Library Board Meeting
Thursday, June 25 at 7 AM
Library Meeting Room
105 Perimeter Rd.
Mount Horeb, WI 53572

Open:

Guest and Public Comments:

Approval of Minutes: May 28, 2026

Treasurer's Report:
- Approval of library bills
- Endowment Fund update

Director's Report
- May statistics
- Strategic Plan tracking/updates
- Review Preliminary 2027 Library Budget

Agenda Items
- Consider Officer Elections for term beginning July 2026
  Incumbents:
  President: Paula Craft
  Vice President: Linda Bullette
  Treasurer: Joe Byrnes
  Secretary: Sarah Miller
- Consider Endowment set up, policies, and disbursement for 2026

Future Agenda Items
- Consider Capital Requests for 2027 - 2031

Adjourn

Director's Report
06.25.26

May statistics (highlights):
Per SCLS: All the April and May reports are delayed due to some data quality issues from the migration. We have continued to experience bumps in the road with daily freezes and problems. SCLS does not have a timeframe when the reporting issue will be fixed. We've also learned that the daily circulation reports contain errors and will need to be updated. So, essentially all checkout data reported since the migration should be taken with a grain of salt. SCLS delayed the patron reading history purge and now that we are into our busiest time of year, we are experiencing severe freezes to the system.

- **Total checkouts = 12,718** In May of 2025, we checked out 13,330 items. To date we are trailing for the year by about 2.3%.
- **Libby checkouts = 3,723.** In May 2025 we checked out 3,518 titles.
- **May door count/foot traffic = 9,170.** Last year we had 9,250 visits in May.
- **Library cards issued** = This report is not yet available via SCLS. Last year we registered 41 new patrons in May.
- **Computer sessions = 415.** In May of 2025, we had 391 computer sessions.

Strategic plan tracking/updates:

Goal 1 initiatives (Staffing/Library Administration):

- We celebrated Amy Kalchik's 25 years with the library on Thursday, May 28th with a small gift, card and social media post. (I have a card for Library Board members to sign as well. Please stop by my office to sign it!) Her actual start date fell on May 31st 25 years ago!
- Thank you to Jim Leary for serving on the Library Board for 9 years! We are all very grateful for your service and your support. If you'd like to sign a card for Jim, please stop by my office!
- Thank you to Jeff Ingebritsen for joining the Library Board!

Goal 2 initiatives (Customer Service):

- We continue to work with the public as they navigate the new system. We are receiving more complaints as the system freezes which it makes it difficult to do the most basic things such as check out, check in, or place items on hold.
- SCLS paused purging patron reading history due to the worry that it may not stop the freezing. Dane County Directors are urging that this issue be made a priority.

Goal 3 initiatives (Outreach and Public Awareness):

- We still do not have access to the new patron reports.
- In June I will visit the Rotary club to give a library outreach presentation on the importance of reading.

Goal 4 initiatives (Collections):

- We do not have access to the collection data reports.

Goal 5 initiatives (Facility):

- On 6/16, our public works director went up into the attic to try to determine the source of two leaks. Thanks to Leonor Munoz, I was able to point out the hatch access points into the attic because now I have a better understanding of reading the original building plans. There are 6 access points to the attic through a hatch and only two walkways that will support a human. Neither leak is near either of the walkways.

- The public works director also inspected the sealant around some of the pipes in the roof where one of the leaks is taking place. He will come back and inspect the meeting room. It was in use when he stopped by.

Review Preliminary 2027 Library Budget: I have a PowerPoint presentation to go through with you that is an initial attempt at the 2027 budget. I have compiled the numbers based on what is available and have a good estimate for next year's fees. I'm also sharing the Mt. Horeb Energy Plan with you as that may come up in the 2027 budget process.

Agenda Items

- **Consider Officer Elections for term beginning July 2026**
    - Incumbents:
        - President, Paula Craft
        - Vice President, Linda Bullette
        - Treasurer, Joe Byrnes
        - Secretary, Sarah Miller
- **Consider Endowment set up, policies, and disbursement for 2026:** This item is on the agenda so the Library Board can discuss if they'd like to make changes. Listed below is the history of the Library Board's past decisions re: Endowment:
    - **June 2016:** Utilizing Endowment Fund: need 2 consecutive meetings with Endowment Fund proposed changes on Agenda to make changes. Start changes next year to spend the lesser of 50% of net appreciation/growth or 5% of principal for annual distributions.
    - **July 2016:** Motion to approve policy to use of lesser of 50% of annual growth or 5% of value of Endowment Fund for Special Projects By Kuse, Seconded by Salerno, Result of Vote – all in favor.
    - **July 2019:** Motion to Establish new Endowment Fund disbursement policy-modify to reflect 3-year rolling average, with a cap of 4%, for innovative projects, Motion was seconded, Result of Vote-all in favor

Future Agenda Items

- **Consider Capital Requests for 2027-2031:** These are almost ready for your review, but I am trying to get some quotes on a few items. I will share them as soon as I have some numbers so you have them ahead of our next meeting. We will need to approve our capital requests at the next Library Board Meeting as they are due to the Village Administrator by the end of July.

Adjourn

VILLAGE OF MOUNT HOREB
BALANCE SHEET
APRIL 30, 2026

LIBRARY OPERATING FUND

	ASSETS			
240-113145-000	CASH IN BANK-MCB CKG		552,263.15	
240-113245-000	CASH IN BANK-MCB INVEST (TECH)		20,130.51	
240-118250-000	CASH ON HAND		181.00	
240-121000-000	TAXES RECEIVABLE-CURRENT		134,209.00	
	TOTAL ASSETS			706,783.66
	LIABILITIES AND EQUITY			
	LIABILITIES			
240-211000-000	VOUCHERS PAYABLE		3,900.00	
240-211100-000	AP (DUE TO POOL)		20,598.75	
240-217000-000	ACCRUED COMP WAGES		1,442.89	
240-261000-000	DEFERRED TAX ROLL REVENUES		134,209.00	
	TOTAL LIABILITIES			160,150.64
	FUND EQUITY			
240-341125-000	ASSIGNED-TECHNOLOGY PROJECT		30,000.00	
240-342100-000	LIBRARY FUND BALANCE		121,855.97	
	REVENUE OVER EXPENDITURES - YTD	394,777.05		
	BALANCE - CURRENT DATE		394,777.05	
	TOTAL FUND EQUITY			546,633.02
	TOTAL LIABILITIES AND EQUITY			706,783.66

VILLAGE OF MOUNT HOREB
BALANCE SHEET
APRIL 30, 2026

LIBRARY SPECIAL PROJECTS

	ASSETS			
241-113145-000	CASH IN BANK-MCB CKG		8,345.04	
241-115100-000	ENDOWMENT FUND		272,214.72	
241-115200-000	LIBRARY BLDG EXPANSION ACCT		46,091.50	
	TOTAL ASSETS			326,651.26
	LIABILITIES AND EQUITY			
	FUND EQUITY			
241-341100-000	ASSIGNED-ENDOWMENT FUND		273,498.69	
241-342100-000	LIBRARY SPECIAL PROJ FUND BAL		36,606.78	
	REVENUE OVER EXPENDITURES - YTD	16,545.79		
	BALANCE - CURRENT DATE		16,545.79	
	TOTAL FUND EQUITY			326,651.26
	TOTAL LIABILITIES AND EQUITY			326,651.26

VILLAGE OF MOUNT HOREB
REVENUES WITH COMPARISON TO BUDGET
FOR THE 4 MONTHS ENDING APRIL 30, 2026

LIBRARY OPERATING FUND

		PERIOD ACTUAL	YTD ACTUAL	BUDGET	UNEARNED	PCNT
	FEDERAL AND STATE AID					
240-437200-000	DANE COUNTY LIBRARY AID	.00	258,841.00	258,841.00	.00	100.0
240-437210-000	OTHER COUNTY LIBRARY AID	.00	33,948.89	33,949.00	.11	100.0
	TOTAL FEDERAL AND STATE AID	.00	292,789.89	292,790.00	.11	100.0
	PUBLIC CHARGES					
240-467110-000	FINES - LOST/DAMAGED MATERIALS	58.00	770.80	2,000.00	1,229.20	38.5
240-467190-000	MEETING ROOM FEES	20.00	50.00	150.00	100.00	33.3
240-467200-000	COPY CHARGES (TAXABLE)	511.05	2,047.93	5,000.00	2,952.07	41.0
240-469100-000	MISCELLANEOUS INCOME	.00	.00	2,600.00	2,600.00	.0
240-469200-000	OTHER REV - CHILDREN PROGRAMS	.00	2,000.00	.00	(2,000.00)	.0
	TOTAL PUBLIC CHARGES	589.05	4,868.73	9,750.00	4,881.27	49.9
	INTEREST AND DONATIONS					
240-481100-000	INVESTMENT INTEREST	62.66	375.11	.00	(375.11)	.0
240-485000-000	CONTRIBUTIONS-OTHER	5.15	259.85	1,000.00	740.15	26.0
	TOTAL INTEREST AND DONATIONS	67.81	634.96	1,000.00	365.04	63.5
	TRANSFERS AND LONG TERM DEBT					
240-492100-000	TRANSFER-GENERAL FUND (TAX)	10,761.00	401,149.00	535,358.00	134,209.00	74.9
	TOTAL TRANSFERS AND LONG TERM	10,761.00	401,149.00	535,358.00	134,209.00	74.9
	TOTAL FUND REVENUE	11,417.86	699,442.58	838,898.00	139,455.42	83.4

VILLAGE OF MOUNT HOREB
EXPENDITURES WITH COMPARISON TO BUDGET
FOR THE 4 MONTHS ENDING APRIL 30, 2026

LIBRARY OPERATING FUND

		PERIOD ACTUAL	YTD ACTUAL	BUDGET	UNEXPENDED	PCNT
	LIBRARY OPER					
240-551100-111	LIBRARY REGULAR WAGES	36,392.50	137,829.34	466,162.00	328,332.66	29.6
240-551100-112	LIBRARY REGULAR WAGES-BLDG MA	156.31	731.19	4,590.00	3,858.81	15.9
240-551100-122	LIBRARY OVERTIME	.00	.00	750.00	750.00	.0
240-551100-131	LIBRARY HEALTH	6,251.11	21,642.08	74,531.00	52,888.92	29.0
240-551100-132	LIBRARY DENTAL	369.73	1,295.40	4,716.00	3,420.60	27.5
240-551100-133	LIBRARY LIFE	62.43	217.49	746.00	528.51	29.2
240-551100-135	LIBRARY RETIREMENT	1,954.52	7,772.47	24,242.00	16,469.53	32.1
240-551100-136	LIBRARY FICA	2,871.76	11,246.96	35,392.00	24,145.04	31.8
240-551100-220	LIBRARY UTILITIES	2,890.95	11,874.35	36,150.00	24,275.65	32.9
240-551100-240	LIBRARY REPAIRS & MAINT. CONTR	4,942.29	15,331.74	38,928.00	23,596.26	39.4
240-551100-245	LIBRARY OFFICE MACHINE CONTRAC	.00	482.56	2,400.00	1,917.44	20.1
240-551100-290	LIBRARY MISCELLANEOUS CONTRAC	.00	49,499.85	50,417.00	917.15	98.2
240-551100-310	LIBRARY OFFICE SUPPLIES	260.28	2,655.30	10,100.00	7,444.70	26.3
240-551100-315	LIBRARY POSTAGE	.00	.00	100.00	100.00	.0
240-551100-320	LIBRARY FEES & DUES	(16.96)	(16.96)	1,313.00	1,329.96	(1.3)
240-551100-328	LIBRARY PRINTING & PUBLICATION	79.38	581.29	2,800.00	2,218.71	20.8
240-551100-335	LIBRARY TRAINING & MILEAGE	80.10	409.63	3,000.00	2,590.37	13.7
240-551100-340	LIBRARY OPERATING SUPPLIES	238.16	713.56	2,060.00	1,346.44	34.6
240-551100-390	LIBRARY MISCELLANEOUS EXPENDIT	383.03	573.59	1,665.00	1,091.41	34.5
240-551100-420	LIBRARY TEEN PROGRAMMING	.00	.00	541.00	541.00	.0
240-551100-421	LIBRARY ENRICHMENT PROGRAMS	276.80	1,525.37	2,514.00	988.63	60.7
240-551100-422	CHILDREN'S PROGRAMMING	389.19	1,129.10	1,902.00	772.90	59.4
240-551100-423	LIBRARY SUMMER LIBRARY PROGRA	339.20	539.20	2,402.00	1,862.80	22.5
240-551100-424	LIBRARY REFERENCE MATERIALS	.00	.00	600.00	600.00	.0
240-551100-425	LIBRARY ADULT MATERIALS	2,892.69	7,504.73	30,450.00	22,945.27	24.7
240-551100-426	LIBRARY BOOKS/PERIODICALS	.00	2,936.21	4,211.00	1,274.79	69.7
240-551100-427	LIBRARY AUDIO	39.99	750.80	2,300.00	1,549.20	32.6
240-551100-428	LIBRARY VIDEO	1,397.62	4,285.42	8,000.00	3,714.58	53.6
240-551100-429	LIBRARY CHILDRENS MATERIALS	557.30	1,095.66	8,700.00	7,604.34	12.6
240-551100-430	LIBRARY TEEN MATERIALS	.00	70.36	3,362.00	3,291.64	2.1
240-551100-431	LIBRARY INTERMEDIATE MATERIALS	.00	225.84	8,078.00	7,852.16	2.8
240-551100-432	LIBRARY SOFTWARE/TECH.	272.90	611.90	3,297.00	2,685.10	18.6
240-551100-433	LIBRARY DIGITAL MATERIALS	.00	.00	7,156.00	7,156.00	.0
240-551100-434	LIBRARY OTHER MATERIALS	.00	333.60	1,100.00	766.40	30.3
240-551100-810	LIBRARY EQUIPMENT	16,138.50	20,817.50	8,015.00	(12,802.50)	259.7
	TOTAL LIBRARY OPER	79,219.78	304,665.53	852,690.00	548,024.47	35.7
	LIBRARY REPL/REFUND					
240-551110-499	LIBRARY REFUND LOST MA	.00	.00	500.00	500.00	.0
	TOTAL LIBRARY REPL/REFUND	.00	.00	500.00	500.00	.0
	TOTAL FUND EXPENDITURES	79,219.78	304,665.53	853,190.00	548,524.47	35.7
	NET REVENUE OVER EXPENDITURES	(67,801.92)	394,777.05	(14,292.00)	(409,069.05)	2762.2

VILLAGE OF MOUNT HOREB
REVENUES WITH COMPARISON TO BUDGET
FOR THE 4 MONTHS ENDING APRIL 30, 2026

LIBRARY SPECIAL PROJECTS

		PERIOD ACTUAL	YTD ACTUAL	BUDGET	UNEXPENDED	PCNT
	INTEREST AND DONATIONS					
241-481100-000	INVESTMENT INTEREST	.00	1,028.31	1,800.00	771.69	57.1
241-481200-000	MARKET ADJUSTMENT-INVESTMENT	.00	(3,109.17)	.00	3,109.17	.0
241-485100-000	LOUISE KINDLUND BEQUEST	.00	5,000.00	5,000.00	.00	100.0
241-485200-000	GRANTS-OTHER	3,969.00	3,969.00	.00	(3,969.00)	.0
241-485400-000	CONTRIBUTIONS-BLDG EXPANSION	.00	15,407.48	.00	(15,407.48)	.0
241-485500-000	CONTRIBUTIONS-ENDOWMENT FUND	.00	100.00	.00	(100.00)	.0
	TOTAL INTEREST AND DONATIONS	3,969.00	22,395.62	6,800.00	(15,595.62)	329.4
	TOTAL FUND REVENUE	3,969.00	22,395.62	6,800.00	(15,595.62)	329.4

VILLAGE OF MOUNT HOREB
EXPENDITURES WITH COMPARISON TO BUDGET
FOR THE 4 MONTHS ENDING APRIL 30, 2026

LIBRARY SPECIAL PROJECTS

		PERIOD ACTUAL	YTD ACTUAL	BUDGET	UNEXPENDED	PCNT
	LIBRARY SPEC PROJ					
241-551110-419	LIB SP PROJ LOUISE KINDLUND EX	.00	5,000.00	5,000.00	.00	100.0
241-551110-490	LIB SP PROJ GRANT/CONTRIBUTION	500.00	500.00	.00	(500.00)	.0
241-551110-550	LIB SP PROJ ENDOWMENT INVESTM	.00	349.83	900.00	550.17	38.9
	TOTAL LIBRARY SPEC PROJ	500.00	5,849.83	5,900.00	50.17	99.2
	TOTAL FUND EXPENDITURES	500.00	5,849.83	5,900.00	50.17	99.2
	NET REVENUE OVER EXPENDITURES	3,469.00	16,545.79	900.00	(15,645.79)	1838.4

Village of Mount Horeb Municipal Energy Plan

January 16, 2026

Table of Contents

Acknowledgment: “This material is based upon work supported by the by the Public Service Commission of Wisconsin, Office of Energy Innovation and the Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE), under the State Energy Program Award Number DE-EE0000163.”

Executive Summary

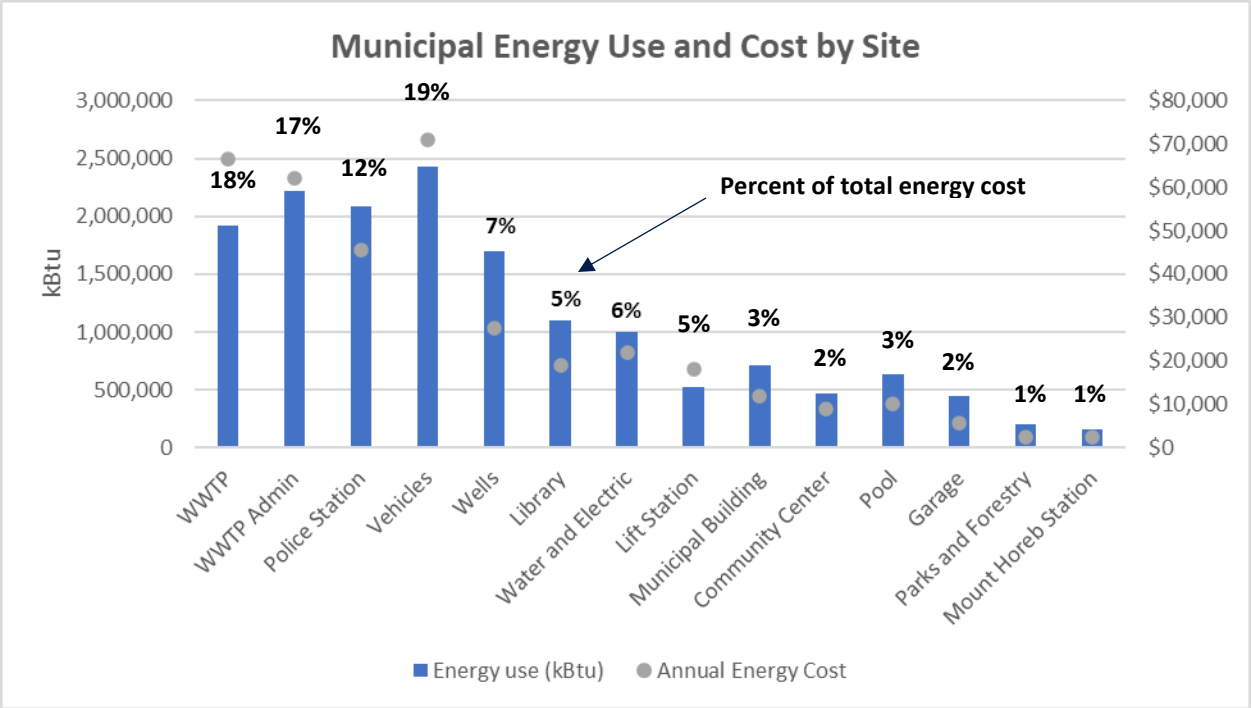
With funding from the Wisconsin Public Service Commission's Office of Energy Innovation, the Village of Mount Horeb partnered with Slipstream and WPPI Energy to develop the Mount Horeb Energy Plan ("Energy Plan"). The Energy Plan is the Village's first comprehensive municipal energy plan, and it will guide Mount Horeb's strategic energy investments over the next 5–10 years. The Energy Plan evaluates the Village's municipal operations, vehicle fleet, and community-wide energy use and identifies actionable strategies to reduce energy costs, advance sustainability, and lower greenhouse gas (GHG) emissions both in municipal operations and throughout the community.

Mount Horeb's goals are driven by its long-standing commitment to environmental stewardship and fiscal responsibility. The Village has already demonstrated leadership through energy-efficient municipal projects, public education initiatives, and the establishment of its Sustainability and Natural Resources (SNR) Committee. This Energy Plan builds on that foundation by prioritizing cost-effective, high-impact actions. The project team used a multi-stage process to understand the energy baseline, identify energy saving opportunities, and recommend improvement strategies. The process included detailed data collection, benchmarking of all municipal facilities, building energy assessments, analysis of vehicle fleet operations, evaluation of community energy use, and extensive engagement with residents, businesses, and the SNR Committee.

ENERGY BASELINE

In the baseline year (2023), the Village of Mount Horeb's municipal operations generated 1,769 metric tons of CO_2e and incurred $373,511 in energy costs. As shown in Figure 1, the largest components of energy costs and emissions were the wastewater treatment plant (WWTP) and the WWTP Administrative building. The police station, wells and lift stations, and the vehicle fleet were also key contributors to baseline energy use and emissions. Benchmarking energy use intensity of each building against national medians showed that several buildings are already more efficient than national medians, but that there continues to be opportunities to improve efficiency at all facilities.

