BAY MILLS INDIAN COMMUNITY

Green Community Assessment and Recommendations

2022

Energy Efficiency
Waste Characterization
Procurement Policy
Green Building Recommendations
Stormwater Management Infrastructure

Bay Mills Indian Community
The Big Green Up Report
2022

Energy Efficiency
Waste Characterization
Single-Use Items Survey
Building Recycling Efforts
Procurement Policy
Green Building Recommendations
Stormwater Management Infrastructure

To assess current energy and waste trends across Bay Mills Indian Community's government, education, enterprise, and business holdings operations. Priorities include, identifying areas for improving energy efficiency, determining most feasible materials for landfill diversion through waste characterization studies, single-use item surveys, greener procurement policies and building recycling efforts, developing a green buildings checklist and assessing storm water management infrastructure to create sustainability standards for future development. This assessment was completed in an effort to create long-lasting, energy-conscious practices and positively affect the quality of the natural environment.

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Executive Summary

In December, 2021, President Gravelle directed the Green Infrastructure Committee to assess current energy and waste trends across government, enterprise, and business holdings operations. The Bay Mills Indian Community (BMIC) Energy and Waste Study was conducted over a 12-month period, beginning January, 2022. This final report was submitted to the Bay Mills Indian Community Executive Council on January 23, 2023. The project scope included conducting energy audits and reviewing two years of energy use bills of BMIC facilities, conducting a waste characterization study for the Bay Mills Resort & Casino, assessing current procurement and use of single-use goods, determining recycling efforts in BMIC facilities, developing a green buildings checklist and procedure policy for future development, and assessing storm water management across the reservation. The ultimate goal of the study is to better understand energy consumption and waste generation, and identify methods of increasing efficiency and sustainability across BMIC entities to create long lasting practices that consider changing climatic changes and weather patterns while positively affecting the quality of the natural and built environment.

In June, 2022, the Green Infrastructure Committee secured a Michigan Department of Environment, Great Lakes, and Energy Community Energy Management Program grant, allowing BMIC to contract with the Superior Watershed Partnership to complete the energy audits and waste characterization study. Over a period of six weeks, Superior Watershed Partnership staff conducted 24 energy audits using the Department of Energy's Building Energy Asset Score Tool, and sorted approximately 975 lbs of Bay Mills Resort and Casino waste using the EPA's waste characterization data collection log and standard operating procedures.

The energy audits and related power consumption analyses conducted for this study revealed numerous significant energy conservation and efficiency opportunities for all of the subject buildings. In addition, many of the energy conservation measures require no cost and serve to help balance other measures requiring capital investment. Reoccurring deficiencies relating to heating, cooling and thermostat inefficiencies, powering computers, lighting, items linked to weatherization and numerous other items were encountered that can be mitigated with the energy conservation measures developed in the following document.

The waste characterization study, single-use item survey and facility recycling survey brought to light many areas where improved recycling practices, greener procurement practices and use of reusable items can be implemented to divert materials from entering the landfill.

In 2021 alone, Bay Mills Indian Community as a whole, procured over $19.6 million in goods. Bay Mills Indian Community's existing Procurement Policy was designed to ensure that supplies, services, and construction are procured at the most favorable prices available to BMIC, not taking into consideration the environmental implications of such purchases. The Green Infrastructure Committee developed a draft Environmentally Preferable Products (EPP) policy to work in concert with the current procurement policy, to ensure that future procurement is assessed in terms of favorable pricing and environmental preferability.

In recent years, BMIC completed several new development projects; including, the Health Center, Elder's Housing, Boys and Girls Club, Maintenance, and Public Works. In addition, BMIC redeveloped old Maintenance into Boys and Girls Club offices, Great Lakes Composite Institute into Northern Lights Cannabis Company, and is in the process of redeveloping the old health center into a new Administration facility. In the next several years, BMIC will develop housing on Plantation Hill, additional Elders Housing, another Boys and Girls Club facility, a Waste Transfer Station, a long-term care facility, storage units, a fish ice shack, a dental clinic, Justice Center and Commodity Foods expansions, Child Development Center expansion, and a BMRC expansion. In addition, the Kings Club Casino, Chippewa Landing, Riverview Park, and properties in Brimley will be redeveloped. Extensive development and redevelopment presents the opportunity for Bay Mills Indian Community to take a proactive approach to development by prioritizing sustainability and a healthy built environment through thoughtful design. To facilitate this effort, the Green Infrastructure Committee compiled a Procedural Checklist for Development and Redevelopment, and Green Elements Building Checklist. Together, these documents will guide future infrastructure efforts by ensuring 1) due diligence steps are completed prior to development, and 2) infrastructure is designed to be more efficient, provide a healthier indoor environment, minimize harmful effects on human health and the environment, and ensure long-term resiliency of the structure.

A dozen road-stream-crossing culverts were surveyed on Bay Mills trust lands. Of the crossings surveyed two are high priority due to their eroding nature and impacts on fish passage in the stream. An additional four are ranked as medium priority for repair or replacement. Improvements at these locations will benefit stormwater management needs and create a more natural condition for fish in the stream.

Two supplemental reports on energy use at Bay Mills buildings were completed. Highlights of these reports, with details for each building, are included in Appendices B through C.

Chapter 1.0 Introduction

Bay Mills Indian Community is located in Michigan's Upper Peninsula and in a climate that is characterized by long cold winters that require heating homes and workplaces for much of the year. In addition to cold temperatures, exposure to strong north winds directly off Lake Superior and short winter daylight means additional energy use to offset these conditions. These conditions contribute to an intensive use of energy to overcome cold and darkness in buildings with design, heating, cooling, and lighting system inefficiencies. Increasing the energy efficiency of Bay Mills Indian Community buildings that are so dependent on energy for heating, lighting and numerous other uses is an important first step in reducing the use of carbon-based energy and costly energy expenditures. Energy efficiency measures are often called the "low hanging fruit" of an energy program because of the often-significant reductions for relatively low capital expenditures.

Waste characterization studies provide important data regarding solid waste generation and landfill diversion opportunities. Assessing the waste streams generated by BMIC informs recycling and procurement decisions by determining which material streams can be landfill diverted through improved recycling opportunities and green procurement policies. Determining recycling availability and use of disposable single-use items in facilities also provides data to assist with recommendations and support for improved recycling opportunities for various departments and buildings.

Future consequences and the practice of thinking forward seven generations are tied to strong family and environment values within the Bay Mills Indian Community. This project is integrated with these values because it plans for actions to positively affect the health and well-being of family, community and the environment. Reducing the amount of energy that originates from a source like that of coal fired electricity plants is very much in line with BMIC's values. Lowering electricity use lowers air emissions and leads to improved health especially for a population that consumes high amounts of fish. Mercury can be traced from coal fired electricity plants, deposited to the surface, ingested by living organisms, accumulated within living organisms and consumed by people. People that consume high amounts of fish, like Bay Mills Indian Community members, are at higher risk of consuming mercury in this way. Reductions in carbon dioxide and particulate matter similarly influence positive changes for current and future generations.

The benefits from the energy and waste reduction measures in this project include sustainable monetary savings, air emission and pollution reduction and strong integration with cultural values. Monetary savings from reduced energy bills and landfill expenditures would be a significant benefit from the implementation of this project's findings. These savings offer various future opportunities including reinvestment into expanding and continuing energy efficiency measures, weatherization, investment into renewable energy production systems and increased recycling.

This study and resulting recommendations create opportunities for reducing air emissions, pollution and environmental degradation that occurs with mining and drilling operations. Numerous environmental benefits would be associated with the implementation of this project's results with reductions of mercury, carbon dioxide reduction, nitrogen oxides reduction, carbon monoxide reduction, particulate matter reduction, erosion, sedimentation and others.

The anticipated cultural benefits of the proposed project would uphold the belief that stewardship of our environment and resources is vital. Continuously working towards care of the environment is a core value and would be part of the benefit of energy efficiency and energy reduction objectives of this project.

Chapter 1.1 Project Background and Description

In December, 2021, President Gravelle directed the Green Infrastructure Committee to assess current energy and waste trends across government, enterprise, and business holdings operations. Priorities included improving energy efficiency and use, and reducing waste entering the landfill.

Chapter 1.2 Project Scope

The Green Community Assessment and Recommendations report was conducted over a 12-month period, beginning January 2022, and ending December, 2022. The study focused on six key areas: conducting an energy audit, conducting a waste audit, determining single-use product use, determining recycling efforts in BMIC facilities, developing a green buildings checklist, developing procedures that promote sustainability and assessing storm water management.

Due to modified building usage during the COVID-19 pandemic, this assessment tried to use records less impacted by changes in building usage and staff behavior. Generally, researchers preferred to use records from 2018-2019 and 2020-2021. Some records were also chosen for analysis because buildings were newly acquired or renovated; in those cases, 2021 data was analyzed. Further explanation of record analysis is described in relevant sections below.

Chapter 2.0 Energy Assessment

2.1 Energy Assessment Methods

An energy assessment was first completed in 2011. Some of the buildings surveyed at the time have been significantly remodeled or repurposed since then. Some have also been renamed over the past decade. The table below highlights the old and new names for these buildings.

Table 2.1. Building Name Comparison

2011 Survey Building Name	2022 Survey Building Name
Tribal Administration Building	Tribal Administration Building
Ellen Marshall Health Center	Future Admin
BMIC Charter School	OCS
Waishkey Center Community Building	Waishkey Center
Bay Mills Community College Library	Library
Bay Mills Community College Admin.	Adikameg Hall
Bay Mills Community College Mikanuk	Mikanuk

2.1.i Billing and Historical Use Assessment Methods

The Bay Mills Indian Community Energy Efficiency Feasibility Study of 2011 was accomplished by collecting historical energy consumption data, analyses of historical energy use data, detailed energy audits including occupant and building manager interviews, thermography evaluation, itemized energy consumption calculations, energy conservation and energy efficiency alternatives research, energy conservation measure choice, energy conservation measure savings and cost calculations and community awareness throughout the project. These efforts were utilized with the objective of reducing each building's energy consumption by 30% or greater.

Before looking at each building's current energy use it was important to look at past energy use in the form of electricity and natural gas utility bills. Two years of previous utility bills were averaged together and formed the numbers representing existing energy use. This will serve as a baseline for comparison to energy conservation measures. In addition to yearly energy use, plotting historical monthly use was analyzed to determine increases associated with seasonal loads tied to heating and cooling.

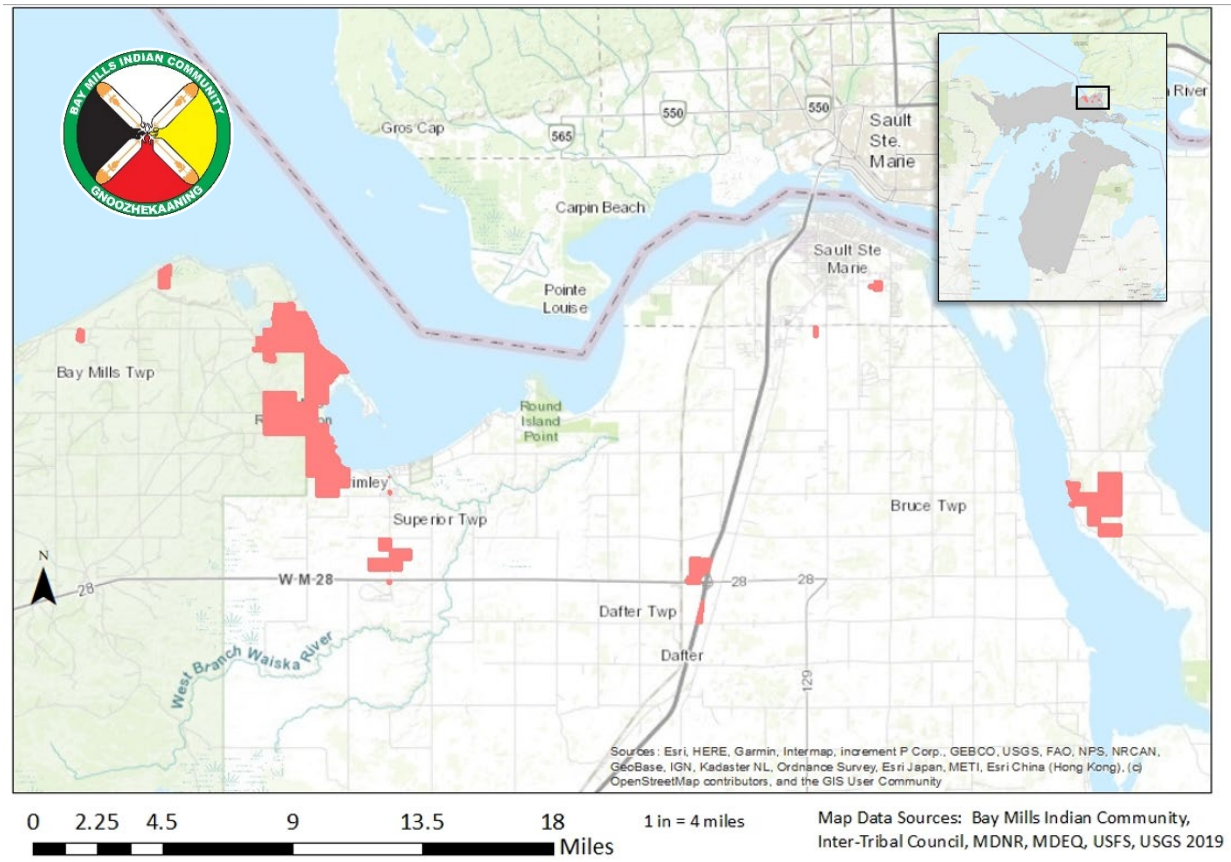


Figure 2.1.i Map of Bay Mills Indian Community Main Reservation

The study completed in 2022 followed a similar format. Records from 2021 and 2019 were used to determine current energy usage. Due to COVID-19, records from 2019 were used in place of 2020. This gives a more complete illustration of energy usage as many buildings were being used significantly less in 2020. For consistency, one year was the December of the previous year included with January-November bills of that year. For example, “2021” was December 2020 combined with January through November 2021. All buildings included in the billing assessment used records from 2021. While researchers hoped to assess the billed utility use of all Bay Mills buildings, that was not possible at the time. Numerous buildings, departments, programs have been in the midst of moves, reorganizations, and/ or renovations in the last three years. For this reason, major facilities such as the health center or Northern Lights were not included in this portion of the assessment. Additionally, data for some buildings was not in time to be included in analysis, such as the Housing Authority office. Still other buildings are combined in aspects of their utility billing and where therefore combined for simplicity in this assessment, such as the BMCC Main Campus buildings. The table below lists the primary buildings that were included in the assessment. They are grouped by primary manager for the facility and not necessarily by department(s) using the facility.

Table 2.1.i. Buildings Assessed for Energy Efficiency in 2022

GOVERNMENT OPERATIONS	EDUCATIONAL FACILITIES
Tribal Admin. Building / Kings Club	Ojibwe Charter School
Future Admin (12124 Lakeshore)	Waishkey Center
Elders/History Dept	BMCC Main Campus (Library + Mikanuk)
Culture Dept	BMCC West Campus: Trades
Justice Center	Mukwa Fitness Center
Head Start Child Center	Waishkey Bay Farm
AOT	BMCC Migizi Hall
Biological Services/Conservation Dept	ENTERPRISE AND BUSINESS HOLDINGS
Commodity Foods	Bay Mart gas station
Public Works (5463 Niibish)	Four Seasons Market & Deli
Maintenance (5414 Niibish)	Wild Bluff Golf Course
	Wild Bluff Mntn/ Cart Barn
	Laundry
	Bay Mills Resort and Casino

2.1.ii Energy Efficiency Assessment of 2022 by Superior Watershed Partnership—Methodology

In 2022, Bay Mills Indian Community contracted with Superior Watershed Partnership and the Great Lakes Climate Corps to perform an assessment on building energy usage and efficiency. The full report is available in Appendix B.

Table 2.1.ii.Building with DOE Score and Potential Cost Savings_

Building and Address	DOE Score	Potential Cost Savings
GOVERNMENT OPERATIONS		
Tribal Administration (12124 W. Lakeshore Dr)	10/10	1%
Biological Services/Conservation (11801 Plantation Rd)	9.0/10	11%
Public Works (5463 S Nbiish Rd)	6.5/10	2%
Advanced Office Technologies (12061 W. Lakeshore Dr)	10/10	14%
Waishkey Center/ Boys & Girls Club (11435 W. Lakeshore Dr)	7.5/10	4%
Tribal Justice Center (12449 W. Lakeshore Dr)	10/10	16%
Elder Center/ History (12485 W. Lakeshore Dr)	7.5/10	2%
Commodity Foods (12497 W. Lakeshore Dr)	8.0/10	1%
Housing Authority (3095 S. Towering Pines Rd)	8.0/5	11%

Culture Department (12498 W. Tower Rd)	10/10	12%
Maintenance Building (5414 S Nbiish Rd.)	0/0	5%
Ellen Marshall Health Center (new) (12455 W. Lakeshore Dr)	9.0/10	1%
EDUCATIONAL FACILITIES		
Head Start Child Care Center (12471 W. Lakeshore Dr)	9.0/10	14%
Ojibwe Charter School (11507 W. Industrial Dr)	6.0/10	>50%
BMCC Migizi Hall (Fire Crew building) (1895 S Iroquois Row)	9.5.10	3%
Bay Mills Community College (12214 W. Lakeshore Dr)	8.0/10	10%
Waishkey Bay Farm (10135 W. Mills Rd.)	5.0/10	10%
Mukwa Health/ Fitness Center (12400 W. Spectacle Lake Rd)	9.0/10	1%
ENTERPRISES		
Bay Mills Resort & Casino (11386 W. Lakeshore Dr)	9.0/10	11%
Wild Bluff Golf Course (11335 W. Lakeshore Dr)	10/10	14%
Bay Mart Gas Station (10001 W. Lakeshore Dr)	9.0/10	2%
Northern Light Cannabis Company (2735 W. M-28, Dafter)	9.5/10	2%
Four Seasons Market & Deli (9253 W. 6 Mile Rd)	10/10	13%

GLCC surveyors with energy efficiency scoring certifications from the Department of Energy (DOE), along with a contractor-partner, utilized a DOE's Building Energy Score Data Collection tool for building assessments. The Asset Score assesses the energy efficiency of these assets and identifies opportunities for improvement. Using building information input by the user, the tool runs a building energy simulation and generates a report. Throughout the process, the surveyors completed DOE data collection sheets for each building. The tool had the capability of assessing physical and structural energy efficiency. Measurements were taken of building envelope, orientation, and window area. Through the use of various sensors and detectors, the efficiency of windows and light fixtures was determined. Heating, ventilation, and air conditioning (HVAC) equipment was also inspected. The efficiencies for HVAC equipment was calculated using nameplate data and through data provided by manufacturers. BMIC Public Works Department and the History Department provided information about the age and features of buildings. Using the DOE's Online Asset Scoring System, each building was given a rating on a scale of one to ten. This system does not take into account occupant behavior or operations. This does allow for the comparison of buildings, but fails to consider the functions of buildings. The measures taken to decrease energy consumption should outweigh the cost both financially and environmentally of the proposed improvements, but it is not clear if that was taken into consideration.

The DOE tool is useful, but limited and should not be considered the *only* measure of efficiency building assessment. The DOE Asset Scoring Tool applies standard assumptions concerning miscellaneous loads (e.g., office equipment, vending machines) based on building type. Building-specific energy and operational costs are not included in the calculation of the building score. The Asset Score Report contains estimated annual building energy usage and estimated savings associated with identified energy efficiency measures. These estimates are based on average regional utility rates and standard assumptions about operational factors such as occupancy density, hours of operation, and miscellaneous loads (such as office equipment). Currently, the Asset Scoring Tool does not include on-site renewable energy generation in the calculation. This tool may be increasingly useful if more detailed information is inputted into the tool. But when only basic information is inputted, it may be challenging to compare buildings with great differences in design and operation, for example the Tribal Office compared to the Public Works building. Additionally in some buildings, limited recommendations for improvement may be offered by the tool if the building and appliances are fairly new, and/or if the building design would have to be significantly altered to improve efficiency (for example, large garage spaces).

2.2 Energy Assessment Results

2.2.i Energy Assessment Results of 2011

The results of the 2011 baseline energy assessment indicate that of the Ellen Marshall Health Center, Tribal Administration Building and the BMIC Charter School have ranking scores available within Energy Star's Portfolio Manager. The ranking of these three facilities show the Charter School is average in energy consumption, Ellen Marshall Health Center consumes more than average and the Tribal Administration Building consumes less energy than average buildings with similarly characterized use. While the remaining buildings don't have available ranking scores compared to their "peers" they do have Energy Intensity values. Energy Intensity and "peer" rankings (for buildings with available score) are shown in the following table that compares and summarizes each building's energy consumption. None of the BMIC facilities were eligible for an Energy Star EPR.

Based on each facility's energy use, estimates of greenhouse gas emissions were generated using Energy Star Portfolio Manager. The College consumed the most total site energy and also generating the greatest amount of GHG emissions at 411 MT CO2-e in 2011 and was close followed by the Ellen Marshall Health Center at 400 MT CO2-e. The total annual GHG emissions was 1,292 MT CO2-e, which to put in more tangible terms is equivalent to the annual emissions from 269 cars or the amount of carbon sequestered annually 1,059 acres of forest.[7] The following table and charts illustrate the current state of energy consumption in the subject buildings.

Table 2.2.i: 2011 Building Energy Performance

Building Energy Performance					
Building	**Energy Performance Rating (1-100)**	**Site Energy Intensity/National Median (kBtu/ft2/yr)**	**Source Energy Intensity/National Median (kBtu/ft2/yr)**	**Total Annual Site Energy (kBtu)**	**Total Annual GHG Emissions (MT CO_2-e)**
Tribal Admin Building (12140)	85	51/82	118/189 (-38%)	586,009	81
Ellen Marshall Health Center (12142)	44	111/104	227/213 (+7%)	3,329,503	400
Ojibwe Charter School	52	106/109	165/170 (-2%)	1,717,715	150
Waishkey Center Building	NA	88/39	145/100 (+45%)	2,589,427	242
BMCC Library	NA	65/104	139/244 (-43%)	429,411	55
BMCC (old) Admin Building	NA	70/104	186/244 (-24%)	926,286	148
BMCC Mikanuk	NA	157/104	308/244 (+26%)	1,880,608	216
Source: Energy Star Portfolio Manager					

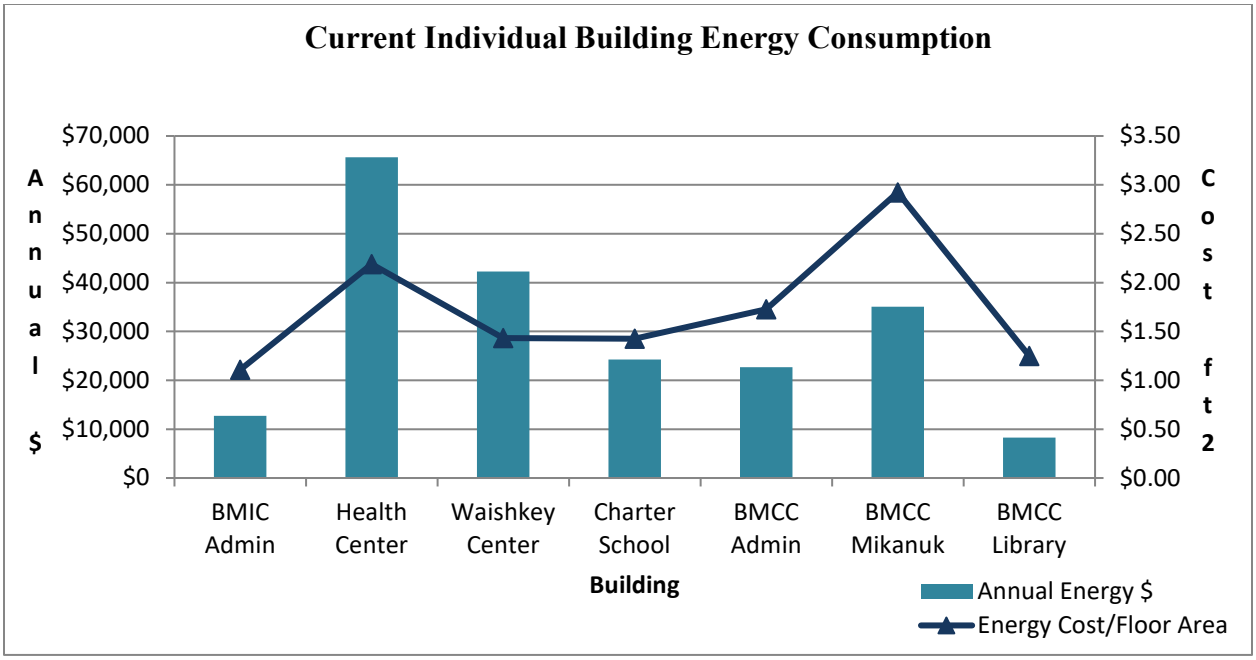


Figure 2.2.i.A. 2011 Individual Building Energy Consumption

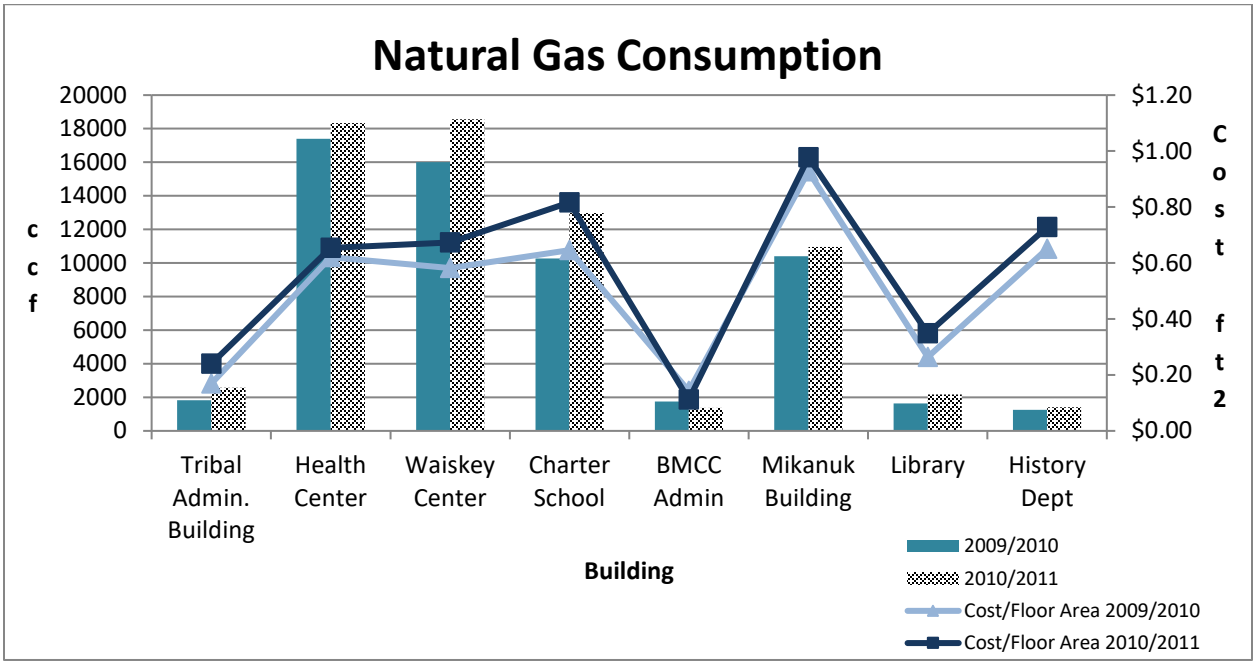


Figure 2.2.i.B: 2011 Natural Gas Consumption per Building

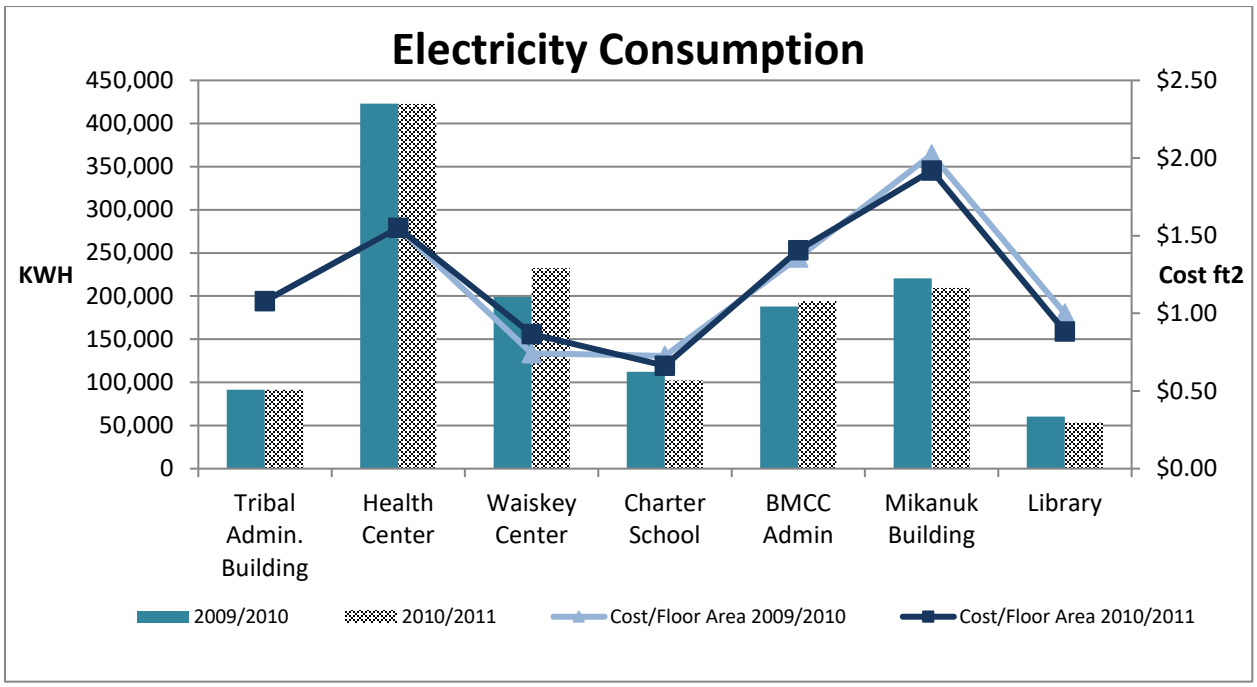


Figure 2.2.i.C: 2011 Electricity Consumption per Building

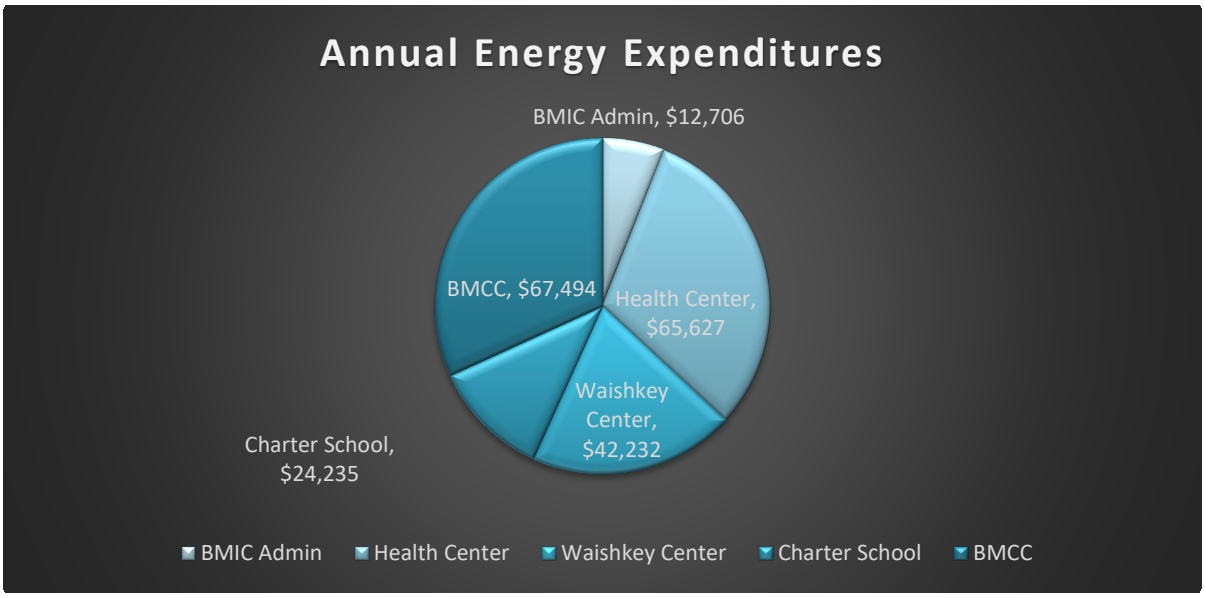


Figure 2.2.i.D: 2011 Annual Energy Expenditures per Building

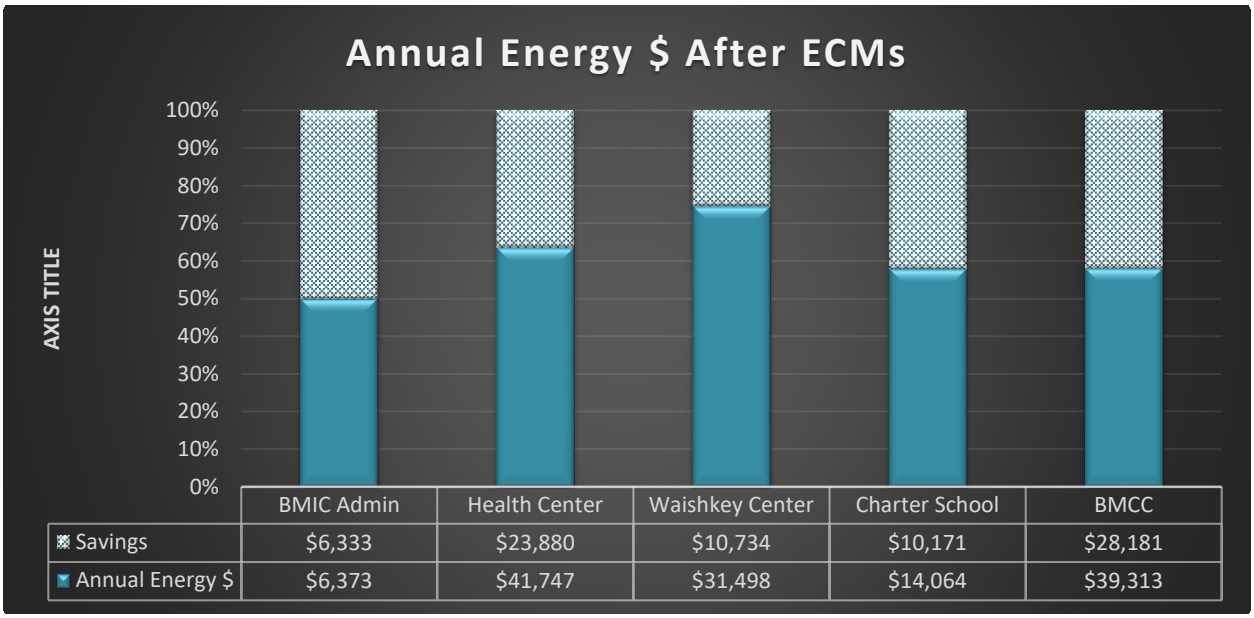


Figure 2.2.i.E: 2011 Annual Energy Savings after Energy Conservation Measures per Building

2.2.ii Energy Assessment Results of 2022

This assessment was performed for 26 total buildings. Due to this large number, results are grouped below by building type. Total building gas consumption, electrical consumption, combined energy costs and their relative square footage have been compared in the figures below.

