-00	004-303374-265		GARAGE-COLD STORAGEBLDG.	4 KW	Electric	
Storage Tank	Wilray	No tag/plate found	No tag/plate found		Site	1000 GAL	Fuel, Interior	
Baseboard Heater [CUH-1]					TEN MILE WATER TRTMNTPLANT	1 KW	Electric, 4 LF	
Baseboard Heater [CUH-2]				3	Electrical room	1 KW	Electric, 3 LF	
Unit Heater	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	3 KW	Electric	
Unit Heater	Inaccessible	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	6 - 10 KW	Electric	
Unit Heater [UH-1]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-10]	Trane	UEC-055D080	No tag/plate found		TEN MILE WATER TRTMNTPLANT	5 KW	Electric	
Unit Heater [UH-11]	Trane	UHEC-10300B0	No tag/plate found		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-12]	Trane	UHEC-10300B0	No tag/plate found		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-13]	Trane	Illegible	No tag/plate found		TEN MILE WATER TRTMNTPLANT	15 KW	Electric	
Unit Heater [UH-14]	Trane	UHEC-1030080	No tag/plate found		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-19]	Trane	U11EC 033D080	No tag/plate found		TEN MILE WATER TRTMNTPLANT	3.3 KW	Electric	
Unit Heater [UH-2]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-3]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-4]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-5]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-6]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	1991
Unit Heater [UH-7]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	6 - 10 KW	Electric	
Unit Heater [UH-8]	Trane	UEC-1030080	No tag/plate found		TEN MILE WATER TRTMNTPLANT	10 KW	Electric	
Unit Heater [UH-9]	Trane	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	5 KW	Electric	
Hydronic [HP-01]	FHP Manufacturing	EC042 - 4HZC	3540 -012-000001-T111M38863		TEN MILE WATER TRTMNTPLANT	3.5 TON	Heat Pump	
Hydronic [HP-02]	FHP Manufacturing	EC120-4HZC	3540 -012-000002-T111M38755		TEN MILE WATER TRTMNTPLANT	10 TON	Heat Pump	
Hydronic [HP-03]	FHP Manufacturing	EC 120- 4HZC	3540 -012-000001-T111M33755		TEN MILE WATER TRTMNTPLANT	10 TON	Heat Pump	
Hydronic [HP-03]	FHP Manufacturing	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	12.5 TON	Heat Pump	
Hydronic [HP-04]	FHP Manufacturing	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	6 TON	Heat Pump	
Hydronic [HP-05]	FHP Manufacturing	EC070-4HZC	3540 -012- 000001 -T111M38894		TEN MILE WATER TRTMNTPLANT	6 TON	Heat Pump	
Hydronic [HP-06]	FHP Manufacturing	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	6 TON	Heat Pump	
Hydronic [HP-07]	FHP Manufacturing	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	6 TON	Heat Pump	
Hydronic [HP-08]	FHP Manufacturing	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	12,5 TON	Heat Pump	
Hydronic [HP-10]	FHP Manufacturing	EC 150 - 4HZC	3540 -012000001 -T111M38800		TEN MILE WATER TRTMNTPLANT	12.5 TON	Heat Pump	
Hydronic [HP-11]	FHP Manufacturing	EC036	3540-012-000001-T111M38862		TEN MILE WATER TRTMNTPLANT	3 TON	Heat Pump	
Axial Flow Fan	Inaccessible	Inaccessible	Inaccessible		TEN MILE WATER TRTMNTPLANT	1000 - 3000 CFM	In-Line, up to 1 HP Motor	
Exhaust Fan [EF-10]	Greenheck	TAB-18-7	89106847		TEN MILE WATER TRTMNTPLANT	8501 - 15000 CFM	Centrifugal, 36"Damper	

Wastewater Treatment Facility

Building Use

The Wastewater Treatment Facility is a multi-building plant occupying 44,302 sf. It serves as the only wastewater treat plant for the city of Helena.

Operation

The facility runs 24/7 to treat the wastewater. The load on the plant is determined the flow influent from the city.

Building Envelope

The building envelope varies from building to building. Due to the limited data available for the buildings only two of them have known envelope characteristics. These are the Administration Building and the Interpretive Center. The other buildings at the plant are primarily CMU wall construction.

The Administration Building walls are masonry bearing walls with a wood roof deck supported by wood joists. The façade is primarily brick finish, with some metal siding finish. The windows are aluminum frame windows.

The Interpretive Center walls are masonry bearing walls with a metal roof deck supported by open-web steel joists. The façade is primarily concrete masonry units (CMU) with some metal siding. The windows are aluminum frame windows.

Lighting

Interior lighting is primarily T8 linear fluorescent lighting. In some buildings the fluorescent lighting is being replaced with LEDs once burnout of the original bulbs occurs. Lighting is primarily controlled by manual wall switches. Exterior lighting consists of building-mounted and pole-mounted LED and compact fluorescent lighting (CFL).

Mechanical Systems & Controls

The treatment process takes place in several stages using different pumps and blowers, including pretreatment, clarification, UV filtration, aeration, activated sludge, and mixers. The equipment is controlled by an industrial PLC control system. Motors range in size from 5 to 200 horse power (HP), and some are on VFDs. A UV filtration system is used for disinfection, and uses four modules with (40) 65 Watt (W) lamps.

A methane boiler burns methane gas produced by the wastewater. The boiler often trips on low pressure, causing it to flare gas.

Historical Utility Data

Electricity

The WWTF is served by two electric meters. Utility data used in this analysis is based on monthly electric data from May 2022 through April 2023. Electric consumption for the facility over the 12 months of data was determined to be 3.36 million kilowatt-hours (kWh). The combined monthly peak demand was 469 kilowatts (kW). The annual cost of electricity for the 12 months is $356,018 or 84% of the annual utility charges. The data did not differentiate between electricity costs and demand cost.

The figure below shows the electrical data provided. The facility operates year-round and the electricity consumption reflects this, with no noticeable seasonal trends present.

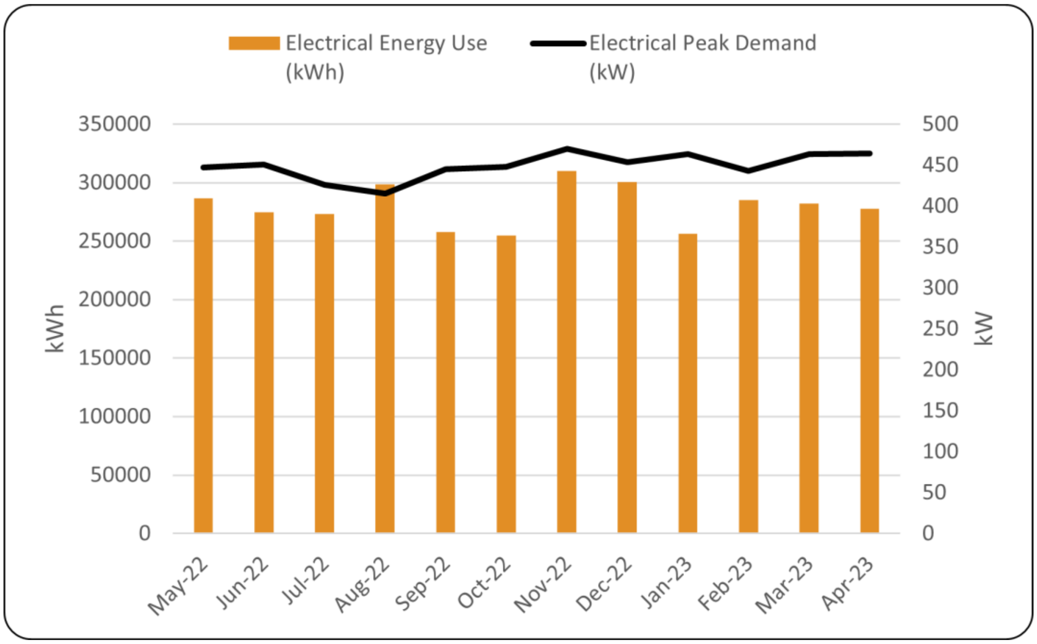


Figure 1 Monthly Electric Consumption

Natural Gas

One natural gas meter serves the facility. Data from May 2022 through April 2023 was used in this analysis. The annual natural gas for the 12 months of data was 70,928 therms with a cost of $68,327.

The figure below compares the natural gas usage to the heating degree days (HDD) for Helena. There is some correlation between natural gas usage and HDD, although some gas usage is expected to be process-related. There is a large spike in usage during March 2023 which does not have an obvious cause.

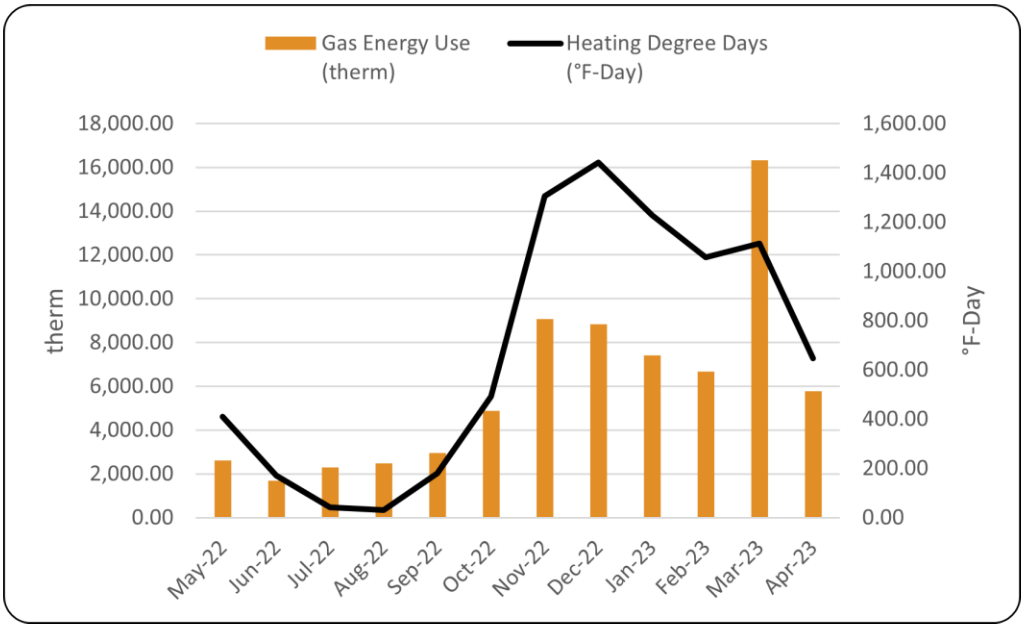


Figure 2 Monthly Natural Gas Consumption & HDD

Total Annual Energy Expense

The total utility costs for all electric and gas meters are shown in the figures below in thousand British thermal units (kBtu). On average, gas accounts for 16% of the overall energy utility cost, but 38% of the usage. Conversely electricity on average accounts for 84% of energy utility costs, but only 62% of the usage. This highlights the discrepancy in per-unit utility costs for electric versus natural gas. These are important metrics when considering site decarbonization and electrification.