Figure 1. Municipal energy use and cost by source.



IDENTIFYING ENERGY SAVING OPPORTUNITIES

Four buildings—Village Hall, the Library, the Community Center, and the Police Station portion of the Public Safety Building—received onsite energy assessments. The team created digital energy models of each facility, which were used to identify cost-effective near term, medium-term, and end-of-service life energy upgrades. Completing all recommended energy upgrades would reduce utility costs for the buildings by 20-30%.

Near term recommendations focused on improvements that will yield the greatest energy cost savings per dollar of investment. These measures included retro-commissioning, LED upgrades, lighting controls, smart thermostats, and plug-load management. Longer-term decarbonization opportunities include heat pumps, heat-pump water heaters, window replacements, and roof insulation.

RENEWABLE ENERGY OPPORTUNITIES

Freely available renewable energy from the sun and the wind offers valuable cost saving and emissions reduction opportunities for Mount Horeb. Survey responses, guidance from the SNR, and feedback at the Community Forum all showed high levels of public support for increasing the use of renewable energy for municipal buildings and among residents and businesses. Consequently, the Energy Plan assessed opportunities for the Village to use both on-site and off-site renewable energy to power its municipal buildings and also recommended ways that the Village can help community members increase the share of the energy that they use that is generated from renewable resources. Key renewable energy recommendations included:

- **Install Solar PV on Municipal Buildings**. The analysis identified opportunities to install 583 kW-DC at municipal facilities, which would reduce the Village's energy costs by approximately $100,000 per year.

- **Supplement Solar with Off-Site Renewable Energy**. Space constraints at municipal facilities would prevent the Village from installing sufficient on-site solar capacity to offset 100 percent of its energy use. To reflect this limitation and to optimize cost-effectiveness, the Energy Plan provides guidance for the Village in supplementing on-site PV with procurement of off-site renewable energy.
- Facilitate a Solar Group Buy Program. This low-cost program would reduce informational, financial, and technical barriers to broader adoption of rooftop solar at homes and businesses in the community.

VEHICLE FLEET ANALYSIS

The Village's fleet of 30-municipal vehicles consumed over 19,000 gallons of fuel in the baseline year and operated at an overall fuel economy of 12.5 MPG. In 2023, combined fuel costs for all vehicles exceeded the energy costs of all municipal facilities except the WWTP and the WWTP Administrative building.

- SUVs, primarily operated by the Police Department, consumed the most fuel and generated the most CO2e. (8,844 gallons consumed | 75 MT CO2e).
- Large trucks, many of which are used by the Public Works department, consumed the second highest amount of fuel (5,065 gallons consumed | 52 MT CO2e).
- The Energy Plan recommends strategies to reduce fuel costs and vehicle emissions by incorporating electric vehicles (EVs) into its operations. The evolving EV market presents cost-competitive replacements for several categories of vehicles that the Village operates. Key vehicle recommendations include:
- Implement a phased transition by beginning with two initial EV purchases. Train staff to operate and maintain a limited number of EVs before adding more EVs to the fleet.
- Future-proof EV charging needs by installing the level of electrical infrastructure that will be needed to meet future vehicle charging requirement when planning for the initial EV charging stations.

COMMUNITY ENGAGEMENT AND ENERGY USE

The people who live and work in Mount Horeb are key stakeholders for the Village's Energy Plan. Additionally, community-wide residential and commercial emissions far exceed municipal emissions and therefore working with the community will be essential to reduce energy use and emissions. The planning process engaged the community in three primary ways.

- Periodic presentations to, and guidance from, the SNR Committee.
- Survey feedback from 473 residents and 34 businesses.
- Presentation of preliminary energy plan recommendations at a community forum at which attendees offered feedback on each recommended strategy.
- Several top themes emerged from the community engagement.
    - Residents strongly value renewable energy and energy efficiency but cite cost, information gaps, and contractor uncertainty as barriers.
    - Businesses report modest improvements but express interest in support, recognition, and financing programs.

- Community support is strong for solar group buys, improving efficiency of municipal buildings, especially by adding smart building controls.
- Some skepticism exists about EV fleet expansion due to concerns about grid capacity and the future policy environment.

SUPPORTIVE POLICIES AND PROGRAMS

Mount Horeb can sustain and amplify the impact of its energy efficiency initiatives by instituting aligned internal operational policies, as well as public-facing policies.

The Energy Plan recommends four types of policies to achieve the Village's objectives:

- Enact a Lifecycle Cost Analysis purchasing policy for equipment and vehicles.
- Introduce program and services to connect residents and businesses to incentives and financing, especially Focus on Energy rebates.
- Join state and regional sustainability collaboratives (e.g., WLGCC) to sustain the Village's engagement with sustainability and to access additional learning and grant opportunities.
- Create a Green Business Recognition Program to encourage leadership and visibility.

FUNDING OPPORTUNITIES

Significant financial investments will be required to implement the recommended energy upgrades to municipal facilities and to homes and businesses. Federal policy changes have reduced opportunities to use tax credits to fund purchases of EVs and installation of solar arrays. However, valuable funding opportunities remain for all municipal stakeholders:

- **Focus on Energy**. The Energy Plan recommends that the Village coordinate with its Focus on Energy Advisor on all energy improvements to municipal buildings. The Energy Advisor can provide helpful technical guidance and can also assist the municipality in accessing financial incentives for these upgrades. We also recommend that the Village support outreach activities to help residents and businesses access Focus incentives.
- **WPPI Energy**. Mount Horeb Utilities is a member of WPPI Energy, which has been a key partner in the development of this Energy Plan. We recommend that the Village continue to engage with WPPI Energy to identify any additional funding opportunities that may be available.
- **WI Public Services Commission (PSC) Office of Energy Innovation (OEI).** This Energy Plan was developed through a Rural Energy Startup grant from OEI. OEI periodically offers additional funding opportunities, which the Village may be able to access to obtain funding for energy upgrades.
- **Clean Energy Revolving Fund.** The Village can quantify the value of the energy cost savings that the energy upgrades generate and deposit these cost savings into a revolving fund. As the Village continues to make energy upgrades, funds in this account can be used to fill funding gaps for future projects.

NEXT STEPS

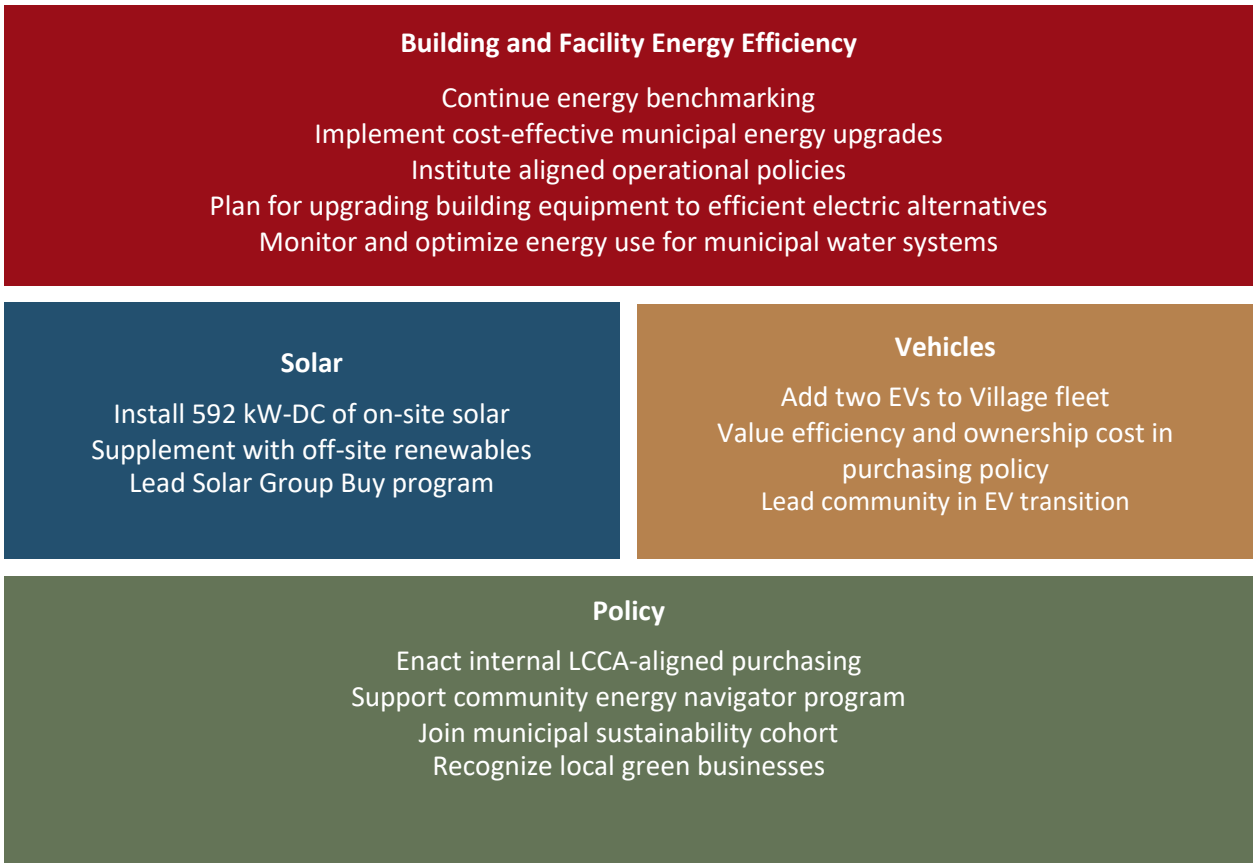
The Mount Horeb Municipal Energy Plan provides a clear, actionable roadmap for reducing energy costs, cutting emissions, and enhancing sustainability across Village operations and the broader community. By

prioritizing high-impact building upgrades, embracing solar energy, modernizing the vehicle fleet, and enabling residents and businesses to participate in energy-saving initiatives, the Village can advance fiscal responsibility, environmental stewardship, and community well-being.

The Plan's success will depend on continued monitoring, strategic investment, and strong collaboration between municipal leadership, Village staff, community members, and regional partners. Mount Horeb is positioned to lead by example and create a model for small communities pursuing a resilient, cost-effective, and sustainable energy future.

Figure 2 provides an overview of the recommendations by category. The recommendations serve as initial items for consideration to save energy and reduce municipal CO_2 emissions. Funding is available through local utility rebates, federal funding, and state funding to implement these recommendations. Funding options for the recommendations are detailed in the full report.

Figure 2. Recommended Mount Horeb energy actions



Glossary

Decarbonization: A process of replacing equipment and systems that generate heat and/or power by combusting fossil fuels with alternatives that are powered solely, or primarily, by electricity or renewable fuels. Fuel switching measures may be complemented by installation of on-site renewable energy systems. These building improvements are designed to achieve near-term and long-term emissions reductions by leveraging trends toward reduced emissions intensity of the electrical grid.

Energy assessment: An on-site inspection paired with energy modeling that analyzes how a building currently uses energy and identifies opportunities to reduce the building's energy consumption.

Electric vehicle (EV): Cars, trucks, buses, and other vehicle types that are propelled using electricity that is stored in a battery.

Energy use intensity (EUI): Total energy used by a building from all fuel types (e.g. electricity, natural gas, and delivered fuels) and converted to British thermal units divided by the total square feet of the building. Normalizes energy use across buildings of different sizes.

Focus on Energy: Wisconsin's statewide program to increase energy efficiency and renewable energy use among residents, businesses, and local governments.

Heat pump: Single heat pump replaces both furnace and an air conditioner; fueled by electricity and highly energy efficient in comparison to furnaces, boilers, and air conditioners.

Internal combustion engine (ICE) vehicle: Conventional vehicle in which gasoline, diesel, or other fuel is consumed to generate the power that propels the vehicle.

Net metering: Billing mechanism that credits solar energy owners for electricity added to grid

PV (Photovoltaic): Conversion of solar energy to electricity

Renewable energy: Energy that is generated from a naturally replenishing resource that does not release carbon dioxide into the atmosphere. Examples include solar energy, wind energy, or geothermal energy.

Weather-normalized site EUI: The energy use a building would have consumed during 30-year average weather conditions. It can be helpful to use this weather normalized value to understand changes in energy when accounting for changes in weather. Energy use is divided by square feet.

Wisconsin Local Government Climate Coalition (WLGCC): Coalition of local governments in Wisconsin committed to accelerating local climate change solutions.

Introduction

BACKGROUND

To guide its next steps toward investing in energy savings, the Village of Mount Horeb collaborated with Slipstream, a Madison-based non-profit organization, and WPPI to apply for funding to develop a community energy plan. In August 2024, the Village signed a grant agreement through the Wisconsin Public Service Commission's Office of Energy Innovation's (OEI) Rural Energy Start-up Program (RESP). Mount Horeb used the RESP funding to partner with Slipstream to develop this Mount Horeb Energy Plan ("Plan"). The Plan recommends steps that the Village can take within the next 5-10 years to strategically invest in reducing the amount of energy used by its municipal buildings and vehicles, as well as the ways that it can make best use of renewable energy. Beyond municipal operations, the Plan recommends policies and programs that the Village can implement to help residents and businesses in the community save money and reduce negative environmental impacts by saving energy.

The Village of Mount Horeb is committed to using energy efficiently and responsibly and to working to improve the environmental and financial sustainability of its operations. It has a track record of pursuing energy efficiency, including leveraging resources from WPPI Energy and Focus on Energy to reduce energy consumption when constructing the Driftless Historium and when retrofitting the Wastewater Treatment Plant.

In addition to addressing energy efficiency within municipal operations, the Village has worked with residents and businesses to save money, and live and work more sustainably by reducing their energy use. For example, in 2022 it engaged the community to reduce energy consumption through the Save to Give Challenge. In November of the same year, the Village demonstrated its ability to institutionalize energy savings opportunities by passing Resolution 2022-15 to create the Village of Mount Horeb Sustainability & Natural Resources Committee.

The Village's efforts are succeeding in facilitating environmental responsibility in the community. In the fall of 2023, Mount Horeb High School was selected to participate in the Focus on Energy Renew Our Schools program. This five-week initiative encourages students and staff to adopt behavioral changes to enhance energy efficiency within their school buildings. Mount Horeb High School demonstrated exceptional commitment by completing every available activity in the program and was awarded $2,500 to use for future energy efficiency projects.

PLAN DEVELOPMENT PROCESS

Developing the Mount Horeb Energy Plan consisted of four primary activities: data collection to develop the baseline, building energy assessments, analysis of energy saving opportunities, and gathering of stakeholder feedback to finalize results (Figure 3).

Data Collection to Develop the Energy Baseline

To enable the Project Team to understand both the municipality's, and the community's current energy use, the first step was to collect data on energy use in the Village's buildings and vehicles. To establish baseline energy use in the community, the team obtained aggregated residential and business energy

consumption data. The team used resident and business surveys to understand current energy consumption practices, behaviors and perspectives among community stakeholders.

Using the data collected, the team established baseline energy use for the Village's buildings and fleet vehicles, which informed insights on the current efficiency performance of each building. Because buildings serve different functions, each with distinct uses, occupancy patterns, and energy-intensive processes, the team compared energy use in Mount Horeb's buildings against two relevant benchmarks. First, we used the site energy use intensity (EUI)[1] of each Mount Horeb building, which is calculated as the amount of energy consumed per square foot. The EUIs were compared to national median site EUI values of other buildings of the same type, using a publicly available dataset[2]. This comparison provided insights on which buildings may currently be under performing in their energy use, and which may therefore present the greatest opportunities for energy savings. Second, the site EUI of municipal buildings was compared against the best practice site EUI target for existing buildings as recommended by the ASHRAE 100 – 2024 Energy and Emissions Buildings Performance Standard for Existing Buildings[3]. The ASHRAE 100 metric provides a target level of energy performance for each building that the Village can seek to achieve through completing the recommended energy improvements.

Data Aggregation and Energy Assessments

Village leadership worked with Slipstream to use the benchmarked energy performance, along with known building improvement needs, to identify the four buildings for which it would be most helpful to complete walk through energy assessments. During the assessments, Slipstream's engineers reviewed HVAC equipment, lighting systems, building automation systems (if present), and other building components. The team also spoke with staff who used and operated each building to identify concerns and functional issues. Finally, the team evaluated roof areas to determine their suitability for solar PV panel installation.

Analysis of Energy Saving Opportunities

For each building, Slipstream created virtual energy models using the on-site data collected with historical energy consumption data and blueprints (when available). The energy model was then used to

---

[1] Calculation of Site EUI converts the electricity, natural gas, and other energy used at the site into a common unit (kBtu) which is divided by building size (square feet). Source EUI, which accounts for total energy used to produce off-site generated fuels (ex. Electricity), as well as the energy that is lost in transmission, can also be a valuable metric. For purposes of assessing current building performance, we find that site EUI, which is used throughout the Mount Horeb Energy Plan is the more relevant metric to consider.

[2] U.S. Energy Information Administration (EIA) Commercial Building Energy Consumption Survey (CBECS). https://www.eia.gov/consumption/commercial/

[3] https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/100_2018_e_20230831.pdf

forecast the energy savings potential of multiple energy upgrade scenarios. These became the basis for the development of energy upgrade roadmaps aligned with the most cost-effective upgrade pathways.

In parallel with analyzing energy efficiency and renewable energy improvement pathways for municipal buildings, the team assessed the types of vehicles in the Village's municipal fleet, as well as their fuel consumption and mileage. The team investigated cost-effective strategies for the Village to reduce fuel costs and vehicle emissions by transitioning to hybrid and electric vehicles (EVs) during planned vehicle replacements.

The team also evaluated supportive policy and programs. This included internal policies that can help the Village sustain energy efficiency efforts over time, as well as public-facing policies and programs informed by survey responses and aggregated residential and business energy data. These recommendations outline ways that the Village could help community members reduce their energy use and shift from conventional electricity usage to renewable energy.

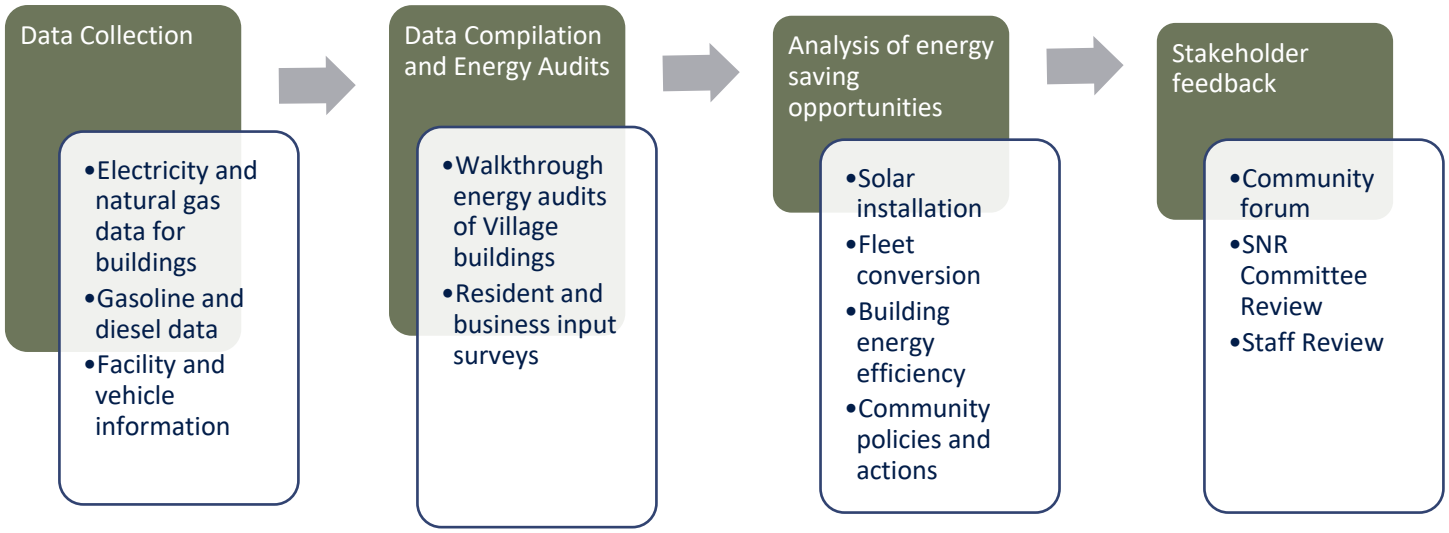
Stakeholder Feedback

The team compiled the strategies identified for energy savings in municipal buildings, municipal vehicles, and community-wide energy used into a preliminary set of recommendations. Because the draft recommendations were informed by community survey responses and by guidance from the Village's SNR committee, it was essential to share them with the SNR and the broader community to confirm that the preliminary roadmap accurately reflected stakeholder priorities.

Community members were invited to a forum where draft recommendations were presented. Participants used dot voting to indicate their level of support or opposition for each recommendation. Attendees also provided insights and feedback by placing sticky notes with comments on posters corresponding to each recommendation. Additional feedback was gathered through comments from Village staff and SNR Committee members.

This final version of the Mount Horeb Energy Plan incorporates feedback from municipal staff, from SNR Committee members, and from residents at the community forum.