Summary Results of Billing/ Use Assessment

Results in the graphs below reflect expected numbers. Numerous buildings are well-known to have high energy usage due to their building use, for example, BMRC. Others are known to have higher energy use and costs due to the age of the building and presumed poor insulation envelop. The graphs below also reflect anticipated energy use changes. For example, Kings Club casino (a combined energy bill with Tribal Admin) was open in 2019, but was closed in 2021; therefore the electrical use was significantly reduced. Other changes reflect building renovations such as new windows (AOT) or roofing (OCS). In a handful of cases, facility use increased in 2021 and as a result, energy use increased.

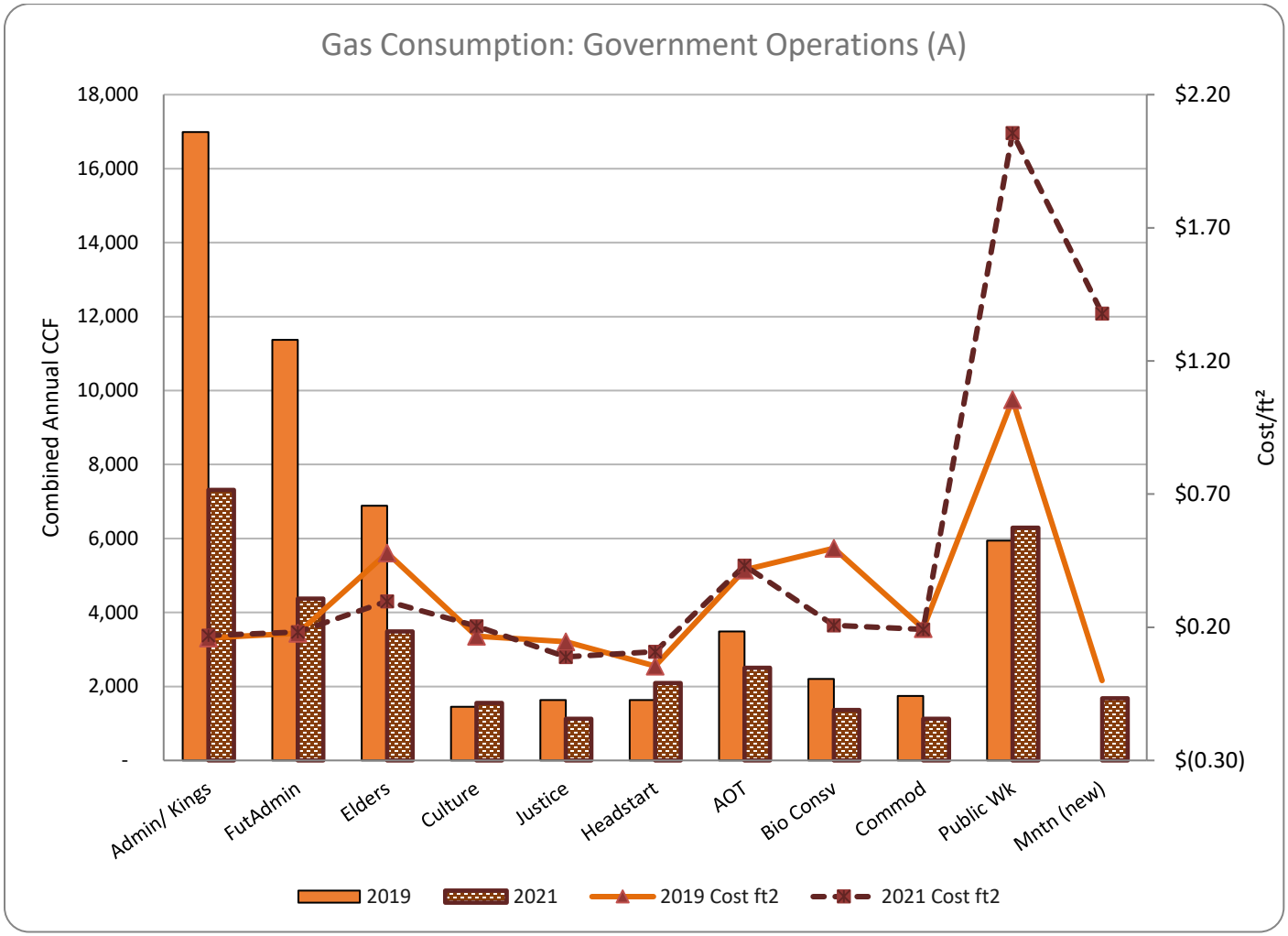


Figure 2.2.ii.A. 2022 Government Operations Gas Consumption (A).

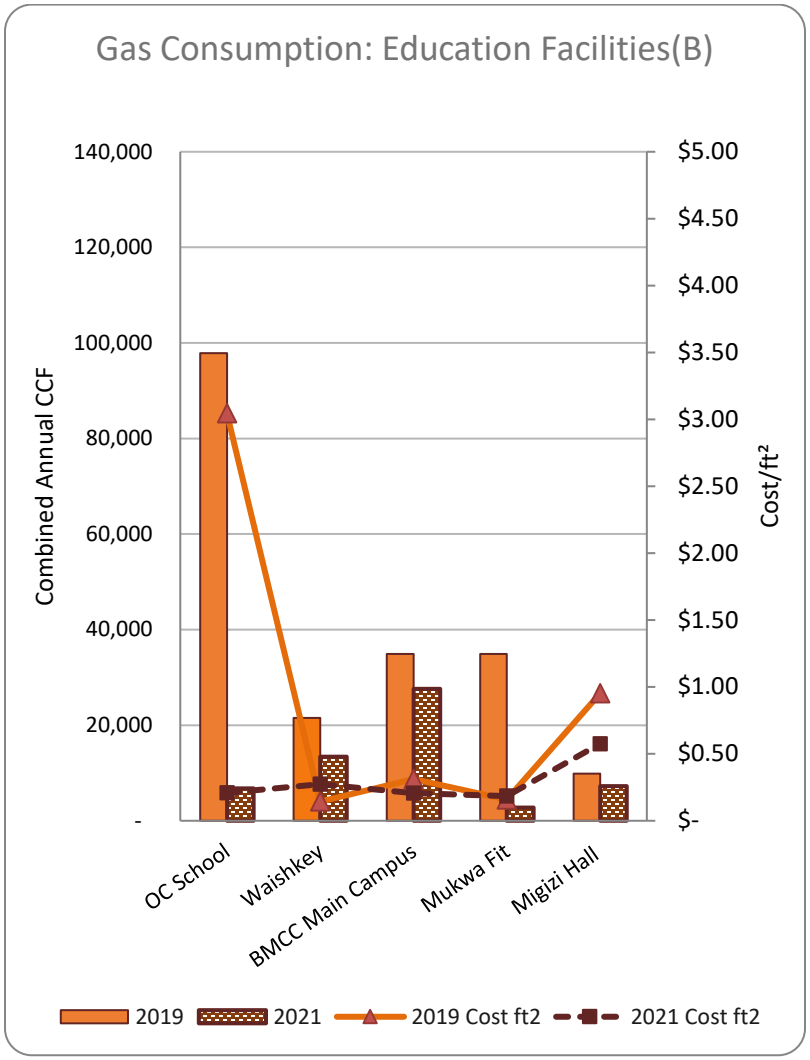


Figure 2.2.ii.B 2022 Educational Facilities Gas Consumption (B).

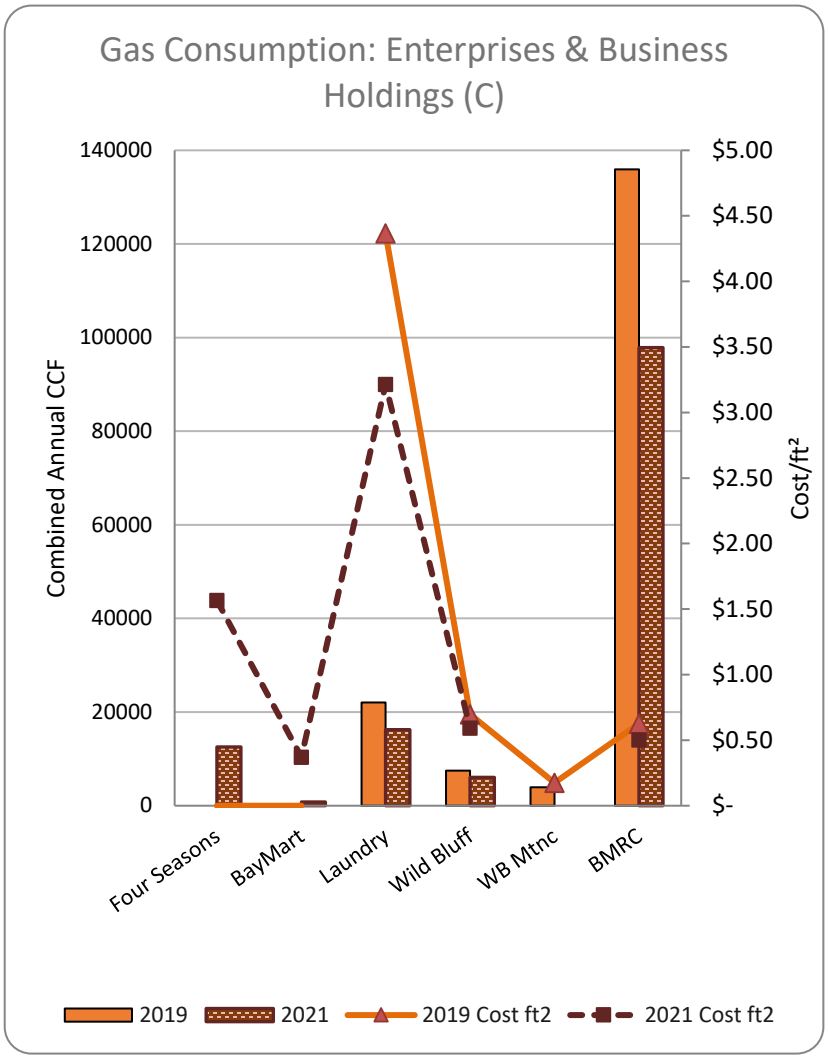


Figure 2.2.ii.C. 2022 Enterprises & Business Holdings Gas Consumption (C).

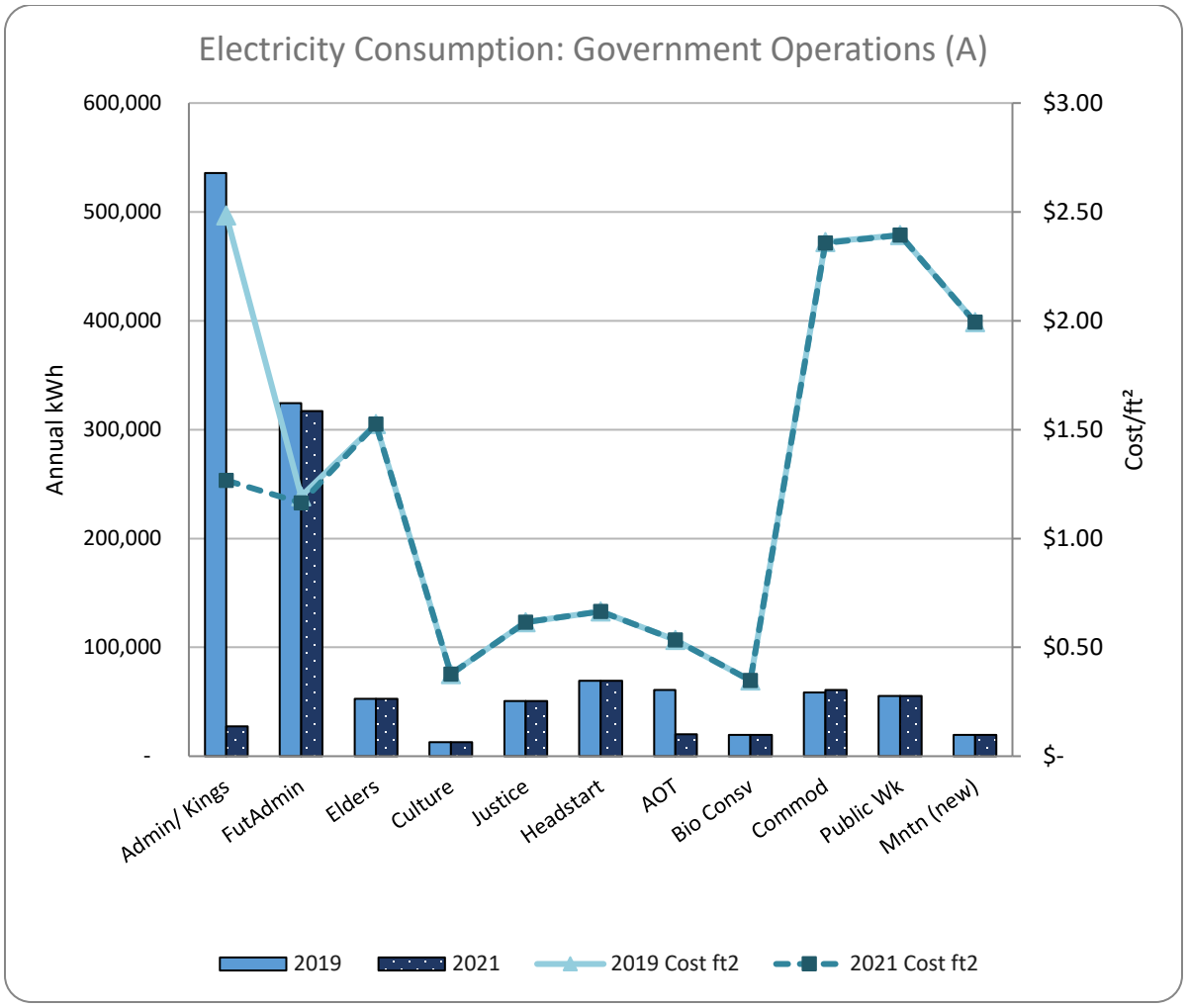


Figure 2.2.ii.D. 2022 Government Operations Electricity Consumption (A).

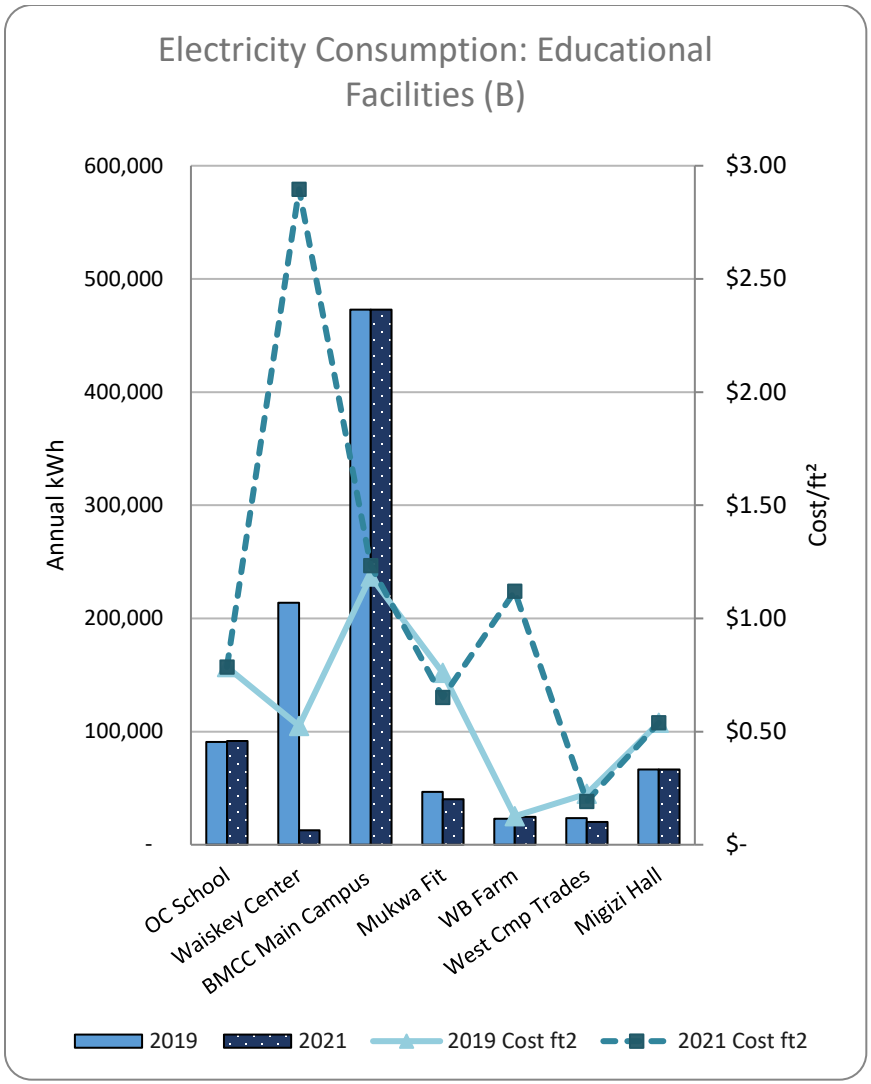


Figure 2.2.ii.E. 2022 Educational Facilities Electricity Consumption (B).

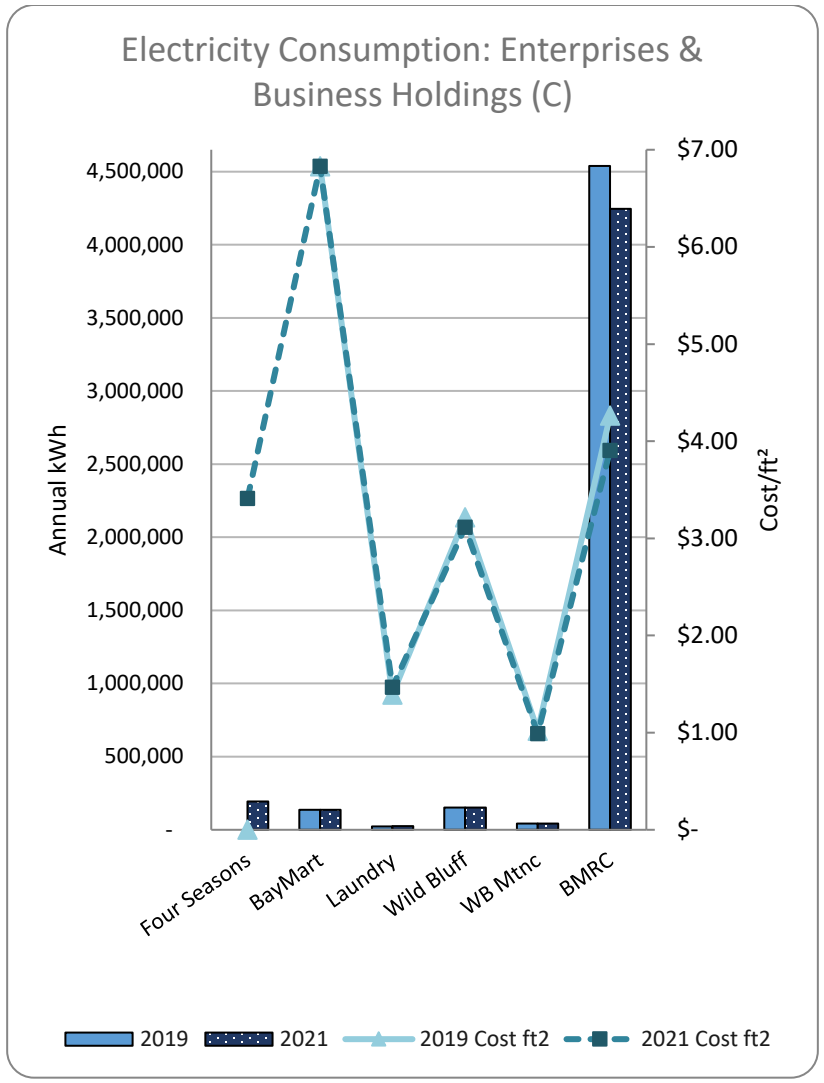


Figure 2.2.ii.F. 2022 Enterprises & Business Holdings Electricity Consumption (C).

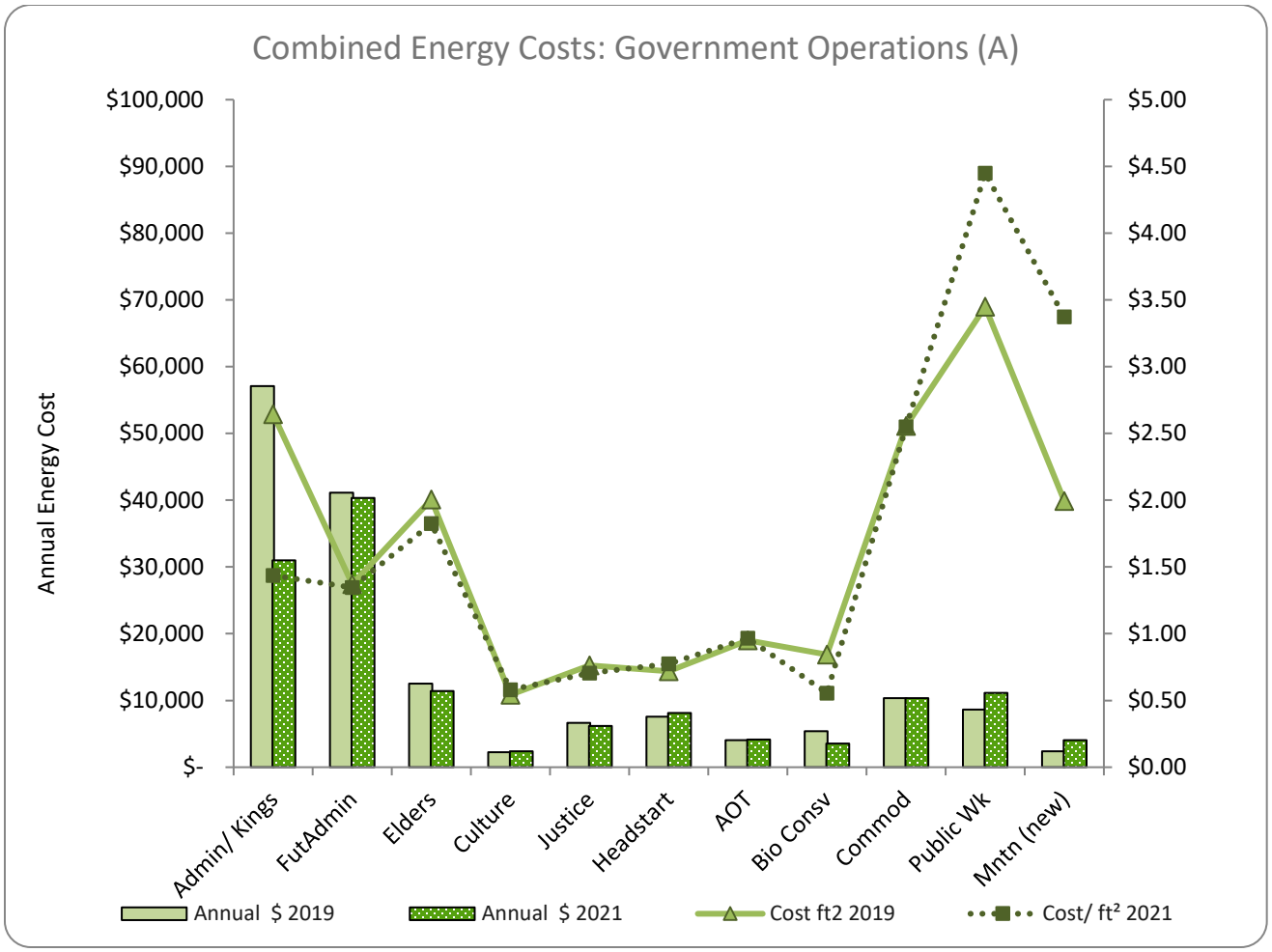


Figure 2.2.ii.G. 2022 Government Operations Individual Government Operations Energy Consumption (A).

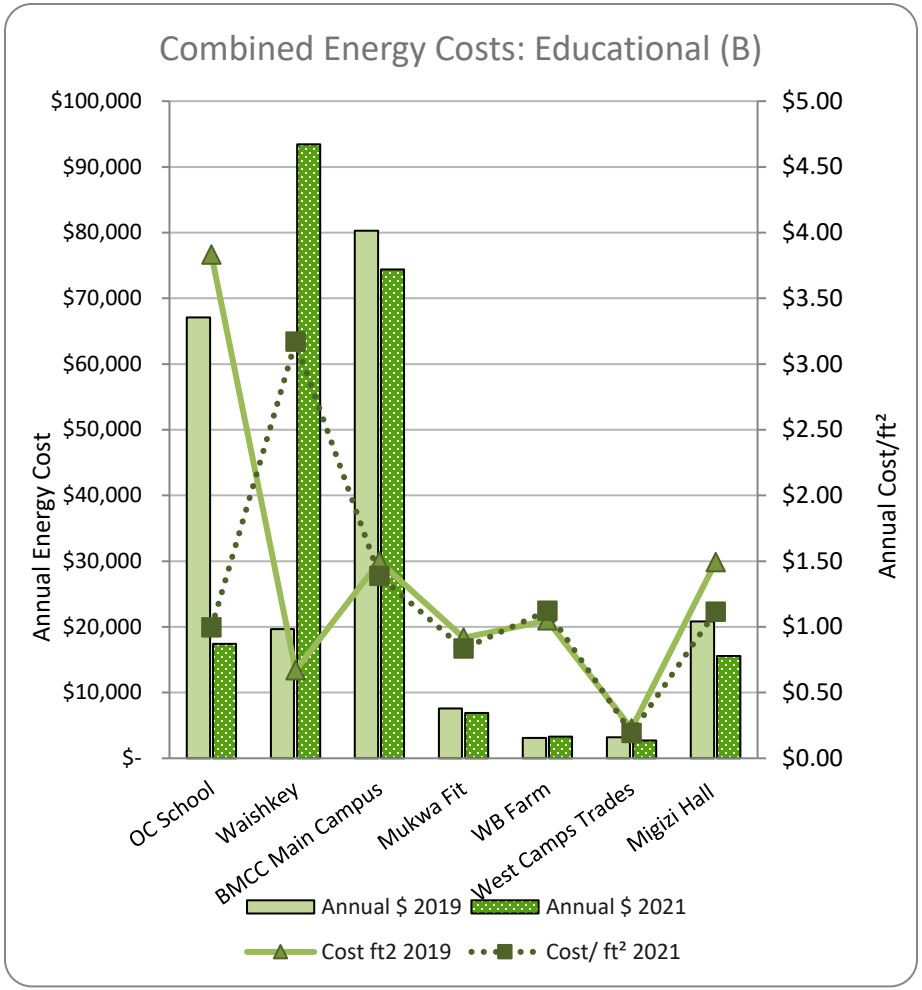


Figure 2.2.ii.H. 2022 Educational Facilities Individual Government Operations Energy Consumption (B).

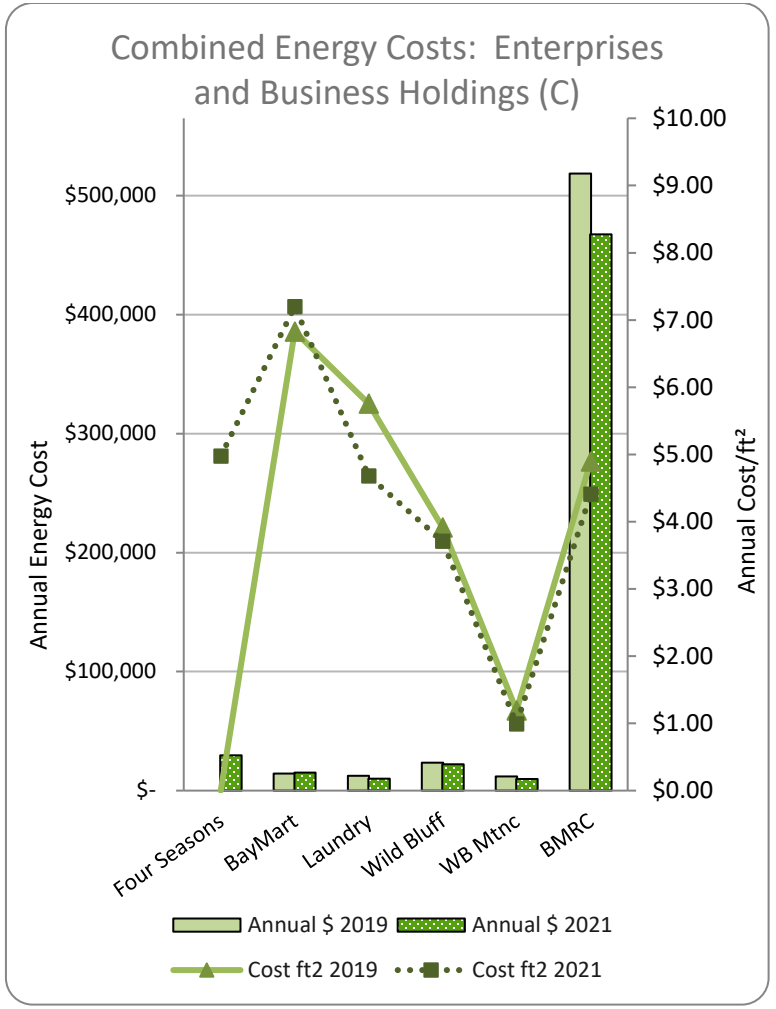


Figure 2.2.ii.I. 2022 Enterprises & Business Holdings Individual Government Operations Energy Consumption (C).