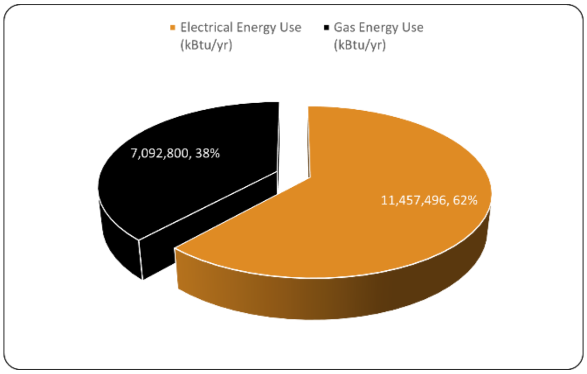


Figure 3 Annual Energy Usage

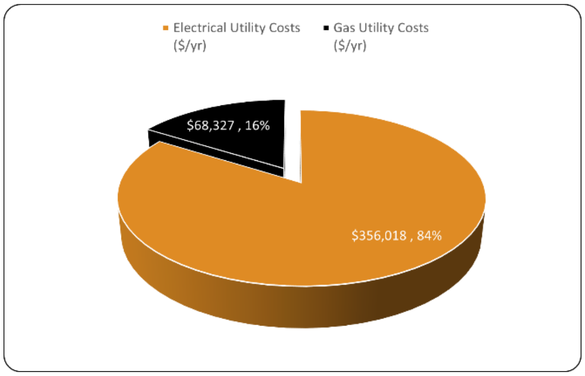


Figure 4 Annual Energy Cost

Appendix B: Solar PV Designs

Conceptual Solar System Design
03/06/2024

Bill Roberts Golf Course
North -Ground Mount
2201 N Benton Ave
Helena, MT 59602

Contact
QstN

Andy Pohren
500 Locust Street
Des Moines, IA, 50309

System

Equipment	
System type	Grid-tied
Racking installation	Ground Mount
Module type	Monocrystalline
Module size	500 W; e.g.,VSUN500 - 132BMH
Number of Module (Panels)	120
Inverters	String Inverter

Performance	
Installed DC potential capacity	60 kW_DC
Installed AC potential capacity	49.8 kW_AC
Annual energy consumption	102,385 kWh
Est. annual solar energy production	83,119 kWh
Est. energy consumption offset	80%

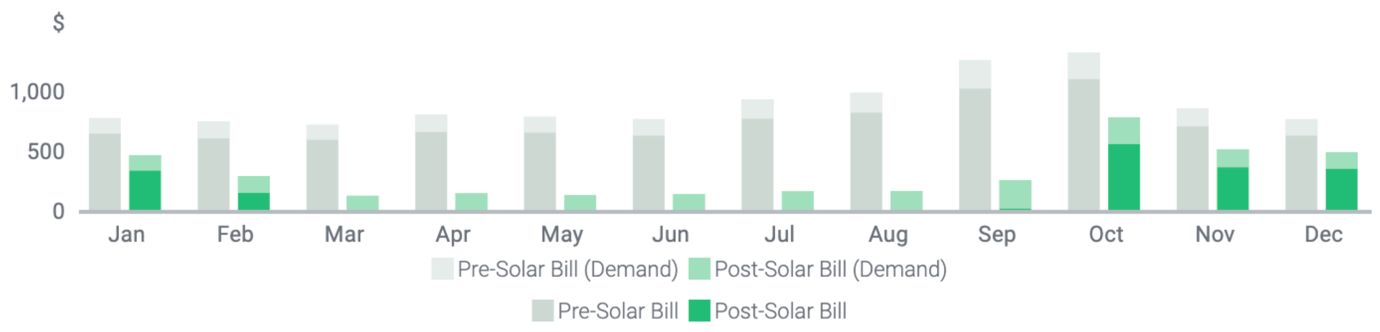
Financial

Metric	Cash
Est. installed cost ($)	$223,303
Est. 30% Investment Tax Credit (ITC)	($66,991)
Est. net out of pocket cost	**$156,312**
Est. $/W	$3.72
Avg. annual energy cost savings	$10,349
Est. Avg. O&M annual cost	$1,043
IRR	2.96%
Est. levelized cost of energy (LCOE)	$0.09/kWh
Est. lifetime savings ($)	$80,087
Payback period	18.5 yrs.

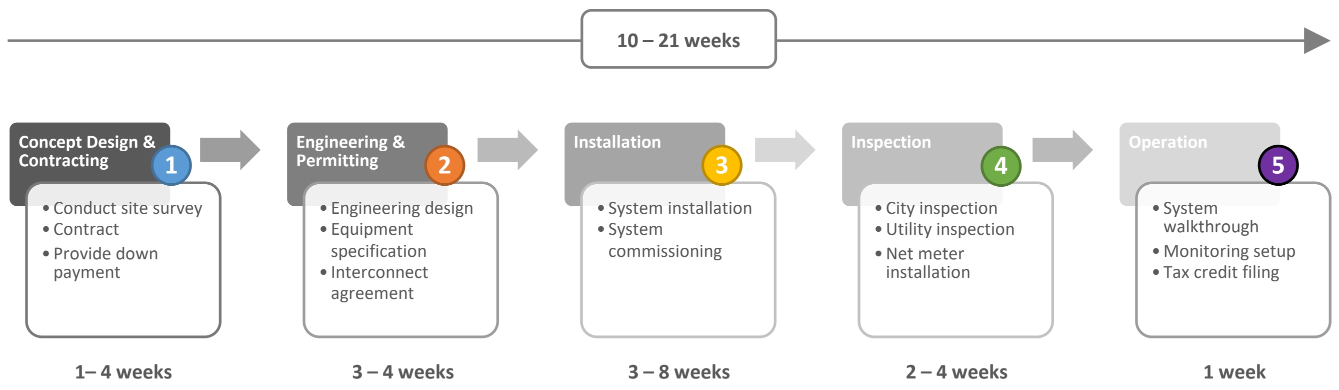
Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- These financial numbers do not reflect the Northwestern Energy E+ Renewable Custom Incentive (participant match at least 10%)
- Average O&M price does include potential inverter replacement
- Assumes running electrical 660ft from array to point of interconnection
- Does not include costs to repair ground from trenching

Bill Savings



Estimated Schedule



ASSUMPTIONS:

Financing Option	Cash
Project Life (years)	25
Discount Rate	0.00%
System Size (kW) (DC, STC)	60
System Size (kW) (DC, PTC)	
System Size (kW) (AC)	0
Electricity Rate Escalation	3.50%
Degradation	99.50%
National Tax Rate	0.00%
Local Tax Rate	0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	223,303.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	223,303.00												
Electric Output (kWh)		83,405.79	82,988.76	82,573.81	82,160.94	81,750.14	81,341.39	80,934.68	80,530.01	80,127.36	79,726.72	79,328.09	78,931.45
Solar Energy Production Price ($/kWh)		0.087	0.090	0.093	0.096	0.099	0.103	0.106	0.110	0.114	0.118	0.122	0.126
Utility Bill Analysis													
Utility Bill Without Solar		10,858.91	11,235.31	11,624.90	12,028.11	12,445.44	12,877.38	13,324.43	13,787.14	14,266.03	14,761.69	15,274.69	15,805.65
Utility Bill With Solar		3,643.22	3,804.42	3,972.38	4,147.36	4,329.64	4,519.53	4,717.31	4,923.30	5,137.83	5,361.24	5,593.88	5,836.11
Avoided Cost of Energy		7,215.68	7,430.89	7,652.52	7,880.76	8,115.80	8,357.85	8,607.13	8,863.83	9,128.20	9,400.45	9,680.81	9,969.54
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		66,990.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Revenues	0.00	7,215.68	7,430.89	7,652.52	7,880.76	8,115.80	8,357.85	8,607.13	8,863.83	9,128.20	9,400.45	9,680.81	9,969.54
EBITDA	0.00	6,615.68	6,812.89	7,015.98	7,225.12	7,440.49	7,662.29	7,890.69	8,125.91	8,368.13	8,617.58	8,874.46	9,139.00
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	6,615.68	6,812.89	7,015.98	7,225.12	7,440.49	7,662.29	7,890.69	8,125.91	8,368.13	8,617.58	8,874.46	9,139.00
Equity Investment	-223,303.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-223,303.00	6,615.68	6,812.89	7,015.98	7,225.12	7,440.49	7,662.29	7,890.69	8,125.91	8,368.13	8,617.58	8,874.46	9,139.00
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-223,303.00	73,606.58	6,812.89	7,015.98	7,225.12	7,440.49	7,662.29	7,890.69	8,125.91	8,368.13	8,617.58	8,874.46	9,139.00
Discounted After Tax Cash Flow	-223,303.00	73,606.58	6,812.89	7,015.98	7,225.12	7,440.49	7,662.29	7,890.69	8,125.91	8,368.13	8,617.58	8,874.46	9,139.00

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	78,536.79	78,144.11	77,753.39	77,364.62	76,977.80	76,592.91	76,209.94	75,828.89	75,449.75	75,072.50	74,697.14	74,323.65	73,952.03
Solar Energy Production Price ($/kWh)	0.131	0.135	0.140	0.145	0.150	0.155	0.161	0.166	0.172	0.178	0.184	0.191	0.198
Utility Bill Analysis													
Utility Bill Without Solar	16,355.20	16,923.98	17,512.66	18,121.95	18,752.56	19,405.25	20,080.78	20,779.95	21,503.60	22,252.57	23,027.75	23,830.07	24,660.47
Utility Bill With Solar	6,088.31	6,350.88	6,624.22	6,908.76	7,204.94	7,513.22	7,834.07	8,167.99	8,515.48	8,877.08	9,253.34	9,644.84	10,052.16
Avoided Cost of Energy	10,266.89	10,573.10	10,888.44	11,213.19	11,547.62	11,892.03	12,246.71	12,611.96	12,988.12	13,375.49	13,774.41	14,185.23	14,608.31
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	855.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	5,055.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Revenues	10,266.89	10,573.10	10,888.44	11,213.19	11,547.62	11,892.03	12,246.71	12,611.96	12,988.12	13,375.49	13,774.41	14,185.23	14,608.31
EBITDA	5,211.43	9,691.98	9,980.88	10,278.41	10,584.80	10,900.32	11,225.25	11,559.86	11,904.45	12,259.31	12,624.75	13,001.08	13,388.63
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	5,211.43	9,691.98	9,980.88	10,278.41	10,584.80	10,900.32	11,225.25	11,559.86	11,904.45	12,259.31	12,624.75	13,001.08	13,388.63
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	5,211.43	9,691.98	9,980.88	10,278.41	10,584.80	10,900.32	11,225.25	11,559.86	11,904.45	12,259.31	12,624.75	13,001.08	13,388.63
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	5,211.43	9,691.98	9,980.88	10,278.41	10,584.80	10,900.32	11,225.25	11,559.86	11,904.45	12,259.31	12,624.75	13,001.08	13,388.63
Discounted After Tax Cash Flow	5,211.43	9,691.98	9,980.88	10,278.41	10,584.80	10,900.32	11,225.25	11,559.86	11,904.45	12,259.31	12,624.75	13,001.08	13,388.63