Figure 3. Overview of planning process



Baseline Data

PLAN BOUNDARY

The project team aggregated electricity, natural gas, gasoline, vehicle, and facility data to establish the energy baseline for the Mount Horeb Energy Plan. The recommendations that the Plan describes use the information in the baseline to create a roadmap for the Village to achieve significant energy savings in comparison to the baseline.

To align with the objectives and requirements of the grant funding that the Village used to develop the plan, the Energy Plan focuses on municipal facilities and vehicles, as well as community-wide energy reduction strategies. The Mount Horeb Area School District is structured as a separate entity from the Village and is responsible for maintaining and improving all of the school buildings in Mount Horeb. Similarly, the Mount Horeb Area Joint Fire Department and Emergency Medical Service, which operates and maintains the Fire Department portion of the Public Safety building is a separate jurisdiction from the Village. Because the School District and the Fire Department are separate governmental entities from the Village, the facilities and vehicles that they use were not included in the Village's baseline, or in the recommendations that the Energy Plan outlines. As a next step, the Village may seek to engage with these two partners to collaborate on clean energy initiatives.

MUNICIPAL ENERGY USE

Mount Horeb has 11 primary municipal facilities, as well as service garages, storage sites, wells, and lift stations. It also has 30[4] vehicles and numerous pieces of off-road equipment in its Village fleet. The project team analyzed energy data from each source for both 2023 and 2024 (where available)[5]. Table 1 and Table 2 reflect the energy use and costs, as well as the relative level of emissions from each source for 2023, which is the most recent year for which energy data for all sources was received.

The second column in Table 1 shows the total energy use for each source. To allow for accurate conversions of energy values to energy costs and GHG emissions, the values in this column have not been weather normalized to account for the positive or negative effects of colder winter temperatures or hotter summer temperatures on energy consumption in buildings. However, consumption values for buildings were weather normalized when calculating site EUI so that the EUI could be meaningfully compared to median EUI and to the ASHRAE 100 Standard target for high performing site EUI.

[4] Data for 2023 fleet vehicle baseline analysis.

[5] To account for data availability, building energy data reported for "2023" refers to activity from 11/1/2022 – 10/31/2023. Building energy data reported for 2024 refers to the period from 11/1/2023 – 10/31/2024.

Table 1. Annual energy use and costs by source (2023 data)

Source	Energy use (kBtu)	Site EUI[6]	Annual Energy Cost	Percent of Total Cost
WWTP	1,921,580	N/A	$66,508	18%
WWTP Admin	2,221,510	491.3[7]	$62,255	18%
Vehicles	2,430,024	N/A	$70,895	19%
Police Station	2,080,739	79.5	$45,488	12%
Wells	1,701,747	N/A	$27,633	7%
Water and Electric	1,001,029	81.3	$22,059	6%
Library	1,105,416	68.3	$18,901	5%
Lift Station	520,210	N/A	$18,250	5%
Municipal Building	713,607	56	$11,805	3%
Pool	631,518	N/A	$10,273	3%
Community Center	466,727	48.3	$9,094	2%
Garage	450,979	37.6	$5,623	2%
Mount Horeb Station	159,773	79.9	$2,360	1%
Parks and Forestry	203,344	16.9	$2,367	1%
Total	**15,608,203**		**$373,511**	

Table 2. Annual CO_2 emissions and costs by source (2023 data)

Source	CO_2 Emissions (metric tons)	Percent of Total CO_2 Emissions
WWTP	334.73	19%
WWTP Admin	319.2	18%
Police Station	240.76	14%
Vehicles	174.91	10%
Wells	151.16	9%
Library	126.47	7%
Water and Electric	115.95	7%
Lift Station	91.87	5%
Municipal Building	64.56	4%
Community Center	48.5	3%
Pool	42.03	2%
Garage	32.06	2%
Parks and Forestry	13.69	1%
Mount Horeb Station	13.1	1%
Total	1,768.99	

[6] Weather-normalized site EUI

[7] Site EUI for the WWTP Admin building significantly exceeds normal ranges. It is likely that the high EUI indicates that a portion of the energy process load for the primary WWTP facility is being allocated to the WWTP Admin account.

MUNICIPAL FACILITIES

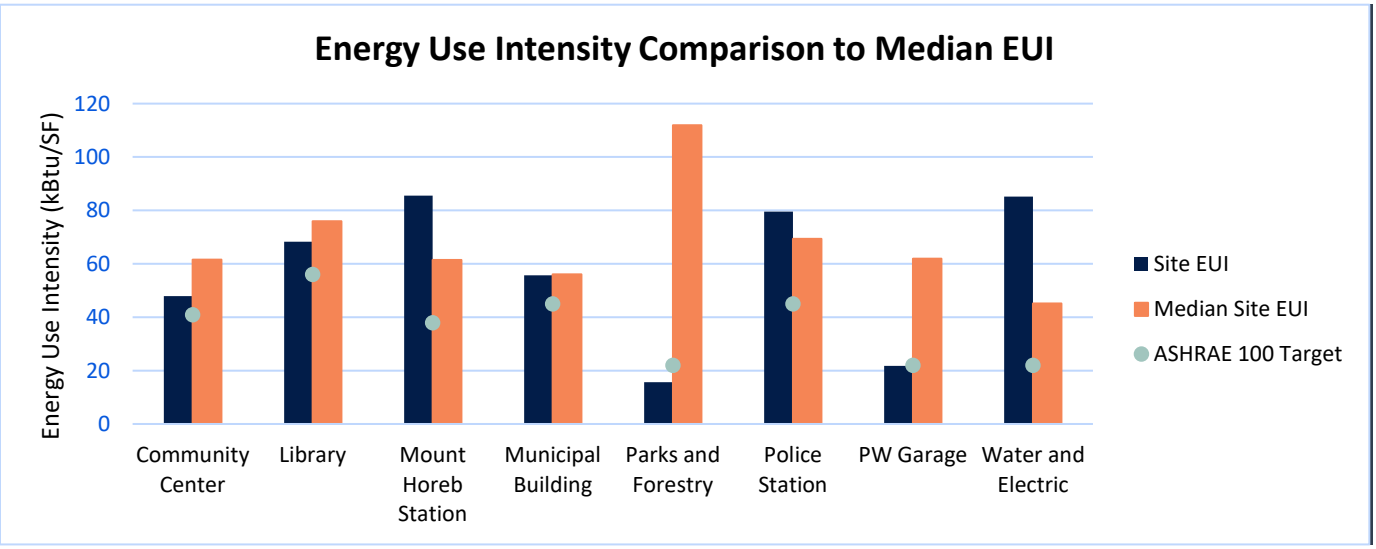
To inform long term energy planning, as shown in Table 3, the project team examined current electricity and natural gas consumption in each facility.

Table 3. Municipal Facility Energy Use

Facility	Annual Electricity (kWh)	Electricity cost	Annual natural gas (therms)	Natural gas cost	Total cost
WWTP	513,689	$65,341	1,389	$1,167	$66,508
WWTP Admin	445,684	$56,691	6,624	$5,564	$62,255
Police Station	285,611	$33,735	13,944	$11,713	$45,488
Wells	141,068	$17,944	11,535	$9,689	$27,633
Library	148,589	$18,901	4,956	$4,163	$23,064
Water and Electric	140,859	$17,917	4,931	$4,142	$22,059
Lift Station	140,859	$17,917	396	$333	$18,250
Municipal Building	60,361	$7,678	4,913	$4,127	$11,805
Pool	50,416	$6,413	4,595	$3,860	$10,273
Community Center	53,921	$6,859	2,662	$2,236	$9,095
Garage	20,949	$2,665	3,522	$2,958	$5,623
Parks and Forestry	7,644	$972	1,660	$1,394	$2,367
Mount Horeb Station	10,910	$1,388	1,158	$973	$2,360
Total	2,020,558	$254,421	62,286	$52,320	$306,780

Figure 4 shows the site EUI for each of the Village of Mount Horeb's municipal facilities as the darker bar, as well as the national median EUI for that building type as the lighter bar. The dot indicates the target EUI set by ASHRAE standard 100-2024.

Figure 4. Municipal Facility Site EUI



MUNICIPAL VEHICLES

Opportunities to replace existing gasoline and diesel vehicles with more efficient hybrids and EVs depend to the category and use of each vehicle. Table 4 segments the energy use and GHG emissions from the Village's vehicles by vehicle category. As shown in the table, SUVs and large trucks consume the most fuel and generate the most emissions.

Table 4. Municipal Vehicle Use

Vehicle category	Annual Gallons	Annual miles	Avg. Fuel Economy[8]	Fuel Cost	Emissions (MT CO2e)
Pickup 1/2 ton or smaller	1,861	60,571	10.8	$6,659	15.82
Large pickup	3,371	47,832	8.9	$12,185	29.60
SUV	8,844	91,293	13.2	$31,639	75.03
Large Truck	5,065	32,713	27.0	$19,410	52.09
Van	280	10,620	10.4	$1,002	2.38
Total	19,421	243,029	12.5	$70,895	**174.91**

COMMUNITY ENERGY USE

Energy use by Mount Horeb residents and businesses, as well as the perspectives of stakeholders on their current energy use, are important components of the community's energy baseline. Figure 5 shows community electricity use and Figure 6 shows community-wide natural gas use among residents and businesses.

The project team surveyed residents and organizations in Mount Horeb to understand the views of community members and stakeholders on energy topics. In May – June 2025, 473 residents as well as representatives from 34 businesses completed surveys through which they identified their views, priorities and challenges related to energy use. The Community Engagement section of the Energy Plan describes key findings that the surveys revealed.

[8] Quality concerns were identified regarding annual miles driven data for some vehicles. To minimize the effects of data input errors by vehicle users. Outliers were removed from the calculation of average MPG. Therefore, the average MPG for each vehicle type may not equal the miles driven divided by the gallons of fuel used.

Figure 5 Mount Horeb community electricity use

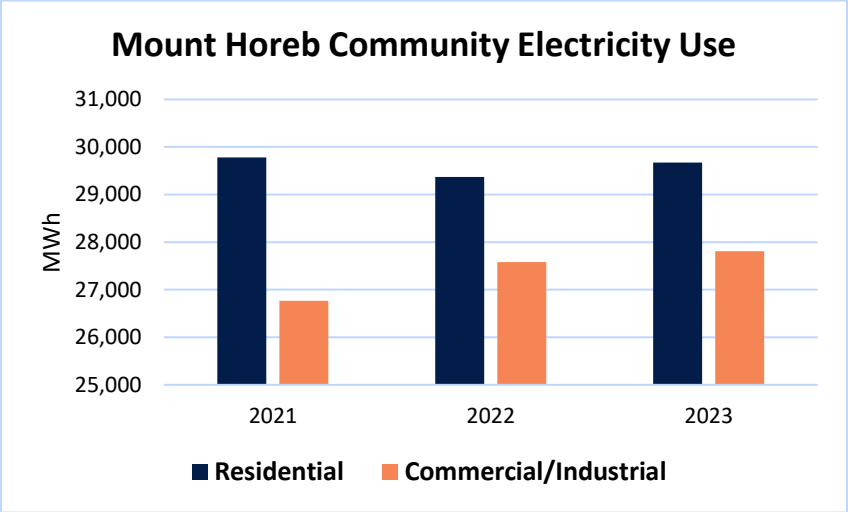
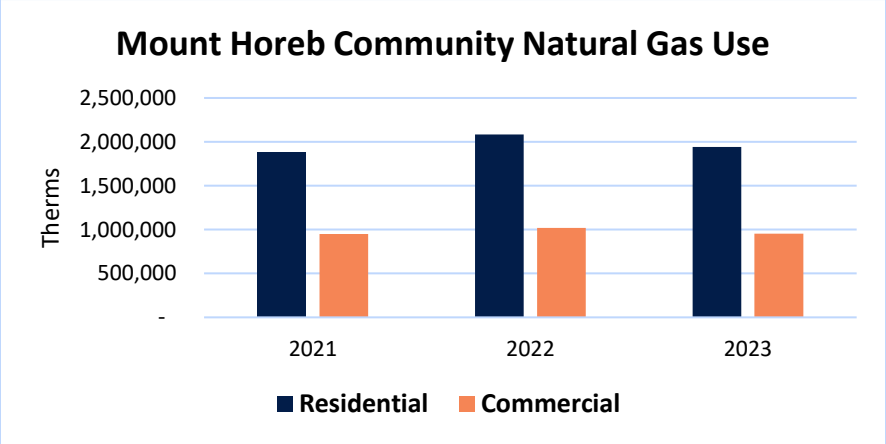
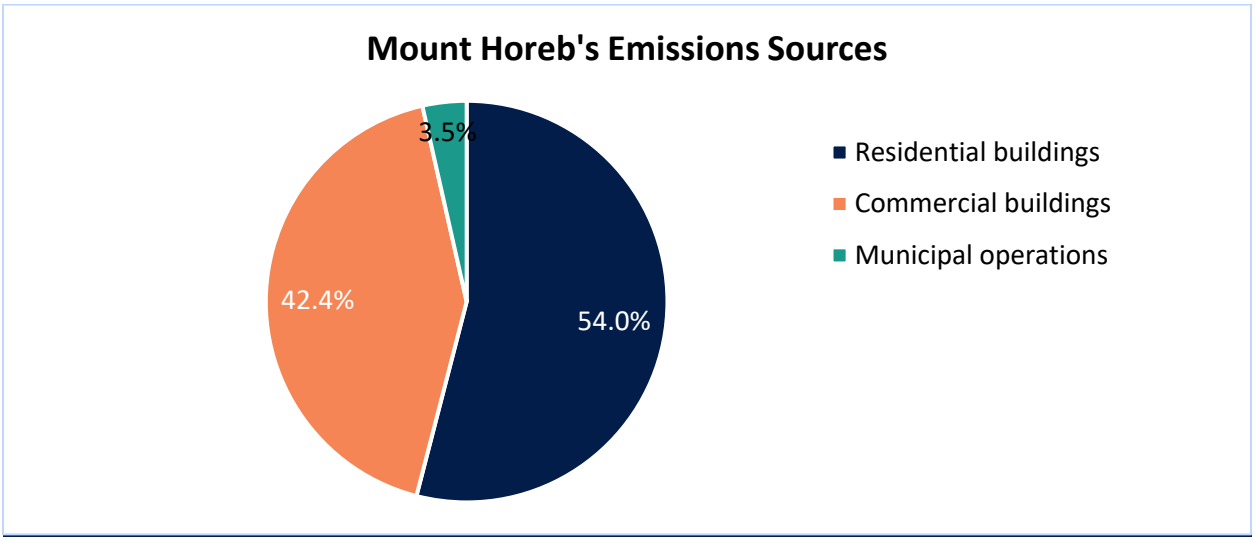


Figure 6. Mount Horeb Community Natural Gas Use



As shown in Figure 7 emissions from residential and commercial buildings greatly exceed emissions generated by municipal operations. Within this context, the Village, residents, and businesses will need to work together to reduce community-wide energy use and emissions.

Figure 7. Mount Horeb Community GHG Emissions by Source



Community Engagement

The people who live, work, and run businesses and organizations in Mount Horeb are key stakeholders for the Mount Horeb Energy Plan. These stakeholders are in Mount Horeb for many reasons, but all have interests in ensuring that the Village is fiscally responsible, economically vibrant, healthy, and environmentally sustainable. Additionally, as shown in Figure , energy use and emissions from homes and places of business in Mount Horeb is much greater than energy and emissions related to municipal operations and facilities.

To ensure that the recommendations in the Energy Plan align with the priorities of community stakeholders, the project team engaged the community in the planning process in three ways.

1. **Village Sustainability and Natural Resources (SNR) Committee**. Mount Horeb established the SNR Committee in 2022 as a resident advisory body that would guide the Village's environmental sustainability initiatives. Within this charter, the SNR is ideally positioned to provide feedback on the Energy Plan from the perspective of residents.

   In July, 2024, after receiving funding approval for the project from the Wisconsin Public Service Commission (PSC), but prior to the start of work, the project team presented the project plan to the SNR and requested feedback from committee members on the SNR's objectives for the project. In April 2025, the project team presented its findings on the Village's energy baseline to the SNR, as well as its initial plans for the facilities on which energy assessments would be completed. At the April meeting, the team also discussed both the content of the community wide survey that would be deployed and distribution channels for the survey that would be most effective.

   After completing energy assessments and using energy models to identify cost effective improvements, the project team presented its preliminary recommendations for energy upgrades to Village facilities to the SNR. At this meeting, the team also shared results of the community surveys and discussed plans for a community forum event. In November and December 2025, the team shared a draft version of the Energy Plan with the SNR Committee to seek feedback on the recommendations that are described in the document.

2. **Resident and Business Surveys**. One survey for residents and a separate survey for businesses were developed and deployed to collect broad input from community stakeholders on five key topics.
   - Concerns and challenges related to energy and climate
   - Values and actions related to energy or sustainability that the respondent household or business has taken
   - Challenges and barriers to saving energy or using renewable energy
   - Ways in which the Village can help the respondent save energy or use renewable energy
   - Input on ways that the Village can save energy.

   Both surveys were distributed both online and in paper formats. Mount Horeb Utilities distributed surveys through its customer communications platform and the SNR supported distribution of the surveys at events and through community outreach channels. As a result of broad distribution through these channels, 473 residents and 34 businesses responded to the survey. Response levels to both surveys were significantly higher than standard survey response rates.

Key findings from the residential survey are shown in Table 5 and findings from the business survey are shown in Table 6.

Table 5. Resident survey key findings

Topic	Results
Demographics	• 73% own and occupy a single-family home. • 71% are 31 – 65 years old. • 56% have household income over $100,000.
Energy actions completed	• 70% - 80% report having installed LEDs, scheduling HVAC setpoints, and/or turning off lights/appliances to save energy. • 64% completed at least 4 energy saving actions.
Level of agreement with energy statements (percent who strongly or somewhat agree)	• "Saving energy is important to our household" - 95% • "It can be hard to afford our energy bills" - 35% • "Using renewable energy is important to our household" - 73% • "Our household has made changes to our home or lifestyle to reduce our energy use" - 78% • "Minimizing the amount of gasoline and/or diesel fuel that we use is a priority for our household" 61%
Perceptions of barriers	Statements with high levels of **agreement** • "Home improvements that save energy are too expensive." • "Renewable energy systems are too expensive." • "I am interested in energy efficiency and/or renewable energy, but I need to prioritize other goals." Statements with high levels of **disagreement** • "I do not know how to save energy in my home." • "I am not interested in saving energy." • "I am not interested in renewable energy." • "Nothing holds me back! I am saving energy and have transitioned to using renewable energy." (moderate disagreement)
Requests for Village support for residents in saving energy	Top tier • Education on low-cost, cost-effective home improvements • Help identifying opportunities to use Focus on Energy incentives Second tier • Village to purchase offsite renewable energy • Encourage residents to purchase offsite renewable energy • 53% support developing additional bicycle/ped friendly infrastructure • Assistance with vetting solar contractors
Hopes for municipal energy plan	• Investigate geothermal for heating and cooling • Efficiency improvements and heat pumps for municipal buildings

Topic	Results
	• Reducing vehicle sizes and improving efficiency in municipal fleet vehicles
Interest in ongoing engagement	• 182 may be interested in participating in a forum. • 118 willing to participate in a focus group.

Table 6. Business survey key findings

Topic	Results
Characteristics of respondents	• 48% have 10 or fewer staff and an additional 33% have 11 – 25 staff. • 48% occupy buildings smaller than 5,000 sf. Additional 28% occupy buildings 5,000 sf – 10,000 sf. • Respondents represent at least 12 different business sectors
Relevance of energy use to business operations (percent who strongly or somewhat agree)	• Managing energy use is important to the financial success of the organization: 76% • Reducing energy use is a priority for the organization: 76% • The organization has worked hard to reduce its energy consumption: 64% • Using renewable energy is important to the organization: 68%
Energy actions completed	• Few reported upgrading to LED lighting. • Many have installed efficient windows and/or added insulation. • Generally low numbers of energy saving actions reported.
Ways the Village can help businesses save energy	• Provide information about available financing and incentives for efficiency and renewable energy. • Publicly recognize organizations that are making progress toward saving energy.
Interest in ongoing engagement	• 11 may be willing to participate in a focus group.

3. **Community Forum**. On September 30, 2025, the Village, the SNR, and the project team collaborated to offer an evening community forum event at the Mount Horeb Community Center. At the forum, large format posters offered high-level descriptions of the preliminary energy recommendations related to municipal facilities, renewable energy, municipal vehicles, and policies, which had been developed for the Energy Plan. Attendees used green and red stickers to indicate their support for, or opposition to, each recommendation. Community members were also asked to write additional feedback on each element of the draft Energy Plan on Post-it notes and adhere the papers to the applicable poster. After the event, the project team recorded the number of sticker votes supporting and opposing each recommendation and supplemented that data by recording the additional viewpoints that were provided on Post-it notes.

   Notable themes from feedback shared at the Forum are outlined below.

   - Recommendations receiving greatest support were for the Village to facilitate a solar group buy program and for using smart control technology to improve energy efficiency at municipal buildings.

- Recommendations for energy upgrades at all municipal facilities and for adding on-site solar arrays at municipal buildings earned the next greatest level of support.
- Strategies related to incorporating EVs into the municipal vehicle fleet were the only category of recommendations that received opposing votes. Comments on these recommendations identified concerns about pursuing electrification during a time when data centers are increasing demand on the electricity grid. Comments on this topic also wondered whether changes in [Federal] policies may create problems for EVs in the future and also encouraged the Village to consider renewable diesel fuel alternatives.