Summary Results of Energy Efficiency Assessment (by Superior Watershed Partnership)

All of the buildings audited utilize air conditioners, chillers, heat pumps, furnaces, and boilers for cooling and heating these properties. The efficiency and quality of technology used in newer available iterations of this equipment have improved dramatically over the past forty years. Most units currently in use at BMIC do not warrant replacement based on energy savings alone. However, the useful life of air conditioners is 12 to 15 years and over 20 for furnaces and boilers. Therefore, building managers should keep track of repair bills; once they become comparable to replacement rates, upgrading to the most efficient equipment available should be considered.

Many buildings are only occupied 40 to 50 hours per week. Programmable thermostats should be used to maintain lower temperatures during the unoccupied hours during the heating season. Air conditioners should be turned off. After a general upgrade to LED lighting, lighting fixtures should be linked to occupancy sensors to reduce waste. The new Ellen Marshall Medical Center does have a Building Management System which has the capability of saving energy through supply-demand alignment; this model should stand as an example to other buildings as they are upgraded.

Table 2.2.ii. Building with DOE Score and Potential Cost Savings

Building and Address	DOE Score	Potential Cost Savings
GOVERNMENT OPERATIONS		
Tribal Administration (12124 W. Lakeshore Dr)	10/10	1%
Biological Services/Conservation (11801 Plantation Rd)	9.0/10	11%
Public Works (5463 S Nbiish Rd)	6.5/10	2%
Advanced Office Technologies (12061 W. Lakeshore Dr)	10/10	14%
Boys & Girls Club/ Waishkey Center (11435 W. Lakeshore Dr)	7.5/10	4%
Tribal Justice Center (12449 W. Lakeshore Dr)	10/10	16%
Elder Center/ History (12485 W. Lakeshore Dr)	7.5/10	2%
Commodity Foods (12497 W. Lakeshore Dr)	8.0/10	1%
Housing Authority (3095 S. Towering Pines Rd)	8.0/5	11%
Culture Department (12498 W. Tower Rd)	10/10	12%
Maintenance Building (5414 S Nbiish Rd.)	0/0	5%
Ellen Marshall Health Center (12455 W. Lakeshore Dr)	9.0/10	1%
EDUCATIONAL FACILITIES		
Head Start Child Care Center (12471 W. Lakeshore Dr)	9.0/10	14%
Ojibwe Charter School (11507 W. Industrial Dr)	6.0/10	>50%
BMCC Migizi Hall (Fire Crew building) (1895 S Iroquois Row)	9.5.10	3%
Bay Mills Community College (12214 W. Lakeshore Dr.)	8.0/10	10%
Waishkey Bay Farm (10135 W. Mills Rd.)	5.0/10	10%
Mukwa Health/ Fitness Center (12400 W. Spectacle Lake Rd)	9.0/10	1%
ENTERPRISES		
Bay Mills Resort & Casino (11386 W. Lakeshore Dr)	9.0/10	11%
Wild Bluff Golf Course (11335 W. Lakeshore Dr)	10/10	14%
Bay Mart Gas Station (10001 W. Lakeshore Dr)	9.0/10	2%
Northern Light Cannabis Company (2736 M-28, Dafter)	9.5/10	2%
Four Seasons Market & Deli (9253 W. 6 Mile Rd)	10/10	13%

2.3 Recommendations of the Energy Assessment 2022

This energy efficiency audit elicited useful and actionable data for 23 BMIC-owned properties constructed between 1981 and 2022. While the body of this report contains building-specific assessments and recommendations, several emergent recommendations, which apply to all or most structures considered, are worth noting.

Recommendations from billing study:
The billing assessment showed that the Bay Mills Resort and Casino was by far the greatest energy user. Followed by the Waishkey Center, BMCC Main Campus, and OCS. However, when cost per square foot of building was analyzed Bay Mart, Bay Mills Laundry & Linen, and Four Seasons are the largest energy users. Of government operations Public Works, Commodity Foods, and Maintenance Departments were the highest energy users per square foot. Energy use total costs and cost per square foot was very high in OCS in 2019 but dropped dramatically in 2021 with the installation of the new roof. Additional assessments on insulation, appliance upgrades and other energy-reducing measures should be explored. However, some buildings will struggle due to their high energy consumption purely due to the nature of building use (for example, the Laundry will always, by its nature, be operating energy-intensive appliances.)

In general, a number of steps may be taken to reduce energy consumption. Additional assessment using more applicable methods could be done on the aforementioned buildings, prioritizing those with the highest usage/ square foot. Following the additional assessment, upgrades will be quantified. Upgrades will then be completed after being prioritized from most to least impactful or achievable. For some buildings, significant changes may not be realistic, such as those with larger work spaces that need to be heated/cooled to allow acceptable working conditions. For others, impactful changes may be as simple as adjusting the thermostat in areas with little use or improving insulation.

All of the buildings audited utilize air conditioners, chillers, heat pumps, furnaces, and/or boilers for cooling and heating these properties. The efficiency and quality of technology used in newer available iterations of this equipment have improved dramatically over the past forty years. Prior to 2000, the SEER (Season Energy Efficiency Ratio) rating for air conditioners and heat pumps when cooling was 10; in 2015, it increased to 14, a 40% increase in efficiency. Now, there are units available with a SEER as high as 22. HSPF (Heating Seasonal Performance Factor) is used to rate heat pumps during the heating season. Before 2000, the standard was 6.7. It was raised to eight in 2015. High-end units are now available with an HSPF of 13, almost double the old standard. Similarly, furnace and boiler efficiency standards have gone from 81% to 91%. There are many models available with 95+ % efficiency. Most units currently in use at BMIC do not warrant replacement based on energy savings alone. However, the useful life of air conditioners is 12 to 15 years and over 20 for furnaces and boilers. Therefore, building managers should keep track of repair bills; once they become comparable to replacement rates, upgrading to the most efficient equipment available should be considered.

Many buildings are only occupied 40 to 50 hours per week. Programmable thermostats should be used to maintain lower temperatures during the unoccupied hours during the heating season. Air conditioners should be turned off. After a general upgrade to LED lighting, lighting fixtures should be linked to occupancy sensors to reduce waste. The new Ellen Marshall Medical Center does have a Building Management System which has the capability of saving energy through supply-demand alignment; this model should stand as an example to other buildings as they are upgraded.

Building by building recommendations for each building are described in Appendix B.

Table 2.3. Upgrades Recommended in SWP Report

Recommended Upgrades to Make Now	**Recommended Upgrades to Make as Existing Appliances Fail**
Transition to LED lighting	Replace AC units and chillers
Install occupancy sensors for light fixtures	Replace heat pumps, furnaces, and boilers
Programmable thermostats programmed for business hours	
Improvements to building envelope (insulation)	

Chapter 3.0 Waste Assessment

3.1 Description of Current Waste Management Practices

Solid waste and recycling is managed in varied ways depending on the facility. BMIC Maintenance Department operates a waste transfer station which serves numerous government operations buildings as well as residents in the community. A complete description of these operations is available in the BMIC Solid Waste Management Plan (2022 BMIC).

- Solid Waste: The solid waste program in place consists of a manned transfer and compacting station located at the Maintenance grounds. This transfer station is manned 8 hours a day from Tuesday to Saturday. Maintenance staff performs curbside pickup at 8 locations including BMIC Administration offices and buildings. For all other residents, waste is disposed of using the "dollar a bag" policy. Once waste is collected at the transfer station and compacted, it is collected by GFL Environmental and taken to the Dafter Landfill.
- General Recycling: There is currently stationed at the BMIC Maintenance Transfer Station a self-sort recycling trailer. Residents can self-sort plastic, metal, glass and paper at this unit. Recycled materials are taken to Chippewa County Recycling in Sault Ste. Marie and recycled at no cost to the BMIC. There exists a second recycling trailer that is rotated into place while the first is being taken into Sault Ste. Marie to be emptied or undergoing maintenance.
- Cardboard Recycling: Starting in 2017 the BMIC initiated a corrugated cardboard recycling program. The maintenance department acquired a bailer and procured some space on the south end of the maintenance building for storage. The cardboard is bailed and stacked then ultimately loaded into a semi for transportation to a paper mill in Manistique. The frequency of pickup of this cardboard is variable and determined by several factors including how much storage room is present, weather conditions for storage, and pickup availability. This endeavor has and will continue to eliminate cardboard from entering into the waste stream.
- Electronic Waste: Electronic waste is collected throughout the year. This is a free service to Tribal Members. Other community members are encouraged to provide a donation at the time of drop off of their e-waste. This collection program is supported by the Michigan Department of Environmental, Great Lakes and Energy (EGLE). Through this program, BMIC is provided boxes and pallets for collection, shipping services and recycling of most materials free of charge. Disposal of some miscellaneous items do include a charge. The donation request is to cover the expense of disposal of these items.
- Special Collections: Currently there are several special collection events that happen at the BMIC on a recurring basis. There is a spring and fall cleanup available for residents where they can dispose of large or bulky items at no cost to themselves. These are large events which are widely participated in. Additionally, there is a regular Household Hazardous Waste collection event which is held in the spring and fall each year where residents can, at no charge, drop off these materials to the BMIC Biological staff for appropriate disposal. Drop-off for the recycling of tires is available to residents from spring to October 15 at the Maintenance Building.

Waste Generators

The following tribal buildings and residential areas have been identified as the main "waste generators" at BMIC. These generators utilize 13 waste disposal containers, including 4, 6, and 8 yard dumpsters, as well as 2 trash compactors and a cardboard recycling compactor. As mentioned in section 3.1 many of these generators are responsible for their own waste collection and do not currently utilize the facilities at the BMIC Waste Transfer Station.

Table 3.1.i. Waste Generator Locations and Fate of Waste Generated

BMIC GOVERNMENT OPERATIONS	
Advanced Office Technologies (AOT)	Maintenance Transfer Station Compactor
Maintenance Department	Maintenance Transfer Station Compactor
Ellen Marshall Health Center	Maintenance Transfer Station Compactor
Tribal Administration Building	Maintenance Transfer Station Compactor
Commodities Distribution Building	Maintenance Transfer Station Compactor
Elders Center/ History Dept	Maintenance Transfer Station Compactor
Head Start/ Child Development Center	GFL pickup
Cultural Center	GFL pickup
Emergency Medical Connection	GFL pickup
Housing Authority	GFL pickup
Public Works/Construction	GFL pickup
EDUCATION FACILITIES	
Bay Mills Community College (collectively)	GFL pickup
Ojibway Charter School	GFL pickup
Waishkey Center	Maintenance Transfer Station Compactor
ENTERPRISES & BUSINESS HOLDINGS	
Bay Mart Store	GFL pickup, Cardboard to Maintenance Transfer Station
Bay Mills Resort and Casino	BMRC Compactor, Cardboard to Maintenance Transfer Station
Laundry and Linen	BMRC Pickup
Wild Bluff Golf Course	GFL pickup
OTHER	
Residential Curbside Pickup	GFL pickup

The dumpsters and compactors are emptied by GFL Inc., (SS), on either a weekly or bi-weekly basis. Each container, after a conducting walk through examinations, averaged 70% capacities prior to pick up.

3.2 Waste Assessment Results

Below are figures showing a yearly total of the amount of waste generated by the key generators on the BMIC; those being the Bay Mills Resort and Casino Enterprises (BMRC) and the Municipal Waste Transfer Station located at the Bay Mills Maintenance Department. The records here comprise a 12 month period from December 2018 to December 2019.

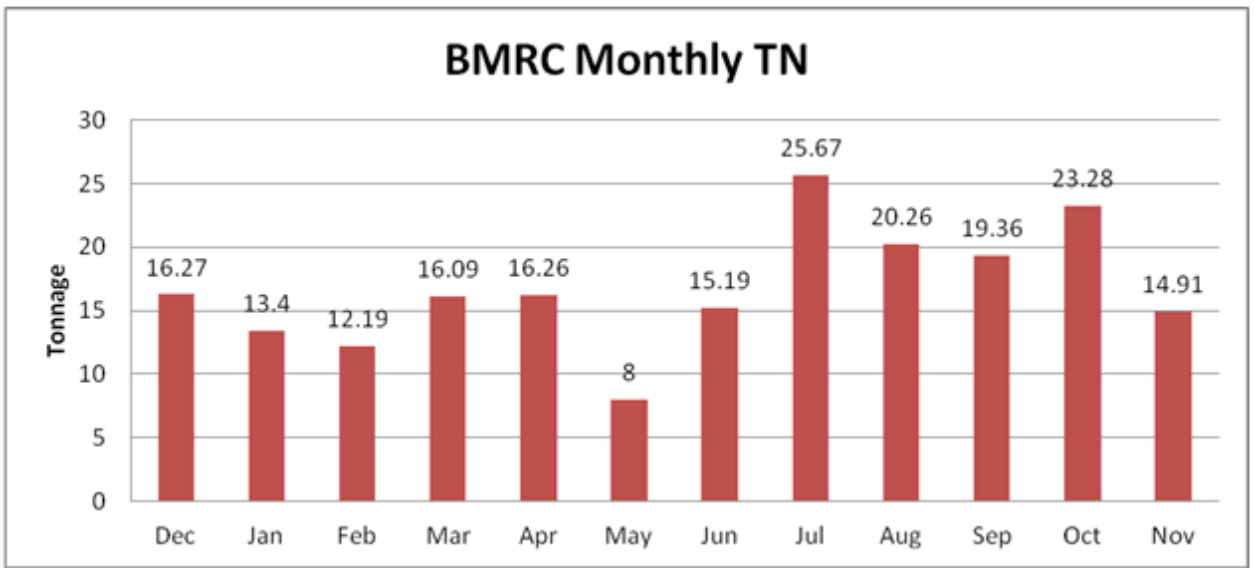


Figure 3.2.i.A: Bay Mills Resort and Casino Monthly Tonnages of Waste

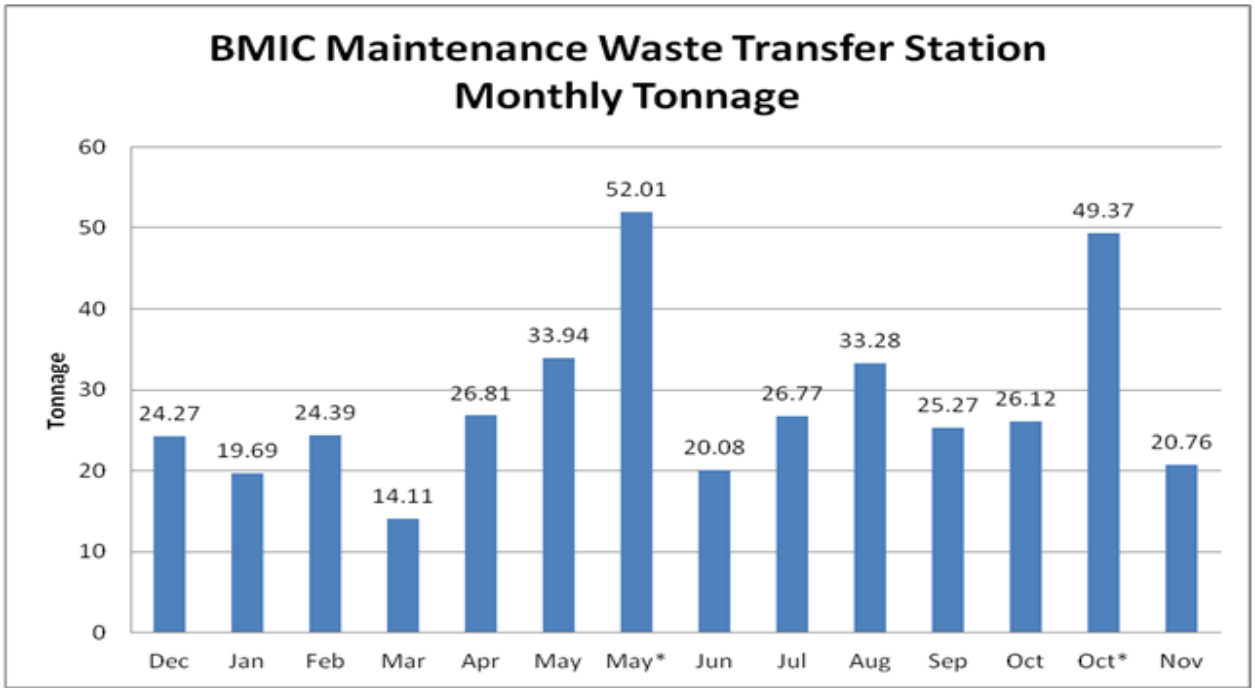


Figure 3.2.i.B: Monthly Tonnage of waste disposed of (* denotes a special cleanup event)

3.3 Waste Characterization Study of 2020—Community

In September of 2020 a waste audit was conducted with waste from the BMIC Maintenance Waste Transfer Station. The waste audit performed was intended to characterize the amount of waste being disposed of at the facility, and to determine if, and to what extent, recycling and other waste sorting practices were being utilized by BMIC residents.

There were plans to conduct a waste audit for the casino waste streams in order to determine if BMIC enterprises could be better incorporated into recycling efforts on the reservation. Due to complications from Covid-19 pandemic and how the casino tourism was affects by this event it was deemed that data collected from enterprise sources would not be representative of a typical season's business.

It should also be noted that the sort took place during the Covid-19 pandemic; it was determined that since the bulk of waste is from private residences, that the waste stream obtained from the Maintenance Waste Transfer station would be representative of typical use.

Waste was collected in a 16ft enclosed trailer for the week leading up to the sort. In all a total of 9 volunteers composed of BMIC, ITCMI, and EPA staff were able to sort through a total of 677 lbs of waste over the course of an 8 hour day. The waste was sorted into 26 categories. These categories were chosen to determine what waste could potential be removed from the waste stream and recycled with increased infrastructure, outreach, and/or education. The categories that were used as part of the study were chosen to identify recycling facilities that could be immediately available to the BMIC through outside contracts and to determine what types of alternative waste disposal could be feasible for the BMIC to implement directly.

Figures 3.3.i and 3.3.ii Staff sorting waste at 2020 characterization survey.

BMIC Waste Audit Results 2020

Results of characterization are listed below. Many pounds of recyclable items were found in the garbage. When these percentages are extrapolated across the costs of a year, the costs of recyclable items being sent to landfill is in the tens of thousands. If BMIC recycled all materials that are accepted throughout the local area (at the BMIC WTS and Chippewa County Recycling Center), approximately $24,000 could be saved per year in disposal costs. Additional money could be saved if recycling efforts were made during clean-up weeks as well.

- Other waste/ true garbage: Other waste comprised approximately 15% of the total waste at BMIC. This included items that could not be diverted from a landfill. Examples include diapers, trash bags, and other non-recyclable or non-compostable materials.
- Paper: The paper stream was almost completely free of corrugated cardboard. Newsprint/paper and recyclable paper/craft/paperboard was approximately 50lbs and 7.5% of the total waste stream. Non-recyclable paper was represented by plastic coated paper, mostly in the form of packaging of food/medicines. Even with these non-recyclable paper products over 50% of the total 97lbs of paper waste is considered to be recyclable.
- Plastic Waste: While plastics made up 19% of the total waste in the study there was a minimal amount of recyclable materials found. Only approximately 2% each of total waste was easily recyclable plastic (HDPE, PET, and #3-7 plastics). Most of the plastic in the general waste stream (54 of a total of 127lbs of plastic) was attributed to film and flexible packaging, which is not generally considered recyclable with typical facilities. Most of the EPS foam identified in the waste stream is attributed to foam food service containers which were identified to be from home meal delivery to school age children and elders during the Covid-19 pandemic; thus, this amount of EPS foam in the waste stream is not considered typical. Due to a lack of PET, HDPE and other plastic containers in the waste stream it seems that the recycling efforts at the BMIC are being utilized effectively by residents.
- Organic waste: As is shown in the totals from the waste audit conducted the largest category of waste that was represented was organic waste. At ~33% of the total waste stream the vast majority of waste is organic in nature. Two thirds of the organic waste are food scraps while approximately one third of all organic waste is compostable fibers (napkins, paper towels, etc.). While much of the organic waste was not of a composition that could be recycled by conventional means there was a large amount of food waste that could be reused through the use of a digester. There were many materials, such as paper-based materials, and coffee grounds that, if separated from the main waste stream, could potentially be part of a community recycling program.

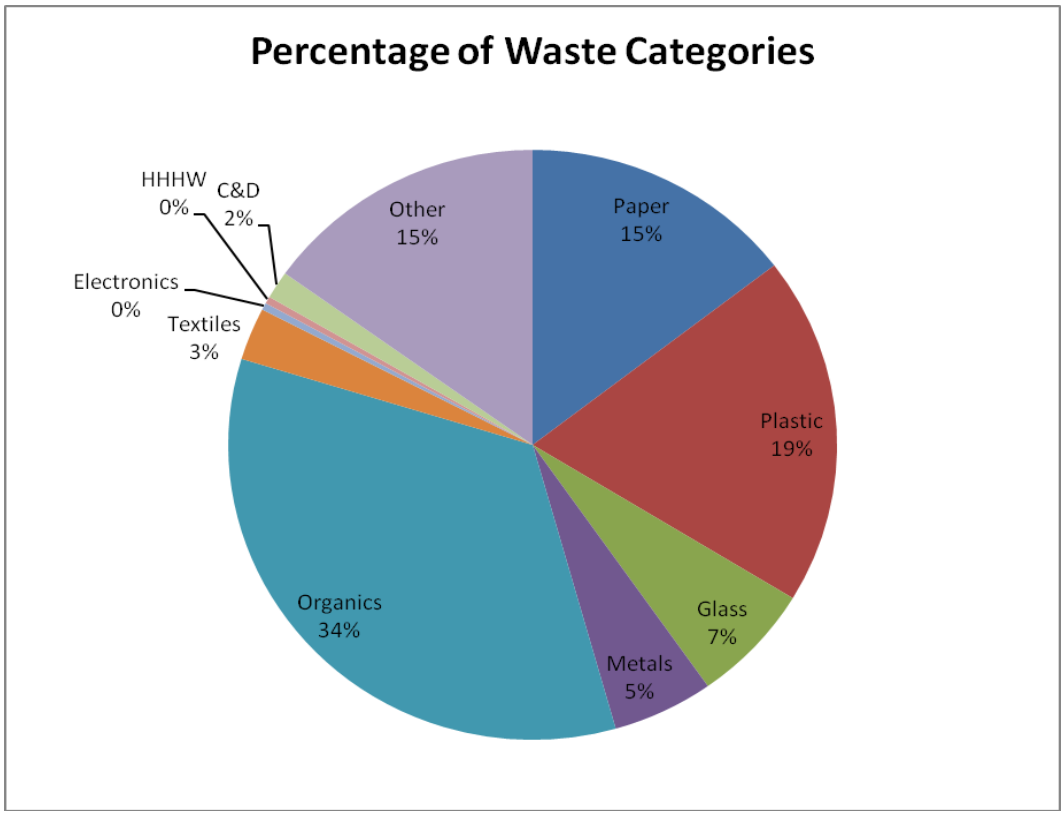


Figure 3.3.iii: 2020 BMIC Community Percentage of Major Waste Categories.

Table 3.3.i 2022 BMIC Waste Audit Totals

Waste Category	Percentage	Annual Cost
Other/ true garbage	15%	$ 5,625.00
Paper	15%	$ 5,625.00
Plastic	19%	$ 7,125.00
Glass	7%	$ 2,625.00
Organics	34%	$ 12,750.00
Metals	5%	$ 1,875.00
Textiles	3%	$ 1,125.00
HHW	0%	$ -
Construction	2%	$ 750.00
	Annual Garbage Tipping Fee	= $37,500.00

Table 3.3.ii 2022 BMIC Waste Audit Totals (detailed)

BMIC Maintenace Transfer Station Waste Audit
14 September 2020

Audit Locaiton and Date: Waishkey Bay Farm, 14 Sep 2020
Individuals in attendance: Anthony Rinna and Greg Schubel (ITCMI), Aubrey Maccoux-LeDuc, Angela Johnston, Britney Weaver, Ryan Sprague, Shannon Russel, Brian Wesolek (BMIC), Jennifer Manville (EPA)

Category	Material	Final Weight (lbs.)	Percent
Paper	Old Corrugated Cardboard (OCC)	4.1	0.61
	Old Newsprint (ONP), Paper, Magazines	25.6	3.78
	Other Mixed Recyclable Paper/Kraft/Paperboard	26.6	3.93
	Non-recyclable Paper Products	41.1	6.07
Plastic	PET Bottles and Containers	21.1	3.11
	HDPE (#2)	17.6	2.60
	Mixed Bottles/Containers (#3-#7)	13.1	1.93
	EPS Foam (#6)	11.1	1.64
	Film & Flexible Packaging	54.1	7.99
	Rigid Bulky	10.6	1.56
Glass	Recyclable Glass	36.1	5.33
	Non-Recyclable Glass	7.6	1.12
Metals	Ferrous Metal Containers	21.1	3.11
	Aluminum Cans (UBC)	6.1	0.90
	Other Metals/Scrap Metals	8.6	1.27
Organics	Food/Putrescible Waste	152.6	22.53
	Compostable Fibers (Napkins, Papertowels, Etc.)	73.6	10.87
	Other Organics	1.6	0.24
Textiles	Textiles	12.6	1.86
	Leather & Rubber	6.6	0.97
Electronics	All Electronics	2.6	0.38
HHHW	Household Hazardous Waste	2.6	0.38
C&D	C&D	10.1	1.49
Other	Fines/.Residual Refuse	101	14.91
	Other Bulky	N/A	N/A
	Composite Items	9.6	1.42
Total		677.4	100.00

3.4 Waste Characterization Study of 2022—BMRC

In June 2022 a waste audit was conducted with waste from the Bay Mills Resort and Casino (BMRC). The waste audit was intended to characterize the amount of waste being disposed of by the hotel, casino, kitchen/restaurants and offices at BMRC and to determine if, and to what extent, recycling and other waste sorting practices were being utilized by BMRC.

Garbage waste was collected in a 16ft enclosed trailer during the weekend leading up to the sort. Items already intended for recycling and/or bottle return were not included in this characterization. BMRC was at approximately 50% capacity during the weekend that the waste was collected for the audit. In all, a total of 9 volunteers comprised of BMIC staff and the Great Lakes Climate Corps members were able to sort through a total of 976.5 lbs of waste over the course of 6 hours. The waste was sorted into 26 categories. These categories were used to determine which waste streams could be diverted through increased recycling infrastructure, outreach, and education. These also help identify recycling facilities that could be immediately available to BMRC through outside contracts and to determine what types of alternative waste disposal could be feasible for the BMRC to implement directly.

BMRC Waste Audit Results 2022

Results of characterization are listed below. Many pounds of recyclable items were found in the garbage. When these percentages are extrapolated across the costs of a year, the costs of recyclable items being sent to landfill is in the tens of thousands. If BMRC recycled all materials that are accepted throughout the local area (at the BMIC WTS and Chippewa County Recycling Center), approximately $23,000 could be saved per year in disposal costs.

Other waste/ true garbage: Other waste comprised approximately 20% of the total waste at BMRC. This included items that could not be diverted from a landfill. Examples include diapers, trash bags, and other non-recyclable or non-compostable materials.

- Organic waste: As shown in the totals from the waste audit conducted at BMRC, the largest category of waste that was represented was organic at approximately 31% of the total waste stream. Approximately one half of the organic waste was food scraps while the other half was compostable fibers, mainly brown paper towels from the public restrooms. While much of the organic waste was not of a composition that could be recycled by conventional means there was a large amount of organic waste that could be diverted from the landfill through the use of a digester.
- Plastic Waste: Plastics made up 18% of the total waste in the study. The majority of plastics included materials that could be recycled at the Chippewa County Recycling Facility such as Plastics # 2-7 and PET. PET was mainly clear plastic bottles including water bottles. Much of the plastic by volume included film and flexible packaging, which is not generally considered recyclable with typical facilities. Most of the EPS foam identified in the waste stream was attributed to foam food service to-go containers.

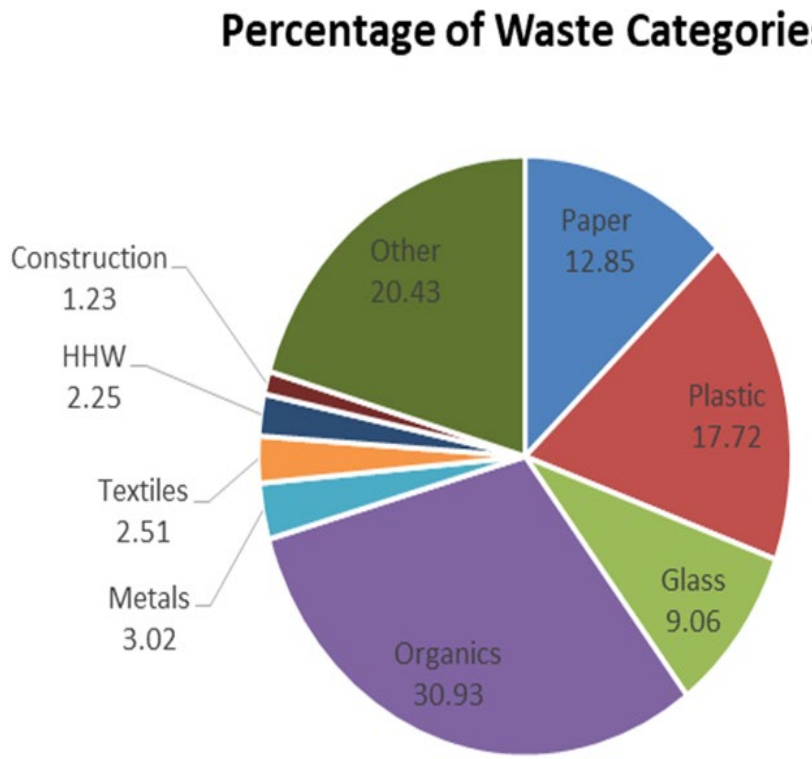


Figure 3.4.i 2022 BMRC Percentage of Major Waste Categories.