NPV	$80,087.28
IRR	2.956%
LCOE ($/kWh)	0.09
Payback Period (years)	18.52
Price per Watt ($/W)	3.72

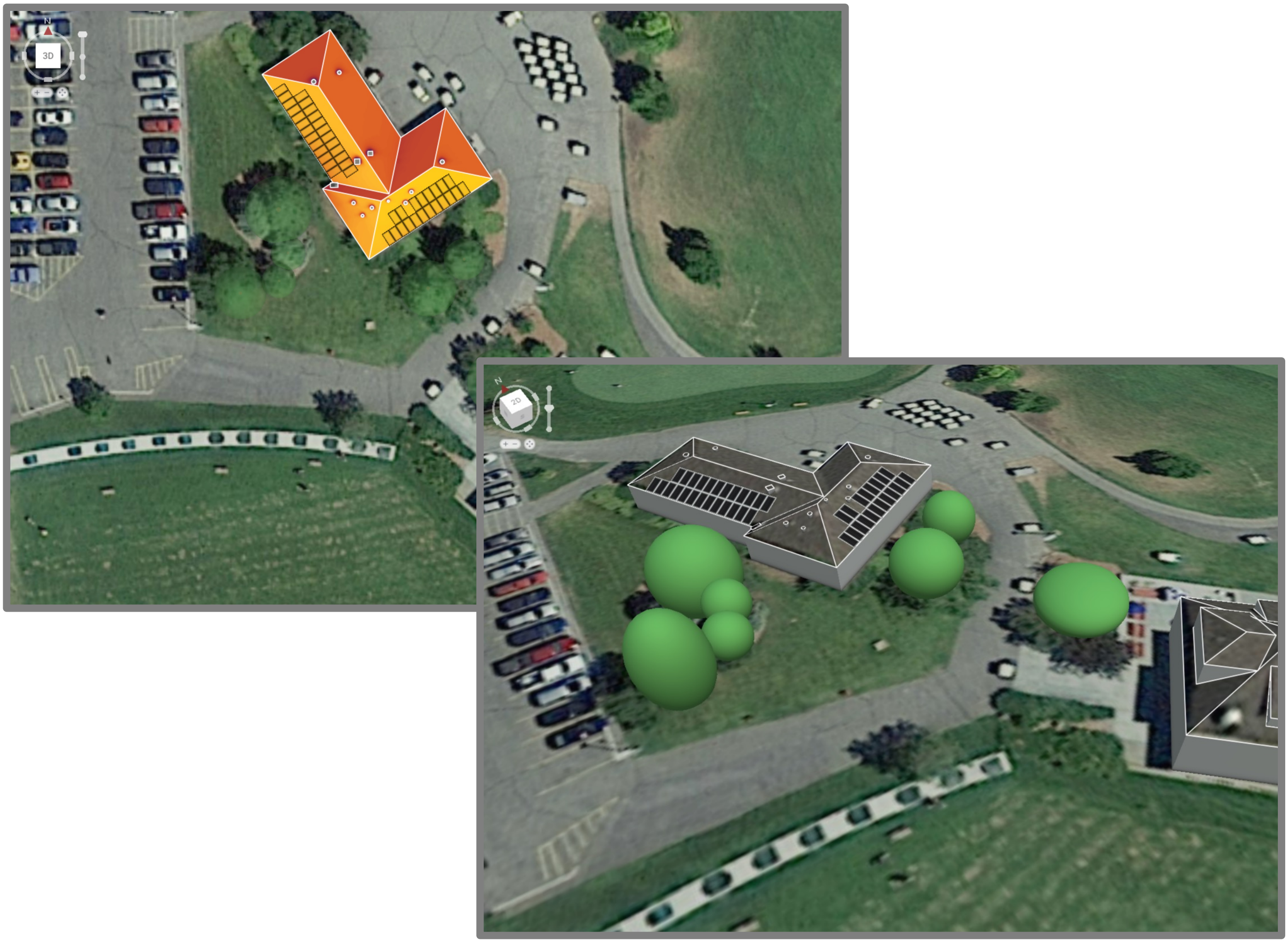
Conceptual Solar System Design
02/20/2024

Bill Roberts Golf Course
2201 N Benton Ave
Helena, MT 59601

Contact
QstN

Andy Pohren
500 Locust Street
Des Moines, IA, 50309

System



Equipment	
System type	Grid-tied
Racking installation	Flush Mount
Module type	Monocrystalline
Module size	410 W; e.g., VSUN410 – 132BMH
Number of Module (Panels)	45
Inverters	String Inverter w/power optimizers

Performance	
Installed DC potential capacity	18.4 kW_DC
Installed AC potential capacity	15.3 kW_AC
Annual energy consumption	102,385 kWh
Est. annual solar energy production	22,879 kWh
Est. energy consumption offset	22%

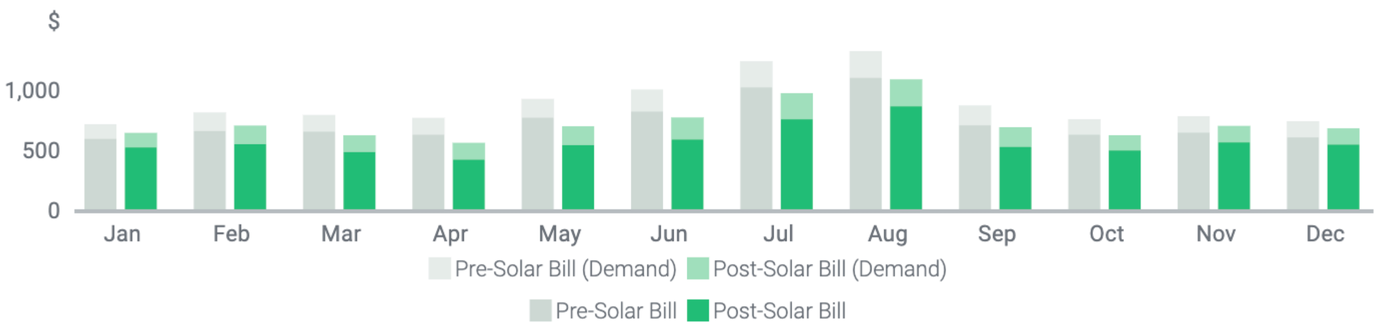
Financial

Metric	Cash
Est. installed cost ($)	$51,313
Est. 30% Investment Tax Credit (ITC)	($15,394)
Est. net out of pocket cost	**$35,919**
Est. $/W	$2.78
Avg. annual energy cost savings	$2,880
Est. Avg. O&M annual cost	$321
IRR	4.25%
Est. levelized cost of energy (LCOE)	$0.08/kWh
Est. lifetime savings ($)	$28,063
Payback period	16.38 yrs.

Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- These financial numbers do not reflect the Northwestern Energy E+ Renewable Custom Incentive (Participant match at least 10%)
- Average O&M price does include potential inverter replacement

Bill Savings



Estimated Schedule

10 – 21 weeks

1 Concept Design & Contracting
- Conduct site survey
- Contract
- Provide down payment

1– 4 weeks

2 Engineering & Permitting
- Engineering design
- Equipment specification
- Interconnect agreement

3 – 4 weeks

3 Installation
- System installation
- System commissioning

3 – 8 weeks

4 Inspection
- City inspection
- Utility inspection
- Net meter installation

2 – 4 weeks

5 Operation
- System walkthrough
- Monitoring setup
- Tax credit filing

1 week

ASSUMPTIONS:

Financing Option	Cash
Project Life (years)	25
Discount Rate	0.00%
System Size (kW) (DC, STC)	18.45
System Size (kW) (DC, PTC)	
System Size (kW) (AC)	0
Electricity Rate Escalation	3.50%
Degradation	99.50%
National Tax Rate	0.00%
Local Tax Rate	0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	51,313.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	51,313.00												
Electric Output (kWh)		22,879.36	22,764.97	22,651.14	22,537.88	22,425.20	22,313.07	22,201.50	22,090.50	21,980.04	21,870.14	21,760.79	21,651.99
Solar Energy Production Price ($/kWh)		0.087	0.090	0.093	0.096	0.099	0.103	0.106	0.110	0.114	0.118	0.122	0.126
Utility Bill Analysis													
Utility Bill Without Solar		10,861.90	11,238.42	11,628.11	12,031.44	12,448.88	12,880.94	13,328.12	13,790.95	14,269.98	14,765.77	15,278.92	15,810.03
Utility Bill With Solar		8,882.54	9,200.02	9,528.91	9,869.64	10,222.61	10,588.27	10,967.06	11,359.48	11,765.99	12,187.10	12,623.34	13,075.25
Avoided Cost of Energy		1,979.36	2,038.40	2,099.19	2,161.80	2,226.28	2,292.67	2,361.05	2,431.47	2,503.99	2,578.67	2,655.58	2,734.78
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		15,393.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		184.50	190.04	195.74	201.61	207.66	213.89	220.30	226.91	233.72	240.73	247.95	255.39
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		184.50	190.04	195.74	201.61	207.66	213.89	220.30	226.91	233.72	240.73	247.95	255.39
Revenues	0.00	1,979.36	2,038.40	2,099.19	2,161.80	2,226.28	2,292.67	2,361.05	2,431.47	2,503.99	2,578.67	2,655.58	2,734.78
EBITDA	0.00	1,794.86	1,848.36	1,903.46	1,960.19	2,018.62	2,078.79	2,140.75	2,204.56	2,270.27	2,337.94	2,407.63	2,479.39
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	1,794.86	1,848.36	1,903.46	1,960.19	2,018.62	2,078.79	2,140.75	2,204.56	2,270.27	2,337.94	2,407.63	2,479.39
Equity Investment	-51,313.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-51,313.00	1,794.86	1,848.36	1,903.46	1,960.19	2,018.62	2,078.79	2,140.75	2,204.56	2,270.27	2,337.94	2,407.63	2,479.39
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-51,313.00	17,188.76	1,848.36	1,903.46	1,960.19	2,018.62	2,078.79	2,140.75	2,204.56	2,270.27	2,337.94	2,407.63	2,479.39
Discounted After Tax Cash Flow	-51,313.00	17,188.76	1,848.36	1,903.46	1,960.19	2,018.62	2,078.79	2,140.75	2,204.56	2,270.27	2,337.94	2,407.63	2,479.39