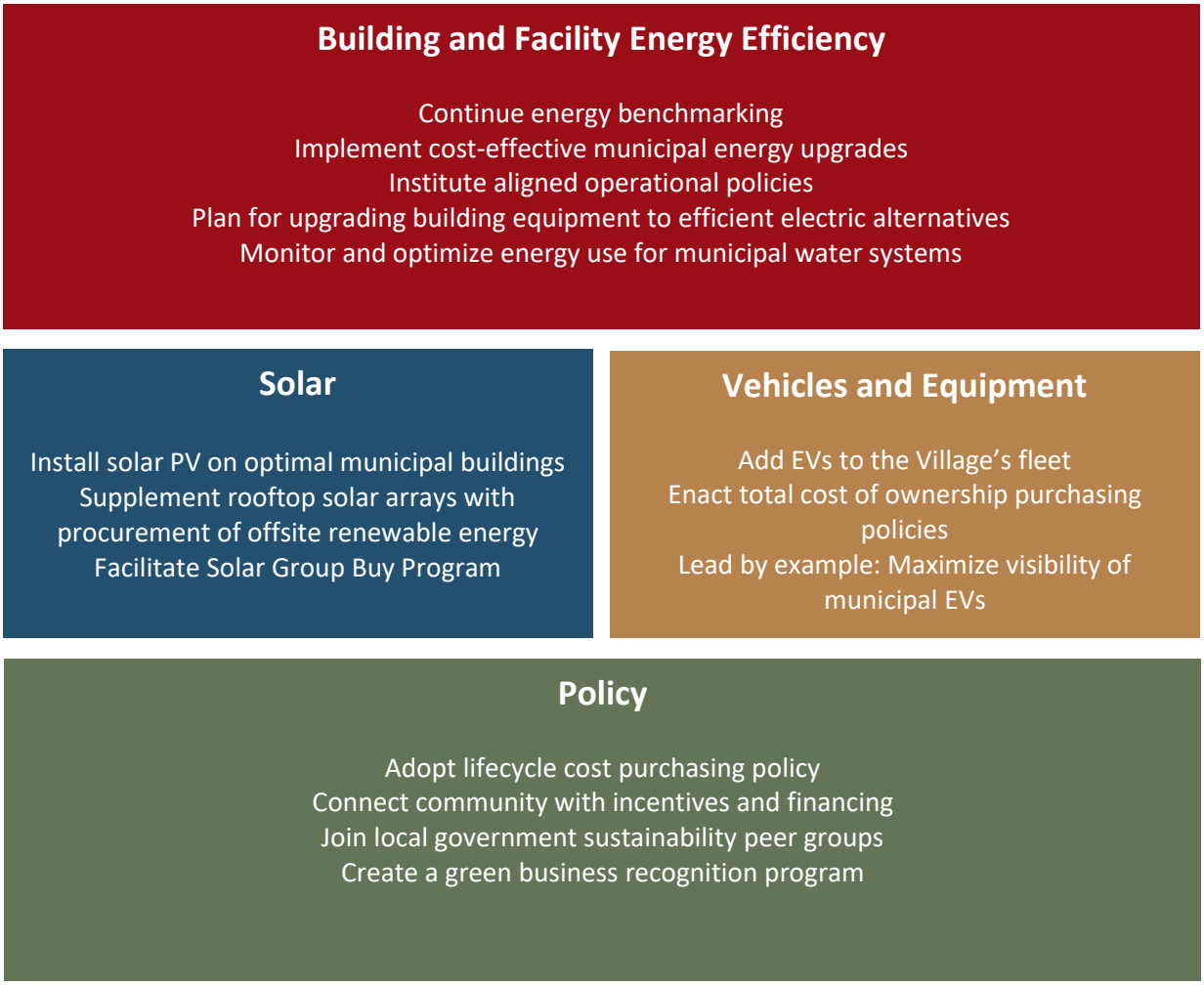
Feedback received from the Forum has been incorporated throughout the Mount Horeb Energy Plan.

Recommendation Overview

The project team identified priorities for specific building upgrades, solar installations, and low-carbon fleet alternatives for the Village to implement, as well as recommendations for policies that institutionalize progress and encourage community-wide energy and emissions reductions.

Figure 8 provides an overview of recommendations by category and the following sections of the report explore each set of recommendations in more detail. We present funding opportunities for these recommendations within each of these sections and also provide a complete overview of funding options at the end of the report.

Figure 8. Mount Horeb energy recommendation summary



This energy plan is intended to guide the Village's investments in energy efficiency and renewable energy projects for the next 5-10 years. The descriptions of the municipal building energy efficiency recommendations estimate the relative level of cost and effort that completing each improvement will require. Using this guidance, we recommend that the Village cross-reference these recommendations with its plans for capital improvements during the next decade to establish a timeline for completing the recommended upgrades.

The project team created quantitative energy models of the buildings that the Village selected for energy assessments. The outputs of the models identified the most cost-effective, and the highest impact, energy efficiency improvements that can be made at each building. The team also assessed the financial and energy benefits of installing solar arrays at each municipal facility.

Building and Facility Energy Efficiency Recommendations

Recommendations

1. Benchmark building energy use .
2. Implement recommended measures buildings to reach over 20% utility cost savings in each building.
3. Adopt standard operating procedures across buildings.
4. Plan for decarbonizing buildings through efficient electrification of HVAC and DHW systems
5. Conduct an evaluation of pumps, lifts, and wastewater treatment plant to identify energy savings.

We recommend that the Village of Mount Horeb commit to ongoing and continuous engagement to reduce energy expenses for its municipal facilities. Recommendations 1, 3, and 4 provide operational and policy guidance that will help the Village move toward ongoing improvements in energy efficiency, while recommendation two outlines a strategy for completing the specific energy upgrades that are described in Appendix 1. The fifth recommendation outlines steps that the Village can follow to reduce energy used in its wells, pumps, and lift stations.

RECOMMENDATION 1: CONTINUE ONGOING BENCHMARKING OF BUILDING PERFORMANCE

The energy performance of buildings can be tracked by examining their energy use intensity over time and in comparison, to other buildings through a process called benchmarking. Energy use intensity (EUI) is a metric that shows the building's total energy use divided by the gross square feet of the building, thus normalizing the level of energy use for the size of the building. How a building is used directly affects the amount of energy that it consumes. For example, a hospital that operates 24 hours per day and which requires high levels of mechanical ventilation will consume more energy per square foot in a given year than an office building that does not house specialized equipment, and which has limited hours of operation each week. To enable effective evaluation of a commercial building's level of efficiency, its EUI is benchmarked against other buildings that have similar types of uses, and which are in the same climate zone.

Error! Reference source not found. Figure 9 shows the EUI of all Mount Horeb municipal facilities over time a nd compared to the national median EUI for that building type. The EUIs for the Library, Community Center, Garage, Parks and Forestry buildings all show EUIs lower than the median. However, the project team has identified strategies through which the Village can further reduce energy costs and emissions. The ASHRAE 100 standard for existing buildings offers target EUI thresholds for high performance buildings. We recommend that the Village work toward reducing energy use to the ASHRAE 100 targets shown in the figure through a continuous improvement process of tracking energy use, identifying opportunities to save energy, and monitoring the savings that the improvements generate. The Mount Horeb Station has a higher EUI than national median. Recommendations in this section highlight specific items to consider for each building.

The Municipal Building (Village Hall) has a similar EUI compared to national median, which suggests that this is a building to prioritize with initial upgrades. The Public Safety building consists of the Police and Fire Department. The Fire Department operates as a separate entity from the Village and was therefore not evaluated for this report. The reported EUI is for the police station only.

The Public Safety building receives natural gas and electricity through common meters that serve both portions of the building. The Village and the Fire Department have agreed that the Village will pay 58% of the cost of the energy use for the building, which is intended to reflect the portion of the building's energy that is

used by the Police Department. The Fire Department pays for the remaining 42% of the cost. To reflect this arrangement, this report assumes that the building's energy use is divided between the Police Department and the Fire Department in the same proportion as the costs for energy have been assigned. While assuming that the Police Department uses 58 percent of the energy that is delivered to the facility applies the best information available regarding distribution of energy use, the actual amount of energy used by the Police Department is unknown. Therefore, the actual EUI for the Police Station may be lower or higher than the EUI that was calculated for this report.

Continuing to track each facility's EUI in comparison to relevant benchmarks is a key strategy for identifying unexpected changes in energy use, as well as maintenance and repairs needed to optimize energy use and to measure progress toward energy saving goals.

ENERGY STAR Portfolio Manager is a free tool that provides an online platform for tracking energy use over time in all municipal facilities. To help the Village measure its progress toward achieving energy saving targets and standards, Portfolio Manager offers the ability to benchmark energy use against a sample of similar buildings in the same use type. Slipstream has created profiles in ENERGY STAR Portfolio Manager of all municipal facilities and has entered each building's energy data for 2023 and 2024 into the platform. The project team recommends that the Village assign a staff person to track energy use for all facilities in Portfolio Manager and utilize the platform's analytical tools to provide regular reports to Village staff and leadership on the Village's energy performance. Slipstream will transfer management of the facilities in Portfolio Manager to the Village's selected point of contact.

RECOMMENDATION 2: IMPLEMENT RECOMMENDED MEASURES FOR AUDITED BUILDINGS

The project team performed energy assessment walkthroughs at four buildings, Village Hall, the Library, the Community Center, and the Police Station section of the Public Safety Building.

The assessments included reviewing current heating and cooling systems, lighting equipment, and appliances and discussing comfort and operations with building staff. The team then developed digital energy models of each building to identify and quantify opportunities for energy savings. Slipstream's engineers applied the equipment that is in use in each building, as well as the condition of the facility, building energy code requirements at the time of construction, and weather data to create the model of each building.

The project team did not create an energy model for the Public Safety Building, as it is a recently built, well-performing building with energy efficient measures already in place. Therefore, rather than focusing on identifying energy efficiency improvement opportunities for the building, this report recommends measures to cost-effectively further reduce emissions from the building by combining on-site renewable energy systems and replacing natural gas fueled space and water heating equipment with electrically powered equipment.

Appendix 1 describes the recommended energy upgrades for the Village's buildings. In these recommendations, measure costs were based on secondary research, industry reference materials, and past project experience. These estimates intend to inform prioritizing improvement measures. Actual energy savings from the recommended improvements will be highly dependent on weather and actual building operation. Further engineering and final pricing of all recommended measures will be required prior to implementation.

Table 7 summarizes the recommended measures for assessed buildings. The measures are organized by high priority, medium priority, and end-of-life.

> **High Priority**. Measures that offer high returns on investment (ROI) and short financial payback periods because they generate significant energy savings in comparison to their installed cost. This category also includes measures that will achieve important comfort upgrades.
>
> **Medium Priority**. Measures that are important to install in order to achieve energy saving goals, but for which the financial payback period is longer, due to higher initial costs and/or lower total energy savings than the High Priority measures.
>
> **End-of-life (EOL)**. Energy efficiency improvements that the Village can implement when the corresponding existing equipment or building system has reached the end of its functional life and must be replaced or repaired.

In addition to measures in the three categories above, the table identifies Decarbonization strategies for each building. Decarbonization measures are italicized and can be most cost-effectively implemented when the corresponding fossil fuel powered space heating or water heating equipment that the measure will replace reaches the end of its service life. Appendix 1 provides additional explanation of the recommendations that are summarized in the table.

Table 7. Overview of recommended measures

	Village Hall	Library	Community Center	Public Safety
High Priority	Retro-commissioning LED Retrofit Lighting Occupancy Controls	Retro-commissioning LED Retrofit Lighting Occupancy Controls Daylighting Controls	Retro-commissioning LED retrofit w/ Occupancy Sensors Smart Thermostat	-
Medium Priority	Plug Load Management Air Sealing Condensing Boiler	Plug Load Management Air Sealing	Air Sealing	-
End of Life and *Decarbonization*	*Heat Pump Water Heater* *Air-To-Water Heat Pump -*	Roof Insulation Heat Pump Water Heater *Air-To-Water Heat Pump*	ENERGY STAR Appliances Window Replacement Roof Insulation *Heat Pump Water Heater*	*Heat Pump Water Heater* *Air-to-Water Heat Pump*

Table 8 estimates upfront cost, annual cost savings, payback period, and annual CO_2 savings for the High Priority, Medium Priority, and End of Life measures. Payback period is calculated as total initial cost divided by annual energy cost savings. The initial cost listed does not account for incentives, and it is recommended that the Village work with its Focus on Energy Representative to understand all incentives that are available for the recommended improvements. The payback for EOL measures is calculated based on the incremental cost of the energy efficient measures compared to a 'business as usual' replacement option. The annual energy cost savings and upfront costs shown in the table are rounded to either the nearest ten or the nearest hundred, depending on the size of the initial value. The Village can reduce its energy costs for each building by approximately 20% - 30% percent if it implements all of the recommended measures.

Appendix 1: Building Descriptions provides a full description of building analysis.

Table 8. Cost and CO_2 savings from recommended measures

	Upfront Cost ($)	Annual Energy Cost Savings ($)	Percent Cost Savings	Annual CO_2 Savings (MT)	Percent CO_2 Savings	Average Payback (yrs)
Village Hall	**$17,100**	**$2,050**	**19.8%**	**17.8**	**27%**	**-**
High Priority	$7,600	$1,600	16.4%	14.1	21.7%	5.9
Medium Priority	$9,500	$450	3.3%	3.7	5.7%	36.1
Library	**$63,700**	**$4,790**	**29.8%**	**28.6**	**27.4%**	**-**
High Priority	$11,600	$3,600	22.6%	18.7	18.0%	3
Medium Priority	$2,100	$190	1.2%	2.0	2.0%	11.2
EOL Measures	$50,000	$1,000	6.0%	7.8	7.5%	>50
Community Center	**$48,500**	**$1,630**	**20.0%**	**9.3**	**19.5%**	**-**
High Priority	$8,300	$1,200	14.9%	6.3	13.6%	7.6
Medium Priority	$1,400	$50	0.7%	0.7	1.5%	28.3
EOL Measures	$38,800	$380	4.3%	2.1	4.4%	>50

RECOMMENDATION 3: INSTITUTE STANDARD OPERATING GUIDELINES AT ALL BUILDINGS

The operation of a building and the behavior of building occupants has a significant impact on building energy use. Operational guidelines can save energy without significant investment and have the potential to positively impact occupant comfort and productivity. We recommend that the Village of Mount Horeb develop a policy that defines clear guidelines for the energy efficient operation of municipal buildings. The policy should provide guidance that applies to all buildings, as well as differentiated guidelines for specific buildings, as needed. The differentiated guidelines should address the unique characteristics functional requirements of individual buildings. All guidelines should seek to balance efficient energy use with assurance of comfort for the staff and visitors that use the building. To ensure that the guidelines are effectively implement and that they align with the functional and occupant wellbeing needs of the building, the Village should establish communications channels so that building occupants can provide ongoing feedback that can be used to adapt the policy, as needed.

Table 9Table provides a full list of items to consider for an operating policy. The operating policy covers ongoing maintenance, HVAC system operation, plug load management, and lighting. The Village of Mount Horeb already implements several of these recommendations, such as establishing setpoints and setbacks. However, it is important to develop a policy to institutionalize current norms and habits.

Table 9. Operating policy examples

Operational Policies	
Maintenance	Include changing air filters as directed by manufacturer specifications in monthly work plans.
	Enter into service contract with HVAC provider that includes regularly monitoring and maintaining refrigerant charge on air conditioning units.
	Establish permissible temperature setpoint ranges and setbacks for occupied and unoccupied times. Guidelines should address both heating season and cooling season operations.
Heating, Ventilation, and Air	Maintain and clearly display a list of operating parameters for all HVAC and water heating equipment. The posted information should include the temperature set points, operating schedules, and maintenance requirements for each piece of equipment.

Operational Policies	
Conditioning (HVAC) Systems	Post guidance on when operable windows can be opened based on room thermostat setpoints. For example, assuming thermostats are set from 70 degrees to 75 degrees, the guidance would state that building users may open windows between 68-77 degrees outdoor temperature.
	Create communication channels for building occupants to provide feedback on comfort or operational issues. A regularly administered survey can be useful to gather additional feedback on occupant comfort.
	Develop a policy that prohibits or limits the use of individual refrigerators, space heaters, printers, and other peripheral equipment at workstations. Consider ways to consolidate the number of refrigerators and printers in each building.
Plug Loads	Implement computer power management on staff workstations that shifts computers and monitors into a sleep mode after no more than 30 minutes of inactivity. Alternatively, install smart plugs or advanced power strips with schedule timer control and/or load-sensing control to automatically power off devices, such as computers and monitors after periods of inactivity to reduce standby energy waste.
	Implement TV sleep requirements to reduce energy consumption when the TV is not in use.
	For spaces where occupancy or daylighting sensors are not installed, post signage that establishes norms for turning off lights in unoccupied rooms. Department heads can lead by example in visibly adhering to the posted policies.

RECOMMENDATION 4: PLAN FOR SPACE AND WATER HEATING ELECTRIFICATION

Electrification is the process of phasing out equipment that uses fossil fuels (i.e., natural gas, propane, gasoline) and replacing it with equipment that uses electricity. Electrification reduces CO_2 emissions in current operations and also enables ongoing emissions reductions.

For more than a decade, market forces have led utilities to choose to add large-scale solar and wind energy systems to their electricity generation portfolios and to retire their coal power plants. Together, these shifts have reduced the amount of carbon dioxide that is released for every unit of electricity that is generated. These trends are expected to continue into the future, which will lead to declining emissions over time from buildings that use electric-powered space and water heating systems, while emissions from buildings that use fossil fuels will remain constant.

In many situations, heat pumps are still more expensive than a high-efficiency natural gas system. However, incentives and changing energy costs are causing heat pumps to become more cost competitive. During future HVAC and water heating decisions, staff should compare both costs and CO_2 emissions of conventional equipment and heat pumps. Table 110 lists the heat pump options for Mount Horeb buildings.

Table 10. Heat pump system options for existing systems in Mount Horeb Buildings

Existing System	Heat Pump System	Description
Furnace and A/C Split System	Dual-Fuel Air-Source Heat Pump	A cost-effective electrification option that still uses gas heat but switches to efficient heat pump heating when outdoor temperatures are above 25°F (user adjustable).
	Air-Source Heat Pump	Full electrification option.

Existing System	Heat Pump System	Description
Hot Water Boiler System	Air-to-Water Heat Pump with Gas Boiler Backup	A cost-effective electrification option that still uses gas but switches to efficient heat pump heating when outdoor temperatures are above 25°F (user adjustable). Can reuse existing distribution system and existing gas boiler for backup.
	Air-to-Water Heat Pump	Full electrification option. Can reuse existing distribution system.
Single Zone Constant Volume Gas-Fired RTU	Dual-Fuel RTU	A cost-effective electrification option that still uses gas heat but switches to efficient heat pump heating when outdoor temperatures are above 25°F (user adjustable).
	Heat Pump RTU	Full electrification option.

RECOMMENDATION 5: IMPLEMENT MONITORING AND OPTIMIZATION STRATEGIES FOR WELLS AND LIFT STATIONS

Wells and lift stations primarily use energy to operate equipment, such as pumps, rather than for space conditioning, water heating, or plug loads. For this reason, energy use intensity, which compares the amount of energy that a building consumes to the size of the building is not a meaningful way of assessing the energy efficiency of these facilities[9].

While EUI does not provide a meaningful metric for benchmarking the energy efficiency performance of wells and lift stations, these facilities, and the equipment that they house, consume a significant share (10% - 30%) of total energy use for many municipalities[10]. In 2024, the Village paid over $48,000 to power these facilities and they account for 13 percent of municipal GHG emissions. Therefore, we recommend that the Village take the steps described below to assess current energy efficiency of this equipment and to improve efficiency move forward while simultaneously operational reliability.

A detailed assessment of the energy efficiency of Mount Horeb's wells and lift stations was outside the scope of this energy planning project. The opportunities described below highlight common strategies to reduce lift station energy use and improve reliability. However, the most effective pathway for Mount Horeb will depend on site-specific factors such as system design, pump sizing, flow patterns, and operational

[9] Because EUI is not a meaningful metric for wells and lift stations, these facilities were excluded from certain tables and charts in the Baseline and Benchmarking sections of this report.

[10] SEDAC. 2022. *Lift Station Optimization in Wastewater Treatment Plants - EnergySense | The EnergySense Resilience Center at The University of Illinois System*. June 29. https://smartenergy.illinois.edu/lift-station-optimization-in-wastewater-treatment-plants/.

requirements. Detailed assessments by technical experts are needed to determine which approaches deliver the greatest benefit for the Village.

Establishing performance baseline

Establishing a performance baseline for lift stations is a critical step in identifying inefficiencies and prioritizing cost-effective improvements. Two primary ways to evaluate current performance are described below. The Village can use both preventative maintenance and reactive upgrades to manage energy use and enhance the operational efficiency of pumping equipment.