Table 3.4.i 2022 BMRC Waste Audit Totals

Waste Category	Percentage	Annual Cost
Other/ true garbage	20.43%	$ 6,741.90
Paper	12.85%	$ 4,240.50
Plastic	17.72%	$ 5,847.60
Glass	9.06%	$ 2,989.80
Organics	30.93%	$ 10,206.90
Metals	3.02%	$ 996.60
Textiles	2.51%	$ 828.30
HHW	2.25%	$ 742.50
Construction	1.23%	$ 405.90
	Annual Garbage Tipping Fee	= $33,000.00

Table 3.4.ii 2022 BMRC Waste Audit Totals (detailed)

BMRC Waste Audit June 20-21, 2022			
Audit Location and Date: Farmer's Market Pavilian June 20-21, 2022 Individuals in attendance: GLCC Crew: Luke, Ari, Kyle, Neveya; BMIC Technicians: James, Kyle, Charlotte, Cameron; BMIC Environmental Coordinator: Jen Parks			
Category	Material	**Final Weight**	**Percent**
Paper	Old Corrugated Cardboard (OCC)	10	1.02%
	Old Newsprint (ONP), Paper, Magazines	31	3.17%
	Other Mixed Recyclable Paper/Kraft/Paperboard	57	5.84%
	Non-recyclable Paper Products (greasy food containers)	27.5	2.82%
Plastic	PET Bottles and Containers (clear bottles/water bottles)	83.5	8.55%
	HDPE (#2)	11	1.13%
	Mixed Bottles/Containers (#3-#7)	41.5	4.25%
	EPS Foam (#6)	4.5	0.46%
	Film & Flexible Packaging (plastic wrap, food packaging)	32	3.28%
	Non-Recyclable Rigid Plastic/Mixed Rigid Bulky	0.5	0.05%
Glass	Recyclable Glass	88.5	9.06%
	Non-Recyclable Glass	0	0.00%
Metals	Ferrous Metal Containers (tin food cans)	2	0.20%
	Aluminum Cans (UBC)	24	2.46%
	Other Metals/Scrap Metals	3.5	0.36%
Organics	Food/Putrescible Waste	163.5	16.74%
	towels from restrooms)	120.5	12.34%
	Other Organics (coffee grounds)	18	1.84%
Textiles	Textiles	24.5	2.51%
	Leather & Rubber	0	0.00%
HHW	Household Hazardous Waste	22	2.25%
Electronics	All Electronics	0	0.00%
C&D	Construction & Demolition	12	1.23%
Other	Fines/Residual Refuse	199.5	20.43%
	Other Bulky	0	0
	Composite Items	0	0
Total		976.5	100.00%

3.5 Single-Use Item Survey

3.5.i Single-Use Item Survey Methods

In a survey separate, but similar to the waste characterization studies, an assessment of single-use items was made for each building. Due to the waste management method for each facility, these items may not have been captured in the characterization studies. Examples of single-use items range from napkins to small shampoo bottles to plastic to-go forks and many others. For each facility, the top ten items were listed. In specialized facilities, such as the Health Center, the survey was restricted to employee break room areas so medical supplies were excluded.

3.5.ii Single-Use Item Survey Results

The top ten single-use items listed by departments include: toilet paper, trash can bags, bathroom hand paper towels (brown, interfolding), kitchen paper towels (white, roll), facial tissue, food prep gloves, paper/plastic plates/bowls/cups, sanitizing wipes, plastic tableware and Ziplock-type bags. See Table 3.5.ii below for a complete list.

Table: 3.5.ii Single-Use Item Use per Building

Single-Use Item Consumption																				
Location	**Toilet Paper**	**Trash Can Bags**	**Bathroom Hand Paper Towels**	**Kitchen Paper Towels**	**Facial Tissue**	**Food Prep Gloves**	**Paper Plates/ Bowls/ Cups**	**Sanitizing Wipes**	**Plastic Tableware**	**Ziplock Bags**	**Hand Sanitizer - single use bottle**	**Napkins**	**Plastic Wrap**	**Bottled Water**	**Tin Foil**	**Hand soap - single use bottle**	**K-cups/Single Use Coffee**	**To Go Boxes**	**Aluminimun Baking Dishes**	**Souffle Cups with Lids**
AOT	x	x	x		x		x	x	x					x						
Biological Services	x	x	x		x	x				x										
Boys and Girls Club	x	x	x	x	x	x	x	x	x	x			x	x						x
Casino	x	x	x	x	x	x	x	x	x		x	x	x		x		x	x	x	
Charter School	x	x	x	x	x	x				x				x			x			
Child Development/Head Start	x	x	x	x	x	x	x	x	x	x	x	x			x					
Commodity Foods	x	x	x	x	x	x	x		x	x										
Community College	x	x		x																
Culture Department	x	x	x	x	x			x								x				
Ellen Marshall Building	x	x	x				x				x									
Health Center	x	x	x	x		x	x	x	x		x	x					x			
Four Seasons Market and Deli	x	x		x		x							x							
Gas Station	x	x		x																
Golf Course	x	x	x	x																
History Department/Elder Center	x	x	x	x	x	x	x	x	x	x	x	x	x		x			x	x	
Housing Authority	x	x	x	x	x		x	x		x	x		x		x	x				
Justice Center	x	x	x	x	x	x		x			x					x				
Maintenance Department	x	x	X													x				
Mukwa Fitness Center	x	x	x		x	x	x	x			x	x								
NLCC	x	x	x		x	x	x		x			x	x	x						
Public Works	x	x	x	x	x			x	x			x								
Tribal Administration	x	x	x				x		x	x					x					
Waishkey Bay Farm	x	x	x	x				x		x				x						
Count	**23**	**23**	**20**	**16**	**14**	**12**	**12**	**12**	**10**	**9**	**8**	**7**	**6**	**5**	**5**	**4**	**3**	**2**	**2**	**1**
Facilities Using Single-Use Items	100%	100%	87%	70%	61%	52%	52%	52%	43%	39%	35%	30%	26%	22%	22%	17%	13%	9%	9%	4%

3.5.iii Single-Use Item Recommendations

Many of the top ten single-use items are necessary health and sanitary items (toilet paper, trash bags, facial tissue, napkins and food prep gloves). Replacing these with reusable items is not recommended in a public or workplace setting. However, other single-use items could be replaced with reusable options that will reduce waste going into the landfill.

Table 3.5.iii. Replacement Items for Single Use Items

Single-Use Item	Reusable Item
Bathroom hand paper towel	Electric hand dryer
Kitchen paper towel	Dish cloth
Paper plates/bowls/cups	Ceramic dishes, glass/stainless steel cups
Sanitizing wipes	Large glass spray bottle with cloth
Plastic tableware	Stainless steel silverware
Ziplock bags	Glass storage containers
Hand sanitizer	Wall mounted refillable dispenser
Plastic wrap	Glass storage containers
Bottled water	Encourage reusable water bottles and refilling from tap
Tin foil	Glass storage containers
Hand soap	Wall mounted refillable dispenser
K-cups/single use coffee	Refillable K-cup coffee filter
To-go boxes	Stainless or glass dishes
Aluminum baking dishes	Ceramic baking dishes
Soufflé cups/lids	Glass storage containers

Another option for paper products is to elevate the importance of purchasing recycled products and those certified by the Forest Stewardship Council.

3.6 Building Recycling

3.6.i Building Recycling Survey Methods

Departments in each building were asked to self-report if they recycle materials including paper, cardboard, aluminum or metal, plastic or glass. These were recorded on the table below.

3.6.ii Building Recycling Survey Results

A surprising number of buildings practice little to no recycling. Four of the twenty-three buildings surveyed are reported to do no recycling. Cardboard is the most recycled item because the maintenance department provides pick-up service. Of the 23 buildings surveyed, 9 do not recycle paper, 12 do not recycle aluminum/metal, 10 do not recycling plastic and 12 do not recycle glass. Some of these buildings have had recycling sorting bins purchased for them by the Biological Services department in the past.

Table 3.6.ii: Recycling available in departmental buildings

	Recyclable Material				
Location	**Paper**	**Cardboard**	**Aluminum/metal**	**Plastic**	**Glass**
AOT	Yes	Yes	Yes	Yes	Yes
Biological Services	Yes	Yes	Yes	Yes	Yes
Boys and Girls Club	No	Yes	No	Yes	No
Casino (BMRC)	Yes	Yes	No	No	No
Charter School	Yes	Yes	Yes	Yes	Yes
Child Development/Head Start	No	Yes	No	No	No
Commodity Foods	No	Yes	No	Yes	No
Community College	Yes	Yes	Yes	Yes	Yes
Culture Department	Yes	Yes	Yes	Yes	Yes
Ellen Marshall Health Center	No	Yes	No	No	No
Future Admin (old Ellen Marshall) Building	Yes	Yes	Yes	Yes	Yes
Four Seasons Market and Deli	Yes	Yes	No	No	No
Gas Station	Yes	Yes	Yes	Yes	Yes
Golf Course	Yes	Yes	Yes	Yes	Yes
History Department/Elder Center	No	Yes	No	No	No
Housing Authority	Yes	Yes	Yes	No	No
Justice Center	No	No	No	No	No
Maintenance Department	Yes	Yes	No	Yes	Yes
Mukwa Fitness Center	No	No	No	No	No
NLCC	No	No	No	No	No
Public Works	No	No	No	No	No
Tribal Administration (current)	Yes	Yes	Yes	Yes	Yes
Waishkey Bay Farm	Yes	Yes	Yes	Yes	Yes
Yes	**14**	**19**	**11**	**13**	**11**
No	**9**	**4**	**12**	**10**	**12**
Facilities Recycling	**61%**	**83%**	**48%**	**57%**	**48%**

3.6. iii Building Recycling Recommendations

Recycling efforts in all buildings can be improved. Self-sort recycling containers could be made available in each building to promote recycling. These containers must be easily accessible. Internal efforts would need to ensure that janitorial and maintenance crews complete the recycling process by ensuring these recyclables are taken to the waste transfer station and placed in the appropriate recycling storage bins and locations. Lastly, a cultural shift must be made that prioritizes follow-through of all staff and renews trust in the whole waste stream system.

Chapter 4. Procurement

In 2021, Bay Mills Indian Community, including Governmental, Enterprise, and Business Holdings operations procured roughly $19.6 million of goods. See Table 4.1.i below for a full breakdown of procurement by entity. Note that, as a result of Coronavirus pandemic relief funding, namely PPP, CARES Act, and ARPA programs, BMIC experienced an influx of funding; therefore, total procurement figures may be atypical. Bay Mills Indian Community's Procurement Policy want not designed to consider or encourage the purchase of products that are environmentally preferable, but to assure that supplies, services, and construction are procured at the most favorable prices available to BMIC.

The goal of the Green Infrastructure Committee in relation to procurement; therefore, is to provide direction for procurement of environmentally preferable products, and to empower government, enterprise, and business holdings entities to factor sustainability into procurement decisions. Environmentally Preferable Products (EPP) are those that have a reduced negative impact on human health and the environment when compared to competing products that serve the same purpose. This comparison may consider raw material acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service.

Entity	Procurement of Goods
Enterprise	
Bay Mills Resort and Casino	$364,052.20
Business Holdings	
Bay Mart	$5,108,349.22
Four Seasons	$484,998.98
Northern Light Cannabis Company	$1,170,356.97
Government	
General Funds	$4,362,731.06
Grants and Contracts (*many departments*)	$8,118,645.18
TOTAL	**$19,609,133.61**

Table 4.1.i. 2021 Total Procurement of Goods by Entity

Factors to consider when determining EPP include, but are not limited to:

- Maximization of recycled products used in product lifecycle
- Environmental cost of entire product life cycle
- Reuse of existing products or materials in product life cycle
- Recyclability of product
- Cleanest mode of transportation used for distribution

- Biodegradability
- Feedstock analysis; what is used to manufacture the product and is the product bio-based or recycled
- Minimization of packaging; use of reusable/recycled packaging materials
- Reduction of energy/water consumption
- Use of renewable energy
- Manufactured from renewable materials
- Reduction of GHG emissions
- Toxicity reduction or elimination
- Elimination of uncertified hardwoods in product life cycle
- Durability and maintenance requirements
- Ultimate disposal of the product; minimize landfill disposal

When considering future procurement, the benefits of favorable pricing will have to be weighed against environmental preferability. In general terms, instituting an Environmental Preferable Procurement Policy would necessitate the following:

- Institute practices that reduce waste by increasing product efficiency and effectiveness;
- Make a good-faith effort to use environmentally preferable purchasing methods when purchasing products to minimize environmental impacts, toxics, pollution, and hazards to worker and community safety;
- Purchase products that reduce greenhouse gas emissions in their production, shipping, use and discard; and
- Purchase products that include recycled content, are durable and long-lasting, conserve energy and water, use agricultural fibers and residues, use unbleached or chlorine free manufacturing processes, are lead-free and mercury-free, and use wood from sustainably harvested forests.

4.1 Procurement Policy Recommendations

The BMIC Green Infrastructure Committee proposes the development of an Environmentally Preferable Procurement Policy that promotes the following tenets:

- Conserve natural resources for the next seven generations,
- Minimize environmental impacts such as pollution and use of water and energy,
- Eliminate or reduce toxins that create hazards to workers and our community,
- Support strong recycling markets,
- Reduce materials that are landfilled,

- Increase the use and availability of environmentally preferable products that protect the environment,
- Identify environmentally preferable products and distribution systems,
- Reward manufacturers and vendors that reduce environmental impacts in their production and distribution systems or services, and
- Create a model for successfully purchasing environmentally preferable products that encourages the use of agricultural fibers, chlorine-free manufacturing processes, wood from sustainably harvested forests, and other environmentally friendly practices, and that encourages other purchasers in our community to adopt similar goals.

Given that BMIC already has an established Procurement Policy, the Green Infrastructure Committee recommends that an EPP Policy be developed to act in concert with the current Procurement Policy, assuring that supplies, services, and construction are procured at the most favorable prices available to BMIC, as well as assuring BMIC is making a good-faith effort to make environmentally preferable purchases. As a matter of policy, the Green Infrastructure Committee looks to Executive Council to determine how stringent the EPP Policy should be in terms of application. This could merely be an exercise of good-faith effort to purchase environmentally-preferable products when economically feasible. Alternatively, Executive Council may choose to establish a firm rule whereby an intangible benefit percentage is allocated for green products. For example, if a green product costs $10,700, versus a comparable product costing $10,000 that isn't green, the green product should be given favor because it is less than 10% more than the non-green product.

4.2 Proposed Procurement Policy

In line with the aforementioned recommendations, the BMIC Green Infrastructure Committee proposes the following Environmentally Preferable Procurement Policy. Note that an intangible benefit percentage has not been provided in this proposed policy draft. The proposed draft language was developed to provide a launching point for future EPP Policy discussions, and will require finetuning based on Executive Council and Executive Management feedback:

BAY MILLS INDIAN COMMUNITY
ENVIRONMENTALLY PREFERABLE PROCUREMENT POLICY

1.0 STATEMENT OF POLICY

It is the policy of Bay Mills Indian Community to:

- Institute practices that reduce waste by increasing product efficiency and effectiveness;
- Make a good-faith effort to use environmentally preferable purchasing methods when purchasing products to minimize environmental impacts, toxics, pollution, and hazards to worker and community safety;

- Purchase products that reduce greenhouse gas emissions in their production, shipping, use and discard; and

- Purchase products that include recycled content, are durable and long-lasting, conserve energy and water, use agricultural fibers and residues, use unbleached or chlorine free manufacturing processes, are lead-free and mercury-free, and use wood from sustainably harvested forests.

2.0 PURPOSE

This Policy is adopted in order to:

- Conserve natural resources for the next seven generations,
- Minimize environmental impacts such as pollution and use of water and energy,
- Eliminate or reduce toxins that create hazards to workers and our community,
- Support strong recycling markets,
- Reduce materials that are landfilled,
- Increase the use and availability of environmentally preferable products that protect the environment,
- Identify environmentally preferable products and distribution systems,
- Reward manufacturers and vendors that reduce environmental impacts in their production and distribution systems or services, and
- Create a model for successfully purchasing environmentally preferable products that encourages the use of agricultural fibers, chlorine-free manufacturing processes, wood from sustainably harvested forests, and other environmentally friendly practices, and that encourages other purchasers in our community to adopt similar goals.

3.0 DEFINITIONS

3.1 "Bio-Based Products" means commercial or industrial products (other than food or feed) that utilize agricultural crops or residues but does not include products made from forestry materials.

3.2 "Biodegradable plastic" means the degradation of the plastic must occur as a result of the action of naturally occurring microorganisms.

3.3 "Buyer" means anyone authorized to purchase or contract for purchases on behalf of this jurisdiction or its subdivisions.

3.4 "The Carpet and Rug Institute" (CRI) is the national trade association representing the carpet and rug industry. CRI has developed and administered the "Green Label" indoor air quality testing and labeling program for carpet, adhesives, cushion materials and vacuum cleaners. The "Green Label Plus" testing program incorporates additional requirements to meet California's Collaborative for High Performance Schools low-emitting materials criteria.

3.5 "Compostable plastic" means plastic that is biodegradable during composting to yield carbon dioxide, water and inorganic compounds and biomass, at a rate consistent with other known compostable materials and leaves no visually distinguishable or toxic residues.

3.6 "Contractor" means any person, group of persons, business, consultant, designing architect, association, partnership, corporation, supplier, vendor or other entity that has a contract with Bay Mills Indian Community or serves in a subcontracting capacity with an entity having a contract with Bay Mills Indian Community for the provision of goods or services.

3.7 "Degradable plastic" means plastic that undergoes significant changes in its chemical structure under specific environmental conditions.

3.8 "EcoLogo" is a third-party, multi-attribute eco-labeling program founded by the Canadian government in 1988 and part of UL Environment since 2010. The Program compares products / services with others in the same category, develops rigorous and scientifically relevant criteria, and awards the EcoLogo to those that are environmentally preferable throughout their entire lifecycle.

3.9 "Electronic Product Environmental Assessment Tool" (EPEAT) is a procurement tool to help institutional purchasers in the public and private sectors evaluate, compare and select personal computers, displays, imaging equipment and televisions based on their environmental attributes.

3.10 "Energy Star" means the U.S. EPA's energy efficiency product labeling program.

3.11 "Energy-Efficient Product" means a product that is in the upper 25% of energy efficiency for all similar products, or that is at least 10% more efficient than the minimum level that meets Federal standards.

3.12 "Environmentally Preferable Products (EPP)" means products that have a reduced negative effect on human health and the environment when compared to competing products that serve the same purpose. This comparison may consider raw material acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance or disposal of the product or service.

3.13 "Federal Energy Management Program" is a program of the Department of Energy that issues a series of *Product Energy Efficiency Recommendations* that identify recommended efficiency levels for energy-using products.

3.14 "Forest Stewardship Council" is a global organization that certifies responsible, on-the-ground forest management according to rigorous standards developed by a broad variety of stakeholder groups.

3.15 "Green Seal" is an independent, non-profit environmental labeling organization. Green Seal standards for products and services meet the U.S. EPA's criteria for third-party certifiers. The Green Seal is a registered certification mark that may appear only on certified products.

3.16 "Integrated Pest Management" is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

3.17 "LEED Rating System" means the most recent version of the Leadership in Energy and Environmental Design (LEED) Rating System, approved by the U.S. Green Building Council, and designed for rating new and existing commercial, institutional, and residential buildings.

3.18 "NSF/ANSI" means NSF International follows the American National Standards Institute (ANSI) standards development process. Standards are developed by joint committees (balanced stakeholder groups of public health, industry and user representatives).

3.19 “Organic Pest Management” prohibits the use and application of toxic chemical pesticides and strives to prevent pest problems through the application of natural, organic horticultural and maintenance practices. All pest control products shall be in keeping with, but not limited to, those products on the approved list of California Certified Organic Farmers (CCOF).

3.20 "Post-consumer Material" means a finished material which would normally be disposed of as a solid waste, having reached its intended end-use and completed its life cycle as a consumer item, and does not include manufacturing or converting wastes.

3.21 “Pre-consumer Material” means material or by-products generated after manufacture of a product is completed but before the product reaches the end-use consumer. Pre-consumer material does not include mill and manufacturing trim, scrap, or broke which is generated at a manufacturing site and commonly reused on-site in the same or another manufacturing process.

3.22 “Recovered Material” means fragments of products or finished products of a manufacturing process, which has converted a resource into a commodity of real economic value, and includes pre-consumer and post-consumer material but does not include excess resources of the manufacturing process.

3.23 “Recycled Content” means the percentage of recovered material, including pre-consumer and post-consumer materials, in a product.

3.24 “Recycled Content Standard” means the minimum level of recovered material and/or post-consumer material necessary for products to qualify as “recycled products.”

3.25 “Recycled Product” means a product that meets [the Organization’s] recycled content policy objectives for post-consumer and recovered material.

3.26 “Remanufactured Product” means any product diverted from the supply of discarded materials by refurbishing and marketing said product without substantial change to its original form.

3.27 “Reused Product” means any product designed to be used many times for the same or other purposes without additional processing except for specific requirements such as cleaning, painting or minor repairs.

3.28 “Source Reduction” refers to products that result in a net reduction in the generation of waste compared to their previous or alternate version and includes durable, reusable and remanufactured products; products with no, or reduced, toxic constituents; and products marketed with no, or reduced, packaging.

3.29 “U.S. EPA Guidelines” means the Comprehensive Procurement Guidelines established by the U.S. Environmental Protection Agency for federal agency purchases as of October 2007 and any subsequent versions adopted.

3.30 “Water-Saving Products” are those that are in the upper 25% of water conservation for all similar products, or at least 10% more water-conserving than the minimum level that meets the Federal standards.

3.31 “WaterSense” means a partnership program by the U.S. Environmental Protection Agency. Independent, third-party licensed certifying bodies certify that products meet EPA criteria for water efficiency and performance by following testing and certification protocols specific to each product category. Products that are certified to meet EPA specifications are allowed to bear the WaterSense label.

4.0 STRATEGIES FOR IMPLEMENTATION

4.1 Source Reduction

4.1.1 Institute practices that reduce waste, encourage reuse, and result in the purchase of fewer products.

4.1.2 Purchase remanufactured products such as toner cartridges, tires, furniture, equipment and automotive parts.

4.1.3 Consider short-term and long-term costs in comparing product alternatives. This includes evaluation of total costs expected during the time a product is owned, including, but not limited to, acquisition, extended warranties, operation, supplies, maintenance and replacement parts, disposal costs and expected lifetime compared to other alternatives.

4.1.4 Purchase products that are durable, long lasting, reusable or refillable and avoid purchasing one-time use or disposable products.

4.1.5 Request vendors eliminate packaging or use the minimum amount necessary for product protection. Vendors shall be encouraged to take back packaging for reuse. A vendor's willingness to take back packaging will be used as part of the consideration in the bid process.

4.1.6 Specify a preference for packaging that is reusable, recyclable or compostable, when suitable uses and programs exist.

4.1.7 Encourage vendors to take back and reuse pallets and other shipping materials, unless these can be used by departments.

4.1.8 Encourage suppliers of electronic equipment, including but not limited to computers, monitors, printers, and copiers, to take back equipment for reuse or environmentally sound recycling when Bay Mills Indian Community discards or replaces such equipment, whenever possible. Suppliers will be required to state their take back, reuse or recycling programs during the bidding process. If this is not feasible, departments can utilize the BMIC E-waste recycling facility and will be expected to follow the disposal fee schedule.

4.1.9 Consider provisions in contracts with suppliers of non-electronic equipment that require suppliers to take back equipment for reuse or environmentally sound recycling when Bay Mills Indian Community discards or replaces such equipment, whenever possible. Suppliers will be required to state their take back, reuse or recycling programs during the bidding process.

4.1.10 Promote electronic distribution of documents rather than printing or copying.

4.1.11 When producing paper documents, print and copy all documents on both sides to reduce the use and purchase of paper. Printers and copiers shall be set to default to duplex.

4.1.12 Reduce the number and type of equipment needed to perform office functions to save energy and reduce purchasing and maintenance costs. Eliminate desktop printers, redundant network printers and reduce the number of fax machines leased or owned by Bay Mills Indian Community]. Consider lease or purchase of multi-function devices.

4.1.13 Ensure all imaging equipment is installed with energy and resource-efficient settings set as default.

4.2 Recycled Content Products

4.2.1 Purchase products for which the United States Environmental Protection Agency (U.S. EPA) has established minimum recycled content standard guidelines, such as those for printing paper, office paper, janitorial paper, construction, landscaping, parks and recreation, transportation, vehicles, miscellaneous, and non-paper office products, that contain the highest post-consumer content available, but no less than the minimum recycled content standards established by the U.S. EPA Comprehensive Procurement Guidelines.

4.2.2 Purchase multi-function devices, copiers and printers compatible with the use of recycled content and remanufactured products.

4.2.3 When specifying asphalt, concrete, aggregate base or Portland cement concrete for road construction projects, use recycled, reusable or reground materials.

4.2.4 Specify and purchase recycled content traffic control products, including signs, cones, parking stops, delineators, channelizers and barricades.

4.2.5 Ensure pre-printed recycled content papers intended for distribution that are purchased or produced contain a statement that the paper is recycled content and indicate the percentage of post-consumer recycled content.

4.3 Energy Efficient and Water Saving Products

4.3.1 Purchase energy-efficient equipment with the most up-to-date energy efficiency functions. This includes, but is not limited to, high efficiency space heating systems and high efficiency space cooling equipment.

4.3.2 Replace inefficient interior lighting with energy-efficient equipment.

4.3.3 Replace inefficient exterior lighting, street lighting and traffic signal lights with energy-efficient equipment. Minimize exterior lighting where possible to avoid unnecessary lighting of architectural and landscape features while providing adequate illumination for safety and accessibility. Refer to the BMIC Green Building Checklist, if needed.

4.3.4 Purchase U. S. EPA Energy Star certified products when available. When Energy Star labels are not available, choose energy-efficient products that are in the upper 25% of energy efficiency as designated by the Federal Energy Management Program.

4.3.5 Purchase U.S. EPA WaterSense labeled water-saving products when available. This includes, but is not limited to, high-performance fixtures like toilets, low-flow faucets and aerators, and upgraded irrigation systems.

4.4 Green Building Products and Practices

4.4.1 Consider Green Building practices for design, construction, and operation as described in the LEED Rating Systems for all building and renovations undertaken by Bay Mills Indian Community. Refer to the BMIC Green Building Checklist.

4.5 Landscaping Products and Practices

4.5.1 Employ sustainable landscape management techniques for all landscape renovations, construction and maintenance performed by Bay Mills Indian Community including workers and contractors providing landscaping services for Bay Mills Indian Community, including, but not limited to, integrated pest management, grasscycling, drip irrigation, computerized central irrigation linked with the local weather station, composting, and procurement and use of mulch and compost that give preference to those produced from regionally generated plant debris and/or food scrap programs.

4.5.2 Choose Landscape Professionals for landscape design and maintenance services. Training and qualifications shall include landscaping locally, landscaping for native and climate adapted species, landscaping for less to the landfill, nurturing the soil, conserving water, conserving energy, protecting water and air quality, and creating wildlife habitat.

4.5.3 Select plants to minimize waste by choosing species for purchase that are appropriate to the microclimate, species that can grow to their natural size in the space allotted to them, and perennials rather than annuals for color. Native and climate adapted plants that require no or minimal watering once established are preferred.

4.5.4 Hardscapes and landscape structures constructed of recycled content materials are encouraged. Limit the amount of impervious surfaces in the landscape. Permeable substitutes, such as permeable asphalt or pavers, are encouraged for walkways, patios and driveways.

4.5.5 Create bioswales and rain gardens in all landscape renovations and construction performed by Bay Mills Indian Community to assist in water run-off management. Develop outreach programs to instruct the public in the proper maintenance of bioswales and rain gardens.

4.6 Toxics and Pollution Prevention Products and Practices

4.6.1 Manage pest problems through prevention and physical, mechanical and biological controls when Bay Mills Indian Community and its contractors maintain buildings and landscapes. Bay Mills Indian Community may either adopt and implement an Organic Pest Management (OPM) policy and practices or adopt and implement an Integrated Pest Management (IPM) policy and practices using the least toxic pest control as a last resort.

4.6.2 Use products with the lowest amount of volatile organic compounds (VOCs), highest recycled content, low or no formaldehyde and no halogenated organic flame retardants when purchasing building maintenance materials such as paint, carpeting, adhesives, furniture and casework.

4.6.3 Purchase or require janitorial contractors to supply, industrial and institutional cleaning products that meet Green Seal or UL/EcoLogo certification standards for environmental preferability and performance.

4.6.4 Purchase, or require janitorial contractors to supply, vacuum cleaners that meet the requirements of the Carpet and Rug Institute Green Label/Seal of Approval Program for soil removal, dust containment and carpet fiber retention for indoor air quality protection and performance cleaning standards. Other janitorial cleaning equipment should be capable of capturing fine particulates, removing sufficient moisture so as to dry within 24 hours, operate with a sound level less than 70dBA, and use high-efficiency, low-emissions engines.

4.6.5 Purchase paper, paper products, and janitorial paper products that are unbleached or are processed without chlorine or chlorine derivatives.

4.6.6 Prohibit the purchase of products that use polyvinyl chloride (PVC) such as, but not limited to, furniture and flooring.

4.6.7 Purchase products and equipment with no lead or mercury whenever possible. For products that contain lead or mercury, Bay Mills Indian Community should give preference to those products with lower quantities of these metals and to vendors with established lead and mercury recovery programs. In addition, whenever lead- or mercury-containing products require disposal, Bay Mills Indian Community will dispose of those products in the most environmentally safe manner possible. All fluorescent lamps and batteries will be recycled or disposed of using the BMIC Maintenance Department Bulb Crusher

4.6.8 Purchase or specify personal computers, displays, imaging equipment and televisions that meet, at a minimum, all Electronic Product Environmental Assessment Tool (EPEAT) environmental criteria designated as "required" as contained in the IEEE 1680 family of Environmental Assessment Standards.

4.6.9 Purchase or specify commercial carpeting that meets NSF/ANSI 140 Standard for Sustainable Carpet Assessment and require old carpet that is removed be recycled.

4.6.10 Purchase or specify non-carpet floor coverings that meet NSF/ANSI 332 Standard for Resilient Flooring including vinyl, linoleum and rubber flooring.

4.6.11 When replacing vehicles, consider less-polluting alternatives to diesel such as compressed natural gas, bio-based fuels, hybrids, electric batteries, and fuel cells, as available.

4.7 Bio-Based Products

4.7.1 Purchase paper, paper products and construction products made from non-wood, plant-based contents such as agricultural crops and residues.

4.7.2 Purchase bio-based plastic products that are biodegradable and compostable, such as bags, film, food and beverage containers, and cutlery.

4.8 Forest Conservation Products

4.8.1 To the greatest extent practicable, do not procure wood products such as lumber and paper that originate from forests harvested in an environmentally unsustainable manner. When possible, give preference to wood products that are certified to be sustainably harvested by a comprehensive, performance-based certification system. The certification system shall include independent third-party audits, with standards equivalent to, or stricter than, those of the Forest Stewardship Council certification.

4.8.2 Encourage the purchase or use of previously used or salvaged wood and wood products whenever practicable.

5.0 RESPONSIBILITIES

5.1 The health and safety of workers and citizens is of utmost importance and takes precedence over all other practices. Nevertheless, Bay Mills Indian Community recognizes its duty to act in a fiscally responsible as well as a timely manner.

5.2 Nothing contained in this policy shall be construed as requiring a department, purchaser or contractor to procure products that do not perform adequately for their intended use, exclude adequate competition, risk the health or safety of workers and citizens, or are not available at a reasonable price in a reasonable period of time.

5.3 Nothing contained in this policy shall be construed as requiring Bay Mills Indian Community, departments, purchasers, or contractors to take any action that conflicts with local, state or federal requirements.

5.4 Bay Mills Indian Community has made significant investments in developing a successful recycling system and recognizes that recycled content products are essential to the continuing viability of that recycling system and for the foundation of an environmentally sound production system. Therefore, to the greatest extent practicable, recycled content shall be included in products that also meet other specifications, such as chlorine free or bio-based.

6.0 IMPLEMENTATION

6.1 The Chief Financial Officer shall implement this policy in coordination with other appropriate Bay Mills Indian Community personnel.

6.2 Require successful bidders to certify in writing that the environmental attributes claimed in competitive bids are accurate. Vendors shall be required to specify the minimum or actual percentage of recovered and post-consumer material in their products, even when such percentages are zero.

6.3 Upon request, buyers making the selection from competitive bids shall be able to provide justification for product choices that do not meet the environmentally preferable purchasing criteria in this policy.

6.4 Encourage vendors, contractors and grantees to comply with applicable sections of this policy for products and services provided to Bay Mills Indian Community.

7.0 PROGRAM EVALUATION

7.1 The Chief Financial Officer shall periodically evaluate the success of this policy's implementation and report to the Executive Council.

8.0 EFFECTIVE DATES

The above Policy was adopted at a meeting of the Executive Council held on the ____day of _____, 2023, by a vote of ____ in favor, ___ opposed, ___ absent, and ___ abstaining. As per the provisions of the Bay Mills Constitutions, the President must abstain except in the event of a tie.