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	21,543.73	21,436.01	21,328.83	21,222.19	21,116.08	21,010.50	20,905.44	20,800.92	20,696.91	20,593.43	20,490.46	20,388.01	20,286.07
Solar Energy Production Price ($/kWh)	0.131	0.135	0.140	0.145	0.150	0.155	0.161	0.166	0.172	0.178	0.184	0.191	0.198
Utility Bill Analysis													
Utility Bill Without Solar	16,359.73	16,928.66	17,517.51	18,126.97	18,757.76	19,410.63	20,086.35	20,785.71	21,509.56	22,258.74	23,034.14	23,836.68	24,667.31
Utility Bill With Solar	13,543.38	14,028.32	14,530.66	15,051.04	15,590.09	16,148.48	16,726.91	17,326.08	17,946.74	18,589.66	19,255.63	19,945.48	20,660.05
Avoided Cost of Energy	2,816.35	2,900.35	2,986.85	3,075.93	3,167.67	3,262.15	3,359.44	3,459.64	3,562.82	3,669.08	3,778.51	3,891.21	4,007.26
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	263.05	270.94	279.07	287.44	296.07	304.95	314.10	323.52	333.23	343.22	353.52	364.13	375.05
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	1,291.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	1,554.55	270.94	279.07	287.44	296.07	304.95	314.10	323.52	333.23	343.22	353.52	364.13	375.05
Revenues	2,816.35	2,900.35	2,986.85	3,075.93	3,167.67	3,262.15	3,359.44	3,459.64	3,562.82	3,669.08	3,778.51	3,891.21	4,007.26
EBITDA	1,261.80	2,629.40	2,707.78	2,788.49	2,871.60	2,957.20	3,045.34	3,136.11	3,229.59	3,325.86	3,424.99	3,527.08	3,632.21
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	1,261.80	2,629.40	2,707.78	2,788.49	2,871.60	2,957.20	3,045.34	3,136.11	3,229.59	3,325.86	3,424.99	3,527.08	3,632.21
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	1,261.80	2,629.40	2,707.78	2,788.49	2,871.60	2,957.20	3,045.34	3,136.11	3,229.59	3,325.86	3,424.99	3,527.08	3,632.21
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	1,261.80	2,629.40	2,707.78	2,788.49	2,871.60	2,957.20	3,045.34	3,136.11	3,229.59	3,325.86	3,424.99	3,527.08	3,632.21
Discounted After Tax Cash Flow	1,261.80	2,629.40	2,707.78	2,788.49	2,871.60	2,957.20	3,045.34	3,136.11	3,229.59	3,325.86	3,424.99	3,527.08	3,632.21

NPV	$28,063.17
IRR	4.251%
LCOE ($/kWh)	0.08
Payback Period (years)	16.38
Price per Watt ($/W)	2.78

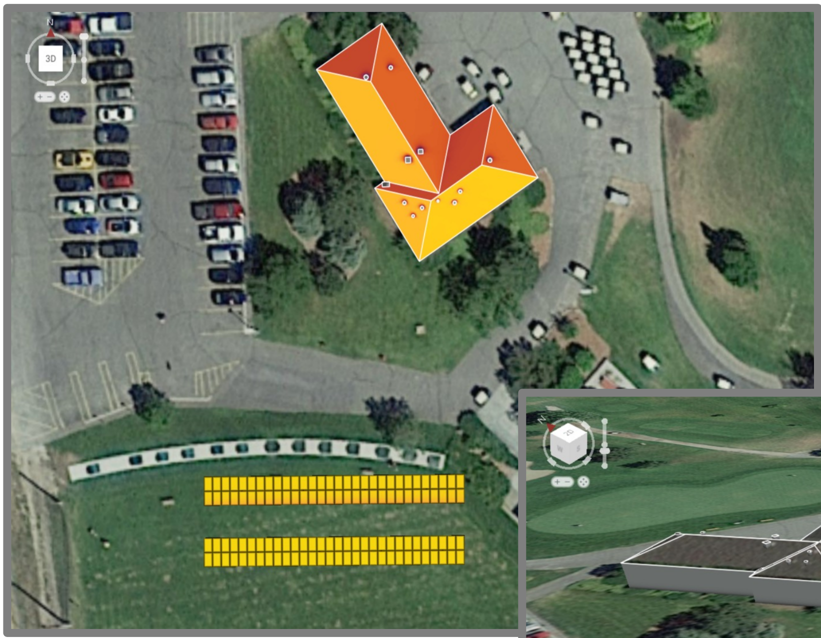
Conceptual Solar System Design
02/20/2024

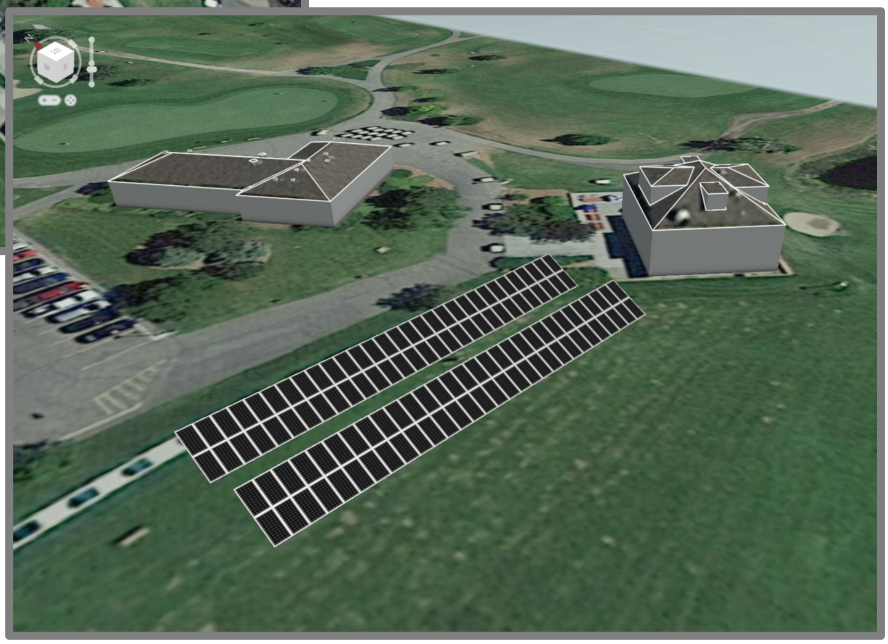
Bill Roberts Golf Course
Ground Mount
2201 N Benton Ave
Helena, MT 59602

Contact
QstN

Andy Pohren
500 Locust Street
Des Moines, IA, 50309

System





Equipment	
System type	Grid-tied
Racking installation	Ground Mount
Module type	Monocrystalline
Module size	500 W; e.g.,VSUN500 - 132BMH
Number of Module (Panels)	120
Inverters	String Inverter

Performance	
Installed DC potential capacity	60 kW_DC
Installed AC potential capacity	49.8 kW_AC
Annual energy consumption	102,385 kWh
Est. annual solar energy production	83,119 kWh
Est. energy consumption offset	80%

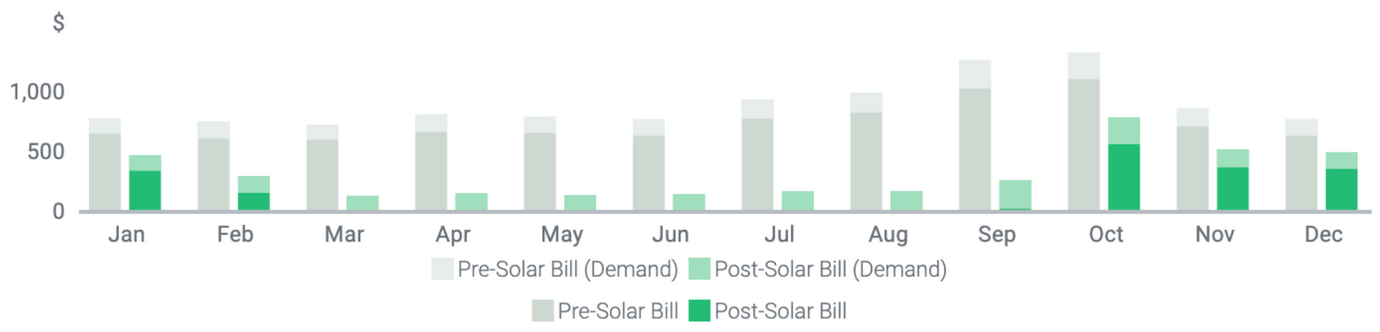
Financial

Metric	Cash
Est. installed cost ($)	$176,086
Est. 30% Investment Tax Credit (ITC)	($52,826)
Est. net out of pocket cost	**$123,260**
Est. $/W	$2.93
Avg. annual energy cost savings	$10,349
Est. Avg. O&M annual cost	$1,043
IRR	4.84%
Est. levelized cost of energy (LCOE)	$0.08/kWh
Est. lifetime savings ($)	$110,998
Payback period	15.5 yrs.

Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- These financial numbers do not reflect the Northwestern Energy E+ Renewable Custom Incentive (participant match at least 10%)
- Average O&M price does include potential inverter replacement

Bill Savings



Estimated Schedule

10 – 21 weeks

1. Concept Design & Contracting
- Conduct site survey
- Contract
- Provide down payment

1– 4 weeks

2. Engineering & Permitting
- Engineering design
- Equipment specification
- Interconnect agreement

3 – 4 weeks

3. Installation
- System installation
- System commissioning

3 – 8 weeks

4. Inspection
- City inspection
- Utility inspection
- Net meter installation

2 – 4 weeks

5. Operation
- System walkthrough
- Monitoring setup
- Tax credit filing

1 week

ASSUMPTIONS:

Financing Option	Cash	
Project Life (years)		25
Discount Rate		0.00%
System Size (kW) (DC, STC)		60
System Size (kW) (DC, PTC)		
System Size (kW) (AC)		0
Electricity Rate Escalation		3.50%
Degradation		99.50%
National Tax Rate		0.00%
Local Tax Rate		0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	176,086.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	176,086.00												
Electric Output (kWh)		83,199.38	82,783.38	82,369.46	81,957.62	81,547.83	81,140.09	80,734.39	80,330.72	79,929.06	79,529.42	79,131.77	78,736.11
Solar Energy Production Price ($/kWh)		0.087	0.090	0.093	0.096	0.099	0.103	0.106	0.110	0.114	0.118	0.122	0.126
Utility Bill Analysis													
Utility Bill Without Solar		10,861.90	11,238.42	11,628.11	12,031.44	12,448.88	12,880.94	13,328.12	13,790.95	14,269.98	14,765.77	15,278.92	15,810.03
Utility Bill With Solar		3,664.08	3,825.91	3,994.53	4,170.18	4,353.17	4,543.77	4,742.29	4,949.05	5,164.37	5,388.59	5,622.07	5,865.16
Avoided Cost of Energy		7,197.83	7,412.50	7,633.58	7,861.25	8,095.71	8,337.17	8,585.82	8,841.90	9,105.61	9,377.18	9,656.86	9,944.87
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		52,825.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Revenues	0.00	7,197.83	7,412.50	7,633.58	7,861.25	8,095.71	8,337.17	8,585.82	8,841.90	9,105.61	9,377.18	9,656.86	9,944.87
EBITDA	0.00	6,597.83	6,794.50	6,997.04	7,205.62	7,420.41	7,641.60	7,869.39	8,103.97	8,345.54	8,594.32	8,850.51	9,114.33
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	6,597.83	6,794.50	6,997.04	7,205.62	7,420.41	7,641.60	7,869.39	8,103.97	8,345.54	8,594.32	8,850.51	9,114.33
Equity Investment	-176,086.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-176,086.00	6,597.83	6,794.50	6,997.04	7,205.62	7,420.41	7,641.60	7,869.39	8,103.97	8,345.54	8,594.32	8,850.51	9,114.33
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-176,086.00	59,423.63	6,794.50	6,997.04	7,205.62	7,420.41	7,641.60	7,869.39	8,103.97	8,345.54	8,594.32	8,850.51	9,114.33
Discounted After Tax Cash Flow	-176,086.00	59,423.63	6,794.50	6,997.04	7,205.62	7,420.41	7,641.60	7,869.39	8,103.97	8,345.54	8,594.32	8,850.51	9,114.33

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	78,342.43	77,950.72	77,560.96	77,173.16	76,787.29	76,403.36	76,021.34	75,641.23	75,263.03	74,886.71	74,512.28	74,139.72	73,769.02
Solar Energy Production Price ($/kWh)	0.131	0.135	0.140	0.145	0.150	0.155	0.161	0.166	0.172	0.178	0.184	0.191	0.198
Utility Bill Analysis													
Utility Bill Without Solar	16,359.73	16,928.66	17,517.51	18,126.97	18,757.76	19,410.63	20,086.35	20,785.71	21,509.56	22,258.74	23,034.14	23,836.68	24,667.31
Utility Bill With Solar	6,118.25	6,381.73	6,656.02	6,941.54	7,238.72	7,548.03	7,869.95	8,204.96	8,553.59	8,916.36	9,293.82	9,686.56	10,095.16
Avoided Cost of Energy	10,241.48	10,546.93	10,861.49	11,185.44	11,519.04	11,862.60	12,216.40	12,580.75	12,955.97	13,342.39	13,740.32	14,150.13	14,572.15
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	855.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	5,055.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Revenues	10,241.48	10,546.93	10,861.49	11,185.44	11,519.04	11,862.60	12,216.40	12,580.75	12,955.97	13,342.39	13,740.32	14,150.13	14,572.15
EBITDA	5,186.02	9,665.81	9,953.94	10,250.66	10,556.22	10,870.89	11,194.94	11,528.65	11,872.31	12,226.21	12,590.66	12,965.98	13,352.48
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	5,186.02	9,665.81	9,953.94	10,250.66	10,556.22	10,870.89	11,194.94	11,528.65	11,872.31	12,226.21	12,590.66	12,965.98	13,352.48
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	5,186.02	9,665.81	9,953.94	10,250.66	10,556.22	10,870.89	11,194.94	11,528.65	11,872.31	12,226.21	12,590.66	12,965.98	13,352.48
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	5,186.02	9,665.81	9,953.94	10,250.66	10,556.22	10,870.89	11,194.94	11,528.65	11,872.31	12,226.21	12,590.66	12,965.98	13,352.48
Discounted After Tax Cash Flow	5,186.02	9,665.81	9,953.94	10,250.66	10,556.22	10,870.89	11,194.94	11,528.65	11,872.31	12,226.21	12,590.66	12,965.98	13,352.48

NPV	$112,489.61
IRR	4.8413%
LCOE ($/kWh)	0.08
Payback Period (years)	15.48
Price per Watt ($/W)	2.93

Conceptual Solar System Design

02/20/2024

Helena Wastewater Treatment Plant

2108 E Custer Ave

Helena, MT 59602

Contact

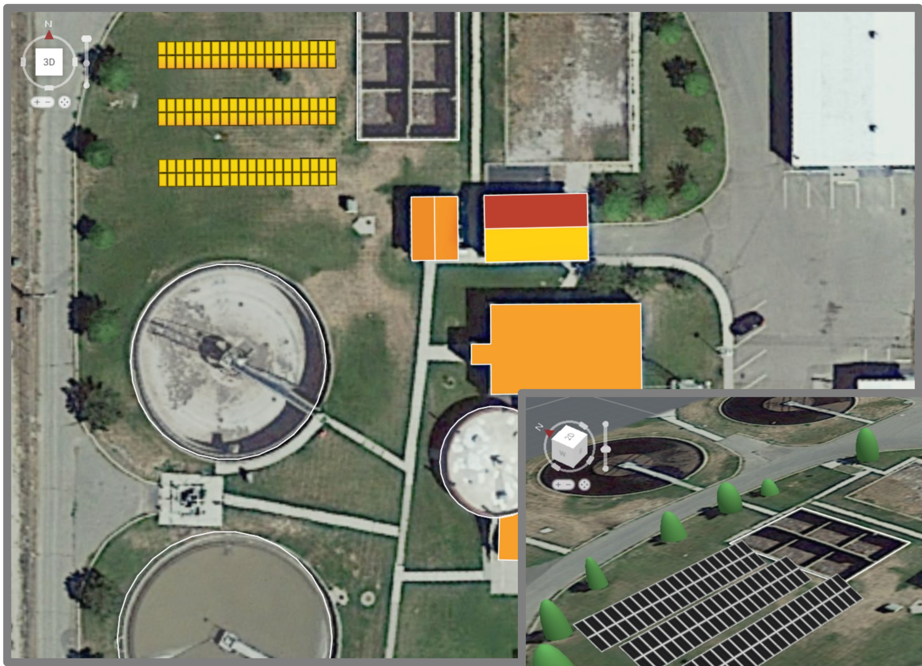
QstN

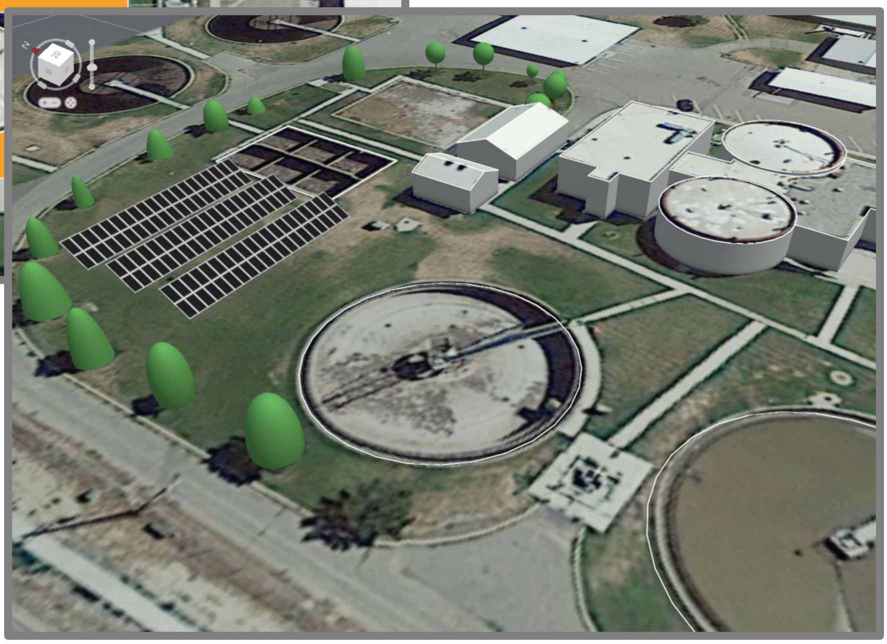
Andy Pohren

500 Locust Street

Des Moines, IA, 50309

System





Equipment	
System type	Grid-tied
Racking installation	Ground Mount
Modules type	Monocrystalline
Module Size	500 W; e.g.,VSUN500 - 132BMH
Number of Module (Panels)	120
Inverters	String Inverter

Performance	
Installed DC potential capacity	60 kW_DC
Installed AC potential capacity	49.8 kW_AC
Annual energy consumption	1,117,040 kWh
Est. annual solar energy production	82,217 kWh
Est. energy consumption offset	7%

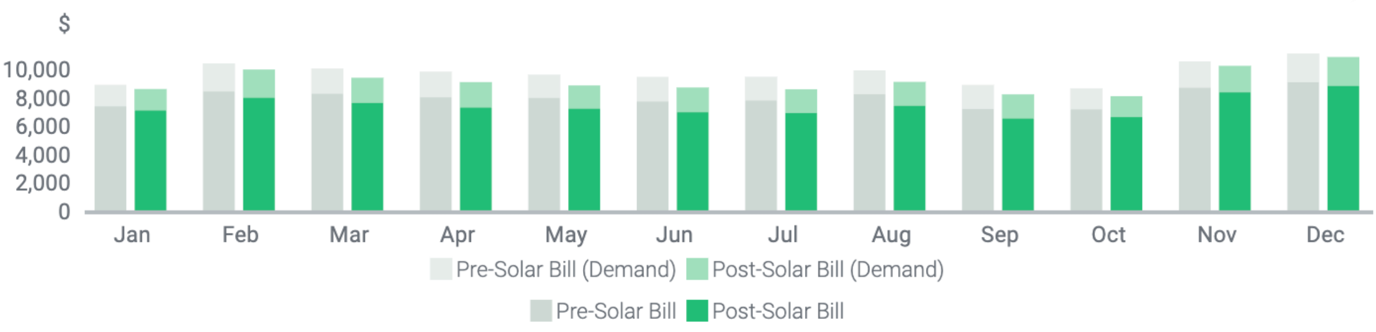
Financial

Metric	Cash
Est. installed cost ($)	$173,800
Est. 30% Investment Tax Credit (ITC)	($52,140)
Est. net out of pocket cost	**$121,660**
Est. $/W	$2.90
Avg. annual energy cost savings	$10,349
Est. Avg. O&M annual cost	$1,043
IRR	4.84%
Est. levelized cost of energy (LCOE)	$0.08/kWh
Est. lifetime savings ($)	$110,998
Payback period	15.5 yrs.