1. Energy intensity tracking. Comparing electricity use with water flow [typically expressed as kilowatt-hours per million gallons pumped (kWh/MG)] provides a valuable metric for assessing efficiency. Tracking the metric over time can reveal reduced equipment performance and needed maintenance. Using the metric to compare the energy performance of existing equipment with rated performance of prospective new equipment can inform decisions about the cost-effectiveness of investing in upgrading equipment.
2. Performance monitoring and analysis. This method uses operational data (e.g., runtime, flow, temperature, and vibration) together with manufacturer pump curves to assess efficiency and system health. Deviations from expected ranges signal issues like oversizing, clogging, seal/bearing wear, or cavitation, providing an opportunity to correct problems before they lead to failures (PumpWorks Engineering 2024). Technologies such as supervisory control and data acquisition (SCADA) provide real-time oversight and early warnings of inefficiencies and can be used to enhance monitoring capabilities.

Optimizing energy use

Beyond managing energy consumption through maintenance, lift station electricity consumption can be lowered through operational adjustments and equipment upgrades. Some common strategies include:

1. **Install variable frequency drives (VFDs**) (if not already in use): Where flows vary significantly, installing VFDs allows pumps to adjust speeds to match system demand, thus reducing wasted energy and delivering 5-40% energy savings (SEDAC, 2022).
2. **Impeller trimming**: If pumps deliver more pressure and flow than needed, the impeller can be machined to a smaller diameter, so the pump matches system requirements more closely. This adjustment can reduce excess pressure and lower energy use by 1-8% (Hydraulic Institute, 2022). However, trimming can reduce the pump's hydraulic efficiency[11] thereby negatively affecting energy efficiency (energy use per gallon pumped). To maintain reliability and minimize efficiency losses, trimming should be performed within manufacturer-recommended limits and verified against updated pump performance curves.
3. **High-efficiency motors and pumps**: Premium-efficiency motors and pump designs, as described in the Department of Energy's (DOE) Premium Efficiency Motor Selection and Application Guide (Basso et al. 2014), yield incremental but persistent savings (1–3%), and improve reliability (SEDAC, 2021). When well pumps require replacement at the end of their useful lifespan, the Village can replace existing equipment with pumps that feature high efficiency motors.

Resources for efficient equipment transitions

[11] Hydraulic Institute, 2022. "Trimming Impellers to Reduce Energy Consumption." *Pumps.Org*, September 27. https://www.pumps.org/2022/09/27/trimming-impellers-to-reduce-energy-consumption/.

As lift station components (pumps, motors, controls, etc.) approach the end of their service lives, replacement presents a natural opportunity to improve efficiency. To support this process, Mount Horeb can draw on existing technical resources such as the Focus on Energy Wastewater and Water Utilities Program[12], which offers pump assessments and incentives; DOE's Pumping System Assessment Tool (PSAT)[13], which models pumping performance and identifies efficiency opportunities; and the Wisconsin DNR's Capacity, Management, Operation, and Maintenance (CMOM) Program[14], which provides guidance for evaluating lift station performance and planning system upgrades.

Applying these resources can help Mount Horeb evaluate equipment options and identify the most cost-effective path forward. We recommend that the Village use the resources from Focus on Energy, DOE, and WI DNR, as well as other relevant information to take four key steps to plan investments that will improve the energy efficiency of its wells and lift stations.

1. **Conduct a needs assessment.** Define pumping capacity requirements by evaluating current actual flow and head conditions can avoid inefficiencies associated with oversizing.
2. **Screen potential technologies.** Proactively research potential efficiency strategies, including high-efficiency motors, VFD-compatible pumps, and SCADA ready systems to prepare the Village to be ready to leverage efficiency opportunities if time-sensitive equipment upgrades are needed.
3. **Apply life-cycle cost analysis.** Compare options for equipment upgrades and replacements based on total cost of ownership, which includes initial capital cost, and estimated energy costs, and maintenance costs for each option.
4. **Verify improved performance.** After investing in efficiency improvements, ensure that the equipment is commissioned, then follow an energy measurement and verification protocol to ensure that the upgrades are achieving the predicted improvements in energy efficiency.

[12] https://focusonenergy.com/business/wastewater

[13] https://www.energy.gov/eere/iedo/articles/pumping-system-assessment-tool

[14] https://dnr.wisconsin.gov/topic/Wastewater/CMOM.html

Solar Recommendations

RECOMMENDATION 1: INSTALL SOLAR PV ON OPTIMAL MUNICIPAL BUILDINGS

Onsite solar can reduce the Village's energy costs and also lower its CO_2 by leveraging existing roof or ground space near existing facilities. The analysis examined Village facilities for solar installations and identified 10 locations that are potential candidates for solar installations.

Recommendations

1. **Install** rooftop solar on municipal buildings
2. **Supplement** with offsite renewable energy
3. **Facilitate** solar group buy

Table 11. Solar PV installation recommendations for Mount Horeb facilities

Building	Size (kW DC)	Renewable Offset	Payback Period (Years)	Annual CO_2 Savings (MT)	Annual Cost Savings
Wastewater Treatment Plant (WWTP)	231.1	59%	15.7	196.65	$39,125
Public Safety (Police Dep't)	146.1	41%	15.5	125.49	$24,967
Electric and Water Shop[15]	65.7	65%*	15.5	56.53	$11,246
WWTP Admin Building	38.2	12%	15.2	33.43	$6,650
Village Hall	33.8	74%	15.5	29.08	$5,786
Community Center	33.5	74%	18.5	24.14	$4,803
Library	19.3	17%	16.3	15.80	$3,144
Public Works	11.8	80%	15.5	10.14	$2,017
Parks and Forestry	4.3	67%	18.5	3.07	$611
Total	**583.8**			**494.33**	**$98,349**

Table12 estimates costs for each of the recommended arrays. The estimated upfront cost is based on size and location on roof or ground. The Focus on Energy incentive shown in the table is a rebate of $50/kW, up to a maximum incentive of $25,000 per installation. The Federal Investment Tax Credit (ITC), which is currently available to non-tax paying entities via the Elective Pay provision will expire in July 2026 and it therefore may not be feasible for the Village to fund, and complete installation of, a solar array within that timeframe. For that reason, the ITC is not considered in the cost estimates in Table2.

[15] The Electric and Water shop currently generates a portion of the electricity that it consumes with a 9 kW on-site solar array. As part of the Mount Horeb Energy Plan, we recommend that the Village install additional PV capacity at this site. All fields except the Renewable Offset column for the Electric and Water Shop in Table and Table reflect information about the added PV capacity. The Renewable Offset field indicates the total renewable offset for the combined systems. Note: Installing additional solar capacity at this facility would require WPPI issuing a waiver for the installation.

Table 12. Cost details of solar PV installations for Mount Horeb facilities

Buildings	Upfront Cost	Focus on Energy Incentives	Net Cost
Wastewater Treatment Plant (WWTP)	$624,000	$11,550	$612,400
Public Safety (Police Dep't)	$394,400	$7,300	$387,200
Electric and Water Shop	$177,300	$3,300	$197,900
WWTP Admin Building	$103,000	$1,900	$101,200
Village Hall	$91,100	$1,700	$89,400
Community Center	$90,500	$1,700	$88,800
Library	$52,100	$950	$51,200
Public Works	$31,800	$600	$31,200
Parks and Forestry	$11,500	$200	$11,300
Total	**$1,575,700**	**$29,200**	**$1,570,600**

RECOMMENDATION 2: SUPPLEMENT ROOFTOP SOLAR WITH PURCHASE OF OFF-SITE RENEWABLE ENERGY

As described in Solar Recommendation 1, this Energy Plan recommends installing rooftop and/or ground mounted solar arrays at most municipal facilities. Table13 includes an indication of the percentage of each building's current electricity consumption that the recommended solar array would offset. For most facilities, due to either limited space available to install solar panels at the site, or for purposes of optimizing cost-effectiveness of the array based on the terms of the applicable electric tariff, the recommended array would offset a maximum of 80 percent of the facility's current electricity use.

Additionally, the estimated combined net cost of the recommended arrays is $1,570,600. Unless the Village is able to leverage outside funding sources to pay for the cost of these installations, we anticipate that the Village will need to install these arrays over a period of 5-10 years.

While it may be necessary for the Village to fund and install the arrays over an extended period of time, the Village can take immediate and near-term action to reduce its municipal emissions by working with Mount Horeb Utilities and WPPI to procure offsite renewable energy. Offsite renewable energy is electricity that a facility purchases, which is generated at a different location from the building that is using the electricity. Due to Wisconsin's regulatory framework, in Wisconsin, offsite renewable energy generating facilities are usually owned by a third party or by the property owner's electric utility, rather than by the owner of the facility.

Table 1313 identifies benefits and drawbacks of both on-site and off-site renewable energy.

Table 13. Comparison of on-site and off-site renewable energy procurement

	Installing on-site solar	Purchasing off-site renewable energy
Initial cost	Significant initial investment required	Initial cost varies depending on procurement method • No initial investment required for adding renewable attributes to conventional electricity purchases (Choose Renewables program. • Low initial investment may be required for community solar participation.

Installation process	Installed by third-party contractor. Requires project management by Village	Not applicable or managed by third party
Energy cost savings	Generated electricity directly reduces utility expenses.	Choose Renewables: Adds surcharge to electricity purchases. Community Solar and RER: Savings vs. added expense determined by rate structure.
Community Leadership	Offers visible and recognizable evidence to the community of Village's investment in clean energy.	May demonstrate leadership if purchase of renewable energy is effectively communicated to the community.
Ease of use	Minimal maintenance occasionally required	No extra effort required following initial registration
Emissions reduction	Renewable energy generated directly reduces Village's Scope 2 emissions from purchased electricity.	Emissions reduction value dependent upon emissions inventory or energy performance standard applied.[16]

The 2024 IECC (International Energy Conservation Code) Section CC103.3.2 of Appendix CC establishes standards for assuring the validity of off-site renewable energy that a building procures to offset its electricity use. We recommend that, if the Village chooses to purchase off-site renewable electricity, it works with the provider of the off-site renewable electricity to ensure that the electricity it purchases meets these standards, as well as the standards provided by Zero Code 2.0.

IECC Section CC 103.3.2[17] Key Requirements for off-site procurement of renewable energy:

- Renewable energy procurement agreement shall be legally binding, have a term of at least 15 years, and be transferrable to a new property owner.
- Renewable energy credits (RECs) associated with the purchased energy must have been created within the past 12 months by a renewable energy system that was constructed within the past five years.
- The renewable electricity must be either directly transmitted to the building or must be provided through the local utility.

Mount Horeb Utilities offers the Choose Renewables rate option. Business and residential customers who opt-in to this program agree to purchase a quantity of 300 kWh blocks of renewable energy each month. For each block of renewable energy, the customer agrees to pay a surcharge in addition to their regular energy charges. For each block that customers purchase, Mount Horeb utilities agrees to procure an additional 300 kWh of electricity produced from renewable sources. The Village could purchase 6,735 blocks of energy[18]

[16] Table 6 of Zero Code 2.0 provides useful framework for comparison of offsite renewable energy procurement options. https://www.zero-code.org/wp-content/uploads/2018/04/Zero-Code-TSD-OffSiteRenewables.pdf

[17] 2024 IECC Appendix CC 103.3.2. https://codes.iccsafe.org/content/IECC2024P1/appendix-cc-zero-energy-commercial-building-provisions

[18] Number of blocks based on weather-normalized 2024 electricity consumption for all municipal facilities

through the Choose Renewables program, at an annual cost of $6,735 to offset all of its current electricity consumption. If the Village installs all of the recommended on-site solar arrays, it could purchase 4,618 blocks of electricity each year at a cost of $4,618 to offset the remaining portion of its electricity use. Utilities in Wisconsin have developed additional frameworks and tariff structures through which they are providing dedicated, locally generated off-site renewable energy to customers who opt in to these programs. Two examples include community solar, and MGE's Renewable energy Rider (RER) tariff.

Community Solar. An off-site PV array that is large enough to generate electricity for multiple residential and/or commercial buildings. Community solar projects in Wisconsin are owned by the local electric utility and ratepayers within designated classes (ex. Residential, business, industrial) may choose to purchase a portion of the electricity that the array generates. While specific terms of participation vary among community solar projects, for most community solar offerings, the customer receives credit on their monthly utility bill for the value of the electricity that the portion of the PV array that they purchased generated that month.

MGE Renewable Energy Rider (RER). MGE's RER tariff offers large energy users the opportunity to opt-in to be an off-taker of the generation capacity of the utility's local large scale renewable energy projects. Specific terms of the agreement are negotiated between the customer and the utility and agreements must be approved by the Wisconsin Public Service Commission. Using the RER, local governments, school districts, and large companies have entered into agreements with MGE to allocate portions of the electricity generated by the large solar arrays that the utility has developed in Dane County. Purchasers that own multiple buildings can allocate the electricity output from the array between their buildings so that the single array and the single agreement provides renewable energy throughout the participant's portfolio of buildings.

Community solar projects and the RER model support the development of local renewable energy systems and offer rate structures through which a participant may be able to achieve cost savings in comparison to purchasing conventional electricity through the default electricity rate. Visibility of local renewable energy projects can demonstrate the Village's use of renewable energy to the community and thus build support for, and adoption of, renewable energy among residents and businesses. Both options also create opportunities for the Village to benefit from electricity cost savings, rather than paying an additional fee to access renewable electricity.

Mount Horeb Utilities is a member of WPPI Energy, which provides the electricity that MHU supplies to its customers. Currently, MHU's contract with WPPI prohibits both community solar programs and the RER tariff framework. We recommend that, while enabling these policies would require considerable changes to contracts and regulations, the Village engage with Mount Horeb Utilities and WPPI to evaluate options through which the Village can achieve electricity cost savings through participation in locally-sited renewable energy developments.

RECOMMENDATION 3: FACILITATE A COMMUNITY-WIDE SOLAR GROUP BUY PROGRAM

Seventy-three percent of respondents to the Mount Horeb residential survey either strongly agreed or somewhat agreed with the statement, "Using renewable energy is important to our household." However, only seven percent of respondents said that they had either installed solar on their home or used renewable energy. The gap between the stated values of residents and the percentage of residents who are currently using renewable energy reveals that many households face barriers in accessing renewable energy.

Respondents identified barriers to using renewable energy, which included installation costs and lack of knowledge in moving forward with installing on-site renewable energy systems. Qualitative responses also suggested that residents have concerns about selecting a qualified and reliable solar installation company.

A solar group buy program could help residents and businesses overcome financial, technical, and information barriers to installing solar arrays at their homes and businesses. Important components of a solar group buy program are outlined below. Mount Horeb can either create a new solar group buy program, or it may consider partnering with nearby municipalities to offer a joint program.

- **Contractor qualification**. The municipality issues an RFP to residential and commercial solar installers that serve the village. The RFP outlines the framework of the solar group buy program and requests proposals from installers for the rate structure(s) that they would offer if selected as the sole provider, as well as examples of the information about recommended solar arrays that they would provide to participants, and references from previous clients who will attest to the quality and reliability of the contractor's work. From the proposals submitted, the Village selects the installer who offers the greatest value to participants within the program framework.
- **Sole sourcing**. In exchange for being the sole installer servicing the program, the contractor reduces its marketing and customer relations expenses, thus lowering the company's cost of doing business and reducing overall project costs for participants.
- **Reliability of pricing and forecasts**. The Village's program implementer coordinates site visits and cost bids by the contractor and provides quality control for the energy production and cost savings forecasts that the contractor provides to participants.
- **Streamlined process**. Both quality control by the Village's program implementer and the installer's pricing agreement with the Village eliminate the need for residents to obtain multiple and conflicting bids from contractors. Oversight by the Village's program implementer ensures that projects progress on a timely basis and that participants have access to a qualified third-party to address any questions or concerns that may arise during the project development and installation processes.

Fleet Recommendations

The Village of Mount Horeb currently owns and operates 30 vehicles, which it uses to support its police, wastewater treatment, public services, and recreation departments. Large pickup trucks (3/4 ton and above), medium/heavy duty trucks, and SUVs are the most common vehicle types, followed by half-ton pickup trucks and vans. All vehicles use internal combustion engines (ICE) and do not have gasoline-electric hybrid drives. The municipality's total fuel cost for vehicles in 2023 exceeded $70,000.

Table 14 shows Mount Horeb's municipal vehicle energy use, cost, and emissions. The Village can reduce its municipal fuel use and costs, while also reducing its annual GHG emissions by implementing the efficiency recommendations in this section.

Benefits of EVs

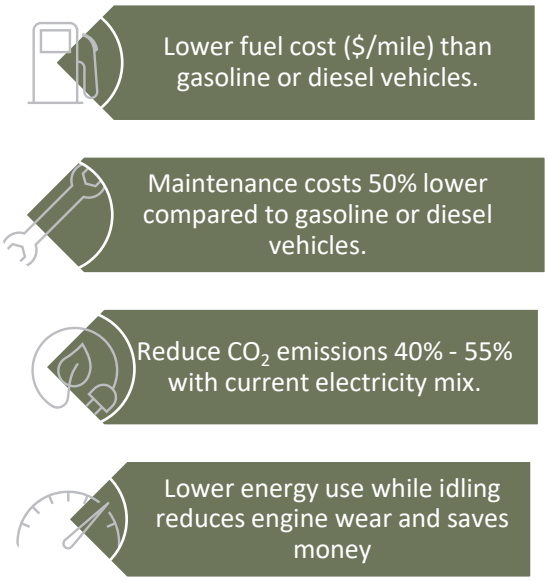


Table 14. Municipal vehicle fleet energy use

Category	Number Vehicles	Gallons of fuel	Fuel cost	Emissions (kg CO_2e)	Miles Driven	Avg MPG[19]
Pickup (1/2 Ton)	5	1,861	$6,659	15,815	60,571	27.0[20]
Pickup (3/4 Ton+)	10	3,371	$12,185	29,596	47,832	13.2
SUV	8	8,844	$31,639	75,027	91,293	10.6
Van	2	280	$1,002	2,379	10,620	10.4
Large Trucks	8	5,065	$19,410	52,092	32,713	8.9
Total	**33**	**19,421**	**$70,895**	**174,909**	**243,029**	**12.5**

Electric vehicles (EVs) provide comparable performance to conventional ICE vehicles, while offering financial and environmental advantages (see sidebar). The electric vehicle (EV) market has accelerated during the past five years and multiple manufacturers now produce an array of light duty electric cars, trucks, vans, and SUVs at price points that are competitive with conventional vehicles.

[19] Quality concerns were identified regarding annual miles driven data for some vehicles. To minimize the effects of data input errors by vehicle users. Outliers were removed from the calculation of average MPG. Therefore, the average MPG for each vehicle type may not equal the miles driven divided by the gallons of fuel used.

[20] Outliers in the vehicle fuel and mileage data suggest that the metric shown for fuel economy of half-ton pickups may not be accurate. Actual fuel economy for this vehicle category is likely closer to 13 mpg.

Currently, there are fewer EV options for larger, medium- and heavy-duty vehicles in the Village's fleet. Many of the Village's current vehicles in these categories use diesel fuel, rather than gasoline. Biodiesel is derived from plant materials and, according to the U.S. Environmental Protection Agency (EPA's) Emissions Factor Hub, generates 7.4% lower emissions than conventional diesel fuel. Additionally, emissions released from burning biodiesel are "biogenic." While emissions produced from fossil fuel combustion release *additional* GHG emissions into the atmosphere, biogenic emissions release CO2e that was already in the earth's carbon cycle, thus not adding to the overall concentration of CO2e in the atmosphere.

While the Village could cost-efficiently reduce GHG emissions by using biodiesel, rather than conventional diesel, according to the U.S. Department of Energy's Alternative Fuels Data Center[21], there are currently no biodiesel refueling stations near Mount Horeb. If the Village would like to assess options for using biodiesel in place of conventional diesel, the Village may engage with local diesel fuel retailers to determine whether they may consider adding biodiesel to the retail fuel options that they sell.

Most EVs can drive 150 – 300 miles between charges, which is significantly greater than the number of miles that the Village's vehicles travel in a single day. Because the driving range of EVs is much greater than typical daily driving distances for Mount Horeb's vehicles, the Village can add EVs to its fleet without interrupting its operations to charge vehicles. Instead, Village staff can plug-in EVs when they are off-duty, and the vehicles will be fully charged and ready for service the next day.

The project team investigated alternative electric models that Mount Horeb could purchase when replacing vehicles in its existing fleet.

RECOMMENDATION 1: ADD TWO EVS TO MUNICIPAL FLEET

Mount Horeb can reduce vehicle fuel and maintenance costs, while also lowering its annual GHG emissions by systematically replacing fleet vehicles nearing the end of their service lives with EV alternatives. While EVs offer financial savings and environmental benefits in comparison to ICE vehicles, the Project Team recommends that the Village gradually transition to EVs and that it starts the transition by replacing two conventional vehicles with EVs. Starting small will enable the Village to install required EV charging supply equipment (EVSE) and train its staff to drive and maintain these vehicles. Lessons learned from adding these vehicles will prepare the Village to systematically replace ICE vehicles with electric, or efficient ICE, options as current vehicles reach the ends of their service lives.

To ensure that the transition to EVs benefits the Village, staff will track the cost and amount of electricity used to charge the EVs, maintenance requirements, and feedback from drivers on their experiences driving the cars. The Village can use this information to guide how it adds more EVs into its municipal fleet in the future.

Part 1: Replace two existing vehicles with EVs

Replace two vehicles nearing end of service life with cost-competitive EVs that match the functionality of their ICE counterparts. The project team analyzed fleet data to identify which vehicles have cost-competitive electric options compared to conventional vehicles and are near-replacement age.