_____
Beverly A. Carrick
Secretary
Executive Council

Chapter 5. Green Buildings and Grounds

Humans interact with the built environment constantly, from our homes, to the roads we drive on, to the stores we shop in, to the offices where we work. The built environment; therefore, literally shapes our everyday lives. Studies show that the design of infrastructure significantly impacts the mental, emotional, and physical health of humans.

Partners with Biological Services and Inter-tribal Council of Michigan compiled a study in 2016 of expected weather impacts to the Bay Mills region. The region has observed noticeable changes in weather in recent years. These changes have been measured in mean season temperatures, percentage of ice cover, frequency of severe storms and many other parameters. Since 1950 the mean temperatures in winter and spring have increased more in the northern Great Lakes than in other areas. The Eastern Upper Peninsula has witnessed warmer winters and warmer springs.

The frequency and intensity of storms in the Great Lakes region has also changed in the last fifty years. GLISA reported that precipitation from 1981-2010 is 5.1% more intense and frequency has increased 23.6% when compared to 1951-1980 (GLISA, Extreme Precipitation, 2015). Severe or intense precipitation has numerous consequences that are cause for concern. Flooding and storm water runoff are priority concerns, as rain from extreme participation events has inadequate time to infiltrate the soil. Instead, it erodes land surfaces, infiltrates and damages infrastructure, and carries soils, nutrients, and/or contaminants directly to surface waters (ITCMI, 2016). Stormwater runoff has the potential to impact natural and manmade systems and structures (ITCMI, 2016).

Climate change is predicted to increase the number of extreme weather events and also decrease our air quality which will impact human health and disease in many ways. With the projected increases in temperature and frequency of extreme weather events, data suggests ground level ozone and particulate matter will increase which causes many problems including decreased lung function, increase in asthma attacks and increase in premature deaths. Also, with the increase in frost-free days and warmer seasonal temperatures, allergenic plants are projected to have longer pollen seasons and affect people with allergies. Buildings may also have increases in mold growth due to the warmer temperatures and increased precipitation. Doctors may have a harder time aiding people with allergies and asthma in the future (Luber et al. 2014). In addition, with these health risks, the projected increase in temperature may increase heat-related illness including heat exhaustion, heat stroke and death. Human health impacts from insect-borne diseases are projected to become more prevalent as well.

Armed with this knowledge, Bay Mills Indian Community can make a conscious decision to thoughtfully design future infrastructure in such a way as to maximize Mino Bimaadiziwin "Good Life" of our citizens, employees, and visitors. Green buildings are one avenue through which BMIC can achieve this goal.

5.1 Definitions

Sustainable Design: an architectural approach that seeks to reduce negative environmental impact that promotes improved health outcomes.

Green infrastructure: planned natural and engineered features designed to deliver ecosystem services for the benefit of human and environmental health.

Net Zero: a target of negating the amount of greenhouse gases produced by human activity by reducing emissions and removing greenhouse gases from the atmosphere.

Stormwater Management: the process of controlling stormwater runoff, primarily from impervious surfaces.

Biophilic Design: an architectural approach that promotes the use of natural materials, natural light, and landscape features to increase connectivity of building occupants to the natural environment, and create a more productive, healthy built environment.

5.2 Background

Green buildings and grounds are those that exemplify biophilic and sustainable design. Essentially, this means that infrastructure is designed in such a way as to reduce harmful impact to the natural environment, while also promoting human health. This can be achieved through use of natural materials, maximizing natural light, incorporating green infrastructure in landscaping, and much more.

When thinking about sustainability in the context of Bay Mills Indian Community, there are several aspects that we can contemplate. The first aspect is how infrastructure can impact different components of a community, whether it be the built environment, social atmosphere, cultural traditions, or human health. Human health is typically thought of as a cross-section of physical, mental, emotional, and spiritual well-being. These ideas can be melded together to create a model of sustainability catered specifically to BMIC. While the word sustainability typically focuses on the cross-section of community well-being, economic prosperity, and environmental stewardship, the Green Infrastructure Committee felt it important to add a long-term resilience component to the mix. All of these concepts together form the basis of sustainability, and the underlying goals for Green buildings in Bay Mills Indian Community (see Figure 5.2. BMIC Sustainability Model).

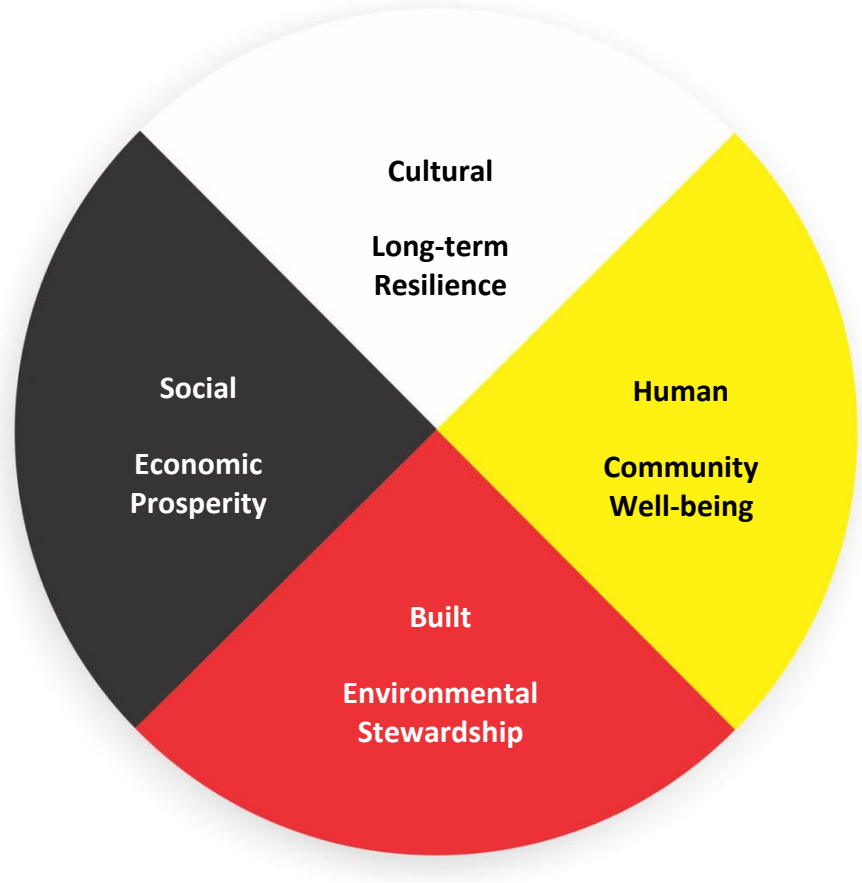


Figure 5.2. BMIC Sustainability Model

"Green" development can be expressed/measured in terms of green building certifications or standards. These certifications create, and hold buildings to specific environmental, energy, human health, etc. standards related to the design, construction, and performance of the building. This may include reduced water and energy consumption, maximizing natural light, proving green space, contemplating physical, mental and emotional wellbeing in the design of a building, meeting air quality standards, reducing light pollution, and much more. Dozens of green building certifications exist for new development and redevelopment. Some of the most popular new development certifications include Leadership in Energy and Environmental Design (LEED), WELL, Energy Start, and the Living Building Challenge. Common redevelopment certifications include EnerPhit and Passive House Certificate. Organizations generally choose a green building certification that aligns most closely with the specific project, organizational goals and objectives. While these certifications/standards are great tools in assisting communities or entities in reducing their ecological footprint, it is important to note that meeting the stringent standards set by these certifications come at a cost, both in terms of time it takes to receive the certification, and the amount of money it can cost to meet the standards.

Given the extensive nature, time and monetary requirements associated with these certifications, the Green Infrastructure Committee is proposing a BMIC Green Building checklist, defined by the Tribe, to include elements of popular green building standards with the additional consideration of culture, values, and traditions as set forth in the BMIC Sustainability Model.

5.3 Green Building Recommendations and Checklist

To ensure future infrastructure, whether new development or redevelopment of existing structures, incorporates sustainable and biophilic design, the Green Infrastructure Committee developed a Procedural Checklist for Development and Redevelopment, and a Green Elements Building Checklist.

The Procedural Checklist for Development and Redevelopment is a tool for departments or entities to thoroughly review a proposed project while in its infancy. This procedural checklist allows BMIC to take a proactive approach to development and redevelopment, instead of a reactive approach, by thoughtfully assessing the proposed project and site on which it will be placed. The procedural checklist includes the following steps:

1. Tribal Manager Review
2. Land Office Review
3. Biological Services GIS Desktop Review
4. THPO Review
5. Construction Manager Review
6. Team Review
7. Additional Committee/Departmental Review
8. Other Considerations, if warranted, including Phase 1 Archaeology Studies or BIA Forestry Timber Cruise and/or Timber Sale
9. Additional Steps, including a presentation of the proposed project to Executive Council, coordinating with the Grants Department to identify and secure funding, and posting a Request for Quotes for Architecture and Engineering services

The full Procedural Checklist for Development and Redevelopment can be found on page 49-50 of this report.

Working through this procedural checklist will ensure any concerns regarding the project and/or proposed location are identified right away. Findings during this initial process may warrant additional reviews, such as a Phase 1 Archeology Study or contacting the BIA Forestry Department. Should grant funding be required for a proposed project, this procedure will provide much of the information for an Environmental Narrative, should that be required by the funding agency/organization. Additionally, this comprehensive review ensures all aspects of a development or redevelopment are considered prior to procurement of architecture and engineering plans. This will safeguard against significant changes late in the development process due to poor initial planning, thereby saving time and money.

In addition to the Procedural CheckList, the Green Infrastructure Committee also developed a Green Elements Building Checklist for extreme weather resilience. This Checklist is designed to complement the Procedure Checklist, specifically when it is time to secure an Architect and Engineering firm. The Green Elements Building Checklist is a Bay Mills Indian Community-specific set of standards for future development or redevelopment that encourages facilities to be designed and constructed to be more efficient, provide a healthier indoor environment, minimize harmful effects on human health and the environment, and ensure long-term resiliency of the structure.

The checklist includes sections focusing on the following:

10. Seven Generations
11. Stormwater Management
12. Disaster and Extreme Weather Mitigation
13. Net Zero Construction and Green Energy
14. Indoor Human Use and Biophilic Design
15. Outdoor Human Use and Biophilic Design
16. Human Health Impacts
17. Solid Waste and Materials
18. Considerations During Construction, including what to do if historic properties, archeological resources, human remains, or other cultural items are discovered; a site blessing in conjunction with the Cultural Department; and how to mitigate environmental challenges in conjunction with the Biological Services Department.

Each of these categories puts forth general items that should be incorporated in the development of Architect/Engineering plans and designs. Specific outcomes will be project-specific, and should rely on proper planning. This checklist may be provided during the Request-for-Proposal process to ensure standards and expectations are fully understood prior to onboarding a A/E firm.

The full and Green Elements Building Checklist can be found on page 51-53 of this report.

In line with the aforementioned recommendations, the BMIC Green Infrastructure Committee proposes the following Procedural Checklist for Development and Redevelopment, and Green Elements Building Checklist:

PROCEDURAL CHECKLIST FOR DEVELOPMENT AND REDEVELOPMENT

DRAFTED BY THE GREEN INFRASTRUCTURE COMMITTEE: 2022

THIS CHECKLIST IS INTENDED TO GUIDE BAY MILLS INDIAN COMMUNITY TO TAKE A PROACTIVE APPROACH TO DEVELOPMENT AND REDEVELOPMENT PLANNING. THIS CHECKLIST IS A TOOL FOR DEPARTMENTS, COMMITTEES, AND LEADERSHIP TO REVIEW A PROPOSED PROJECT WHILE IN IT'S INFANCY.

1 TRIBAL MANAGER REVIEW

- [ ] Present proposed development/redevelopment to Tribal Manager
- [ ] Determine if there are competing proposals for the same site

2 LAND OFFICE REVIEW

Please allow 5 business days for the request to be processed

- [ ] Review maps with BMIC Land Office.
- [ ] Review ownership/leases
- [ ] Review in correlation with Comprehensive Plan/Land Use Plan

3 BIOLOGICAL SERVICES GIS DESKTOP REVIEW

Please allow 30 business days for the request to be processed

- [ ] Map Township/Range/Section/Quarter Section of Proposed Area
- [ ] Map Soils and Drainage
- [ ] Map Topography and Surface Water Hydrology- both Ephemeral and Permanent Streams, including 100' buffer
- [ ] Map Vegetation Cover Type/Wetland Classification (This will determine if a Wetland Delineation Survey is needed)
- [ ] Map 100-year Floodplain, including 100' buffer
- [ ] Map Threatened and Endangered Species; determine if a Threatened and Endangered Species clearance letter
- [ ] Request a Phase 1 ESA report if known historical contamination/current contamination of proposed site and surrounding area

4 THPO REVIEW

Please allow 30 business days for the request to be processed

- [ ] Review Map of Township/Range/Section/Quarter Section
- [ ] 50' buffers from identified sites
- [ ] Provide THPO Review Letter

5 CONSTRUCTION MANAGER REVIEW

Please allow 5 business days for the request to be processed

- [ ] Review map of soils and drainage
- [ ] Review map of topography, hydrology, and 100-year floodplain
- [ ] Review utility hook-up potential
- [ ] Review road access potential and zoning requirements
- [ ] 100' setback from Lake for septic systems, etc.
- [ ] Assess need for permits

6 TEAM REVIEW

- [ ] Team review with Tribal Manager, Land Office, THPO, Biological Services, Construction Manager, and Legal

7 ADDITIONAL COMMITTEE/DEPARTMENTAL REVIEW

- [ ] Review proposal with Solid Waste Committee
- [ ] Review proposal with Green Infrastructure Committee
- [ ] Review proposal with Transportation Planner- road access, trails, and walkability

8 OTHER CONSIDERATIONS, IF WARRANTED

- [ ] BIA Phase 1 Archeological Study
- [ ] BIA Forestry Department Timber Cruise/ Timber Sale

9 ADDITIONAL STEPS

- [ ] Present project to Executive Council
- [ ] Introduce project to BMIC Grants Department- follow Grants Policy and Procedures, and prepare the neccessary documents; such as, clearance surveys, environmental narratives, and NEPA
- [ ] Request for Quotes for Architecture and Engineering Services; attach Green Buildings Checklist to RFQ

GREEN ELEMENTS BUILDING CHECKLIST FOR EXTREME WEATHER RESILIENCY

DRAFTED BY THE GREEN INFRASTRUCTURE COMMITTEE: 2022

FIRST COMPLETE THE PROCEDURAL CHECK LIST FOR DEVELOPMENT AND REDEVELOPMENT

1 SEVEN GENERATIONS

- [ ] Appropriately size the facility to ensure there is room to grow. Will users of this building have room to:
  - [ ] Grow staffing for the next seven generations?
  - [ ] Grow storage for the next seven generations?
- [ ] Durability of the Materials: choose durable, sustainability sourced materials that will not need frequent replacement
- [ ] Plan for vertical development if site conditions allow (two stories +, always build a full basement on suitable soil sites)

2 STORMWATER MANAGEMENT

- [ ] Install road ditches where suitable
- [ ] Stormwater catchment basins on parking lots (equivalent to 20% of parking lot square footage)
- [ ] Culverts sized for 100-year flood

3 DISASTER AND EXTREME WEATHER MITIGATION

- [ ] Dual energy and heating sources (on the grid electric with backup generator, wood-burning heat source, etc.)
- [ ] Siting on higher ground to avoid flood waters
- [ ] Roof pitch and capacity to handle 100-year ice storm/rain storm/wet snow, etc.
- [ ] Durability of materials (i.e. triple-paned, bird-safe glass, resilient exterior cladding, etc.)

4 NET ZERO CONSTRUCTION AND GREEN ENERGY

- [ ] First orient the building for passive solar design (additional passive lighting from well-placed windows, sky tunnels, and sky lights)
- [ ] Create efficient exterior envelope (thick insulation, high R-value insulation, triple-paned, bird-proof glass)
- [ ] Install efficient appliances and electric systems (LED lights, EnergyStar appliances, recirculating fans, heat pumps, etc.
- [ ] Water efficiency (e.g. high and low flush toilets) and/or recapture system (e.g. rain water to flush toilets)

- [ ] Electricity generation on-site
  - [ ] Solar panel siting/green energy considerations (At a minimum, facilities should be engineered PV-ready)
  - [ ] Electric vehicle charging station (At a minimum, facilities should be engineered EV charger-ready)

5 INDOOR HUMAN USE AND BIOPHILIC DESIGN

- [ ] Allow for incorporation of "biophilic" design. This goal often supports occupant mental health (including passive lighting, plants, water, natural materials such as wood and stone, etc.)
- [ ] Allow for incorporation of Anishinaabe principle in the design
- [ ] Allow for diverse accessibility
  - [ ] ADA hallways, doorways, elevators, bathrooms, etc.
  - [ ] Breastfeeding/pumping rooms for employees
  - [ ] Employee mental health rooms

6 OUTDOOR HUMAN USE AND BIOPHILIC DESIGN

- [ ] Allow for incorporation of Anishinaabe principle in the design
- [ ] Consider views and access to outdoor spaces and walkability to and from the facility
- [ ] Allow for diverse accessibility
  - [ ] ADA sidewalks, parking, ramps, etc.
- [ ] Consider large vehicle access for maintenance and deliveries

7 HUMAN HEALTH IMPACTS

- [ ] Radon, air and vapor mitigation systems
  - [ ] Regular mold inspections
  - [ ] Chemical storage
- [ ] Biohazard bins

8 SOLID WASTE AND MATERIALS

- [ ] Allow adequate space for waste stream sorting. If the facility contains a kitchen or breakroom, allow space for indoor composting
  - [ ] Consider bear-proof or nuisance animal mitigation if outdoor waste streams
  - [ ] Consider if facility will be part of Maintenance pick-up or independent contractor route
- [ ] Construction waste reduction
  - [ ] Utilize material-efficient framing and ordering techniques
  - [ ] Implement construction waste management practices to reduce waste going to landfill
  - [ ] Utilize construction materials with recycled content or reused construction materials

9 CONSIDERATIONS DURING CONSTRUCTION

- [ ] **NATIONAL HISTORIC PRESERVATION ACT AND NATIVEAMERICAN GRAVE PREPATRIATION ACT. If historic properties, archeological resources, human remains, or other cultural items not previously reported are encountered during the course of any activity associated with this lease, all activity in the immediate vicinity of the properties, resources, remains, or items will cease and the Lessee will contact the Bureau of Indian Affairs and the Bay Mills Indian Community to determine how to proceed and appropriate disposition.**
- [ ] **Invite Cultural Department for a site blessing.**
- [ ] **Engage early and often with Biological Services for technical expertise to mitigate environmental challenges that may arise during construction.**
- [ ] **Report all fuel/chemical spills within 24 hours to Biological Services Department while the responsible party applies containment of spill. Refer to BMIC Spill Prevention Plan.**

3

Chapter 6. Stormwater Management Infrastructure and Roads Network

Like many communities, the network of roads, ditches, and stormwater management at Bay Mills has changed and evolved as the community has grown. Main roads, such as Lakeshore Drive, W Spectacle Lake Rd, Tower Rd, and Plantation Rd, are maintained by Chippewa County Road Commission and so match their typical design parameters. Neighborhood roads, such as Red Pine Lane, Crane Road, South Towering Pines Rd, and others are developed and maintained by BMIC. Some areas have ditching for stormwater management while others do not.
BMIC ordinances for businesses and government building development date back to 1960s. These ordinances do not include design specifications on parking lot green space or ditching requirements. Snow plowing is also completed at the discretion of the operator, so piles frequently concentrate along riparian and shoreline areas. Consequently, many BMIC government, enterprise, business holdings, and residential facilities experience ponding or flooding during rain events and spring melt.

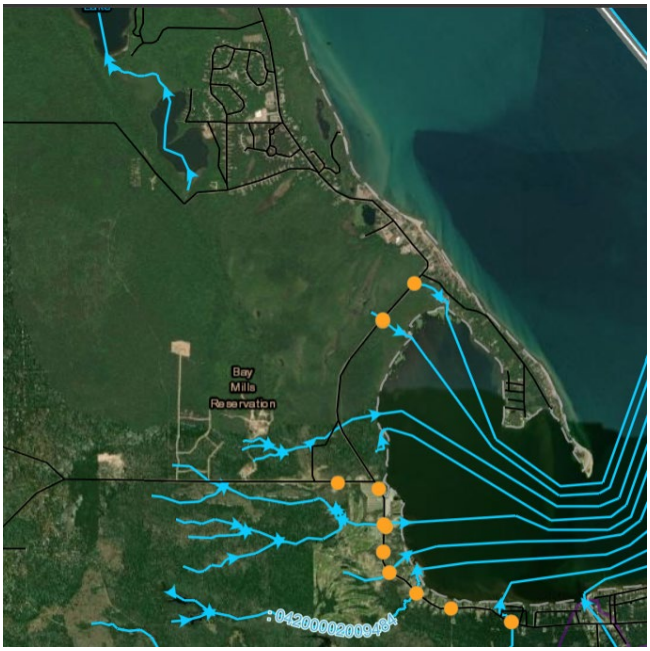
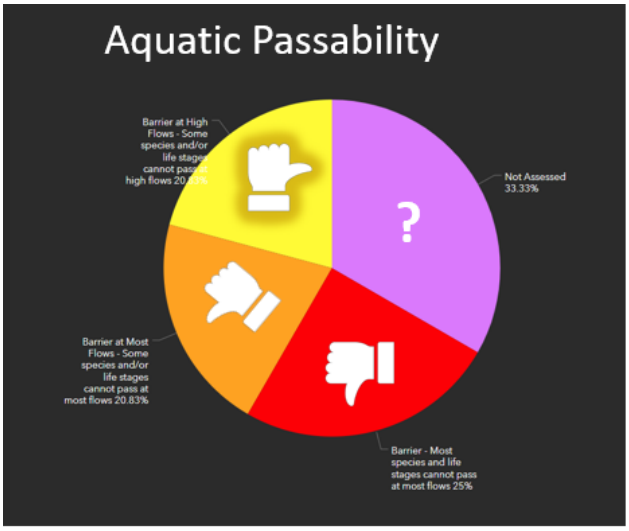
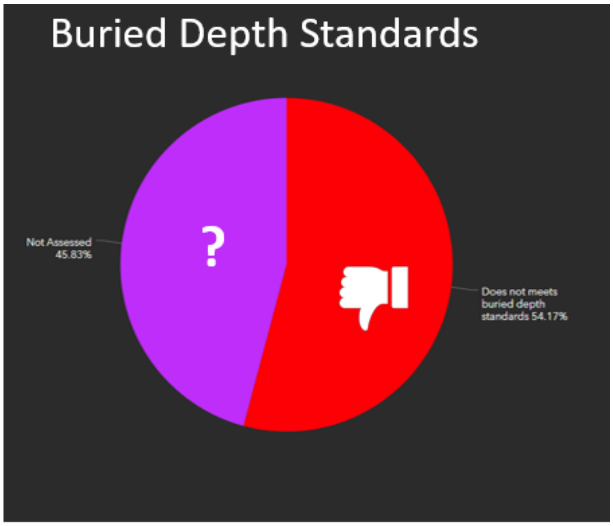


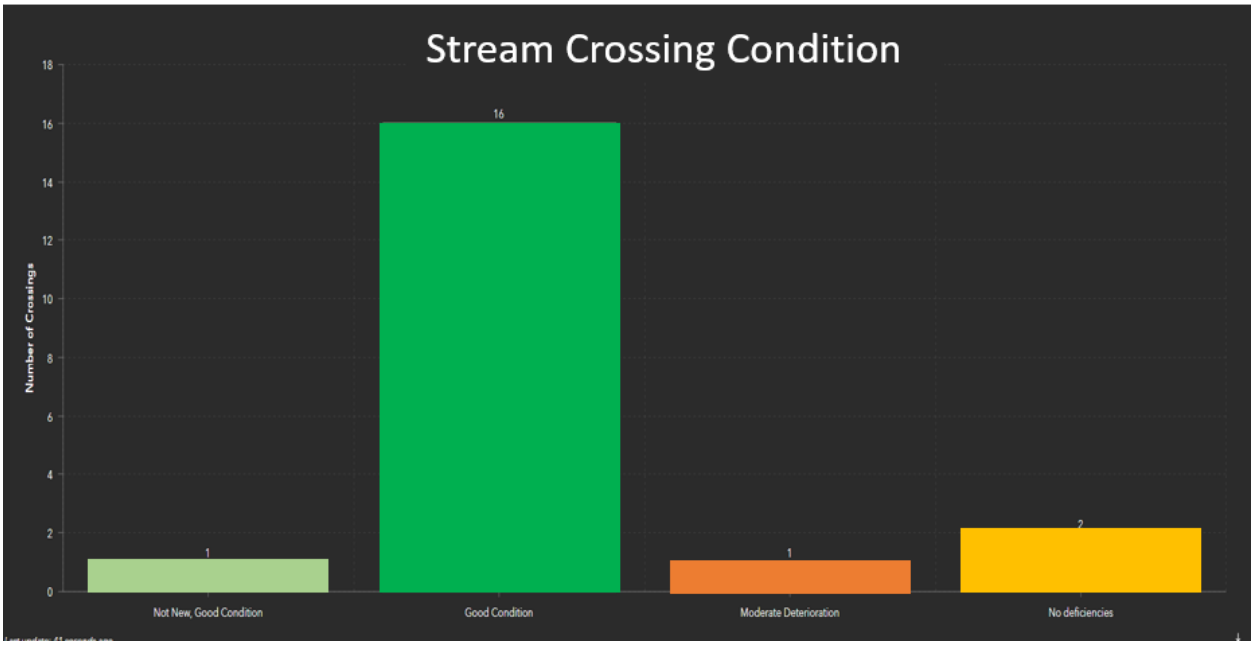
Figure 6a. Road-stream-crossing locations around Waishkey Bay. Many more driveway and ditch culverts exist, but were not assessed. Figure 6b. High priority crossing 281/282 at BMRC.

The Waishkey River Watershed Management Plan of 2020 included extensive surveys of area road stream crossings (whether they are culverts or bridges). Many, many more culverts exist in this area, allowing for ditch drainage, etc; in this survey, only crossings of permanent streams were surveyed. Information was collected at a dozen specific crossings on Bay Mills trust land within the Waishkey watershed (see Figure 6a). Data collected from the stream-crossings surveys revealed point- and nonpoint sources of contamination. Many of the culverts in the watershed and Bay Mills are undersized and should be considered for replacement. Additionally, their style may be ill-suited for the flashy, clay streams they are placed in. The metal or concrete of these structures may be in largely good condition, but due to alignment, sizing, embedded depth, etc, these structures are less than ideal for the environment and human infrastructure (see figures

and table below). Potential negative outcomes from improper RSC range from environmental degradation, to additional road maintenance, to catastrophic failure of the crossing. Of the RSC surveys completed at Bay Mills, most are undersized. Two RSCs (located at BMRC parking lot) are deemed high priority due to their alignment.







Figures 6c, 6d, 6e. Data summary from Great Lakes Road Stream Crossing data dashboard (DNR).

Table 6.1. Road Stream Crossings recently surveyed with Great Lakes Road Stream Crossing Inventory. These priority levels have been determined by BMIC Biological Services staff.

ID	Priority Level	Road	Stream/ Landmark	Erosion Extent	Fish Passage	Perch Culvert	Undersized	Misalignment	Ownership
RSX 276	Medium	Lakeshore Dr	Deep Creek	Entrenched	Barrier at high flows	No	Yes	Ok	County
RSX 281	High	BMRC Driveway	Parrish Creek	Moderate	Plugged	No	Yes	Severe	BMIC
RSX 282	High	Lakeshore Dr, BMRC	Parrish Creek	Moderate	Barrier at high flows	No	Yes	Ok	County
RSX 287	Low	Lakeshore Dr	Unnamed, Ash Preserve	Moderately entrenched	Plugged. Barrier to Fish	Perched	Yes	Ok	County
RSX 291	Low	Lakeshore Dr	Club Creek	Minor	No	Slightly	No	Minor	County
RSX 292	Low	Lakeshore Dr	Lil Waiska	Minor	No	No	Yes	Ok	County
RSX 314		Lakeshore Dr	Unnamed, RV Park	no	no	no	Somewhat	Ok	County
RSX 315	Medium	Plantation	Unnamed, ditch	Moderate	No	No	Yes	Ok	County
RSX 316	Low	Lakeshore Dr	Ponty's Creek	Entrenched. Moderate	Yes	Yes. Not Buried	No	Ok	County
RSX 317	Medium	Lakeshore Dr	Unnamed, Chippewa Landing	Minor	No	No	Yes	Ok	County
RSX 318	Medium	Lakeshore Dr	Unnamed, Gma Turtle	Moderate	Barrier to Fish	Yes	Yes	Poor	County
RSX 319	Unranked	Lakeshore Dr	Unnamed, College Pond	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed	County

6.1 Stormwater Management Recommendations

General strategies have been developed by local land managers and partner organizations. These strategies are outlined and further described in the Waishkey River Watershed Management Plan (accepted in 2020 by Bay Mills Executive Council). These recommendations should be employed around Bay Mills when opportunity arises.

Excerpts from Table 22. Nonpoint source pollution goals and proposed implementation strategies for all Waishkey River subwatersheds.

SUBJECT	STRATEGY	PARTNER
Ordinances and Policies (business development & parking lots)	a. Promote water infiltration on site (percolation through soil and plant uptake and transpiration). Use soil and vegetation in a constructed technique, such as rain gardens. b. Build snow retention areas / bioswales DISCONNECTED from waterbodies. c. Protect adjacent lands from direct stormwater discharge off of BMIC gov and enterprise developments. d. Build rain gardens or green roofs, to mimic natural hydrologic processes and water infiltration. e. Effectively minimize or disconnect impervious surfaces (for example, continuous parking lots).	BMIC
Ordinances and Policies (BMIC neighborhood roads network)	f. Reduce floodplain development and preserve small streams. Preserve natural features, such as floodplains with a natural vegetation buffer along streams, that can slow, filter, and store storm runoff. g. Plan new neighborhoods with stormwater in mind. h. Ensure long-term operation and maintenance of stormwater facilities.	BMIC
Reduce streambank erosion (due to culverts & other anthropogenic causes)	i. Stabilize slopes j. Reseed areas with native plants k. Replace undersized culverts l. Encourage the use of bottomless culverts and bridges	BMIC, CCRC, CLMCD, MITC, Townships

References

Bay Mills Indian Community. 2022. Solid Waste Management Plan. Accepted by Executive Council July 2022. Staff Jennifer Parks.

Bay Mills Indian Community. 2020. Waishkey River Watershed Management Plan. Accepted by Executive Council Dec 2020. Staff Aubrey Maccoux-LeDuc.

Bay Mills Indian Community. 2016. Non-point Source Pollution Management Plan. Accepted by Executive Council. Staff Brian Wesolek.

Great Lakes Integrated Sciences and Assessments. 2014. Change in Frost-Free Season Length. Great Lakes Integrated Sciences and Assessments, Ann Arbor, MI (www.glisa.umich.edu, Accessed June 2016).

Great Lakes Integrated Sciences and Assessments. 2014. Climate Change in the Great Lakes Region. Great Lakes Integrated Sciences and Assessments, Ann Arbor, MI (www.glisa.umich.edu, accessed June 2016).

Inter-Tribal Council of Michigan, Inc. 2016. Michigan Tribal Climate Change Vulnerability Assessment and Adaptation Planning: Project Report.