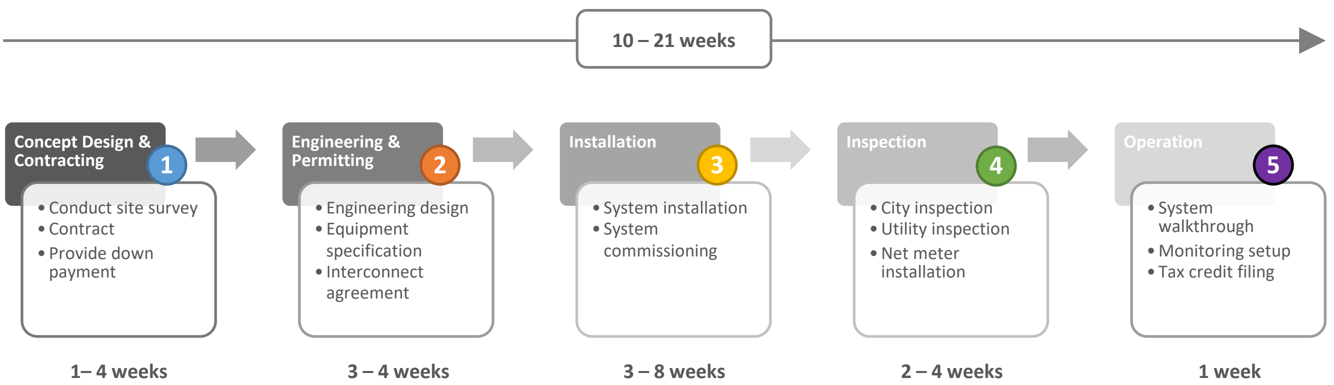
Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- These financial numbers do not reflect the Northwestern Energy E+ Renewable Custom Incentive (participant match at least 10%)
- This design would require removal of one tree
- Average O&M price does include potential inverter replacement

Bill Savings



Estimated Schedule



ASSUMPTIONS:

Financing Option	Cash
Project Life (years)	25
Discount Rate	0.00%
System Size (kW) (DC, STC)	60
System Size (kW) (DC, PTC)	
System Size (kW) (AC)	0
Electricity Rate Escalation	3.50%
Degradation	99.50%
National Tax Rate	0.00%
Local Tax Rate	0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	173,800.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	173,800.00												
Electric Output (kWh)		82,216.81	81,805.73	81,396.70	80,989.71	80,584.77	80,181.84	79,780.93	79,382.03	78,985.12	78,590.19	78,197.24	77,806.25
Solar Energy Production Price ($/kWh)		0.087	0.090	0.093	0.096	0.099	0.103	0.106	0.110	0.114	0.118	0.122	0.126
Utility Bill Analysis													
Utility Bill Without Solar		117,506.97	121,616.06	125,868.97	130,270.73	134,826.55	139,541.83	144,422.14	149,473.26	154,701.17	160,112.06	165,712.32	171,508.60
Utility Bill With Solar		110,394.15	114,291.10	118,325.54	122,502.32	126,826.45	131,303.12	135,937.71	140,735.78	145,703.10	150,845.62	156,169.51	161,681.18
Avoided Cost of Energy		7,112.82	7,324.96	7,543.43	7,768.41	8,000.11	8,238.71	8,484.43	8,737.48	8,998.07	9,266.44	9,542.81	9,827.42
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		52,140.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		600.00	618.00	636.54	655.64	675.31	695.56	716.43	737.92	760.06	782.86	806.35	830.54
Revenues	0.00	7,112.82	7,324.96	7,543.43	7,768.41	8,000.11	8,238.71	8,484.43	8,737.48	8,998.07	9,266.44	9,542.81	9,827.42
EBITDA	0.00	6,512.82	6,706.96	6,906.89	7,112.78	7,324.80	7,543.14	7,768.00	7,999.55	8,238.01	8,483.58	8,736.46	8,996.88
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	6,512.82	6,706.96	6,906.89	7,112.78	7,324.80	7,543.14	7,768.00	7,999.55	8,238.01	8,483.58	8,736.46	8,996.88
Equity Investment	-173,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-173,800.00	6,512.82	6,706.96	6,906.89	7,112.78	7,324.80	7,543.14	7,768.00	7,999.55	8,238.01	8,483.58	8,736.46	8,996.88
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-173,800.00	58,652.82	6,706.96	6,906.89	7,112.78	7,324.80	7,543.14	7,768.00	7,999.55	8,238.01	8,483.58	8,736.46	8,996.88
Discounted After Tax Cash Flow	-173,800.00	58,652.82	6,706.96	6,906.89	7,112.78	7,324.80	7,543.14	7,768.00	7,999.55	8,238.01	8,483.58	8,736.46	8,996.88

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	77,417.22	77,030.14	76,644.99	76,261.76	75,880.45	75,501.05	75,123.55	74,747.93	74,374.19	74,002.32	73,632.31	73,264.14	72,897.82
Solar Energy Production Price ($/kWh)	0.131	0.135	0.140	0.145	0.150	0.155	0.161	0.166	0.172	0.178	0.184	0.191	0.198
Utility Bill Analysis													
Utility Bill Without Solar	177,507.75	183,716.87	190,143.30	196,794.66	203,678.82	210,803.93	218,178.41	225,811.00	233,710.73	241,886.95	250,349.34	259,107.92	268,173.04
Utility Bill With Solar	167,387.22	173,294.49	179,410.08	185,741.33	192,295.82	199,081.43	206,106.28	213,378.82	220,907.77	228,702.14	236,771.29	245,124.90	253,772.98
Avoided Cost of Energy	10,120.53	10,422.37	10,733.22	11,053.34	11,383.00	11,722.50	12,072.13	12,432.18	12,802.97	13,184.81	13,578.05	13,983.02	14,400.06
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	855.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	5,055.46	881.12	907.55	934.78	962.82	991.71	1,021.46	1,052.10	1,083.67	1,116.18	1,149.66	1,184.15	1,219.68
Revenues	10,120.53	10,422.37	10,733.22	11,053.34	11,383.00	11,722.50	12,072.13	12,432.18	12,802.97	13,184.81	13,578.05	13,983.02	14,400.06
EBITDA	5,065.07	9,541.25	9,825.67	10,118.56	10,420.18	10,730.79	11,050.67	11,380.07	11,719.30	12,068.64	12,428.39	12,798.87	13,180.38
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	5,065.07	9,541.25	9,825.67	10,118.56	10,420.18	10,730.79	11,050.67	11,380.07	11,719.30	12,068.64	12,428.39	12,798.87	13,180.38
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	5,065.07	9,541.25	9,825.67	10,118.56	10,420.18	10,730.79	11,050.67	11,380.07	11,719.30	12,068.64	12,428.39	12,798.87	13,180.38
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	5,065.07	9,541.25	9,825.67	10,118.56	10,420.18	10,730.79	11,050.67	11,380.07	11,719.30	12,068.64	12,428.39	12,798.87	13,180.38
Discounted After Tax Cash Flow	5,065.07	9,541.25	9,825.67	10,118.56	10,420.18	10,730.79	11,050.67	11,380.07	11,719.30	12,068.64	12,428.39	12,798.87	13,180.38

NPV	$110,997.71
IRR	4.8402%
LCOE ($/kWh)	0.08
Payback Period (years)	15.48
Price per Watt ($/W)	2.90

Conceptual Solar System Design
03/13/2024

Helena Wastewater Treatment Plant (25-year payback)
2108 E Custer Ave
Helena, MT 59602

Contact
QstN

Andy Pohren
500 Locust Street
Des Moines, IA, 50309

System

Equipment	
System type	Grid-tied
Racking installation	Ground Mount
Modules type	Monocrystalline
Module Size	500 W; e.g.,VSUN500 - 132BMH
Number of Module (Panels)	3,560
Inverters	String Inverter

Performance	
Installed DC potential capacity	1,780 kW_DC
Installed AC potential capacity	1,483 kW_AC
Annual energy consumption	3,358,000 kWh
Est. annual solar energy production	2,462,724 kWh
Est. energy consumption offset	73%

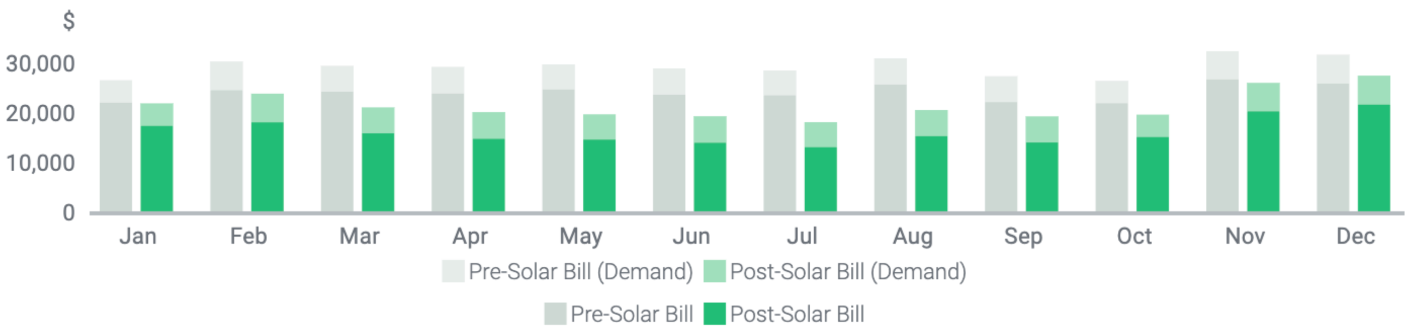
Financial

Metric	Cash
Est. installed cost ($)	$4,013,786
Est. 30% Investment Tax Credit (ITC)	($1,204,136)
Est. net out of pocket cost	**$2,809,650**
Est. $/W	$2.25
Avg. annual energy cost savings	$143,996
Est. Avg. O&M annual cost	$30,943
IRR	.04%
Est. levelized cost of energy (LCOE)	$0.06/kWh
Est. lifetime savings ($)	$16,670
Payback period	24.9 yrs.