We reviewed available EVs to determine which vehicle categories currently have market-ready EV alternatives and then calculated incremental cost and payback periods to identify which categories are

[21] https://afdc.energy.gov/stations#/find/nearest?fuel=BD

feasible for adoption. While there are not yet cost-effective EVs for all vehicle categories, the EV market continues to advance quickly, so it will be important for the Village to continue to monitor the market moving forward and to watch for cost-effective electric vehicles in additional vehicle categories.

Table15 shows the four vehicle categories in Mount Horeb's fleet for which EVs are available and are currently cost-competitive. The current vehicle column shows an existing vehicle in that category in Mount Horeb's fleet, and the new gasoline vehicle benchmark shows the approximate cost and fuel efficiency rating for a new conventional vehicle in that category. The EV incremental cost is the difference between the cost of a new conventional vehicle and the cost of a corresponding EV. Costs shown do not account for any rebates or credits which may be available. The cost savings per mile is the reduced per mile cost of fueling and maintaining the EV instead of the conventional vehicle. The payback period estimates the number of years required for operational cost savings to surpass the EV's incremental costs.

Table 15. Potential EV Alternatives by Vehicle Category

Category	Ex. current vehicle	New gasoline vehicle benchmark	Ex. EV Alternative	Incremental EV Cost	Annual Cost Savings	Payback period (yrs)
Half-ton Pickup	**WWTP 2016 Ford F150**	**20 mpg $38,810**	**Ford F150 Lightning**	**$13,200**	**$1,048**	**12.6**
SUV	**Police Dept. 2015 Chevrolet Tahoe**	**22 mpg $59,000**	**Chevrolet Blazer EV**	**($12,900)**	**$1,204**	**0**
Work van	Ford Transit Connect	24 mpg $47,400	Ford E-Transit	$5,700	$1,238	4.6
Large truck	International MV607	9 mpg $112,000	International eMV series	$78,000	$3,104	25.1

Commercially available EVs in these four categories could replace 42% of the Village's vehicles. Completing this transition would reduce Mount Horeb's annual fuel and maintenance costs by approximately $16,000 and would reduce the GHG emissions from the Village's fleet vehicles by 13,300 kg CO2e per year (8.1% reduction). The Village could lower its vehicle emissions by 41,700 kg CO2e per year (25.4% reduction) by supplementing its transition to EVs by sourcing the electricity used to power the vehicles from on-site or off-site renewable energy systems.

Instead of an immediate full transition, the Project team recommends initially purchasing two EVs (bolded in Table 4) as replacements for functionally comparable vehicles that are nearing the ends of their service. In addition to achieving the cost savings shown, replacing these vehicles would reduce emissions by over 2,000 kg CO2e/year. After purchasing these vehicles, we recommend collecting data and stakeholder feedback to inform how the Village will transition additional vehicles.

Part 2: Install EV Charging Systems

EVSE Recommendations

1. Prioritize level 2 chargers
2. Install EVSE to future-proof charging needs

To enable initial and expanded future operation of EVs by staff, Mount Horeb will need to install EV charging equipment.

Table 16 summarizes the three categories of EV charging stations[22]. Level 1 chargers offer very low installation costs; however, they do not recharge vehicles quickly enough to fully recharge a vehicle during a typical off-duty period. While Level 3 equipment can quickly refuel vehicles, the equipment and installation costs for chargers in this category may deter the Village from installing DC fast chargers.

The Project Team recommends that the Village install Level 2 charging equipment at central locations where vehicles are typically parked when off-duty. Using Level 2 EVSE will allow staff to plug in a vehicle that is low on charge at the end of their shift and for that vehicle to be fully charged by the start of their next shift. Level 2 chargers require a moderate incremental cost over Level 1 chargers, but this cost is offset by their enhanced functionality.

We recommend adding two EVs to the fleet during the initial transition. If the Village chooses to replace the two vehicles listed in Part 1, the Village will need to install EVSE to support these vehicles, which would require at least one Level 2 charger at the Public Safety building, and at least one Level 2 charger at the wastewater treatment plant (WWTP).

The cost for adding EV charging equipment includes both the cost for the charging ports, as well as the cost of installing the electrical system infrastructure, such as conduit and electrical panel upgrades. Depending on the locations where the charging ports will be installed and the existing electrical infrastructure that serves the building, the cost of laying conduit and upgrading electrical panels may significantly exceed cost of the charging ports. To minimize the total cost of adding the amount of EVSE that will be needed to support a full transition of the Village's current vehicles to EVs in the future, the project team recommends that Mount Horeb install conduit and upgrade electrical service levels proactively to prepare for replacing more ICE vehicles with EVs in the future.

The following steps support cost-efficiently preparing to meet future charging needs.

1. Determine the number of vehicles that park at each location (Public Works building, Public Safety building, and WWTP) for which there is currently a commercially available EV alternative.
    a. Considering likely expansion in the market sectors in which there are cost-competitive EVs, evaluate the number of ICE vehicles that could be replaced with EVs if viable large pickup truck and large truck EVs are introduced.
2. Based on the number of daily miles that each vehicle travels, EV driving ranges, and estimated cold-weather range reductions, determine a 'worst case charging scenario,' that the EVSE will need to support (ex. High number of vehicles requiring charging on a very cold day).
3. To prepare for adding EVs to the municipal fleet, install conduit and complete electrical service upgrades that will be sufficient to support the worst-case charging scenario in a full EV transition of the municipal fleet.

[22] There are variations in capacity and functionality among different types of equipment in a given category

Table 16. EV Charging Station Types

Charger type	Approx. Range Miles per charging hour	Uses	Installed cost per port (est.)
Level 1 (120V AC)	5	Home charging	Less than $500
Level 2 (240V AC)	25	Home, workplace, and public charging (most common)	$500 - $2,500
Level 3 (DC)	200+	Public charging; transportation corridors	$40,000 - $150,000

RECOMMENDATION 2: USE ESTIMATED TOTAL COST OF VEHICLE OWNERSHIP TO GUIDE PURCHASING

To reflect the ever-changing EV market and the benefits of EVs, we recommend that the Village adopt a vehicle purchasing policy to prioritize vehicles that offer the lowest cost of ownership throughout their lifecycle, rather than the lowest initial purchase price. A purchasing policy that prioritizes selecting vehicles that have the lowest total cost of ownership (TCO) will achieve two key objectives. 1) The cost of fueling and maintaining a vehicle during the ownership period may exceed the initial cost of purchasing the vehicle. Selecting vehicles based on comparative TCO will appropriately value these costs and will offer an advantage to more fuel-efficient vehicles, as well as to EVs, which are less expensive to refuel. 2) Focusing on TCO will ensure that the Village uses taxpayer dollars as efficiently as possible to provide the services for which the municipality is responsible. Looking ahead, a TCO-based purchasing policy will ensure that future decisions about fleet transitions reflect the changing costs of EVs vs ICEs and includes the following:

- Purchase cost differential
- Ongoing fuel costs: cost to charge an EV vs. cost to purchase gasoline or diesel fuel to power an ICE vehicle
- Expected maintenance costs
- Forecasted resale values of each vehicle option

Free TCO comparison calculators are offered on the U.S. DOE's Alternative Fuels Data Center site[23], and from Fleetio[24], as well as from other sites.

Table 17 summarizes EV vs conventional vehicle considerations across cost categories.

Table 17. EV vs conventional vehicle cost comparisons - upfront and operating

Vehicle Expense Category	Electric vehicle or conventional vehicle comparison
Purchase Cost	Purchase costs vary by vehicle category
Fuel Cost	Fuel cost per mile is lower for EVs

[23] https://afdc.energy.gov/calc/

[24] https://www.fleetio.com/blog/calculating-total-cost-of-ownership-for-fleet

Maintenance Cost	Studies[25] show approximately 50% lower maintenance costs for EVs.
Resale Value	Some analyses have shown higher resale value for EVs, but irregularities in markets for all used and new vehicles from 2020 – 2023 create uncertainty.

Another way for a municipal fleet to save money is to optimize the total number of vehicles in the fleet. Low annual mileage for some municipal vehicles suggests that parts of the Village's fleet may be under-utilized. To best align the Village's fleet with functional requirements, as vehicles reach the end of their service lives, the Village can add a "Do not replace" option to the choices that it evaluates in the LCCA. When evaluating the "Do not replace" option, in an LCCA, staff may assess opportunities to combine vehicle functions in order to avoid incurring replacement costs.

RECOMMENDATION 3: LEAD COMMUNITY IN EV TRANSITION

As the Village adds EVs to its vehicle fleet, it has an opportunity to demonstrate to the community that EVs are a good transportation solution for residents and businesses.

Mount Horeb can increase the visibility of EVs in the community by adding signage to the sides or backs of EVs in its fleet, which recognizes that a municipal vehicle is an EV. In addition to increasing visibility of EVs in the community, the signage could include information that quantifies the fuel cost savings and the GHG emissions reductions that the Village is realizing by operating EVs in place of gasoline-powered conventional vehicles.

Using a fun and attractive logo or identifier for municipal EVs that connects the Village's logo, community pride, or other positive associations (trolls?) with the environmental and cost benefits can prompt the vehicles to become local conversation pieces and could consequently increase interest in EVs among residents.

A second strategy through which the Village can lead the EV transition by example would be for municipal leaders, such as the Village Administrator, the police chief, and other recognizable figures to drive one of the Village's EVs to public events. At the events, these leaders may reference their enjoyment of the EV that they drove.

There is currently only one public EV charging station in Mount Horeb, with the next closest charging stations located in Verona[26]. While most EV owners primarily charge their vehicles at home, rather than at public charging stations, concern about a lack of available charging stations is a common concern that deters people from considering purchasing an EV.

The Village may be able to reduce concerns among residents about charger availability and thereby increase EV adoption among residents by facilitating the development of additional charging stations in the community. Survey results found that community members do not support the Village installing and owning public-facing charging stations. However, survey responses also indicated that there is support for the Village

---

[25] Harto, C. *Electric Vehicle Ownership Costs: Chapter 2 – Maintenance.* Consumer Reports. September, 2020. (https://advocacy.consumerreports.org/wp-content/uploads/2020/09/Maintenance-Cost-White-Paper-9.24.20-1.pdf)

[26] https://afdc.energy.gov/fuels/electricity-locations#/find/nearest?fuel=ELEC&location=mount+horeb,+wi

encouraging local businesses to add EV charging stations to their facilities. Mount Horeb can foster the addition of EV charging stations in the municipality by working with businesses, such as grocery stores, restaurants, and museums, and hotels, where shoppers/visitors are likely to stay for at least 30 minutes to install charging at their places of business. To support businesses that agree to add EVSE, the Village can offer to connect them with technical assistance, to streamline permitting processes, and to publicly recognize these businesses and feature their charging stations in local business guides and in tourism materials.

Policy Recommendations

The recommendations in this section focus on two objectives: 1) institutionalizing and sustaining practices and policies that advance energy efficiency within municipal government operations; and 2) identifying ways to encourage efficient energy use and reductions in CO_2 emissions throughout the community. The recommendations can serve as a springboard for future community efforts.

Policy Recommendations

1. LCCA Purchasing Policy
2. Energy Navigator Program
3. Clean energy peer support
4. Recognize clean energy leaders

RECOMMENDATION 1: IMPLEMENT SUSTAINABLE LCCA PURCHASING POLICY

There are opportunities to increase building efficiency whenever the Village purchases a piece of equipment that uses energy. For high priority measures that generate significant energy cost savings in relation to their cost, the Village may choose to upgrade equipment before it reaches the end of its useful life. However, decisions on upgrading building systems frequently occur when a system is reaching the end of its useful life and must either be replaced or undergo significant repairs. The Village's decisions in addressing these needs will impact the Village's energy use for decades. For many building improvement decisions, the approach that offers the lowest initial cost may utilize less efficient equipment or building systems, which will force the Village to incur increased energy costs throughout the time that the equipment is operational. To manage long term operational costs and to ensure overall cost-effectiveness of capital improvements, we recommend that the Village establish a purchasing policy for all building repairs, upgrades, and new construction that estimates lifecycle operational costs for each option that is being considered and recommends the option that offers the lowest overall cost (initial cost net of financial incentives + operational costs) while achieving the Village's functional requirements. The Village may further advance its environmental goals by also assessing the estimated GHG emissions for each option and applying a cost-factor to each option based on each option's projected lifetime emissions.

Table 18 summarizes types of equipment and operational standards that the Village may use to identify upgrade options that offer the lowest lifecycle costs. While the table shows current high-performance options and standards, we anticipate that efficiency and operational standards will continue to improve in future years, so the Village will need to periodically refresh this guidance.

The Village has already implemented several of these items in certain buildings, such as purchasing LEDs and installing energy efficient equipment.

Table 18 Purchasing Policy Examples

Purchasing Policy Examples	Heating, Ventilation, and Air Conditioning (HVAC) Systems	When purchasing furnaces, consider condensing furnaces with efficiency higher than 95% AFUE.
		When an HVAC system needs to be replaced, consider installation of air source or dual-fuel heat pumps.
		When purchasing air conditioners, consider ENERGY STAR certified AC with SEER2 ≥15.2.
		Install smart thermostats with occupancy sensors to automatically setback temperatures when spaces are unoccupied.
		Consider installing or upgrading the building automation system when replacing equipment.
	Appliances and Other Equipment	New windows should meet or exceed ENERGY STAR requirements. Large commercial windows or store front windows should target U-value no greater than 0.3 and SHGC no greater than 0.25.
		Consider replacing gas domestic water heaters with hybrid electric water heaters or heat pump water heaters.
		Purchase ENERGY STAR equipment to replace office appliances and domestic water heaters.
	Lighting	Continue purchasing LED bulbs or full fixture replacements for lighting retrofit.
		Consider addition of daylighting and occupancy controls for LED lighting.

RECOMMENDATION 2: CONNECT COMMUNITY WITH INCENTIVES AND FINANCING

Respondents to both the residential survey and the business survey stated that the Village could support them in saving energy and shifting to using more renewable energy by helping them identify low-cost energy saving opportunities for their homes and businesses and by providing assistance in understanding the financial incentives and financing options that are available for making energy efficiency improvements to their homes and buildings.

Focus on Energy and WPPI Energy provide portfolios of energy efficiency informational resources, financial incentives, and technical assistance programs to residential and business customers. While changes in Federal policies will eliminate some currently available clean energy funding resources, Mount Horeb residents and businesses can apply for the Federal HOMES and HEAR rebate programs until December 31, 2026.

Focus on Energy is administering the HOMES and HEAR rebate programs in Wisconsin. The programs offer significant rebates for residential building energy efficiency and electrification improvements for single family homes and for multifamily buildings. Rebates are available for all projects that install qualifying equipment (HEAR) and/or that meet energy savings requirements (HOMES), with higher rebates offered to households with lower incomes.

The HOMES and HEAR programs offer rebates that can offset significant portions of the total costs of qualifying projects. However, to receive this funding, customers must ensure that work is done in compliance with the Federal requirements. Focus on Energy representatives and trained contractors are well-equipped to guide Mount Horeb residents throughout their project. To maximize the potential benefits of this funding

resource for the Mount Horeb community, we recommend that, through 2026, the Village highlight opportunities through HOMES, HEAR, Focus on Energy, and WPPI in its outreach to residents.

Additionally, numerous informational resources about energy efficiency and renewable energy upgrades that have been created by non-profit organizations, businesses, utilities, and units of government may provide the clean energy information that Mount Horeb stakeholders are seeking.

While valuable financial, technical, and informational resources are available to help Mount Horeb residents and businesses identify, and pay for, energy efficiency and renewable energy improvements, survey results show that many community members would benefit from assistance accessing these resources. Therefore, without providing additional financial incentives or grants, the Village can facilitate energy improvements in the community by helping community members connect with existing resources. Following are three ways that the Village could support community-wide energy savings:

1. **Village of Mount Horeb Clean Energy web page**. Adding a dedicated page for energy efficiency and renewable energy information to the Village's website would help residents, businesses, and organizations in the community remove the informational and financial barriers to saving energy that they have identified. In addition to offering a community-specific location for this information, adding this information to the Village's website would increase the credibility of this information to local stakeholders. Survey responses indicated that, while residents and businesses want help finding the resources that the page would include, they also expressed concerns about determining what information on this topic is credible and trustworthy. The Village could collaborate with WPPI Energy and Focus on Energy, which both have expertise on these topics, to provide quality assurance for the information on the page and to help the Village ensure that the page continues to display currently available resources and accurate policy guidance.
2. **Staff support**. The Village could dedicate a portion of a staff person's time to serve as the Clean Energy Navigator for community members. This person would be a first point of contact for residents and businesses

   As shown by responses to the surveys, there is significant demand and need for clean energy outreach, education, and individualized support for residents and businesses. The Village may consider either re-allocating a percentage of an existing staff person's job responsibilities to coordinate the Village's sustainability outreach, education, and assistance, or seeking funding to add a new staff person to fill this role. This staff person can both coordinate the Village's community-focused work on this topic and serve as a first point of contact for incoming inquiries. Job responsibilities may include:

   - Developing partnerships with other organizations to collaborate on education and outreach. Partnerships may include the Mount Horeb School District, the Mount Horeb Area Chamber of Commerce, WPPI Energy, Focus on Energy, Neighbors Helping Neighbors, the Mount Horeb Community Foundation, neighborhood associations, and other community organizations. Periodic updates about the Village's progress implementing its Energy Plan and on opportunities for residents and businesses to access energy saving resources can also be shared through articles in the Mount Horeb Mail.
   - Coordinating the Community-Led Energy Navigator Program (see below)
   - Staffing the municipal Sustainability and Natural Resources Committee

3. **Community-Led Energy Navigators**. Mount Horeb's municipal SNR Committee, as well as its Green Team, show that there are community members who are committed to environmental sustainability. The SNR's engagement with this planning process also demonstrates that there are residents who are committed to helping reduce community-wide emissions and to operate more energy efficiently. Recognizing these community resources, the Village can seek to build on the momentum generated during this planning process, as well as the need to help connect community members and local businesses in both completing initial low-cost, low-effort efficiency upgrades, and then in identifying and funding longer term high-impact energy projects.

   By providing coordination support for a volunteer-led clean energy navigator program, the Village can amplify its efforts by engaging residents in meaningful outreach and community-building work that responds to an identified need. To support these volunteers, the Village would need to coordinate with WPPI Energy, Focus on Energy, and other relevant resource providers to compile a set of applicable informational resources and to train the volunteers in sharing this information within their neighborhoods, and beyond. The Village could further advance the work of the Clean Energy Navigators by highlighting it on the Village's website, as well as in newsletters and other communications.

RECOMMENDATION 3: JOIN LOCAL GOVERNMENT SUSTAINABILITY PEER GROUPS

Leaders of local governments face unique challenges and opportunities when developing and implementing sustainability initiatives within their municipal operations and throughout the broader community. Considerations related to procurement, funding mechanisms, staffing capacity, and assurance of reliable service delivery, are some of the many factors that leaders must navigate for these projects.

Additionally, limited staffing and availability constraints for current staff members can both contribute to municipalities failing to move forward with projects that advance the community's clean energy objectives.

Collaborations among local governments can provide peer accountability when working toward energy goals, as well as a cadence of regular checkpoints that support forward progress. Working with other municipalities that have made energy, climate, and/or sustainability commitments can also provide valuable peer learning opportunities as leaders share both their achievements and their lessons learned as they each work on energy efficiency, renewable energy, sustainable transportation, and other similar projects in their own communities.

We recommend that Mount Horeb join one or more local government peer organizations as a strategy to support its ongoing efforts to implement the Mount Horeb Energy Plan and to advance other sustainability initiatives. There are at least two networks of this type in Wisconsin, and we recommend that the Village consider joining one, or both, of the organizations.

1. Wisconsin Green Tier Legacy Communities (GTLC) network. The Wisconsin Department of Natural Resources coordinates this group of municipalities and counties. There is no cost to join the GTLC network; however, members are required to adopt a resolution that formalizes their commitment to work with the program and to provide annual reports on the municipality's sustainability activities. The GTLC network meets online quarterly. Each meeting includes presentations on topic areas that the members identify, as well as opportunities for peer learning and exchange. In addition to quarterly meetings, members are able to participate in relevant learning opportunities and receive preferential treatment when applying for state funding related to sustainability programs. There are currently 43 GTLC members from throughout the state. Member municipalities range in size from the Village of Egg Harbor (pop. 327) to the City of Green Bay (pop. 107,395).
2. Wisconsin Local Government Climate Coalition (WLGCC). WLGCC is a non-profit organization that both advocates for improved energy and climate policies and supports local governments in moving forward clean energy and climate efforts at the local level. Programs address energy use in buildings; transportation, land use; resilience, and reducing emissions from the electricity grid. The organization provides a framework for collaboration on relevant projects, as well as access to additional resources. WLGCC currently has 25 member municipalities, as well as six county governments that are members. Members range in size from Shorewood Hills to the City of Milwaukee. Nine of the members are in Dane County (including the Dane County government).

RECOMMENDATION 4: PUBLIC RECOGNITION PROGRAM FOR ENERGY EFFICIENT BUSINESSES

Both the high number of respondents to the surveys and the feedback that respondents shared show that community members and stakeholders value and support energy efficiency and renewable energy. Of the businesses who responded, 50 percent of businesses indicated that it would be helpful for the Village to publicly recognize local businesses and organizations that are making progress in operating more energy efficiently and/or are using renewable energy.

We recommend that the Village develop a mechanism to publicly identify businesses and organizations that are taking meaningful steps on a clean energy journey. Highlighting the clean energy achievements of local businesses would create two important benefits.