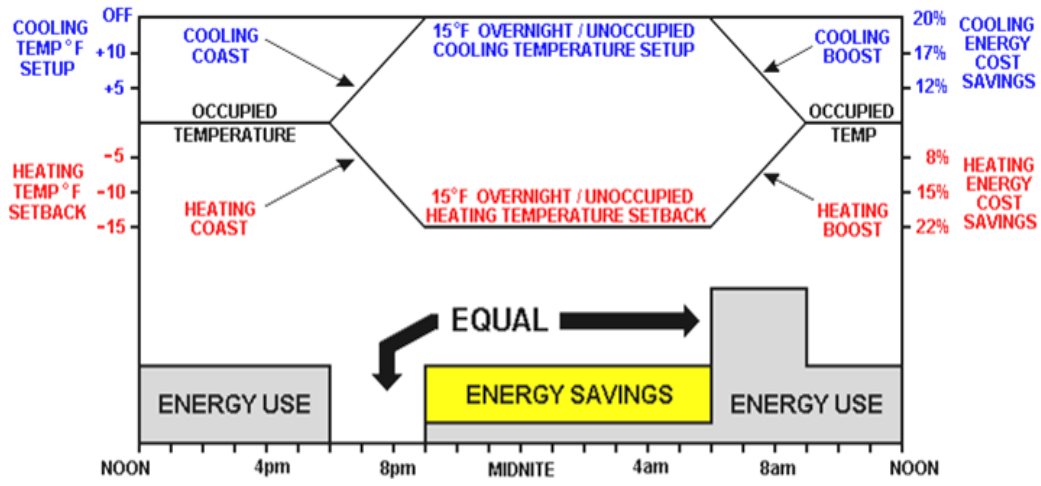
Luber, G., K. Knowlton, J. Balbus, H. Frumkin, M. Hayden, J. Hess, M. McGeehin, N. Sheats, L. Backer, C. B. Beard, K. L. Ebi, E. Maibach, R. S. Ostfeld, C. Wiedinmyer, E. Zielinski-Gutiérrez, and L. Ziska. 2014. Ch. 9: Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/J0PN93H5.

Superior Watershed Partnership. 2022. Bay Mills Indian Community Energy Efficiency Assess

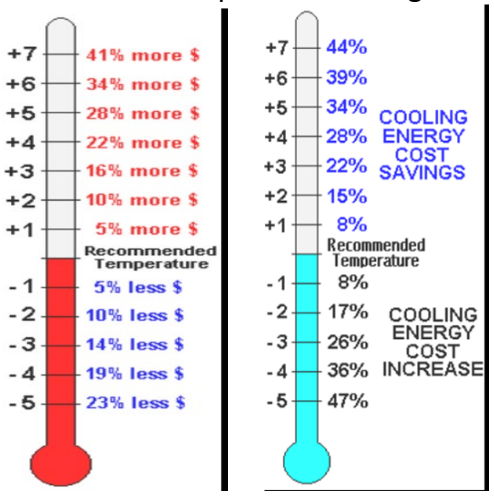
Appendix A: Energy Conservation Measures

Thermostat Optimization

Setback & Setup Savings



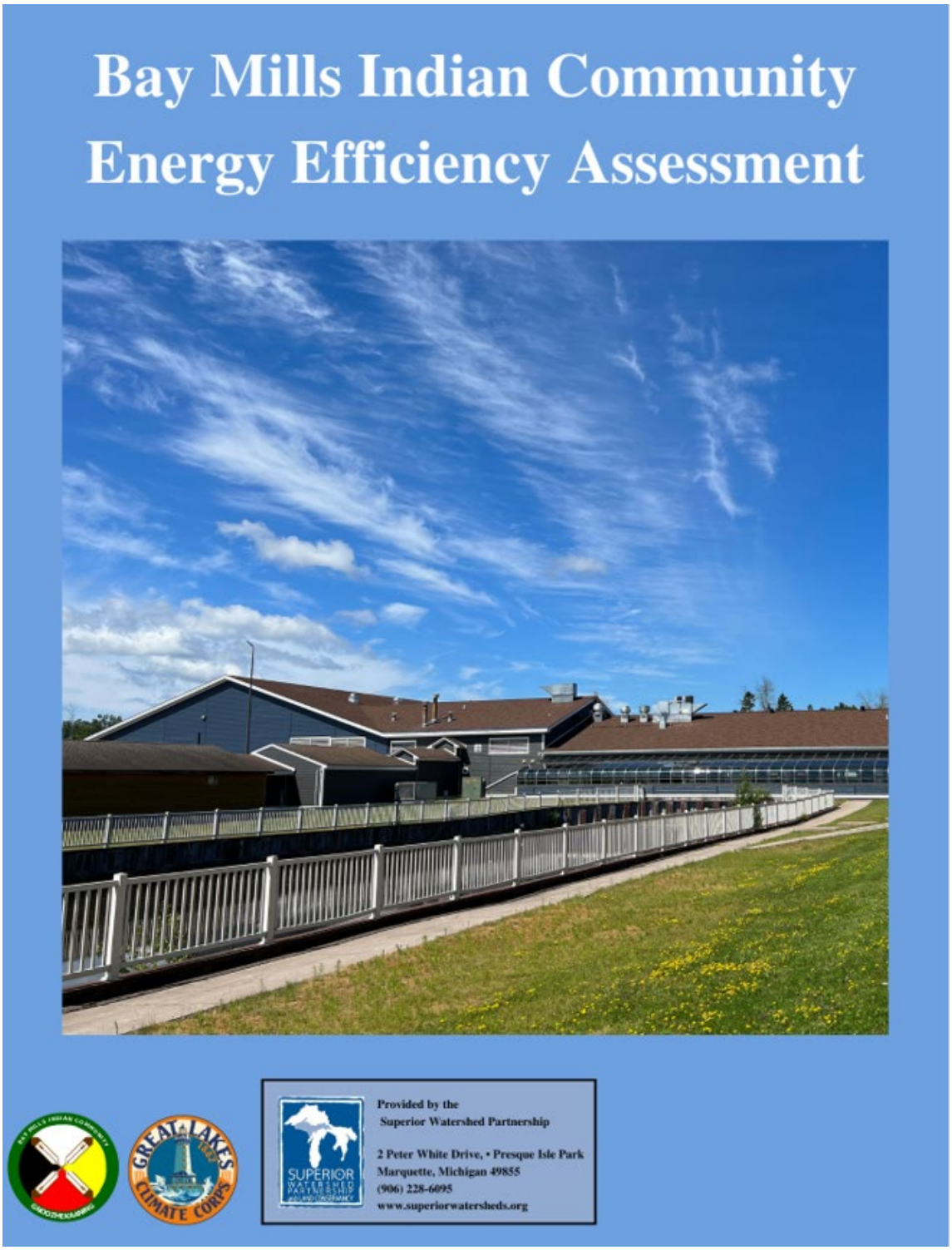
Thermostat Temperature Savings



Lighting

Leviton Ultrasonic/Infrared Dual-Relay Multi-Technology Occupancy Sensor
Model # : 041-OSSMT-MDI

Appendix B: Energy Efficiency Assessment of 2022



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The Authors Acknowledge the Contributions Of the Following:

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Logan Samountry - GLCC Surveyor

All Assisting Building Managers and Staff

The Citizens and Administrators of Bay Mills Indian Community

Executive Summary

Project Profile

This report contains the results of a community-wide, collaborative energy audit/assessment undertaken by the Superior Watershed Michigan Energy Assistance Program (SWP MEAP) at the Bay Mills Indian Community (BMIC) in Chippewa County. Over eight weeks, surveyors from the Great Lakes Climate Corps (GLCC) worked with an expert contractor to conduct audits on 24 buildings of importance to the BMIC population. The GLCC's primary goal is to educate UP communities regarding renewable energy and energy waste reduction to assist low-income families in conserving energy and lowering their energy costs. UP communities pay some of the highest electricity rates in the country. The GLCC addresses this issue throughout all 15 counties in the Upper Peninsula by conducting basic home energy assessments in low-income households and installing weatherization measures to improve self-sufficiency and lower heating and electric costs. Their work with BMIC produced useful energy-asset characterizations and identified opportunities for tangible efficiency improvements. This report includes a building-by-building narrative description of assessment outcomes as well as figures and data pulled from DOE Assessment Summaries. The original summaries are included in the report's appendices.

Methodology

At the BMIC, two GLCC Surveyors holding Department of Energy (DOE) energy efficiency scoring certifications and a contractor-partner deployed the DOE's Building Energy Score Data Collection tool, a nationally standardized tool for assessing buildings' physical and structural energy efficiency. Surveyors took measurements of each building's envelope, orientation, and window area. They used an ETEKT+ Low-E Coating Detector to determine whether glass had a Low-E coating. Light fixtures were counted and listed by type, mounting, number of lamps per fixture, and wattage. Occupancy sensors were noted. Heating, ventilation, and air conditioning (HVAC) equipment was inspected. Equipment nameplate data was used to calculate efficiencies available for air conditioners, chillers, boilers, and furnaces. Surveyors did this for hot water heaters as well. Manufacturers were contacted to gather further details. Interviews were held with building managers, maintenance personnel, and the BMIC Construction Department to glean additional information about building age and features. When available, blueprints and specifications were reviewed, and a discussion was held with the architect for the recently completed Ellen Marshall Health Center. Finally, the History Department provided additional information to fill knowledge gaps.

Throughout this process, surveyors filled out department of Energy data collection sheets for each building. These were digitized, reviewed, and entered into the DOE's Online Asset Scoring System. The system scored buildings' energy efficiency based on asset characteristics; the score does not consider occupant behavior or operations, making inter-building score comparisons possible. Each building's score falls along a one to ten energy efficiency scale. The system generates a series of energy conservation measures (ECMs) and shows how much a property score could increase through the ECMs' adoption. Therefore, this report shares DOE system-generated property asset scores, property-specific ECMs, and expert recommendations offered by the project's contractor after investigating each site with GLCC surveyors.

Assessments by Building

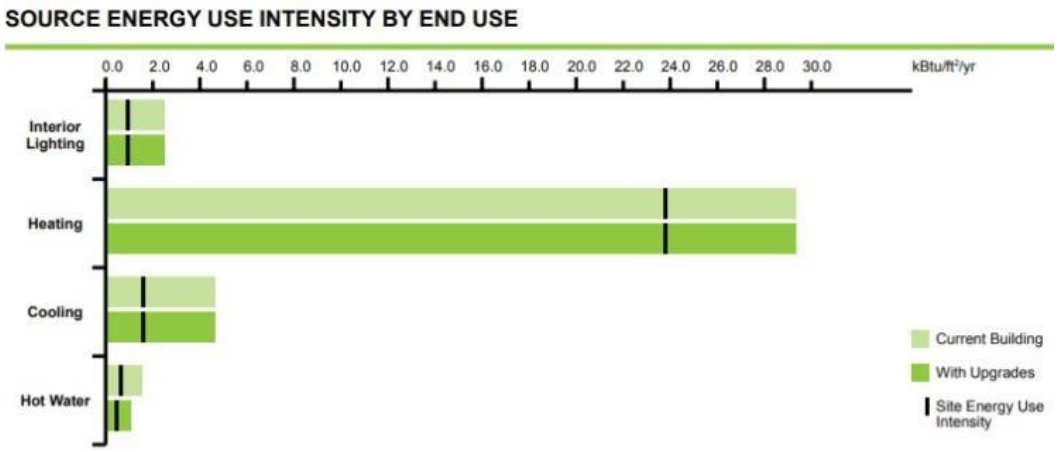
BMIC Tribal Administration

The BMIC Tribal Administration Building, built in 1981, received a ten-out-of-ten DOE asset score. Occupant sensor assessments showed 248 average occupants and average usage at 48.6 hours a week.

Recommendations

The DOE building score summary identifies an upgrade opportunity in the Administration building's Hot Water System; installing low flow faucets in Block 2 would slightly increase hot water efficiency for moderate investment cost. Building envelopes, Lighting Systems, and HVAC Systems generated no recommendations.

If the recommended improvements are adopted, the building's score would improve by one percent and remain at a score of ten. It is worth noting that while the Administration Building's score reflects modern systems, only roughly a quarter of the building's gross floor space is regularly used. This may affect the DOE system's calculation and warrants further operations assessment. Regardless, the improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 1 DOE)

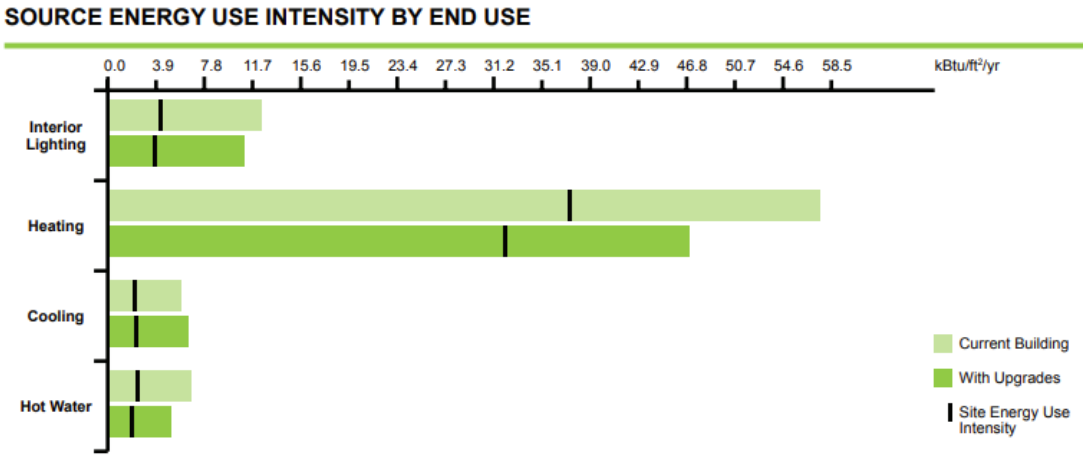
BMIC Biological Services & Conservation

The BMIC Biological Services & Conservation Building, built in 2006, received a nine-out-of-ten DOE asset score. The building hosts an average of 31 people with an average usage of 48.6 hours per week.

Recommendations

DOE systems recommended several improvement measures. Firstly, the building envelope can be made more efficient through air barrier renovations; a building's air barrier is composed of physical assemblies designed to prevent outside air infiltration. In most cases, unconditioned attics and large conditioned spaces account for most envelope leakage. Insulation and other improvements in such areas would help to reduce building air leakage resulting in a relatively low increase in efficiency for a moderate cost. For lighting systems, shifting Fixture 1 to LED would result in a moderate increase in efficiency at a low cost. Also, installing occupancy sensors would further increase efficiency for a medium-high investment. In hot water systems, installing low-flow faucets would slightly increase efficiency for moderate cost. The system did not identify ECMs for HVAC.

Implementing the above ECMs would increase the Biological Services and Conservation Building's score from nine to ten and capture an estimated 11% in energy savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 2 DOE)

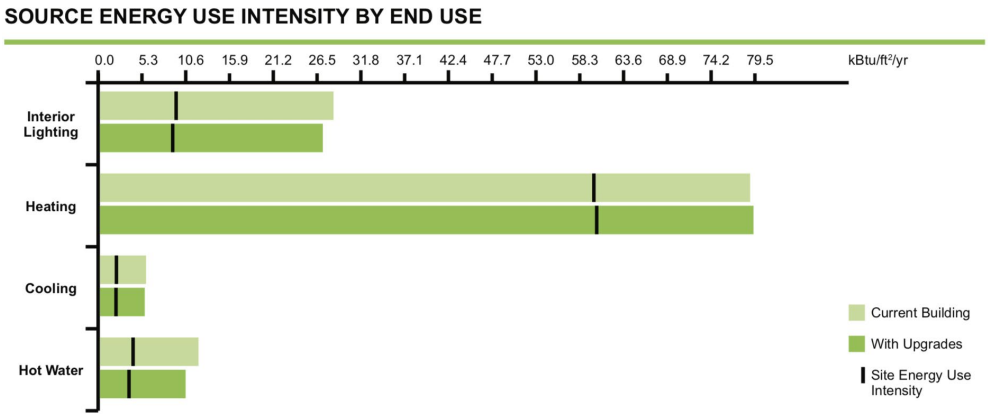
BMIC Public Works

The BMIC Public Works Building, constructed in 2016, scored a 6.5 on the DOE asset assessment. Occupancy was assumed at 12 persons, and hours of operation per week were found to be 48.6.

Recommendations

DOE recommendations for lighting systems improvement include the installation of occupancy sensors to better coordinate energy supply with demand for a low to medium-sized investment cost. Upgrading to low-flow faucets will also help decrease hot water heating waste for a medium-cost investment.

With these improvements, the Public Works Building's score will remain a 6.5 and provide an estimated 2% energy cost savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 3 DOE)

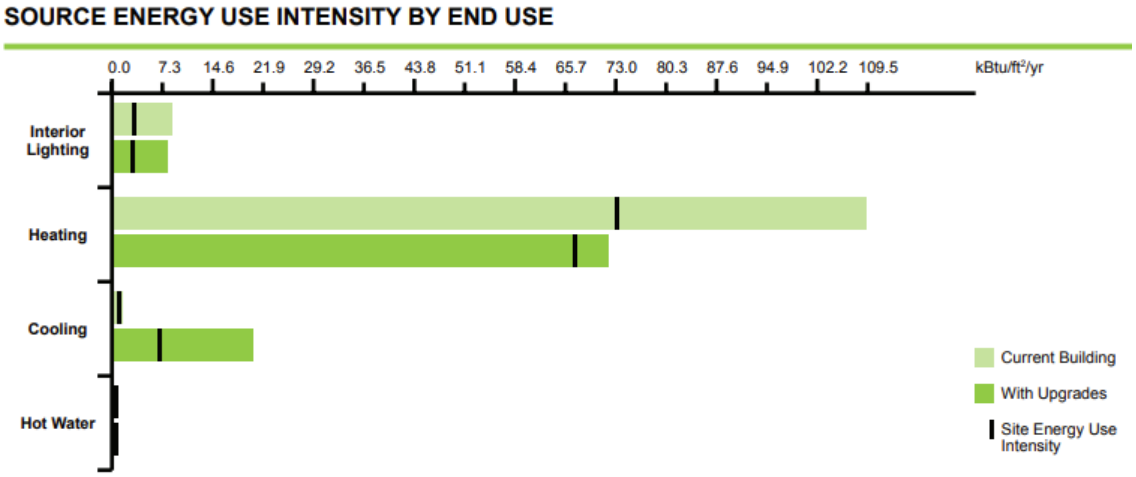
Advanced Office Technologies

The Advanced Office Technologies building, built in 2006, received a ten-out-of-ten DOE asset score. Occupancy is noted at 63 people with an average usage of 46.3 hours per week.

Recommendations

The DOE recommended several improvements. First, for lighting systems, the summary suggests shifting lighting to LED, resulting in a low cost, moderate efficiency improvement. In HVAC systems, data shows that installing an air-side economizer would moderately improve efficiency for a medium-high investment. Economizers help reduce air-conditioning costs by sensing outside air temperature in coordination with thermostat settings; the device draws in outside air for free cooling when feasible. HVAC can be further made efficient with the installation of a variable frequency drive for fan control. These devices allow the system to match output with demand rather than overusing energy during low-demand periods. Neither building envelope nor hot water service systems warranted improvement recommendations.

With these improvements, the building's score will remain a 10; however, energy savings are estimated at 14%. The improvement's effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 4 DOE)

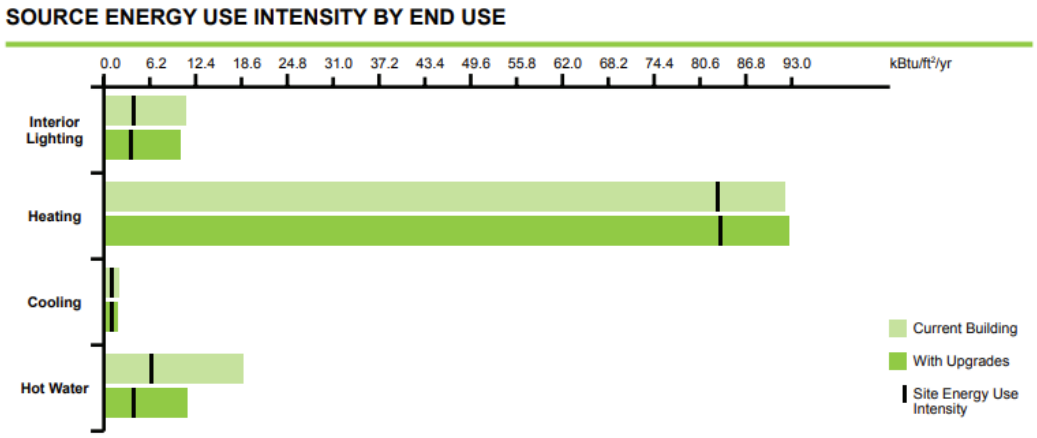
Boys & Girls Club of Bay Mills

The Boys & Girls Club of Bay Mills, built in 2022, scored seven out of ten on the DOE asset summary. The building sees an occupancy of 64 and 40.75 operation hours a week.

Recommendations

Occupancy sensors would help regulate lighting system waste by better coordinating fixture use with demand. This would slightly increase efficiency for a medium-high investment. Low flow faucets would improve hot water efficiency; slight efficiency improvements will occur for medium investment. There are no DOE recommendations for the Club's envelope or HVAC systems.

Implementing the changes listed above will increase the Club's score to 7.5 with a 4% energy cost reduction. The improvement's effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 5 DOE)

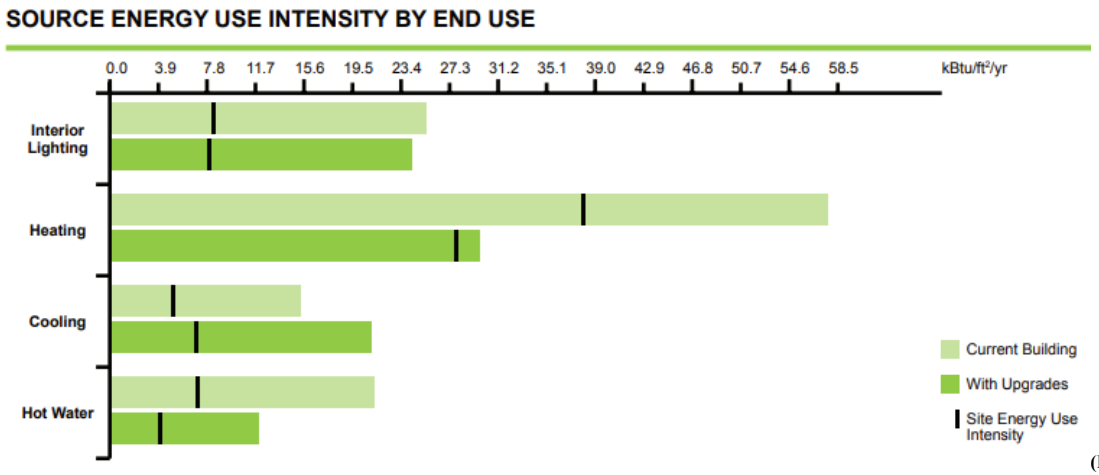
BMIC Justice Center

The BMIC Justice Center, completed in 2014, scored a ten on the DOE asset summary. Occupancy was assumed at 265 and hours of operation per week at 90.5.

Recommendations

In relation to the property's long hours and high occupancy, the DOE recommends the adoption of occupancy sensing interior lighting control to better align light supply with occupant demand. This lighting systems improvement would generate a relatively low increase for a moderate cost. Next, the DOE system recommends several improvements for the Justice Center's HVAC systems. An air-side economizer would improve efficiency by capturing free cooling by circulating outside air when appropriate. The investment would be low to medium with a moderate efficiency increase. In tandem, implementing demand-controlled ventilation (DCV) will further improve the economizer's ability to respond to changes in demand. DCV would require a medium-sized investment with moderate gains in efficiency. Upgrading fans with variable frequency drives would improve ventilation even further. Again, this final HVAC investment requires medium investment for moderate efficiency improvement. Finally, the installation of low-cost low-flow faucets would slightly improve hot water efficiency.

While these improvements would keep the Justice Center at a ten score, energy savings come in at an estimated 16 percent. The improvement's effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 6 DOE)

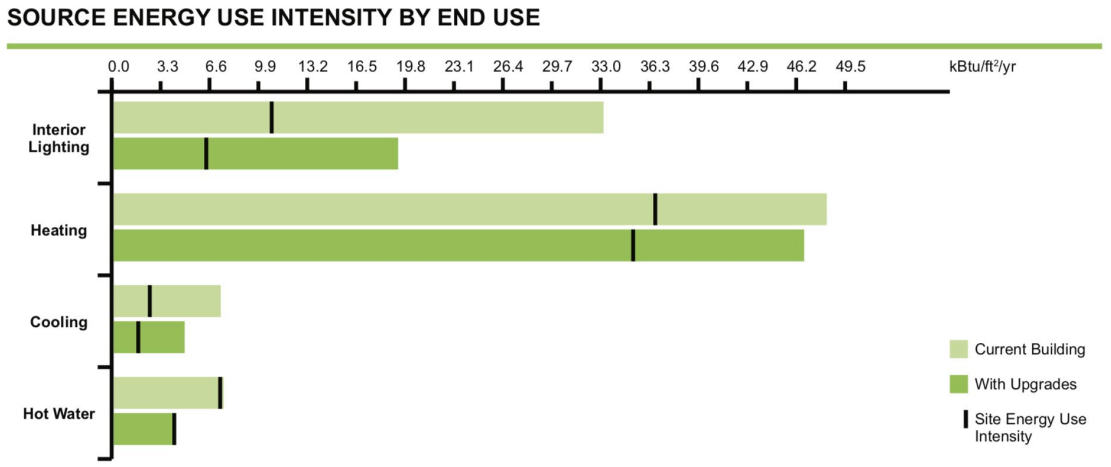
Bay Mills Head Start Child Development Building

The Bay Mills Head Start Child Development Building, built in 2008, was rated at seven out of ten by the DOE asset system. Occupancy was noted at 105, with weekly use at an average of 40.75 hours.

Recommendations

In lighting systems, transitioning lighting in fixture 1 to LED would moderately increase energy efficiency for low investment costs. Combining these more-efficient light sources with occupancy sensors would further increase efficiency for a low to medium investment cost. Shifting HVAC systems with the addition of demand-controlled ventilation will align ventilation expenditure with occupancy demand, moderately increasing conditioning efficiency for medium-cost investment. Further increasing demand alignment, installing variable frequency fans would allow for more efficiency with another medium-cost investment. Finally, low-flow faucets will provide relatively lower efficiency increases for a medium investment cost. The DOE system found no improvement opportunities in the building's envelope system.

Adopting the above recommendations will increase the Child Development Building's score to a 9, with energy cost savings calculated at 14%. The improvement's effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 7 DOE)

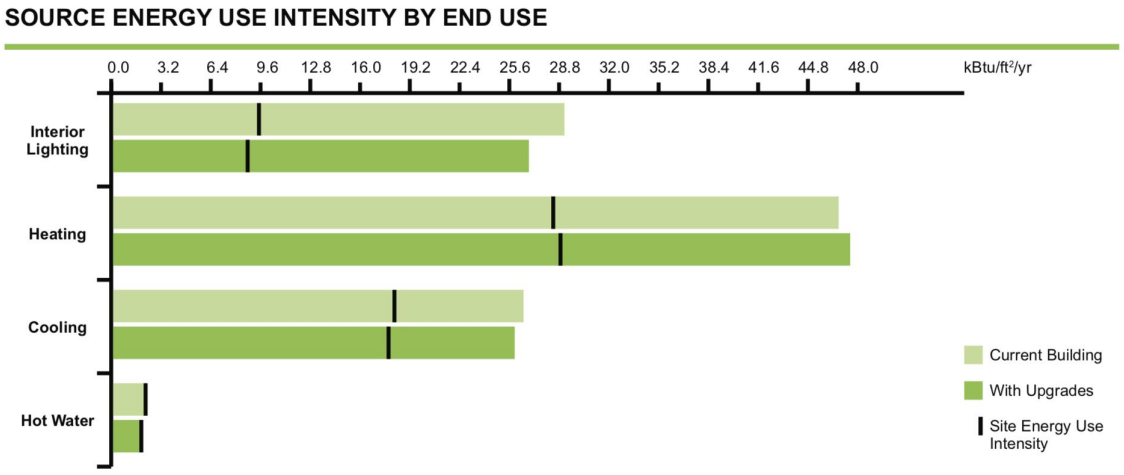
Armelia B. Parket Elder Center & History Department

The Armelia B. Parket Elder Center & History Department Building, constructed in 2001, scored a 7.5 on the DOE system. Occupancy was noted to be 65, and the building sees an average use of 46 hours a week.

Recommendations

Again, the property's lighting system can be improved by replacing older lighting with LED light fixtures. For a low investment, efficiency can be moderately increased. Variable frequency drive fans will moderately increase HVAC efficiency through supply-demand alignment for a medium cost. Low flow faucets can slightly increase heating efficiency for a medium investment cost. The building envelope elicited no recommendations.

With these improvements, the Center would remain at a score of 7.5; energy cost savings is calculated at 2%. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 8 DOE)

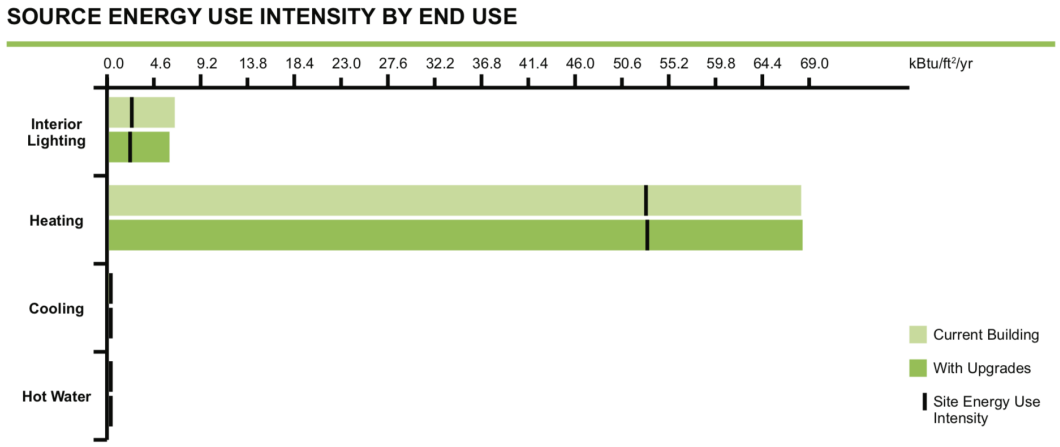
Commodity Foods

The Commodity Foods Building, constructed in 2005, scored a 7.5 on the DOE asset score.

Recommendations

The DOE assessment recommends a building-wide upgrade to LED lighting; this low-cost improvement would offer moderate energy efficiency gains.

The LED installation will improve the building's asset score to an eight as well as provide 1% in energy cost savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 9 DOE)

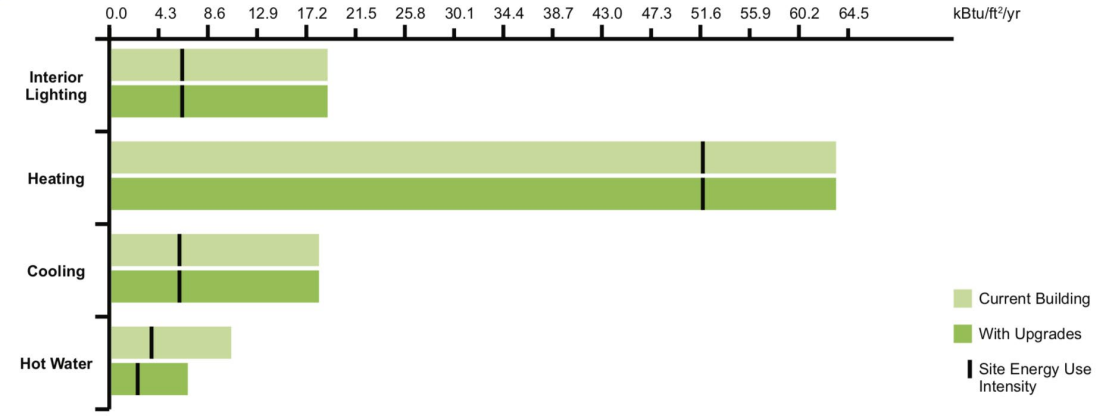
Mukwa Health & Fitness Center

The new Mukwa Health & Fitness Center, built in 2022, scored an 8.5 out of ten on the DOE asset assessment. Occupancy was estimated at 36 and weekly hours of use at 48.6.