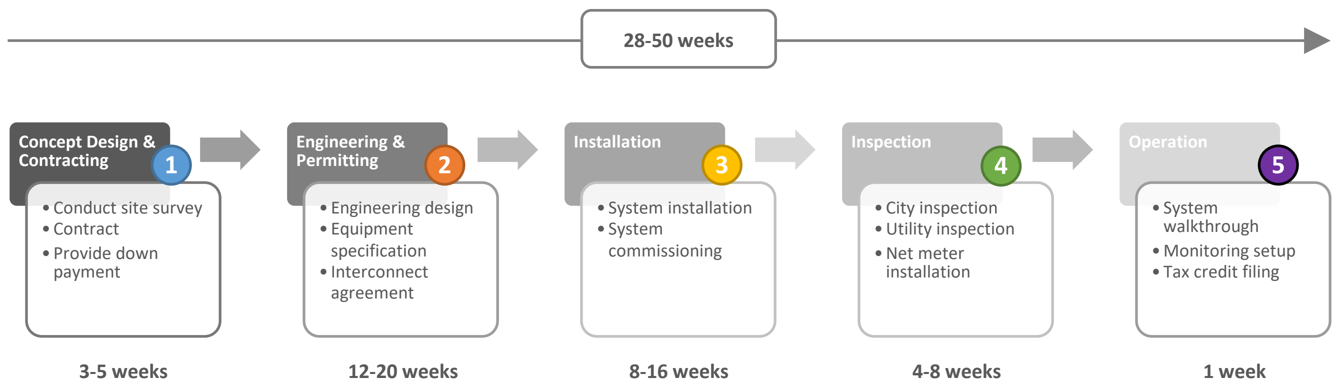
Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- Average O&M price does include potential inverter replacement
- Assumed No Net Metering

Bill Savings



Estimated Schedule



ASSUMPTIONS:

Financing Option	Cash
Project Life (years)	25
Discount Rate	0.00%
System Size (kW) (DC, STC)	1780
System Size (kW) (DC, PTC)	
System Size (kW) (AC)	0
Electricity Rate Escalation	3.50%
Degradation	99.50%
National Tax Rate	0.00%
Local Tax Rate	0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	4,013,786.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	4,013,786.00												
Electric Output (kWh)		2,462,723.65	2,450,410.03	2,438,157.98	2,425,967.19	2,413,837.35	2,401,768.17	2,389,759.33	2,377,810.53	2,365,921.48	2,354,091.87	2,342,321.41	2,330,609.80
Solar Energy Production Price ($/kWh)		0.038	0.040	0.041	0.043	0.045	0.046	0.048	0.050	0.052	0.054	0.056	0.058
Utility Bill Analysis													
Utility Bill Without Solar		352,998.56	365,349.86	378,133.45	391,364.47	405,058.57	419,231.97	433,901.43	449,084.33	464,798.62	481,062.92	497,896.47	515,319.19
Utility Bill With Solar		258,622.56	267,813.93	277,332.80	287,190.85	297,399.29	307,971.27	318,919.56	330,258.28	342,000.95	354,161.82	366,755.01	379,795.68
Avoided Cost of Energy		94,376.01	97,535.93	100,800.65	104,173.62	107,659.29	111,260.70	114,981.87	118,826.05	122,797.68	126,901.10	131,141.46	135,523.51
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		1,204,135.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		17,800.00	18,334.00	18,884.02	19,450.54	20,034.06	20,635.08	21,254.13	21,891.75	22,548.51	23,224.96	23,921.71	24,639.36
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		17,800.00	18,334.00	18,884.02	19,450.54	20,034.06	20,635.08	21,254.13	21,891.75	22,548.51	23,224.96	23,921.71	24,639.36
Revenues	0.00	94,376.01	97,535.93	100,800.65	104,173.62	107,659.29	111,260.70	114,981.87	118,826.05	122,797.68	126,901.10	131,141.46	135,523.51
EBITDA	0.00	76,576.01	79,201.93	81,916.63	84,723.08	87,625.23	90,625.62	93,727.74	96,934.30	100,249.17	103,676.14	107,219.75	110,884.15
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	76,576.01	79,201.93	81,916.63	84,723.08	87,625.23	90,625.62	93,727.74	96,934.30	100,249.17	103,676.14	107,219.75	110,884.15
Equity Investment	-4,013,786.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-4,013,786.00	76,576.01	79,201.93	81,916.63	84,723.08	87,625.23	90,625.62	93,727.74	96,934.30	100,249.17	103,676.14	107,219.75	110,884.15
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-4,013,786.00	1,280,711.81	79,201.93	81,916.63	84,723.08	87,625.23	90,625.62	93,727.74	96,934.30	100,249.17	103,676.14	107,219.75	110,884.15
Discounted After Tax Cash Flow	-4,013,786.00	1,280,711.81	79,201.93	81,916.63	84,723.08	87,625.23	90,625.62	93,727.74	96,934.30	100,249.17	103,676.14	107,219.75	110,884.15

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	2,318,956.76	2,307,361.97	2,295,825.16	2,284,346.04	2,272,924.31	2,261,559.68	2,250,251.89	2,239,000.63	2,227,805.62	2,216,666.59	2,205,583.26	2,194,555.35	2,183,582.57
Solar Energy Production Price ($/kWh)	0.060	0.063	0.065	0.068	0.070	0.073	0.076	0.079	0.082	0.085	0.088	0.092	0.095
Utility Bill Analysis													
Utility Bill Without Solar	533,351.71	552,015.37	571,332.25	591,325.23	612,017.95	633,434.93	655,601.50	678,543.90	702,289.28	726,865.75	752,302.40	778,629.33	805,877.70
Utility Bill With Solar	393,300.31	407,286.14	421,768.94	436,767.23	452,299.65	468,384.49	485,041.84	502,291.08	520,153.30	538,650.87	557,808.39	577,647.67	598,193.00
Avoided Cost of Energy	140,051.40	144,729.23	149,563.31	154,557.99	159,718.30	165,050.44	170,559.66	176,252.82	182,135.98	188,214.88	194,494.00	200,981.66	207,684.70
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	25,378.54	26,139.90	26,924.10	27,731.82	28,563.77	29,420.69	30,303.31	31,212.41	32,148.78	33,113.24	34,106.64	35,129.84	36,183.74
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	124,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	149,978.54	26,139.90	26,924.10	27,731.82	28,563.77	29,420.69	30,303.31	31,212.41	32,148.78	33,113.24	34,106.64	35,129.84	36,183.74
Revenues	140,051.40	144,729.23	149,563.31	154,557.99	159,718.30	165,050.44	170,559.66	176,252.82	182,135.98	188,214.88	194,494.00	200,981.66	207,684.70
EBITDA	-9,927.15	118,589.33	122,639.21	126,826.17	131,154.53	135,629.75	140,256.35	145,040.41	149,987.20	155,101.64	160,387.36	165,851.82	171500.96
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	-9,927.15	118,589.33	122,639.21	126,826.17	131,154.53	135,629.75	140,256.35	145,040.41	149,987.20	155,101.64	160,387.36	165,851.82	171,500.96
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-9,927.15	118,589.33	122,639.21	126,826.17	131,154.53	135,629.75	140,256.35	145,040.41	149,987.20	155,101.64	160,387.36	165,851.82	171,500.96
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-9,927.15	118,589.33	122,639.21	126,826.17	131,154.53	135,629.75	140,256.35	145,040.41	149,987.20	155,101.64	160,387.36	165,851.82	171,500.96
Discounted After Tax Cash Flow	-9,927.15	118,589.33	122,639.21	126,826.17	131,154.53	135,629.75	140,256.35	145,040.41	149,987.20	155,101.64	160,387.36	165,851.82	171,500.96

NPV	$16,747.12
IRR	0.0391%
LCOE ($/kWh)	0.06
Payback Period (years)	24.90
Price per Watt ($/W)	2.25

Conceptual Solar System Design

03/13/2024

Helena Wastewater Treatment Plant (900 kW)

2108 E Custer Ave

Helena, MT 59602

Contact

QstN

Andy Pohren

500 Locust Street

Des Moines, IA, 50309

System

Equipment	
System type	Grid-tied
Racking installation	Ground Mount
Modules type	Monocrystalline
Module Size	500 W; e.g.,VSUN500 - 132BMH
Number of Module (Panels)	1,800
Inverters	String Inverter

Performance	
Installed DC potential capacity	900 kW_DC
Installed AC potential capacity	750 kW_AC
Annual energy consumption	3,358,000 kWh
Est. annual solar energy production	1,252,214 kWh
Est. energy consumption offset	37%

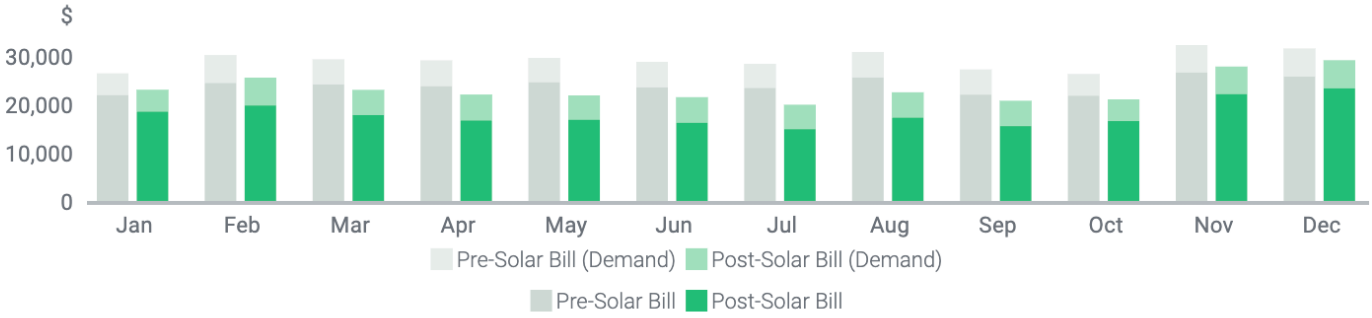
Financial

Metric	Cash
Est. installed cost ($)	$2,068,222
Est. 30% Investment Tax Credit (ITC)	($620,467)
Est. net out of pocket cost	**$1,447,755**
Est. $/W	$2.30
Avg. annual energy cost savings	$106,941
Est. Avg. O&M annual cost	$15,645
IRR	3.25%
Est. levelized cost of energy (LCOE)	$0.06/kWh
Est. lifetime savings ($)	$834,629
Payback period	18.2 yrs.