1. An opportunity to earn recognition for saving energy and/or using renewable energy can add motivation for businesses to implement efficiency or operational improvements that will reduce energy use, but which may otherwise be invisible to customers and stakeholders.
2. Highlighting local businesses that are actively working to enact clean energy practices would enable community members who value environmental sustainability to choose to patronize businesses and organization that align with their values. Connecting aligned businesses and customers can increase revenue for the businesses and can support development of Mount Horeb's identity as a clean energy leader among its residents.

Funding Opportunities for Recommendations

The cost of the upgrades identified in this energy plan is substantial and may be a barrier to implementing some of the recommended measures. This section is intended to provide an overview of funding opportunities for the various upgrades identified in the report.

FOCUS ON ENERGY

Mount Horeb Utilities partners with Focus on Energy to provide incentives for renewable energy installations and energy efficiency upgrades. We recommend that Mount Horeb provides a copy of this report to its Energy Advisor and asks for assistance in identifying the best way to access rebates and support programs to fund the recommended improvements. The Focus on Energy incentive amount available depends on the measure and often specific characteristics of the equipment, such as efficiency of new building equipment or quantity of light fixtures. [27]

WPPI ENERGY

Mount Horeb is a member of WPPI Energy. While Mount Horeb Utilities (MHU), like all WPPI member utilities, participates in the Focus on Energy program, WPPI may periodically have opportunities to work with the Village to access additional funding resources to demonstrate innovative energy projects. We recommend that the Village coordinate with staff at Mount Horeb Utilities to communicate the Village's progress toward completing recommendations in this energy plan, as well as to discuss the Village's funding needs related to these efforts so that WPPI can share relevant funding opportunities that emerge with the Village.

WISCONSIN PUBLIC SERVICE COMMISSION'S OFFICE OF ENERGY INNOVATION

Mount Horeb accessed a Rural Energy Start Up Program (RESP) grant from the Wisconsin Office of Energy Innovation (OEI) to pay for this Mount Horeb Energy Plan. In addition to RESP, OEI has periodically issued funding opportunities for local governments through the Energy Innovation Grant Program (EIGP). Both RESP and EIGP have typically funded several categories of projects, including comprehensive energy planning for local governments, energy efficiency upgrades to municipal buildings, renewable energy potential studies, and microgrid feasibility assessments.

The Mount Horeb energy plan is an example of a Comprehensive Energy Planning project. Generally, to ensure that building upgrade funds that it approves achieve maximum impact, OEI has required that a jurisdiction have completed a comprehensive energy plan as a prerequisite for receiving funding to support energy efficiency or renewable energy building improvements. Because Mount Horeb has completed a comprehensive energy plan, it may now be prepared to prepare a competitive proposal for EIGP funds to support an energy efficiency or renewable energy project that is described in this plan.

CLEAN ENERGY REVOLVING FUND

Mount Horeb's Energy Plan identifies opportunities for the Village to save money on its electricity, natural gas, and transportation fuel costs. To support future energy projects, the Village can deposit the energy cost

[27] Focus on Energy's 2025 Incentive Summary: https://assets.focusonenergy.com/production/02-pdf/2025/BIZ_Business-Summary-of-Services-Incentives_2025.pdf

savings from completed energy projects into a separate Clean Energy Revolving Fund sub-account. The Village can deposit money into this fund on a monthly or annual basis, which will cause the fund balance to increase quickly.

The purpose of the Clean Energy Revolving Fund is to supplement other municipal funding sources. It is not intended to replace the need for the Village to use capital funds, operating budgets, and third-party grant funds to pay for the improvements recommended in this plan.

As Mount Horeb continues to move ahead with the recommendations in the Energy Plan, it may periodically encounter recommended projects that it is not able to include in its regular capital budget. In these cases, the Village can draw from its Clean Energy Revolving Fund to supplement other municipal funding sources and obtain approval for these projects.

Appendix 1: Building Descriptions and Recommendations

BUILDING 1: VILLAGE OF MOUNT HOREB MUNICIPAL BUILDING

Size: 12,739 square feet

Age: Built in 1924

Existing heating and cooling system: Three gas-fired constant volume rooftop units (RTU) for cooling and heating that serve the whole building. Two natural-gas-fired boilers; one is for fin tube perimeter heating in stairwells and hallways, and one is serving forced air units in the offices. Boilers are reported to be turned off in the summer.

Baseline Electricity Use: 60,361 kWh/yr

Baseline Natural Gas Use: 4,913 therms/yr

Weather-normalized site EUI: 56 kBTU/sf. At regional median for comparable buildings.

Over the past several years, some of the office spaces in Village Hall have undergone an LED retrofit and have added occupancy sensors, but there is still some fluorescent lighting in the building. The hearing room has a mixture of LEDs and fluorescent lights, but no occupancy sensors. There are multiple computers, for employee use, that provide opportunity for plug load management. The roof insulation was replaced within the last ten years, and the three constant-volume rooftop units (RTUs) were installed in 2014 to provide cooling to the building. The boilers and RTUs serve overlapping zones but are controlled by separate, non-communicating thermostats, leading to simultaneous, uncontrolled heating during the winter and shoulder seasons. However, during the site visit, staff indicated needing to use space heaters for individual offices during spring and fall, suggesting underheating in the winter and overheating in the shoulder season. There are not individual thermostats for each office area and thus, no individualized temperature control. Due to this configuration, gas and electric usage in the shoulder seasons is higher than expected. Domestic hot water (DHW) is provided by a 40-gallon gas water heater.

Table9 summarizes the recommended measures by priority level and provides potential cost, energy, and carbon savings for Village Hall. The total savings row includes the savings from high priority, medium priority, and EOL measures. Payback period for the condensing boiler is based on an incremental cost instead of a first cost and it is marked with an *. Percentage reduction is relative to the existing (baseline) case. Measure cost and annual energy values displayed in the table are rounded up to the nearest ten or hundred, depending on the initial value.

Table 19. Village Hall recommended energy actions.

Measure	Priority	Installed Cost	Annual Utility Cost Savings	Financial Payback		Annual Energy Reduction		Emissions Reduction (MT CO2e)
						kWh	Therms	
Retro-commissioning	High	$4,800	$1,100	11.7%	4.7 Yrs	5,300 8.2%	1,600 37.1%	12.1 18.7%
Retrofit LED bulbs in existing fixtures	High	$1,800	$300	2.8%	7.3 Yrs	2,100 3.2%	-40 -0.9%	1.2 1.8%
Occupancy lighting controls	High	$1,000	$200	1.9%	5.7 Yrs	1,500 2.3%	-30 -0.7%	0.8 1.2%
Plug load management	Medium	$300	$200	1.3%	2.1 Yrs	1,000 1.5%	0 -	0.6 0.9%

Measure	Priority	Installed Cost	Annual Utility Cost Savings	Financial Payback		Annual Energy Reduction		Emissions Reduction (MT CO2e)
						kWh	Therms	
Improve building air sealing	Medium	$2,700	$50	0.5%	> 50 Yrs	200 0.3%	100 1.9%	0.6 0.9%
Condensing boiler*	Medium	$6,500	$200	1.5%	48.9 Yrs	200 0.3%	400 10.1%	2.5 3.9%
Overall		**$17,100**	**$2,050**	**19.8%**		**10,300 16%**	**2,030 48%**	**18 27%**

Table 20 identifies the impacts of replacing existing fossil fuel powered space and water heating equipment at Village Hall with electricity-powered systems ("Decarbonization measures"). The primary function of a decarbonization measure is to eliminate fossil fuel usage and reduce carbon emissions. Actual carbon emissions reduction over the lifetime of the equipment is difficult to quantify because of fluctuations in the generation sources that supply Mount Horeb's regional electricity grid. Mount Horeb should consider these options if they are interested in a decarbonization or electrification pathway.

The table shows the estimated energy and cost impact of each improvement. The cost listed for the equipment is shown as incremental cost compared with a like-for-like system replacement. The percentage reduction for each measure is relative to the existing (baseline) case.

Table 20. Village Hall recommended decarbonization measures.

Measure	Incremental Cost	Annual Utility Cost Savings		Annual Energy Reduction	
				kWh	Therms
Heat Pump Water Heater	$1,300	-$400	-5%	-4,500 -6.9%	300 6.8%
Air to Water Heat Pump (Alternative to Condensing Boiler)	$271,000	-$1,600	-19%	-18,800 -29%	2,400 55%

High Priority: Retro-Commissioning

Next Step: Focus on Energy provides incentives and a list of qualified contractors for retro-commissioning or building tune-ups. Contact an Energy Representative to understand potential programs and to enroll. [28]

We recommend that Village Hall explore retro-commissioning to address multiple HVAC issues that affect comfort and energy use. Retro-commissioning is a process of servicing and repairing existing heating and air conditioning equipment to restore it to nearly its original level of performance. Retro-commissioning for Village Hall would include reviewing thermostats, valves, and boiler and RTU tune-ups to reduce simultaneous heating and fan usage. Advanced controls such as demand control ventilation (DCV) and boiler supply water temperature reset based on outside air temperature are recommended to be implemented as part of the tune-up process. These tune-ups will also eliminate the need for space heaters in office areas and should mitigate occupant comfort concerns.

[28] Information on Focus' retro-commissioning incentives is here: https://focusonenergy.com/business/building-optimization

The retro-commissioning process would also generate a report that recommends additional system improvements, such as implementing a building automation system (BAS) to tie RTU and boiler operation together and for better implementation of advanced control sequences.

High Priority: LED Upgrades

Next Step: Finish existing fluorescent tube conversion to LED or replace existing fluorescent light fixtures with integrated LED fixtures. Discuss upgrades with Focus on Energy representatives to ensure that lighting fixture upgrades and retrofits optimize potential financial incentives.

Some areas of Village Hall, such as office spaces, have already been retrofitted with LED fixtures. The stairways and hearing room have a mixture of LED and fluorescent lighting. Energy cost savings realized by replacing fluorescent lighting with LED fixtures will quickly recoup the initial installed costs of these improvements. Therefore, we recommend all fluorescent lighting be retrofitted to LEDs. An LED tube retrofit (LED bulbs are placed into existing fixtures) is less expensive, and depending on the ballast and fixture wiring, certain types of tube retrofits can allow for external occupancy sensors (wall-mounted or ceiling-mounted). A full LED fixture replacement is more costly but allows for integrated advanced lighting controls including occupancy, daylighting and task tuning. 20 displays values for an LED tube retrofit.

High Priority: Lighting Occupancy Controls

Next Step: Incorporate occupancy sensors into LED fixtures in smaller enclosed areas, either as externally mounted components or integrated directly into the fixture. Discuss with Focus on Energy representative as occupancy sensors may be eligible for financial incentives.

Some of the office areas already have occupancy sensors installed, but the hearing room does not have occupancy sensors. We recommend installing occupancy sensors in smaller enclosed areas, such as offices, backrooms, the hearing room, corridors, and lavatories that do not already have automatic controls. Daylighting was not considered because windows are mainly located near stairways and hallways.

Medium Priority: Plug Load Management

Next Step: Implement smart plugs or advanced power strips to reduce energy used by computers and by other miscellaneous loads

We recommend installing smart plugs or advanced power strips with schedule timer control and/or load-sensing control to automatically power off devices, such as computers, after periods of inactivity to reduce standby energy waste.

Medium Priority: Improve Building Air Sealing

Next Step: Hire a qualified insulation or air sealing contractor to inspect building and air seal any leaks, gaps, or cracks in the building envelope (ex. Walls, roof, windows, doors, etc.).

Air sealing helps prevent air leaks, thus reducing the workload on heating and cooling systems and improving comfort. Air sealing is typically done on walls, floors, basements, and around doors and windows. We recommend having a professional walk through the building and air seal any leaks that they notice.

Medium Priority: Condensing Boiler Upgrade

Next Step: Consult an HVAC contractor to replace existing gas-fired boiler with a condensing boiler. Discuss this measure with Focus on Energy representative, as boiler upgrades may be eligible for incentives.

Village Hall has two existing 210 MBH boilers that are rated at 80% thermal efficiency. They are turned off during the summer months and used for forced air heating in offices and fin tube perimeter heating in stairwells and hallways. If the village is not pursuing an electrification pathway, we recommend replacing the boilers with high efficiency fully condensing boilers. After retro-commissioning to see how/if the boilers and RTUs can be integrated, the Village should have detailed heating load calculations performed to determine if the boilers can be downsized. Downsizing the boilers would both reduce the cost of the condensing boiler and reduce the cost of supplying the boiler with energy during operations. In addition to condensing boilers, implement outdoor air temperature reset controls on a trim-and-respond sequence to adjust the hot water temperature based on outdoor temperature.

Decarbonization Measure: Alternative to Condensing Boiler Upgrade – Air-to-Water Heat Pump Upgrade

Next Step: Consult a qualified HVAC contractor to supplement the existing gas-fired boiler with an air-to-water heat pump (AWHP) to reduce the use of natural gas heating.

We recommend this measure if Mount Horeb is interested in pursuing an electrification or decarbonization strategy. The hybrid AWHP + gas boiler configuration enables the use of electric heat pump technology as the primary hydronic heating source. The AWHP is used until outdoor temperatures drop below a predefined switchover point, at which the system switches over to the gas-fired boiler for heating. This configuration maximizes efficiency by leveraging the heat pump's high performance during milder conditions and maintains reliable heating during colder weather, when heat pump performance drops.

Decarbonization Measure EOL: Heat Pump Water Heater Upgrade

Next Step: Consult a qualified plumbing contractor to replace the existing gas-fired domestic water heater with a heat pump water heater (HPWH) for improved efficiency and carbon reductions.

We recommend this measure if Mount Horeb chooses to pursue an electrification or decarbonization strategy. A HPWH replaces fossil-fuel-based water heating while being 2-4 times more efficient than a standard electric water heater. It uses electricity to move heat from the surrounding area into the water, instead of generating heat directly through electric resistance. We recommend replacing the gas-fired domestic water heater at its end of life with a HPWH.

BUILDING 2 MOUNT HOREB PUBLIC LIBRARY

Size: 15,936 square feet

Age: Built in 2001

Existing heating and cooling system: One variable-air-volume rooftop air-handling unit with VAV (variable air volume) terminal boxes equipped with hot water reheat serve the west side of the building. One staged air volume rooftop air-handling unit with booster coils equipped with hot water reheat serve the east side of the building. Both rooftop units use DX cooling and gas-fired heating and have an air-side economizer. A condensing boiler provides hot water to the VAV terminal boxes, booster coils, perimeter convectors, and the radiant floor heating system. On the site visit, staff noted that radiant floor heating, which is in the children's area, is turned off and staff are uncertain about how well the radiant floor heating is functioning.

Baseline Electricity Use: 148,589 kWh

Baseline Natural Gas Use: 4,956 therms

Weather-normalized Site EUI: 68 kBTU/sf. Lower than regional median for similar buildings (74 kBTU/st).

Over the past several years, some spaces of the library have undergone LED retrofits. While there are existing occupancy sensors in the bathroom and storage areas, there are additional opportunities for both occupancy and daylighting controls throughout the building. The building is equipped with a Building Automation System (BAS) with advanced control sequences such as demand controlled ventilation (DCV) and boiler supply water temperature reset control. There is an electric humidifier for the building, but staff noted that it is turned off because condensation from high humidity was causing paint damage in the reading room. The radiant floor heating in the children's area was also turned off. There are multiple desktop computers in the area that provide opportunities for plug load management. Domestic hot water is provided by a 40-gallon electric resistance water heater that was installed in 2019.

Table 21 displays the recommended measures for the library and provides estimated installation cost, energy, and carbon savings. The total savings row includes the savings from high priority, medium priority, and EOL measures. Payback periods for most measures are based on totals cost of the measures; however, the estimated cost indicated for the roof upgrade, which is an end-of-life measure, indicates the incremental cost of increasing insulation levels in the roof in comparison to a business-as-usual like-for-like replacement. This distinction is marked with an *. The percent savings/reduction columns compare reduced energy, cost, and emissions available from completing the measure to the existing (baseline) case.

Table 21. Library measure prioritization and estimated savings.

Measure	Priority	Installed Cost	Annual Utility Cost Savings		Financial Payback	Annual Energy Reduction		Emissions Reduction (MT CO2e)
						kWh	Therms	
Retro-commissioning	High	$8,000	$1,100	7.0%	7.5 yrs	8,200 7.0%	400 7.0%	7.3 7.0%
Retrofit LED bulbs in existing fixtures	High	$2,000	$800	5.2%	2.5 yrs	6,900 5.9%	-100 -2.3%	3.7 3.6%
Occupancy lighting controls	High	$1,100	$700	4.0%	1.8 yrs	5,300 4.5%	-100 -2.3%	2.9 2.8%

Measure	Priority	Installed Cost	Annual Utility Cost Savings		Financial Payback	Annual Energy Reduction		Emissions Reduction (MT CO2e)
Daylighting controls	High	$500	$500	6.4%	0.4 yrs	8,500 7.2%	-100 -2.3%	4.8 4.6%
Plug load management	Medium	$300	$100	0.6%	2.4 yrs	800 0.7%	0 0%	0.5 0.5%
Improve building air sealing	Medium	$1,800	$90	0.6%	19.9 yrs	200 0.2%	300 4.7%	1.5 1.5%
Upgrade roof insulation*	EOL	$48,700	$400	2.5%	>50 yrs	1,800 1.5%	700 13.1%	5.0 4.8%
Heat pump water heater*	EOL	$1,300	$600	3.5%	2.5 yrs	4,500 3.8%	0 0%	2.9 2.8%
Total		**$63,700**	**$4,290**	**29.8%**		**36,200 30.9%**	**1,100 19%**	**28.6 27%**

Table 22 identifies the impacts of replacing existing fossil fuel powered space heating equipment at the library with an electricity-powered system ("Decarbonization measure"). The primary function of a decarbonization measure is to eliminate fossil fuel usage and reduce carbon emissions. Actual carbon emissions reduction over the lifetime of the equipment is difficult to quantify because of fluctuations in the generation sources that supply Mount Horeb's regional electricity grid. Mount Horeb should consider these options if they are interested in a decarbonization or electrification pathway.

Table 22. Library recommended decarbonization measures.

Measure	Incremental Cost	Annual Utility Cost Savings		Annual Energy Reduction		
				kWh	Therms	
Air-to-Water Heat Pump	$96,900	-$4,200	-28%	-45,300 -38%	4,500 82%	82%

High Priority: Retro-commissioning

Next Step: Focus on Energy provides incentives and a list of qualified contractors for retro-commissioning or building tune-ups. Contact an Energy Representative to understand potential programs and to enroll. [29]

We recommend that the Mount Horeb Library explore retro-commissioning to address HVAC issues that are affecting energy use. Retro-commissioning is a process of servicing and repairing existing heating and air conditioning equipment to restore it to nearly its original level of performance. Retro-commissioning of the library includes a BAS tune-up to identify potential improvements, such as reviewing the VAV system to reduce fan energy by lowering minimum airflow setpoints at the terminal boxes, minimizing zone reheat when the AHU is in cooling mode, optimizing humidifier operation to prevent paint damage, and improving the radiant floor heating system operation.

High Priority: LED Upgrades

[29] Information on Focus on Energy's retro-commissioning incentives is here: https://focusonenergy.com/business/building-optimization

Next Step: Finish tube replacement from fluorescent T8 to LED or replace light fixtures with integrated LED fixtures. Discuss with Focus on Energy representatives as lighting fixture upgrades and retrofits are eligible for incentives.

Some lighting in the library has already been retrofitted to LED lighting, and we recommend retrofitting the rest of the fluorescent lighting to LED lighting. An LED tube retrofit (LED bulbs are placed into existing fixtures) is less expensive than a fixture replacement, and depending on the ballast and fixture wiring, some tube retrofits can allow for external occupancy sensors (wall-mounted or ceiling-mounted). A full LED fixture replacement is more costly but allows for integrated advanced lighting controls including occupancy, daylighting, and task tuning. Table 21 displays estimated costs, as well as energy, cost, and emissions reductions for an LED tube retrofit.

High Priority: Occupancy Sensor Controls

Next Step: Incorporate occupancy sensors into LED fixtures in smaller enclosed areas, either as externally mounted components or integrated directly into the fixture. Discuss with Focus on Energy representative as occupancy sensors may be eligible for financial incentives.

Occupancy sensors are already located in lavatories and storage areas. We recommend installing occupancy sensors in the office, break rooms, and larger reading room areas where controls are not already present.

High Priority: Daylighting Controls

Next Step: Implement daylighting controls around perimeter of building in main reading, information services, and general collection areas; discuss with Focus on Energy representative as daylighting controls are eligible for incentives.

We recommend implementing automatic daylight continuous dimming controls near windows to reduce energy use while maintaining sufficient light levels for reading and other visual tasks. An initial illuminance target of 50 footcandles can be set and then fine-tuned by the controls contractor based on occupant feedback.

Medium Priority: Improve Building Air Sealing

Next Step: Hire a qualified insulation or air sealing contractor to inspect building and air seal any leaks, gaps, or cracks in the building envelope (ex. Walls, roof, windows, doors, etc.).

Air sealing helps prevent air leaks, thus reducing the workload on heating and cooling systems and improve comfort. Air sealing is typically done on walls, floors, basements, and around doors and windows. We recommend having a professional walk the building and air seal any leaks that they find.

Medium Priority: Plug Load Management

Next Step: Implement smart plugs or advanced power strips for computers and other miscellaneous loads.