Recommendations

The DOE system recommended the installation of low-flow faucets to improve hot water efficiency for a medium investment cost. The DOE tool made no other recommendations were made.

The low-flow faucet upgrade would increase the Health & Fitness Center's score to an even 9 with a 1% savings in energy costs. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 10 DOE)

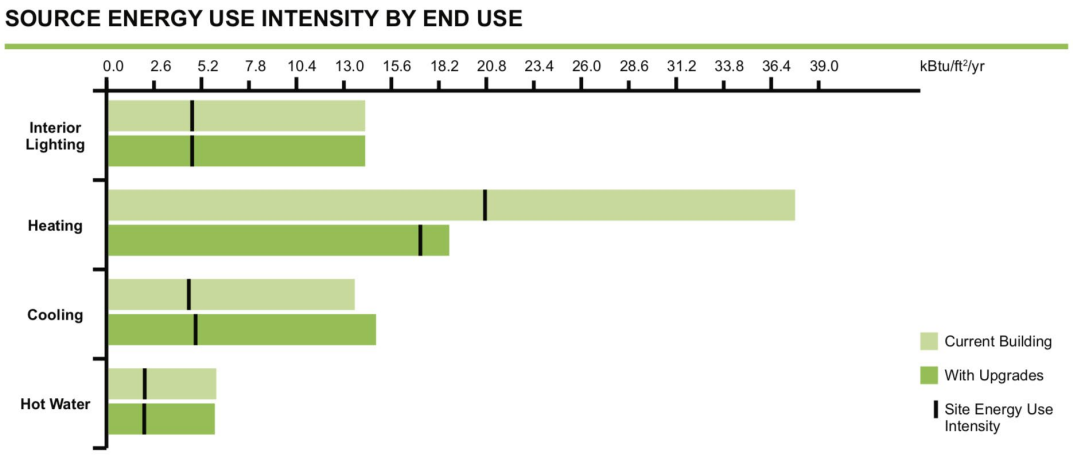
Culture Department

The BMIC Culture Department, finished in 2016, was rated ten out of ten on the DOE asset assessment. Occupancy was assumed at 41, and average weekly hours of use were set at 46.

Recommendations

Most improvements were identified in the building's HVAC system. First, the DOE assessment recommends the installation of an air-side economizer to capture amenable outside air for free cooling. For low to medium investment, the economizer offers a moderate increase in energy efficiency. In tandem with the economizer, adding variable fan drives will help adjust ventilation for closer alignment with occupant demand. This improvement would require another low to medium investment and offer moderate energy efficiency improvements. Finally, the assessment recommends installing low-flow faucets to moderately improve hot water efficiency for a medium investment cost. No opportunities were identified in the building envelope and lighting systems.

Should these recommendations be adopted, the Culture Department's score will remain a ten; however, there will be a 12% energy cost savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 12 DOE)

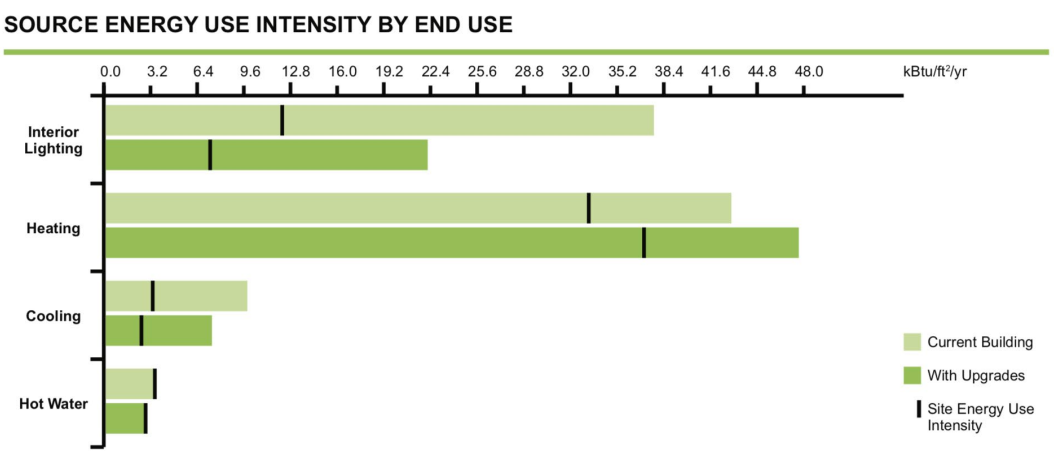
Bay Mills Housing Authority

The Bay Mills Housing Authority Building, completed in 2001, received a seven out of ten DOE asset score. Occupancy was estimated at 22 and weekly hours of use at 48.6.

Recommendations

Lighting systems improvement recommendations included light fixture replacements with LED lighting. This low-cost improvement would provide a moderate increase in energy efficiency. Again, adding occupancy sensors will augment LED replacement benefits by better coordinating lighting demand and energy supply for a low to medium-cost investment. Finally, low-flow faucet installation will improve hot water efficiency. HVAC and Lighting systems warranted no improvement recommendations.

These changes will increase the property's DOE asset score to 8.5 while providing an 11% energy costs savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 13 DOE)

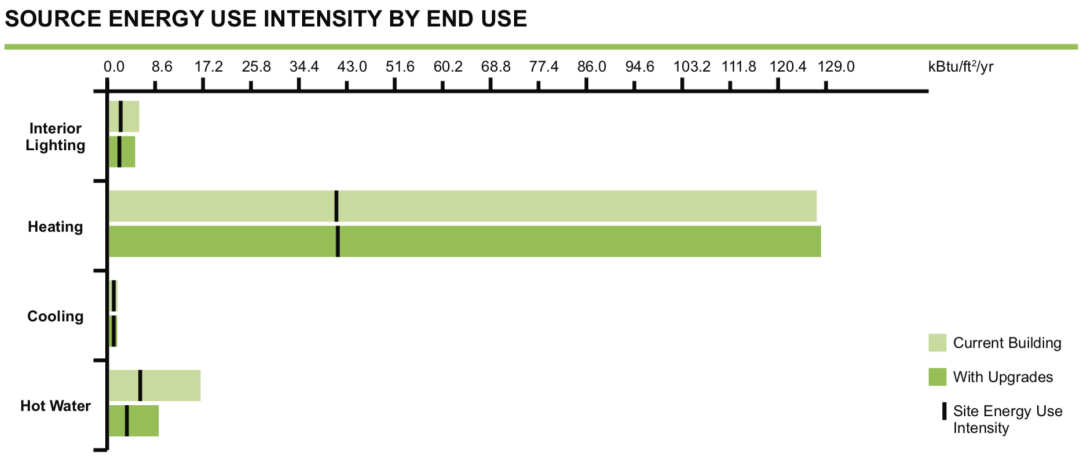
Ojibwe Charter School

The Ojibwe Charter School, constructed in 2002, received a six out of ten DOE asset score. Occupancy was estimated at 161 persons, and hours of operation per week averaged 40.75.

Recommendations

In lighting systems, the DOE assessment recommends upgrading to LED lighting, a low-cost investment for a moderate efficiency increase. Secondly, interior lighting systems efficiency can be improved with the addition of occupancy sensors to better align usage with demand. These sensors would require a medium-sized investment. Low-flow faucet upgrades would increase water heating efficiency for a medium-sized investment cost. For HVAC, the School relies on seven wall-mounted heat pumps for heating and cooling; these were installed during construction in 2002. Heat pump technology and heating capabilities have since improved dramatically. In fact, the use of older heat pumps adds high costs to the building's HVAC usage, especially when outside air temperatures approach freezing. Newer units available for northern climates can now provide heat to -13 degrees F. Upgrading to these newer models would decrease Electrical consumption by 15% for cooling and at least 50% for heating. Purchasing heat pumps with Variable Refrigerant Flow (VRF) can provide even more savings by only running compressors at speeds to match the loads.

The Charter School has one of the highest potential improvement rates through recommendation upgrades. Adopting non-HVAC improvements would improve its score to a 7; however, the heat pump upgrades alone will improve overall efficiency by over 50%. The figure below represents the improvements' effect in terms of fuel end use change is illustrated in the figure below. Heat pump upgrades are not included in the figure as these recommendations were made by the project's contractor, not the DOE system.



(Fig. 15 DOE)

Bay Mills Resort & Casino

Overall, the Bay Mills Resort & Casino, built in 1995, scored a 7.5 out of 10 on the DOE assessment. Because of the structure's size, the DOE assessment output sheet contains several section-specific ratings for the retail and lodging portions of the structure; this report will focus on overall recommendations from the project expert contractor and include the original scoring sheet in the appendix.

Recommendations

In the lodging section, 163 Wall-Mounted Packaged Terminal Air Conditioners (PTAC) are used to heat and cool individual hotel rooms. These units rely on inefficient electric resistance for heating. Heat pump PTACs are now available, which move heat out of the rooms to the outside air in the summer and extract heat from the air in the winter to warm the room. The existing PTACs were installed in the 1990s and had a coefficient of performance (COP) of 3.2 for cooling but only 1.0 for heating. A modern heat pump will approach a COP of 4.0 for both heating and cooling. Thus cooling electrical consumption may decline by 25%, while heating will go down by 75%. Furthermore, smart heat pump units are available that use occupancy sensors to reduce energy expenditure when the room is unoccupied, generating further savings.

In lighting systems, an overall conversion to LED lighting will greatly reduce costs. Also, upgrading to advanced lighting controls (ALC) fixtures will allow for programming, dimming, and adjusting to daylight to further reduce unnecessary energy use. The recommended order for improvement is the Casino, Lobby, Back Bay Bar & Casino, hotel rooms, Conference Center, and Sacy's restaurant.

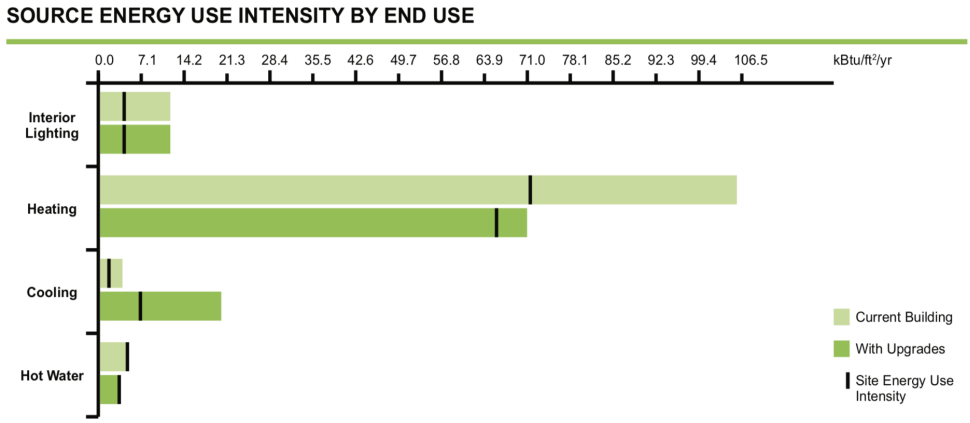
Wild Bluff Golf Course

The Wild Bluff Golf Course Building, constructed in 1999, was rated at 9.5 on the DOE assessment score. Occupancy was estimated at 89 persons and hours of use per week at 46.3.

Recommendations

The DOE system recommended the improvement of HVAC systems via air-side economizer instillation. This would allow HVAC systems to make use of free conditioning opportunities presented by amenable outside weather. The upgrade would provide a moderate efficiency increase at a low to medium-cost investment. In addition, upgrading the HVAC with variable drive fans will further reduce energy waste through increased customizability. For a medium cost, this improvement offers moderate efficiency gains. Finally, low-flow faucets will decrease water-heating waste at a medium cost.

The above improvements would improve the Gulf Course's DOE score to a ten and provide an estimated 14% energy cost savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 16 DOE)

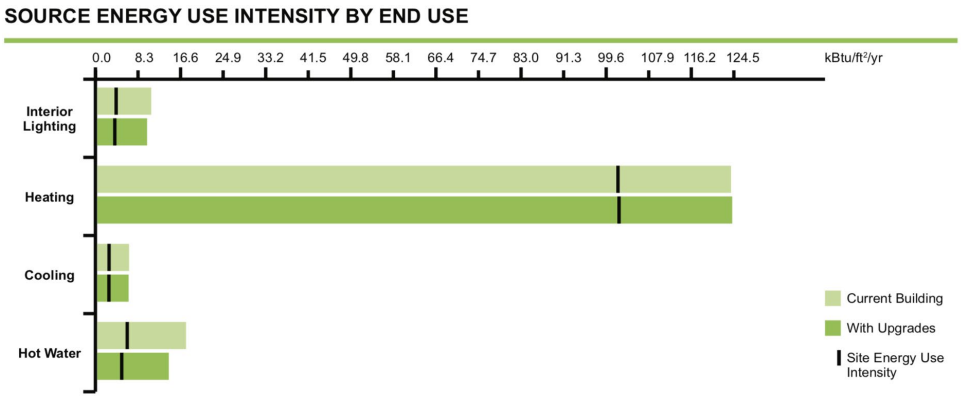
Bay Mart Gas Station

The Bay Mart Gas Station, completed in 1998, was rated by the DOE asset assessment at an 8.5. The building's occupancy was estimated at 31 persons, and its average weekly hours of use at 46.3.

Recommendations

The DOE assessment recommends upgrading all non-LED fixtures to LED lighting, a low investment improvement creating moderate efficiency improvements. Low-flow faucet upgrades were also identified as an improvement opportunity.

The recommended improvements would raise Bay Mart's score to a nine and create 2% in energy savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 17 DOE)

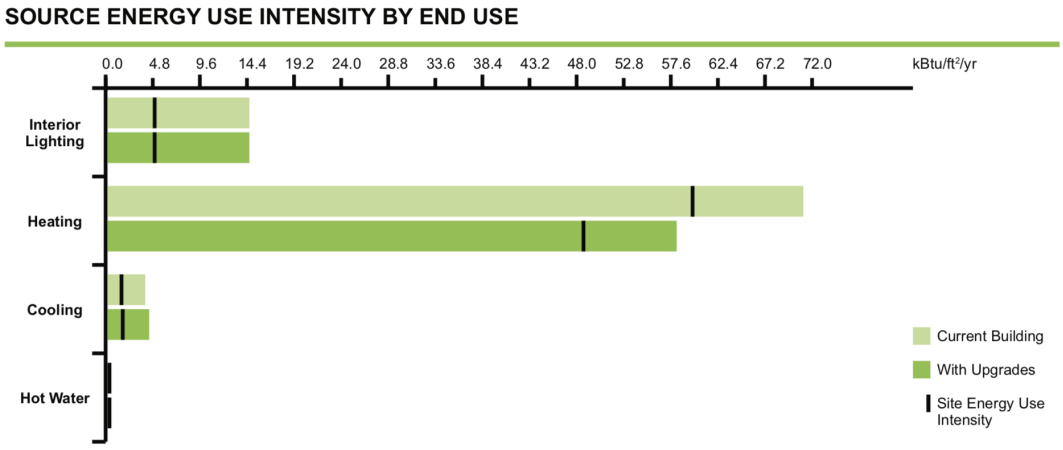
Four Seasons Market & Deli

The Four Seasons Market & Deli, built in 2020, received a ten on the DOE asset assessment. Occupancy was estimated at 95 persons and weekly hours of operation at 46.3.

Recommendations

The only DOE recommendation for the property is in regard to envelope improvement. Assessing potential leakage points, doors, windows, walls, attics, and basements for integrity under both negative and positive pressure can help identify points requiring improvement. Assessment and improvement stand to increase efficiency for a low to medium investment cost.

While the building's DOE score will remain a 10, these improvements stand to provide 13% in energy cost savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 18 DOE)

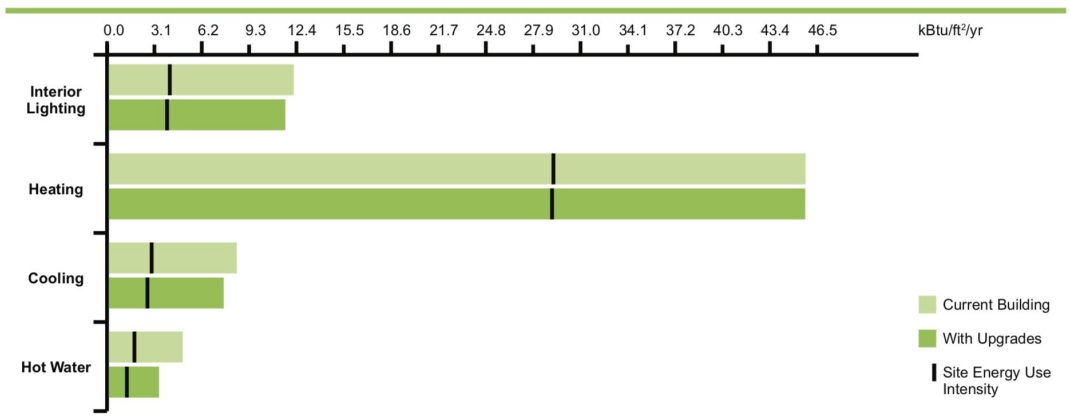
Bay Mills Fire Crew - Migizi Hall

Migizi Fire Hall, built in 1998, was rated a nine during the DOE assessment process. Its occupancy was estimated at 63 persons and the weekly average hours of operation at 48.6.

Recommendations

Lighting systems could be improved by installing occupancy sensors to limit overuse for a low to medium-cost investment. HVAC systems can be made more efficient by upgrading ventilation control to better align demand and supply. This upgrade could be further augmented through the addition of variable frequency drive fans; both improvements require a medium cost investment for a moderate efficiency increase. Finally, low-flow faucets would reduce water-heating waste for a medium investment cost.

The recommendations above will increase Migizi Fire Hall's rating to 9.5 and provide 3% energy savings. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 19 DOE)

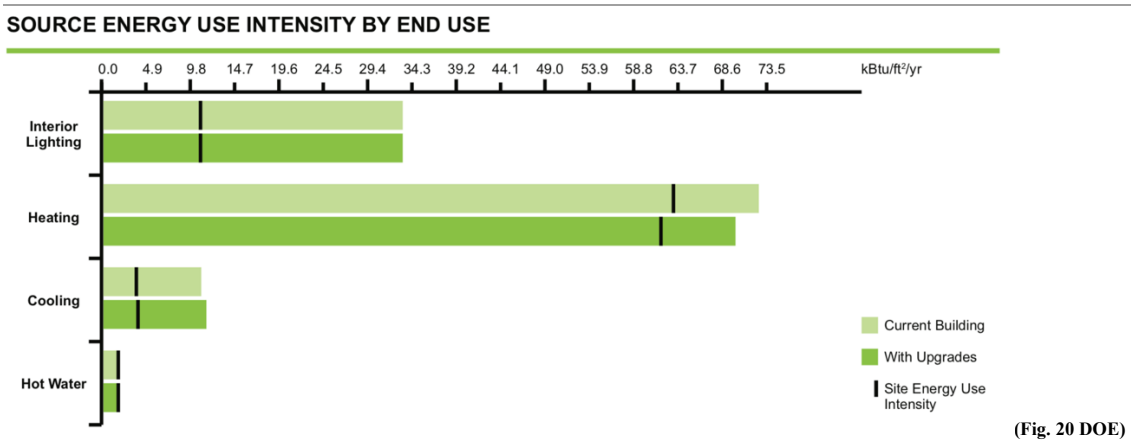
Ellen Marshall Health Center

The new Ellen Marshall Health Center, completed in 2022, received a 9 on the DOE asset rating scale. Its assumed occupancy was set at 159 persons and its average hours of use per week at 48.6.

Recommendations

Both recommended improvements create efficiency benefits in the building's HVAC system. Firstly, the DOE system recommends adjustments to the HVAC's VAV flow boxes where possible, lowering the minimum ventilation flows to reduce waste when demand is low. For a medium sized investment cost, this change would provide high efficiency gains. Secondly, the assessment recommends the addition of air temperature reset sensors. This technology automatically resets building average temperature in response to demand and outside weather conditions, moderately increasing efficiency for a low cost.

Adoption of the above upgrades would keep the Ellen Marshall Center's score at 9 while providing a 1% energy cost savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 20 DOE)

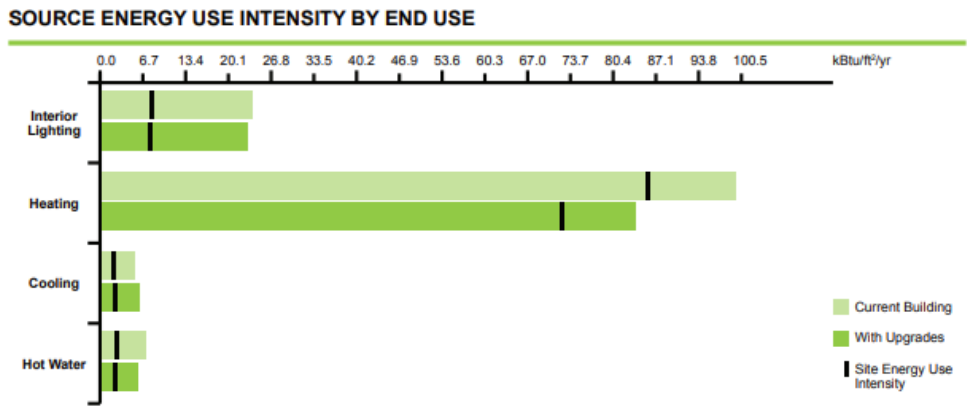
Waishkey Bay Farm

Waishkey Bay Farm, built in 2015, was scored at 5 on the DOE asset rating scale. Its assumed occupancy was set at 14 persons and its average hours of use per week at 48.6.

Recommendations

The DOE system generated several recommendations. For the building envelope, the tool recommends whole-building pressurization tests to determine leakage locations. Improving the building envelope for a moderate investment cost will improve efficiency. Occupancy sensors throughout the building can help reduce lighting systems waste for a moderate to high investment. Low-flow faucets will reduce how-water waste for a moderate investment.

Adoption of these improvements would improve Waishkey Bay Farm's score to a 5.5 with a 10% energy cost savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 21 DOE)

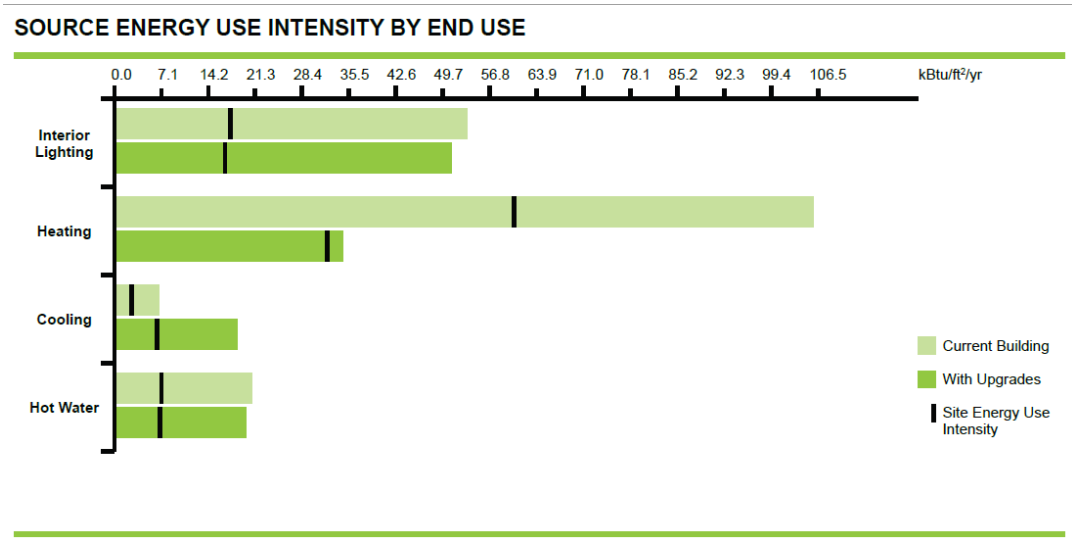
BMIC Maintenance Department

The DOE system generated several recommendations. The BMIC Maintenance Department building, finished in 2022, scored a 3 on the DOE asset rating scale. Its assumed average hours of use per week was set at 48.6. The structure is used for vehicle and equipment storage and office space.

Recommendations

Sealing the building envelope and upgrading the roof insulation will provide some benefit. Installing occupancy sensors for interior lighting was also recommended. Recommendations for HVAC and Hot Water are as follows. For the former, the tool recommends installing an air-side economizer system to allow for cooling with outside air. This low to moderate sized investment offers middle range efficiency improvements. Relatedly, installing a Variable Frequency Drive Fan Control will allow for demand synchronized air conditioning. Improving the HVAC for a medium sized investment cost will moderately improve efficiency. For Hot Water systems, low-flow faucets will improve efficiency for moderate cost.

Adoption of these improvements will improve the Maintenance Building's score to 6.0, and offer 28% energy cost savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 22 DOE)

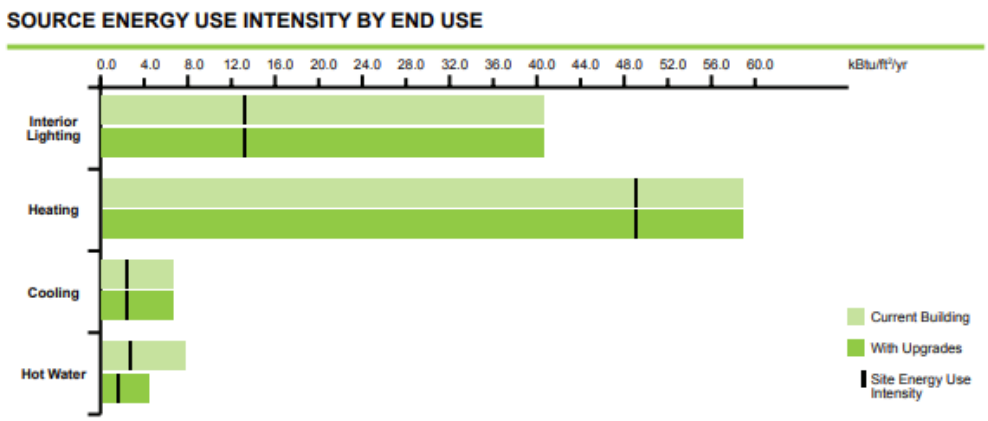
Northern Lights Cannabis Company

The Northern Lights Cannabis Company, constructed in 2019, scored a 9.5 on the DOE asset rating scale. Its assumed occupancy was 390 persons and average hours of use per week was set at 46.3.

Recommendations

Given how efficient this structure is, the only generated recommendation was the addition of low flow faucets. This would improve the hot water system's efficiency for a medium investment cost.

While, adoption of these improvements won't improve the building's score, they do offer 2% energy cost savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 23 DOE)

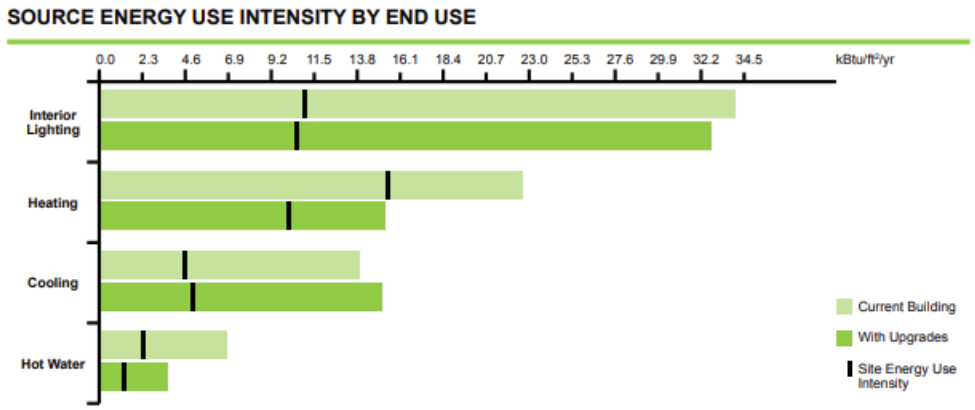
Bay Mills Community College

The Bay Mills Community College, opened in 2018, received an 8 on the DOE asset rating scale. Its assumed occupancy was 434 persons and average hours of use per week was calculated at 45.11.

Recommendations

There were a variety of improvement recommendations for the college. First, conducting pressure tests to identify building envelope leakage and enhancing the envelope's weak points and joints would reduce leakage for a medium sized investment. Occupancy lighting sensors would improve system efficiency by coordinating lighting supply and demand for moderate to large investment cost. Similarly, implementing demand controlled ventilation will moderately improve HVAC efficiency for medium cost. This improvement requires variable frequency drive supply fans, which will further improve efficiency for medium cost. Finally, installation of low flow faucets throughout the building will improve hot water efficiency for a medium investment.

Adopting these improvements will increase the Community College's score to a 9.5, conferring a 10% energy cost savings benefit. The improvements' effect in terms of fuel end use change is illustrated in the figure below.



(Fig. 24 DOE)

Conclusion

This energy efficiency audit elicited useful and actionable data for 27 BMIC properties constructed between 1981 and 2022. While the body of this report contains building-specific assessments and recommendations, several emergent recommendations, which apply to all or most structures considered, are worth noting.

All of the buildings audited utilize air conditioners, chillers, heat pumps, furnaces, and boilers for cooling and heating. The efficiency and quality of technology used in newer available iterations of this equipment have improved dramatically over the past forty years. Prior to 2000, the SEER (Season Energy Efficiency Ratio) rating for air conditioners and heat pumps when cooling was 10; in 2015, it increased to 14, a 40% increase in efficiency. Now, there are units available with a SEER as high as 22. HSPF (Heating Seasonal Performance Factor) is used to rate heat pumps during the heating season. Before 2000, the standard was 6.7. It was raised to eight in 2015. High-end units are now available with an HSPF of 13, almost double the old standard. Similarly, furnace and boiler efficiency standards have gone from 81% to 91%. There are many models available with 95+ % efficiency. Most units currently in use at BMIC do not warrant replacement based on energy savings alone. However, the useful life of air conditioners is 12 to 15 years and over 20 for furnaces and boilers. Therefore, building managers should keep track of repair bills; once they become comparable to replacement rates, upgrading to the most efficient equipment available should be considered.

Many buildings are only occupied 40 to 50 hours per week. Programmable thermostats should be used to maintain lower temperatures during the unoccupied hours during the heating season. Air conditioners should be turned off. After a general upgrade to LED lighting, lighting fixtures should be linked to occupancy sensors to reduce waste. The new Ellen Marshall Medical Center does have a Building Management System which has the capability of saving energy through supply-demand alignment; this model should stand as an example to other buildings as they are upgraded.

Please contact the Superior Watershed Partnership with any questions, more recommendations, or other inquiries.