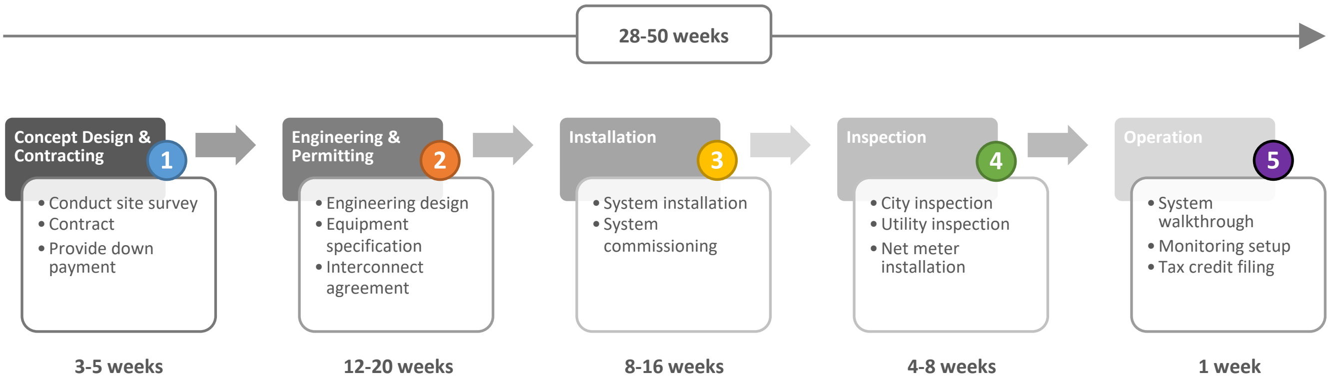
Key assumptions:

- System life of 25 years
- Performance degradation of 0.5% per year
- Customer receives 30% ITC incentive as direct payment
- Electricity Rate escalation assumption 3.5%
- Discount rate 0%
- Average O&M price does include potential inverter replacement
- Assumed no Net Metering

Bill Savings



Estimated Schedule



ASSUMPTIONS:

Financing Option	Cash
Project Life (years)	25
Discount Rate	0.00%
System Size (kW) (DC, STC)	900
System Size (kW) (DC, PTC)	
System Size (kW) (AC)	0
Electricity Rate Escalation	3.50%
Degradation	99.50%
National Tax Rate	0.00%
Local Tax Rate	0.00%

PRO-FORMA CASH FLOW:

Years	0	1	2	3	4	5	6	7	8	9	10	11	12
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds	2,068,222.00												
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments	2,068,222.00												
Electric Output (kWh)		1,252,209.21	1,245,948.16	1,239,718.42	1,233,519.83	1,227,352.23	1,221,215.47	1,215,109.39	1,209,033.84	1,202,988.68	1,196,973.73	1,190,988.86	1,185,033.92
Solar Energy Production Price ($/kWh)		0.057	0.059	0.062	0.064	0.066	0.069	0.071	0.074	0.077	0.079	0.082	0.085
Utility Bill Analysis													
Utility Bill Without Solar		352,998.56	365,349.86	378,133.45	391,364.47	405,058.57	419,231.97	433,901.43	449,084.33	464,798.62	481,062.92	497,896.47	515,319.19
Utility Bill With Solar		281,357.67	291,418.70	301,841.39	312,638.35	323,823.32	335,409.36	347,412.40	359,845.05	372,723.40	386,064.46	399,883.28	414,196.15
Avoided Cost of Energy		71,640.90	73,931.16	76,292.06	78,726.12	81,235.25	83,822.61	86,489.03	89,239.27	92,075.23	94,998.46	98,013.19	101,123.05
Incentives													
Local PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI		620,466.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs		9,000.00	9,270.00	9,548.10	9,834.54	10,129.58	10,433.47	10,746.47	11,068.86	11,400.93	11,742.96	12,095.25	12,458.10
Variable O&M Costs		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs		9,000.00	9,270.00	9,548.10	9,834.54	10,129.58	10,433.47	10,746.47	11,068.86	11,400.93	11,742.96	12,095.25	12,458.10
Revenues	0.00	71,640.90	73,931.16	76,292.06	78,726.12	81,235.25	83,822.61	86,489.03	89,239.27	92,075.23	94,998.46	98,013.19	101,123.05
EBITDA	0.00	62,640.90	64,661.16	66,743.96	68,891.58	71,105.67	73,389.14	75,742.56	78,170.41	80,674.29	83,255.50	85,917.94	88,664.94
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	0.00	62,640.90	64,661.16	66,743.96	68,891.58	71,105.67	73,389.14	75,742.56	78,170.41	80,674.29	83,255.50	85,917.94	88,664.94
Equity Investment	-2,068,222.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	-2,068,222.00	62,640.90	64,661.16	66,743.96	68,891.58	71,105.67	73,389.14	75,742.56	78,170.41	80,674.29	83,255.50	85,917.94	88,664.94
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	-2,068,222.00	683,107.50	64,661.16	66,743.96	68,891.58	71,105.67	73,389.14	75,742.56	78,170.41	80,674.29	83,255.50	85,917.94	88,664.94
Discounted After Tax Cash Flow	-2,068,222.00	683,107.50	64,661.16	66,743.96	68,891.58	71,105.67	73,389.14	75,742.56	78,170.41	80,674.29	83,255.50	85,917.94	88,664.94

Years	13	14	15	16	17	18	19	20	21	22	23	24	25
Funding Structure													
Debt Funds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity Funds													
Total Grants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Capital Investments													
Electric Output (kWh)	1,179,108.75	1,173,213.21	1,167,347.14	1,161,510.40	1,155,702.85	1,149,924.34	1,144,174.72	1,138,453.84	1,132,761.57	1,127,097.77	1,121,462.28	1,115,854.96	1,110,275.69
Solar Energy Production Price ($/kWh)	0.088	0.092	0.095	0.099	0.102	0.106	0.110	0.114	0.118	0.122	0.127	0.132	0.136
Utility Bill Analysis													
Utility Bill Without Solar	533,351.71	552,015.37	571,332.25	591,325.23	612,017.95	633,434.93	655,601.50	678,543.90	702,289.28	726,865.75	752,302.40	778,629.33	805,877.70
Utility Bill With Solar	429,021.65	444,378.02	460,284.72	476,761.84	493,829.30	511,507.67	529,820.33	548,791.45	568,445.42	588,805.06	609,895.63	631,742.66	654,372.13
Avoided Cost of Energy	104,330.06	107,637.34	111,047.53	114,563.39	118,188.65	121,927.26	125,781.17	129,752.44	133,843.86	138,060.69	142,406.77	146,886.66	151,505.57
Incentives													
Local PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National PBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National CBI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financing Payments													
PPA/Lease Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Principal Pre-Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt Payment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Operating Expenses													
Fixed O&M Costs	12,831.85	13,216.80	13,613.31	14,021.71	14,442.36	14,875.63	15,321.90	15,781.55	16,255.00	16,742.65	17,244.93	17,762.28	18,295.15
Variable O&M Costs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equipment Replacement Costs (Inverter Replacement Only)	63,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total O&M Costs	75,831.85	13,216.80	13,613.31	14,021.71	14,442.36	14,875.63	15,321.90	15,781.55	16,255.00	16,742.65	17,244.93	17,762.28	18,295.15
Revenues	104,330.06	107,637.34	111,047.53	114,563.39	118,188.65	121,927.26	125,781.17	129,752.44	133,843.86	138,060.69	142,406.77	146,886.66	151,505.57
EBITDA	28,498.21	94,420.54	97,434.22	100,541.68	103,746.29	107,051.63	110,459.28	113,970.89	117,588.86	121,318.04	125,161.83	129,124.38	133,210.43
Local Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Depreciation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pre-Tax Cashflow to Equity	28,498.21	94,420.54	97,434.22	100,541.68	103,746.29	107,051.63	110,459.28	113,970.89	117,588.86	121,318.04	125,161.83	129,124.38	133,210.43
Equity Investment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Pre-Tax Cashflow to Equity	28,498.21	94,420.54	97,434.22	100,541.68	103,746.29	107,051.63	110,459.28	113,970.89	117,588.86	121,318.04	125,161.83	129,124.38	133,210.43
Local Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxable Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
National Taxes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
After Tax Cash Flow	28,498.21	94,420.54	97,434.22	100,541.68	103,746.29	107,051.63	110,459.28	113,970.89	117,588.86	121,318.04	125,161.83	129,124.38	133,210.43
Discounted After Tax Cash Flow	28,498.21	94,420.54	97,434.22	100,541.68	103,746.29	107,051.63	110,459.28	113,970.89	117,588.86	121,318.04	125,161.83	129,124.38	133,210.43

NPV	$834,628.94
IRR	3.2482%
LCOE ($/kWh)	0.06
Payback Period (years)	18.15
Price per Watt ($/W)	2.30

Appendix C: Glossary

AHU – Air Handling Unit

ASHP – Air-Source Heat Pump

ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers

BAS – Building Automation System

BTU – British Thermal Units

CFL – Compact Fluorescent Lamp

CMU – Concrete Masonry Units

CRAC – Computer Room Air Conditioning

DDC – Direct Digital Control

DHW – Domestic Hot Water

ECM – Energy Conservation Measure

EIFS – Exterior Insulation Finishing System

EPDT- Ethylene Propylene Diene Terpolymer

ERV – Energy Recovery Ventilator

EUI – Energy Use Intensity

FCU – Fan Coil Unit

FIM – Facility Improvement Measure

GHG – Greenhouse Gas

HDD – Heating Degree Days

HHW – Heating Hot Water

HP – Horsepower

HPS – High-Pressure Sodium

HVAC – Heating, Ventilating, and Air-Conditioning

HW – Hot Water

Kw – Kilowatt

Kwh – Kilowatt-Hours

LED – Light-Emitting Diode

MZ – Multi-Zone

OMC – Other Measures Considered

PLC – Programmable Logic Controller

PTAC – Packaged Terminal Air Conditioning

PV – Photovoltaic

PVC – Polyvinyl Chloride

RAS – Return Activated Sludge

RTU – Roof Top Unit

SPB – Simple Payback

TPO – Thermoplastic Polyolefin

UV – Ultraviolet

VAV – Variable Air Volume

VFD – Variable Frequency Drive

W - Watt

WSHP – Water-Source Heat Pump

WWTF – Wastewater Treatment Facility