We recommend installing smart plugs or advanced power strips with schedule timer control and/or load-sensing control to reduce standby energy waste by automatically powering off the library's computers after periods of inactivity.

EOL: Upgrade Roof Insulation

Next Step: Have an engineer or contractor review insulation and determine an improvement plan; discuss with Focus on Energy representative for potential incentives with roof insulation upgrades.

While adding attic insulation is expensive, it can significantly reduce heating loads. We recommend insulation be R-30 or better to comply with current energy code.

EOL/Decarbonization: Heat Pump Water Heater Upgrade

Next Step: Consult a qualified plumbing contractor to replace the existing electric resistance domestic water heater with a heat pump water heater (HPWH) for improved efficiency and carbon reductions.

A HPWH is 2-4 times more efficient than a standard electric water heater, such as the current water heater at the library, leading to substantial energy savings. An HPWH uses electricity to move heat from the surroundings into the water, instead of generating heat directly through electric resistance. When the current water heater reaches the end of its service life, we recommend replacing it with an HPWH.

Decarbonization Measure: Air-to-Water Heat Pump Upgrade

Next Step: Consult a qualified HVAC contractor to supplement the existing gas-fired boiler with air-to-water heat pump (AWHP) to reduce the use of natural gas heating.

We recommend this measure if Mount Horeb is interested in pursuing an electrification or decarbonization strategy. The hybrid AWHP + gas boiler setup enables the use of electric heat pump technology as the primary hydronic heating source until outdoor temperatures drop below a predefined switchover point, at which the system switches over to the gas-fired boiler for heating. This configuration maximizes efficiency by leveraging the heat pump's high performance during milder conditions and maintains reliable heating during colder weather, when heat pump performance drops.

BUILDING 3 COMMUNITY CENTER

Size: 9,660 square feet

Age: Built in 1978. The top floor houses the Senior Center, and the Parks and Recreation department occupies the bottom floor. The top floor used to be a library until the early 2000s, and the ground floor used to be a youth activity center.

Existing heating and cooling system: Five split system air conditioners with gas-fired furnaces provide heating and cooling to the building. Two systems serve the top floor and three serve the bottom floor, with two of the bottom floor systems in a twinned configuration. The units were replaced in 2020, 2022, 2023, and 2024. A packaged terminal air conditioner (PTAC) serves the converted screen porch area on the ground floor. On the site visit, staff noted that the office area in the senior center is always too cool in the summer and too hot in the winter, such that they use space heaters in the summer for the offices.

Baseline Electricity Use: 53,921 kWh

Baseline Natural Gas Use: 2,662 therms

Weather-normalized Site EUI: 48 kBTU/sf. Lower than median for similar buildings (61 kBTU/sf).

The Community Center is a two-story building with the parks and recreation center on the first floor and the senior center on the second floor. All the HVAC systems have been replaced in the last five years. Staff in the Senior Center noted that their offices are often too cold in the summer and too hot in the winter and they use space heaters in the summer. Because the second floor used to be a library, only one of the offices contains a thermostat, so there isn't proper temperature control in the office wing. The senior citizens who use the facility, however, are generally comfortable. For the Parks and Recreation Center, staff indicated that there is a piece of paper covering the thermostat to prevent people from changing it and the temperature is set to be constant. The converted screen porch area on the first floor is conditioned with a PTAC that is turned off when the room is not being used. Domestic hot water is provided by a 40-gallon natural gas water heater that was replaced in 2019. Lighting in the parks and recreation center has been replaced with LEDs that are connected to occupancy sensors, while the Senior Center has T8 fluorescent lighting with new fixtures. The Senior Center does not have any lighting controls. Except for the former screen porch area and the director's office in the senior center, the windows are original.

Table 23 displays the recommended measures for the Community Center and provides estimated installation cost, energy, and carbon savings. The total savings row includes the savings from high priority, medium priority, and EOL measures. Payback periods for most measures are based on totals cost of the measures; however, the estimated cost indicated for the roof upgrade, which is an end-of-life measure, indicates the incremental cost of increasing insulation levels in the roof in comparison to a business-as-usual like-for-like replacement. This distinction is marked with an *. The percent savings/reduction columns compare reduced energy, cost, and emissions available from completing the measure to the existing (baseline) case.

Table 23. Community Center measure prioritization and estimated savings

Measure	Priority	Installed Cost	Annual Utility Cost Savings		Financial Payback	Annual Energy Reduction		Emissions Reduction (MT CO2e)
						kWh	therms	
Retrofit LED bulbs in existing fixtures	High	$2,800	$400	5.2%	8.3 yrs	3,000 6.1%	-100 -3.1%	1.6 3.3%
Smart Thermostats	High	$600	$300	3.3%	2.8 yrs	1,500 3.1%	200 6.3%	1.8 3.7%

Measure	Priority	Installed Cost	Annual Utility Cost Savings		Financial Payback	Annual Energy Reduction		Emissions Reduction (MT CO2e)
						kWh	therms	
Retro-commissioning	High	$4,900	$500	6.4%	11.8 yrs	3,100 6.4%	200 6.8%	3.1 6.5%
Improve building air sealing	Medium	$1,400	$50	0.7%	28.3 yrs	200 0.3%	100 3.7%	0.7 1.5%
ENERGY STAR commercial appliances*	EOL	$1,500	$90	1.4%	16.2* yrs	800 1.6%	0 0%	0.5 1.0%
Window replacement*	EOL	$22,500	$200	1.6%	>50 yrs*	1,000 2.1%	-100 -1.8%	0.3 0.7%
Upgrade roof insulation*	EOL	$14,800	$90	1.3%	>50 yrs*	300 0.7%	200 6.3%	1.3 2.7%
Overall		**$48,500**	**$1,630**	**20%**		**9,900 20%**	**500 18%**	**9.3 19%**

Table 24 identifies the impacts of replacing existing fossil fuel powered water heating equipment at the Community Center with an electricity-powered system ("Decarbonization measure"). The primary function of a decarbonization measure is to eliminate fossil fuel usage and reduce carbon emissions. Actual carbon emissions reduction over the lifetime of the equipment is difficult to quantify because of fluctuations in the generation sources that supply Mount Horeb's regional electricity grid. Mount Horeb should consider this option if they are interested in a decarbonization or electrification pathway.

Table 24. Community Center recommended decarbonization measures.

Measure	Incremental Cost	Annual Utility Cost Savings		Annual Energy Reduction	
				kWh	Gas
Heat Pump Water Heater	$1,300	-$200	-3.4%	-2,100 -4.4%	100 3.1%

High Priority: Retro-commissioning

Next Step: Focus on Energy provides incentives and a list of qualified contractors for retro-commissioning or building tune-ups. Contact a Focus on Energy, Energy Representative to understand potential programs and to enroll. [30]

We recommend that the Community Center explore retro-commissioning to address the HVAC issues that are affecting comfort, especially in the senior center. Retro-commissioning is a process of servicing and repairing existing heating and air conditioning equipment to restore it to nearly its original level of performance. For the Community Center, this process includes reviewing thermostats and performing a test and balance procedure for the building to eliminate the need for space heaters in the summer. As part of the retro-commissioning process, we also recommend relocating the thermostats to the areas that they serve. This is particularly important on the bottom floor, which was originally an open space but was later converted

[30] Information on Focus on Energy's retro-commissioning incentives are here: https://focusonenergy.com/business/building-optimization

into a wing of offices. Currently, only one office contains a thermostat, leaving the rest of the wing without proper control.

High Priority: Smart Thermostats Upgrade

Next Step: Replace thermostats with smart thermostats. We recommend replacing existing thermostats with smart thermostats to automatically adjust temperature setpoints based on occupancy sensing, ultimately saving energy by reducing energy used to heat and cool unoccupied spaces. As part of this effort, we also recommend implementing temperature setback protocols for unoccupied periods in the parks and recreation portion of the building. When replacing thermostats, we also recommend that the Community Center considers relocating the thermostats on the ground floor to the areas they are serving for better temperature control and comfort. Currently, the office wing has only one thermostat located in one of the offices and therefore it is directing heating and cooling based only on the current temperature in a limited and confined space.

High Priority: LED Upgrades with Occupancy Sensors

Next Step: Retrofit tube replacement from T8 fluorescent to LED in the senior center. Discuss with Focus on Energy representatives to ensure that lighting equipment used for retrofits is eligible for incentives.

The parks and recreation floor already has LED lighting with occupancy controls, but the senior center has T8 fluorescent in both uplight and downlight fixtures. The senior center has newer fixtures, so we recommend an LED tube retrofit (LED bulbs are placed into existing fixtures) and implementing occupancy control. Depending on ballast and fixture wiring, some tube retrofits can allow for external occupancy sensors (wall-mounted or ceiling-mounted).

Medium Priority: Improve Building Air Sealing

Next Step: Hire a qualified insulation or air sealing contractor to inspect building and air seal any leaks, gaps, or cracks in the building envelope (ex. Walls, roof, windows, doors, etc.).

Air sealing helps prevent air leaks, thus reducing the workload on heating and cooling systems and improving comfort. Air sealing is typically done on walls, floors, basements, and around doors and windows. We recommend having a professional walk the building and air seal any leaks that they find.

EOL: ENERGY STAR Appliances

Next Step: Replace equipment with ENERGY STAR appliances at their end of life.

ENERGY STAR appliances are energy efficient appliances that use less energy than alternative non-certified models. Upon end of life, we recommend replacing appliances, such as the refrigerators and dishwasher with ENERGY STAR certified units.

EOL: Windows Replacement

Next Step: At end of life, replace windows with low-E, double pane windows.

Some windows, such as those on the porch and in the director's office on the top floor, have been replaced, while the rest remain original to the building. When the existing windows reach the end of their service life, we recommend replacing the original windows with low-E, double pane glazing for improved energy efficiency and occupant comfort. Upgraded windows can significantly reduce heating and cooling loads.

EOL: Upgrade Roof Insulation

Next Step: Request that an engineer or contractor evaluate existing insulation and determine an improvement plan; discuss with Focus on Energy representative for potential incentives with roof insulation upgrades.

The current roof is pitched with insulation between the studs and the roof. The building does not have an attic, and facility staff were not aware of any additional insulation that has been added. When the roof reaches its end of life, we recommend bringing the roof insulation level to R-30 or greater to comply with the current energy code. While roof upgrades are expensive, they can help reduce heating and cooling loads.

Decarbonization Measure at EOL: Heat Pump Water Heater Upgrade

Next Step: Consult a qualified plumbing contractor to replace the existing gas-fired domestic water heater with a heat pump water heater (HPWH) for improved efficiency and carbon reductions.

We recommend this measure if Mount Horeb is interested in pursuing an electrification or decarbonization strategy. A HPWH replaces fossil-fuel-based water heating while being 2-4 times more efficient than a standard electric water heater. It uses electricity to move heat from the surroundings into the water, instead of generating heat directly through electric resistance. When the existing domestic hot water system reaches the end of its service life, we recommend replacing it with a HPWH.

BUILDING 4 PUBLIC SAFETY: POLICE STATION

Size: 29,000 square feet

Age: Built in 2019. The building consists of a fire station and a police station. Our site visit focused primarily on the police station.

Existing heating and cooling system: The building is served by two variable-air-volume (VAV) air-handling units (AHU) with DX cooling and hot water terminal reheat, one dedicated to the fire station and the other to the police station. Hot water is provided to the building by two natural gas boilers, with one in lead and the other for backup operation. The police station's garage is served by unit heaters and gas-fired makeup air units (MAU) with energy recovery ventilation (ERV).

Baseline Electricity Use: 285,611 kWh

Baseline Natural Gas Use: 13,944 therms

Weather-normalized Site EUI: 79.5 kBTU/sf. Higher than median for similar buildings (71.8 kBTU/sf).

The building was designed with energy efficiency in mind; however, site EUI does exceed the national median for this building type. The building receives natural gas and electricity service through joint accounts that serve both the fire department and the police department. Energy costs are distributed between the Village (for the police station) and the Mount Horeb Area Joint Fire Department and Emergency Medical Service based on an agreement between the parties that the Village will pay 58 percent of the energy costs and the fire department will pay the other 42 percent of the costs. The energy assessment confirmed that the building appears to be operating efficiently. While more detailed analysis of would be needed to confirm, it is likely that the police station's higher EUI reflects a misalignment between the terms of the agreement between the parties and how energy is actually used in the building.

A building automation system (BAS) manages the HVAC system, allowing for advanced control strategies such as economizer operation, demand control ventilation via CO2 sensors, supply air temperature control, static pressure control, and hot water supply temperature reset controls. The gas and electric bills are divided between the fire and police stations, with 58% allocated to the police station and 42% to the fire department. Each station receives its own water bill. Domestic hot water is provided by an ENERGY STAR certified condensing gas water heater. The police station also features LED lighting throughout with occupancy sensors, along with automated blinds for additional efficiency.

As the building is relatively new and already incorporates many energy efficient measures, our recommendations primarily focus on electrification and decarbonization opportunities that can be implemented when the existing equipment approaches the end of its service life.

Decarbonization Measure at EOL: Air-to-Water Heat Pump Upgrade

Next Step: Consult a qualified HVAC contractor to supplement the existing gas-fired boiler with air-to-water heat pump (AWHP) to reduce the use of natural gas heating.

We recommend this measure if Mount Horeb is interested in pursuing an electrification or decarbonization strategy. The hybrid AWHP + gas boiler setup enables the use of electric heat pump technology as the primary hydronic heating source until outdoor temperatures drop below a predefined switchover point, at which the system switches over to the gas-fired boiler for heating. This configuration maximizes efficiency by leveraging the heat pump's high performance during milder conditions and maintains reliable heating during colder weather, when heat pump performance drops.

Decarbonization Measure at EOL: Heat Pump Water Heater Upgrade

Next Step: Consult a qualified plumbing contractor to replace the existing gas-fired domestic water heater with a heat pump water heater (HPWH) for improved efficiency and carbon reductions.

We recommend this measure if Mount Horeb is interested in pursuing an electrification or decarbonization strategy. A HPWH replaces fossil-fuel-based water heating while being 2-4 times more efficient than a standard electric water heater. It uses electricity to move heat from the surrounding into the water, instead of generating heat directly through electric resistance. We recommend replacing the DHW at its end of life with a HPWH.

Appendix 2: Solar Methodology

The steps described in this section were followed to recommend sizes of solar arrays that could be installed at each municipal facility. The scope of the Energy Plan project did not allow for solicitation of bids from solar installers to determine exact array configurations, capacities, and costs. The scope also did not include evaluations of roof load capacity for each facility to confirm that the roof structures at all facilities are sufficient to support the recommended solar arrays.

1. **Assessed available space**. Used on-site assessments of Village Hall, the Library, the Public Safety Building, and the Community Center to determine the amount of rooftop space that is available to install a solar array.
    a. Supplemented site visits with aerial and street level imagery from Google Maps and other online sources to assess available roof space, ground space, and potential shading for the remaining municipal facilities.
2. **Determined maximum generating capacity**. Used the National Renewable Energy Lab's (NREL's) PVWatts tool to determine the maximum photovoltaic (PV) array capacity that could be installed in the available space and the annual amount of electricity that the maximum array capacity would generate in an average year.
3. **Optimized cost-effectiveness**. The terms of the MHU electric tariff that applies to facilities that house PV arrays that have generating capacity greater than 20 kW-DC offer a low value to the customer for electricity that the PV array generates which exceeds the building's electricity demand at that time ("over production"). To reduce occurrences of over-production, if the PVWatts output estimated electricity production greater than 80 percent of the building's annual electricity consumption, the size of the recommended array was reduced to a capacity that would produce 80 percent of the facility's annual electricity consumption.
4. **Estimated net installed cost**. The initial cost of the installed array was estimated to be $2.70/watt based on NREL's most recent market assessment[31]. Focus on Energy offers a financial incentive of $50/kW-DC for commercial solar installations, up to a maximum $25,000 incentive amount. The value of this incentive was deducted from the total cost to calculate the net cost. Due to termination of the Federal Investment Tax Credit for any renewable energy systems completed after July 2026, potential value of the ITC was not deducted from the total cost.
5. **Forecast financial payback**. Used U.S. Energy Information Administration (EIA) data for Wisconsin[32] to determine an average value of $0.127/kWh for electricity that the arrays produce which reduces the amount of electricity that the facility purchases. The value per kilowatt-hour produced was applied to the amount of electricity that the array would produce each year to determine an annual value of the electricity that would be generated. The net cost of the array was divided by the annual value of electricity produced to estimate the number of years that would be required for the value of

[31] https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost

[32] https://www.eia.gov/electricity/state/wisconsin/

the electricity that is generated to surpass the initial net cost of the array. The financial payback period does not apply a discount rate to future production and does not consider the potential effects of changes in electricity prices.

We recommend that the Village follow standard procurement procedures of soliciting bids from qualified installation contractors to determine specifications for PV systems on the buildings on which it decides to install solar arrays.

Appendix 3: Fleet Methodology

The analysis measured the current annual energy, cost, and emissions impacts of the Village of Mount Horeb's municipal fleet. It also applied data on current vehicles to performance metrics of new gasoline, diesel, and electricity-fueled vehicles to recommend a strategy through which the Village can cost-effectively reduce the energy used, and emissions generated by, its vehicles. The methodology used to calculate data on current vehicles and prepare recommendations for fleet vehicle replacements is described below.

1. Calculate key performance indicators (KPIs) for municipal fleet vehicles.
    - Collected data showing the number of gallons of fuel purchased for each vehicle, as well as the fuel type (gasoline, diesel, or other) during a 24-month period
    - Collected data showing the number of miles driven by each vehicle during the same 24-month period.
    - Applied data for fuel use, fuel type, and miles driven to calculate the pounds of CO_2 emitted by each vehicle
    - All Village-owned vehicles were assigned to one of five categories: Half-ton pickup truck, Large pickup truck, Heavy-duty truck, SUV, and Van.
    - Estimated fuel costs per gallon based on 24-month average fuel costs for the Midwest[33].
    - Calculated the annual fuel use, fuel cost, miles driven, and CO_2 emissions for all of the Village's vehicles, then segmented each metric for each vehicle category.
2. Surveyed the market to identify all electric vehicles available in the existing vehicle categories in the Village's fleet.
    - Limited findings to eliminate vehicles that are not yet in production or had limited market share, making them difficult for the Village to obtain.
    - Within each vehicle category, identified a cost-effective EV option that met minimum driving range requirements and had a strong fuel economy (kWh/100 miles) rating to use for opportunity analysis.
3. Surveyed the market to identify a leading gasoline or diesel-powered vehicle in the existing vehicle categories in the Village fleet that the Village would be likely to consider for purchase during its normal vehicle retirement and replacement process.
    - Identified cost and fuel economy metrics for each selected vehicle.
4. Used previous gasoline, diesel, and electricity costs to calculate the cost of fuel used to drive one mile by the selected EV and by the selected gasoline or diesel vehicle in each vehicle category.
5. Applied research by Consumer Reports[34] to estimate the average per mile maintenance costs for EVs and gasoline or diesel-powered vehicles.
   Calculated the potential cost savings per mile that the Village could obtain by purchasing an EV in place of a gasoline or diesel vehicle. If the net purchase cost of the EV exceeded the cost of the gasoline or diesel vehicle, calculated the number of miles after which the per mile cost savings from driving the EV would surpass the incrementally higher purchase of the EV.

---

[33] U.S. Energy Information Administration Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_r20_a.htm

[34] Harto, C. *Electric Vehicle Ownership Costs: Chapter 2 – Maintenance.* Consumer Reports. September, 2020. (https://advocacy.consumerreports.org/wp-content/uploads/2020/09/Maintenance-Cost-White-Paper-9.24.20-1.pdf)

Appendix 4: Additional References and Resources

Advanced Manufacturing Office: Case Study - The Challenge: Saving Energy at a Sewage Lift Station Through Pump System Modificat. n.d.

ANSI/ASHRAE/IES Standard 100-2018 Addendum C. *Energy Efficiency in Existing Buildings.* December 2022. https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/100_2018_c_20221230.pdf

PumpWorks Engineering. 2024. "What Can Predictive Monitoring Tell You About Your Pumps?" *Pumpworks*, December 19. https://www.pumpworks.com/what-can-predictive-monitoring-tell-you-about-your-pumps/.

U.S DOE. 2012. "Case Study - The Challenge: Saving Energy at a Sewage Lift Station Through Pump System Modifications." *Energy Efficiency and Renewable Energy Advanced Manufacturing Office*, February 2.

Basso, Dale, Bruce Benkhart, Thomas Bishop, et al. 2014. *Premium Efficiency Motor Selection And Application Guide: A Guidebook for Industry*. U.S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE). https://www.energy.gov/sites/prod/files/2014/04/f15/amo_motors_handbook_web.pdf.

National Renewable Energy Laboratory (NREL) Solar Installed System Cost Analysis. https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost

U.S. Environmental Protection Agency (EPA). *U.S. Energy Use Intensity by Property Type*. ENERGY STAR Portfolio Manager Technical Reference. August 2024. https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf

U.S. Energy Information Administration Weekly Retail Gasoline and Diesel Prices. https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_r20_a.htm

U.S. Energy Information Administration Wisconsin Electricity Profile 2024. https://www.eia.gov/electricity/state/wisconsin/

U.S. Energy Information Administration 2018 Commercial Building Energy Consumption Survey (CBECS). https://www.eia.gov/consumption/commercial/