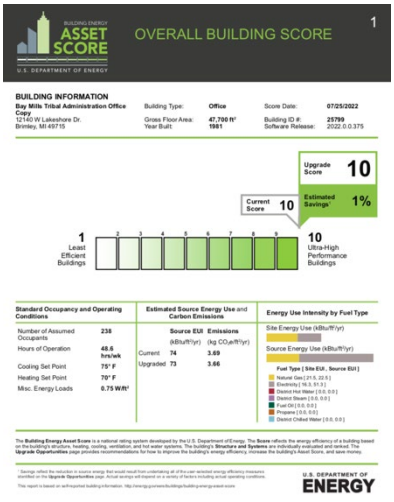
SUPERIOR WATERSHED PARTNERSHIP and LAND CONSERVANCY

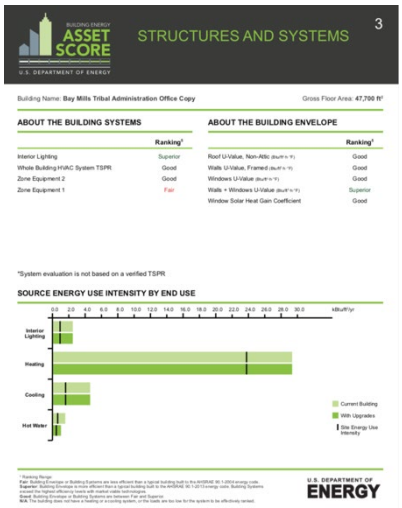
Provided by the
Superior Watershed Partnership

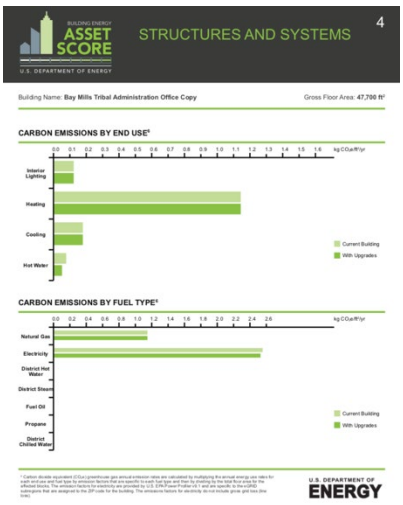
2 Peter White Drive, • Presque Isle Park
Marquette, Michigan 49855
(906) 228-6095
www.superiorwatersheds.org

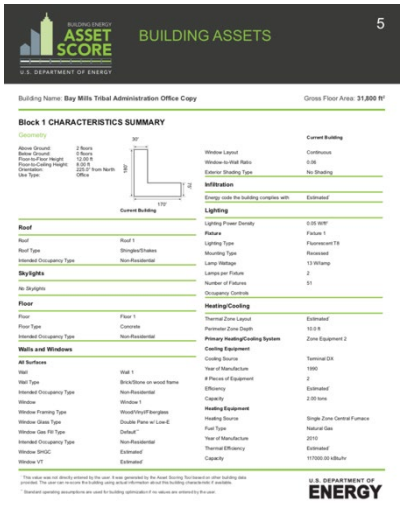
Appendix

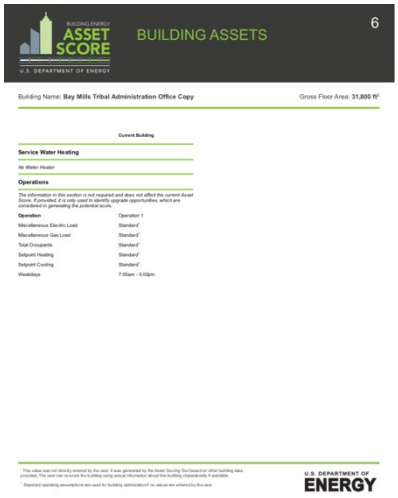
Tribal Administration

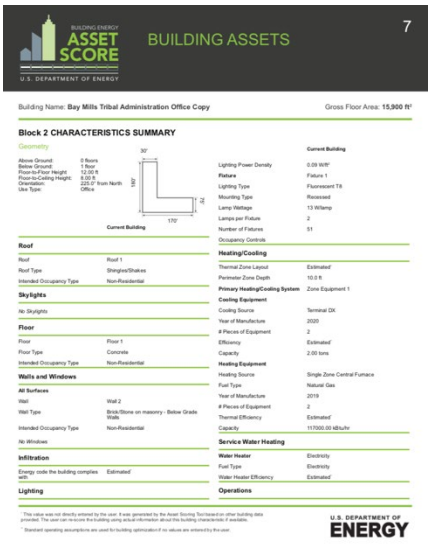












BUILDING ASSETS 7

Building Name: **Bay Mills Tribal Administration Office Copy** Gross Floor Area: **15,900 ft²**

Block 2 CHARACTERISTICS SUMMARY

Geometry

Above Ground:	0 floors
Below Ground:	1 floor
Floor-to-Floor Height:	12.00 ft
Floor-to-Ceiling Height:	8.00 ft
Orientation:	330.0° from North
Use Type:	Office

Current Building

Roof

Roof	Roof 1
Roof Type	Shingles/Shakes
Intended Occupancy Type	Non-Residential

Skylights

No Skylights

Floor

Floor	Floor 1
Floor Type	Concrete
Intended Occupancy Type	Non-Residential

Walls and Windows

All Surfaces

Wall	Wall 2
Wall Type	Brick/Stone on masonry - Below Grade Walls
Intended Occupancy Type	Non-Residential

No Windows

Infiltration

Energy code the building complies with: Estimated*

Lighting

	Current Building
Lighting Power Density	0.09 W/ft²
Fixture	Fixture 1
Lighting Type	Fluorescent T8
Mounting Type	Recessed
Lamp Wattage	13 Wlamp
Lamps per Fixture	2
Number of Fixtures	51
Occupancy Controls	

Heating/Cooling

Thermal Zone Layout	Estimated*
Perimeter Zone Depth	10.0 ft
Primary Heating/Cooling System	Zone Equipment 1
Cooling Equipment	
Cooling Source	Terminal DX
Year of Manufacture	2020
# Pieces of Equipment	2
Efficiency	Estimated*
Capacity	2.00 tons
Heating Equipment	
Heating Source	Single Zone Central Furnace
Fuel Type	Natural Gas
Year of Manufacture	2019
# Pieces of Equipment	2
Thermal Efficiency	Estimated*
Capacity	117000.00 kBtu/hr

Service Water Heating

Water Heater	Electricity
Fuel Type	Electricity
Water Heater Efficiency	Estimated*

Operations

* This value was not directly entered by the user. It was generated by the Asset Scoring Tool based on other building data provided. The user can re-score the building using actual information about this building characteristic if available.

* Standard operating assumptions are used for building optimization if no values are entered by the user.

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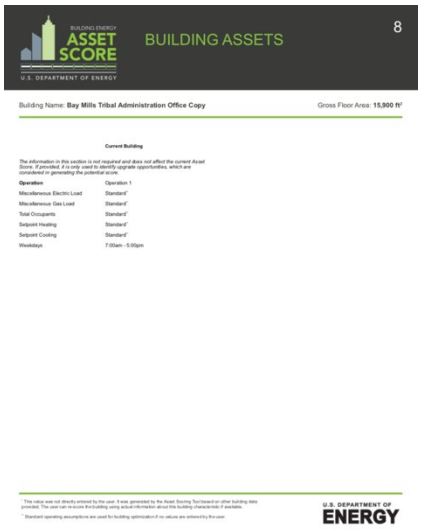

BUILDING ASSETS 8

Building Name: **Bay Mills Tribal Administration Office Copy** Gross Floor Area: **15,900 ft²**

	Current Building
The information in this section is not required and does not affect the current Asset Score. If provided, it is only used to identify upgrade opportunities, which are considered in generating the potential score.	
Operation	Operation 1
Miscellaneous Electric Load	Standard*
Miscellaneous Gas Load	Standard*
Total Occupants	Standard*
Setpoint Heating	Standard*
Setpoint Cooling	Standard*
Weekdays	7:00am - 5:00pm

* This value was not directly entered by the user. It was generated by the Asset Scoring Tool based on other building data provided. The user can re-score the building using actual information about this building characteristic if available.

* Standard operating assumptions are used for building optimization if no values are entered by the user.

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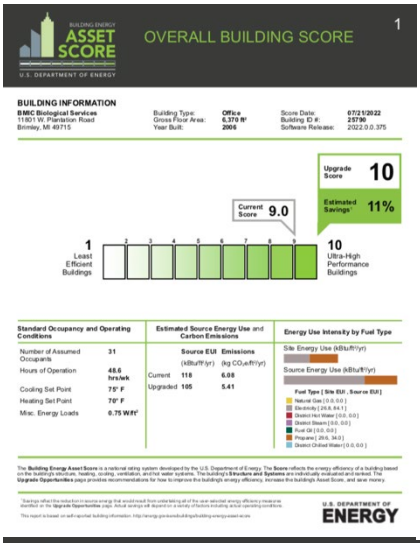
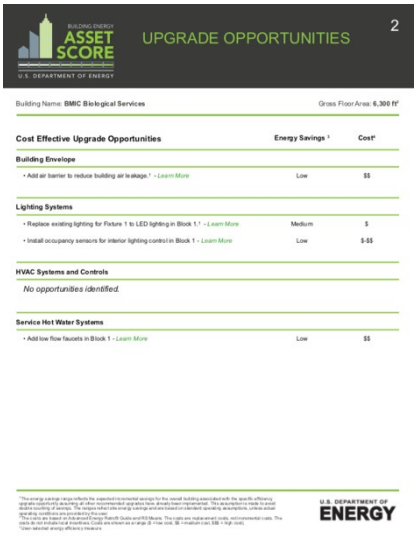
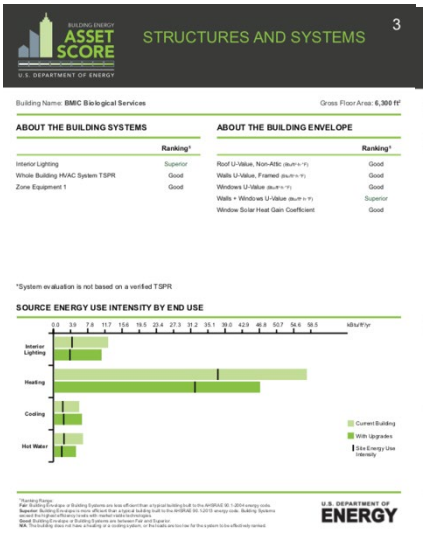
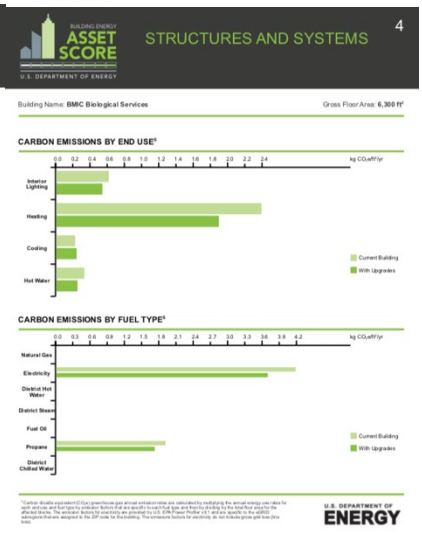
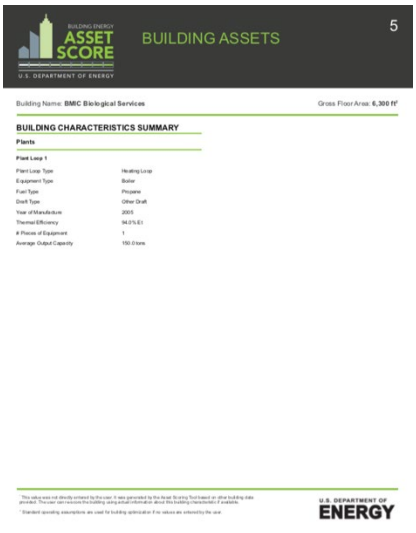
BMIC Biological Services & Conservation

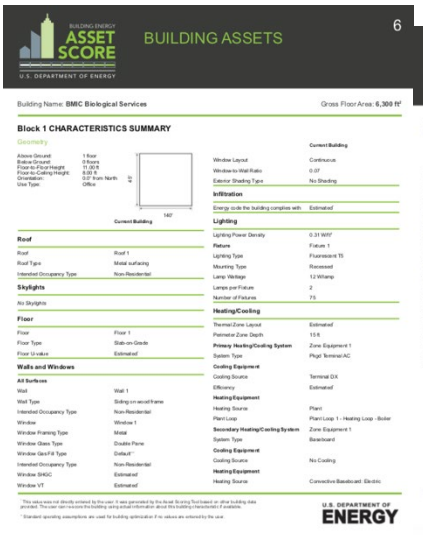




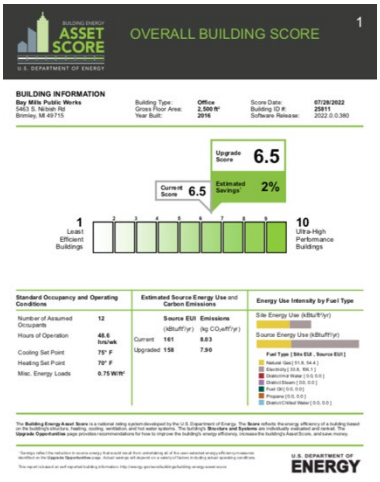


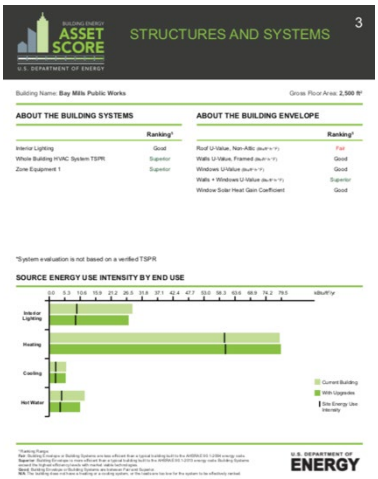


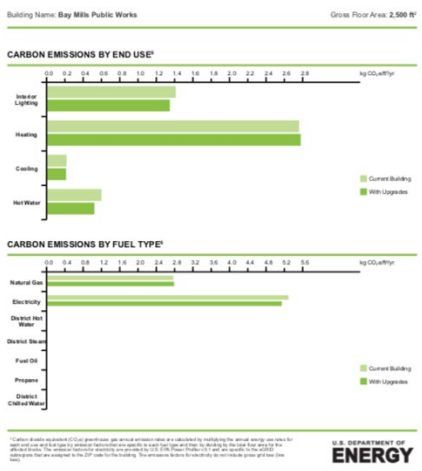




BMIC Public Works

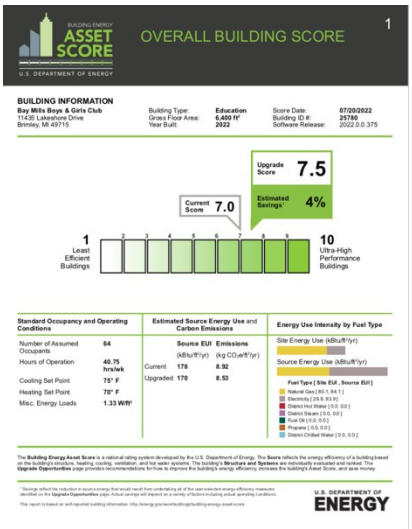


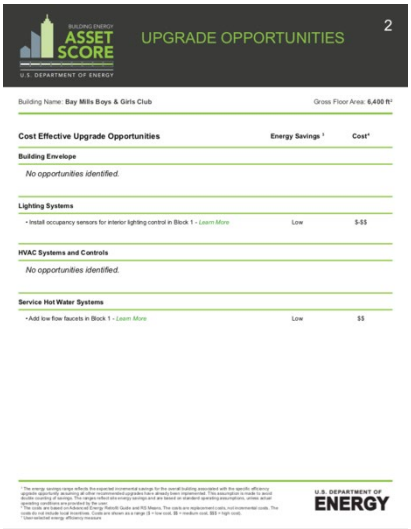


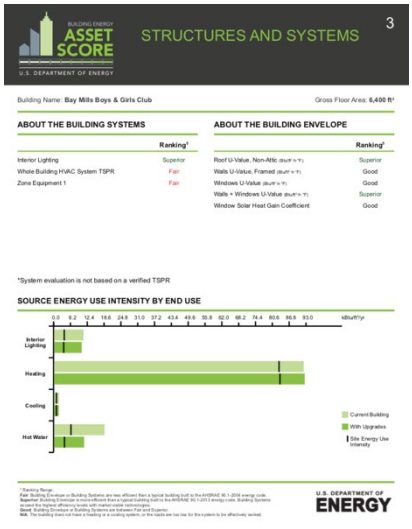


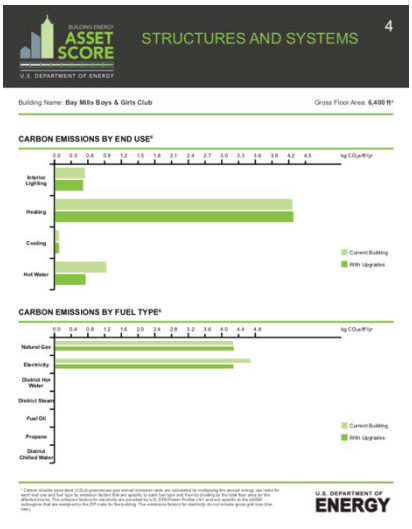
Advanced Office Technologies

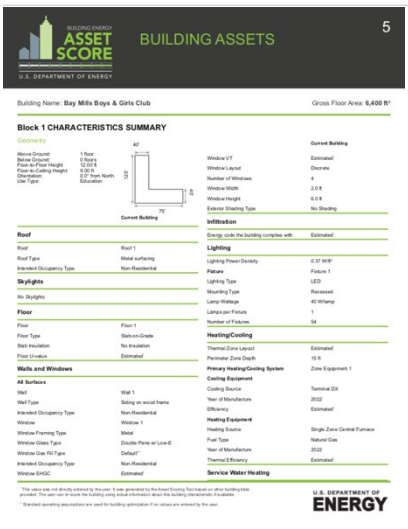
Boys and Girls Club of Bay Mills

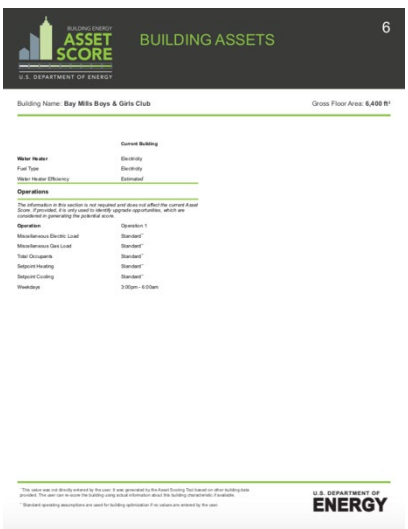




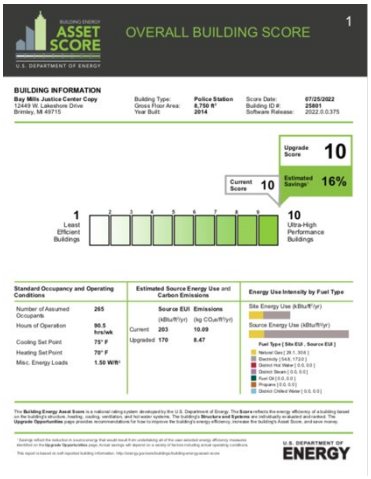


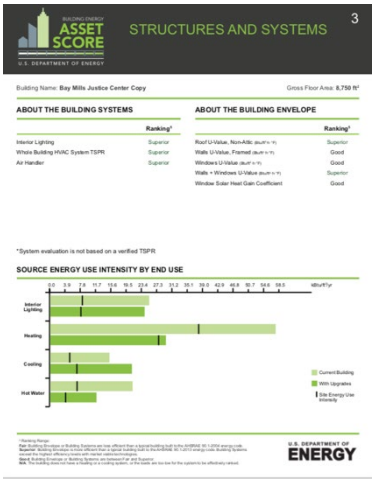


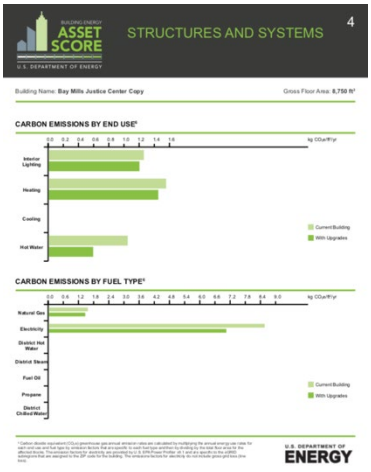


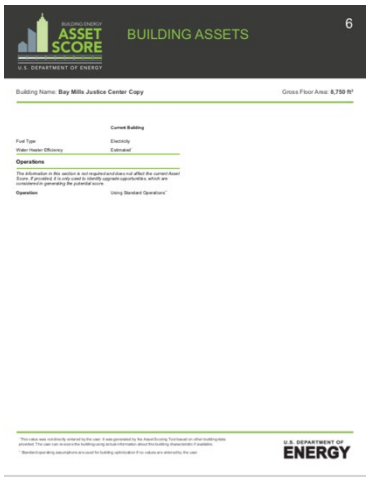


Bay Mills Justice Center

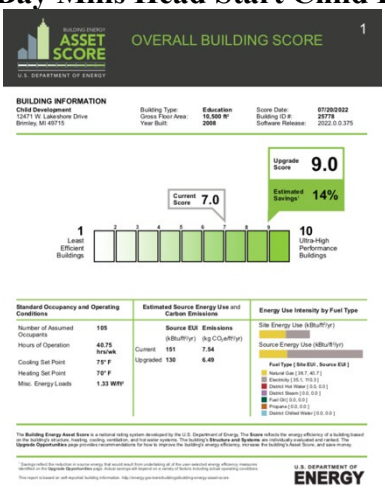








Bay Mills Head Start Child Development Center


OVERALL BUILDING SCORE 1

BUILDING INFORMATION
Child Development
12471 W. Lakeshore Drive
Brimley, MI 49715

Building Type: Education
Gross Floor Area: 10,500 ft²
Year Built: 2008

Score Date: 07/20/2022
Building ID #: 25779
Software Release: 2022.0.0.375

Upgrade Score 9.0
Estimated Savings¹ 14%
Current Score 7.0
1 Least Efficient Buildings
10 Ultra-High Performance Buildings

Standard Occupancy and Operating Conditions
Number of Assumed Occupants 105
Hours of Operation 40.75 hrs/wk
Cooling Set Point 75° F
Heating Set Point 70° F
Misc. Energy Loads 1.33 W/ft²

Estimated Source Energy Use and Carbon Emissions
Source EUI (kBtu/ft²/yr) Emissions (kg CO₂e/ft²/yr)
Current 151 7.54
Upgraded 130 6.49

Energy Use Intensity by Fuel Type
Site Energy Use (kBtu/ft²/yr)
Source Energy Use (kBtu/ft²/yr)

The Building Energy Asset Score is a national rating system developed by the U.S. Department of Energy. The Score reflects the energy efficiency of a building based on the building's structure, heating, cooling, ventilation, and hot water systems. The building's Structure and Systems are individually evaluated and ranked. The Upgrade Opportunities page provides recommendations for how to improve the building's energy efficiency, increase the building's Asset Score, and save money.

U.S. DEPARTMENT OF ENERGY


UPGRADE OPPORTUNITIES 2

Building Name: Child Development
Gross Floor Area: 10,500 ft²

Cost Effective Upgrade Opportunities | Energy Savings¹ | Cost²

Building Envelope
No opportunities identified.

Lighting Systems
• Replace existing lighting for Fixture 1 to LED lighting in Block 1 ¹ - Learn More — Medium — $
• Install occupancy sensors for interior lighting control in Block 1 - Learn More — Low — $-$$

HVAC Systems and Controls
• Implement demand controlled ventilation (DCV) in Block 1 - Learn More — Medium — $$
• Add variable frequency drive to supply fans in Block 1 - Learn More — Medium — $$

Service Hot Water Systems
• Add low flow faucets in Block 1 - Learn More — Low — $$

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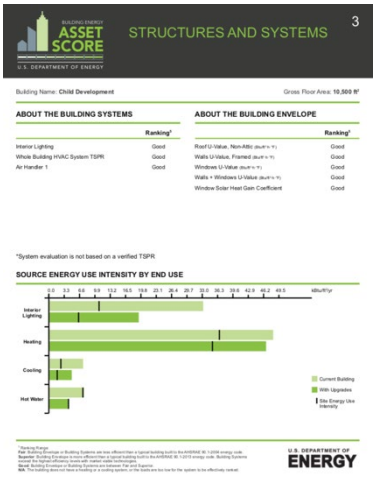
STRUCTURES AND SYSTEMS 3

Building Name: Child Development
Gross Floor Area: 10,500 ft²

ABOUT THE BUILDING SYSTEMS
Ranking²
Interior Lighting — Good
Whole Building HVAC System TSPR — Good
Air Handler 1 — Good

ABOUT THE BUILDING ENVELOPE
Ranking²
Roof U-Value, Non-Attic — Good
Walls U-Value, Framed — Good
Windows U-Value — Good
Walls + Windows U-Value — Good
Window Solar Heat Gain Coefficient — Good

*System evaluation is not based on a verified TSPR

SOURCE ENERGY USE INTENSITY BY END USE
Interior Lighting
Heating
Cooling
Hot Water
Current Building
With Upgrades
Site Energy Use Intensity

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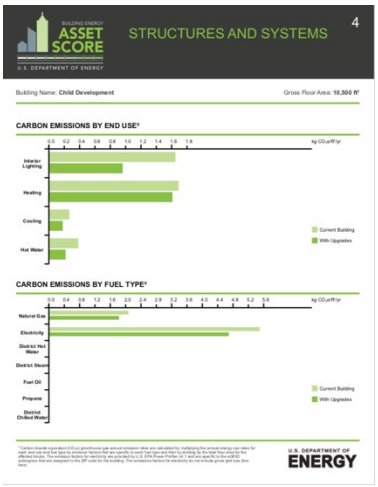
STRUCTURES AND SYSTEMS 4

Building Name: Child Development
Gross Floor Area: 10,500 ft²

CARBON EMISSIONS BY END USE¹
kg CO₂e/ft²/yr
Interior Lighting
Heating
Cooling
Hot Water
Current Building
With Upgrades

CARBON EMISSIONS BY FUEL TYPE¹
kg CO₂e/ft²/yr
Natural Gas
Electricity
District Hot Water
District Steam
Fuel Oil
Propane
District Chilled Water
Current Building
With Upgrades

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BUILDING ASSETS 5

Building Name: Child Development
Gross Floor Area: 10,500 ft²

Block 1 CHARACTERISTICS SUMMARY
Geometry
Current Building

Roof
Walls and Windows
All Surfaces
Skylights
Floor
Infiltration
Lighting
Heating/Cooling
Heating Equipment
Cooling Equipment

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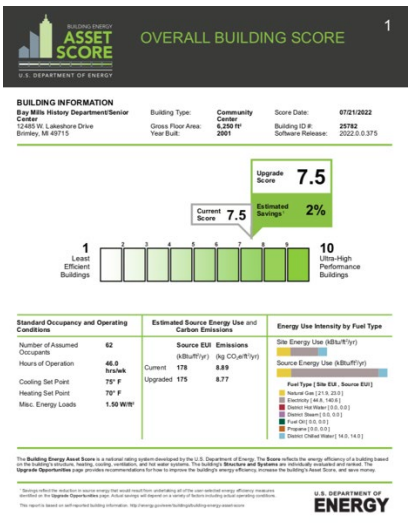
BUILDING ASSETS 6

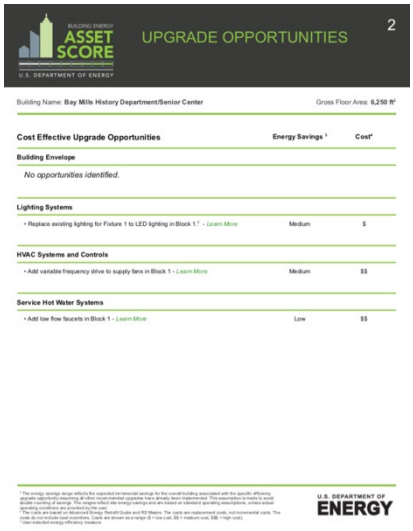
Building Name: Child Development
Gross Floor Area: 10,500 ft²

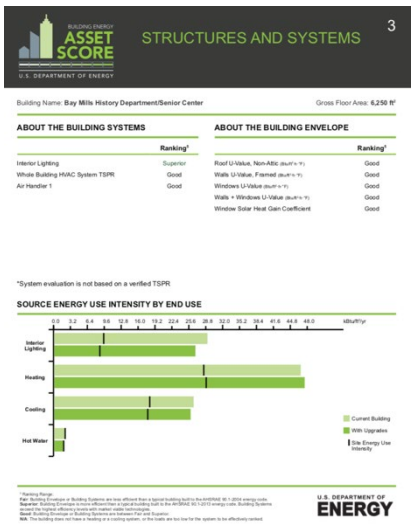
Current Building
Distribution
Fan Systems
Service Water Heating
Operations

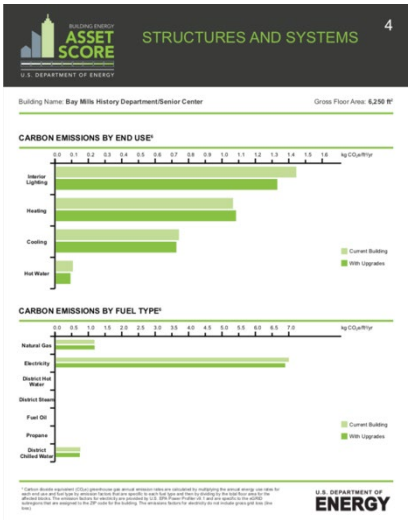
U.S. DEPARTMENT OF ENERGY

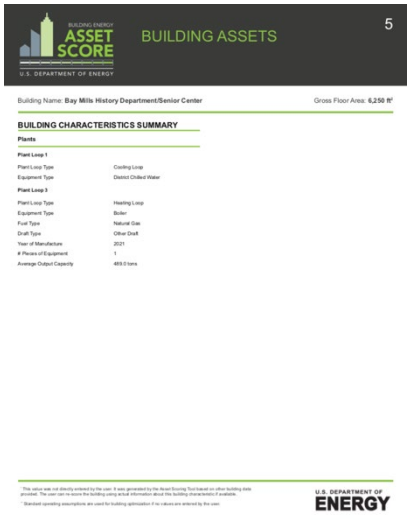
Armelia B. Parket Elder Center & History Department

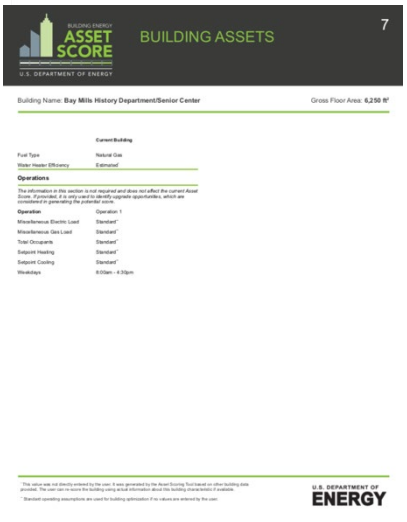






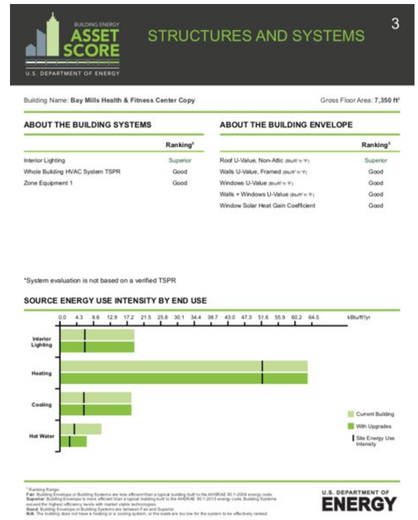


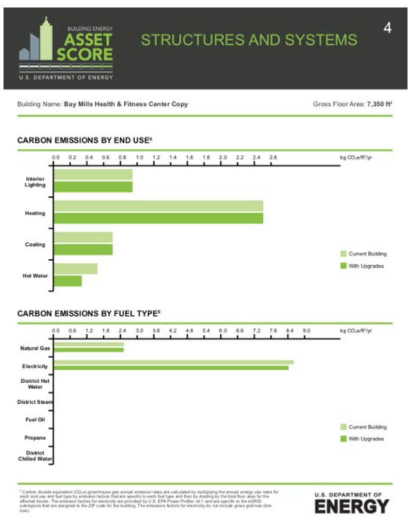




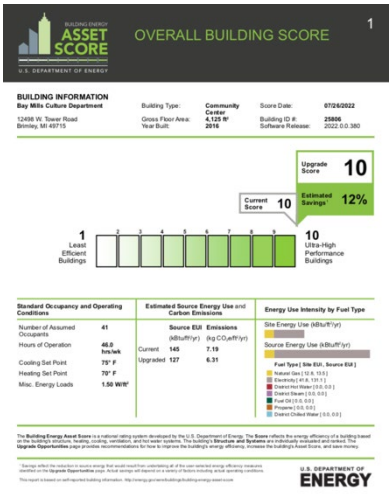
Commodity Foods

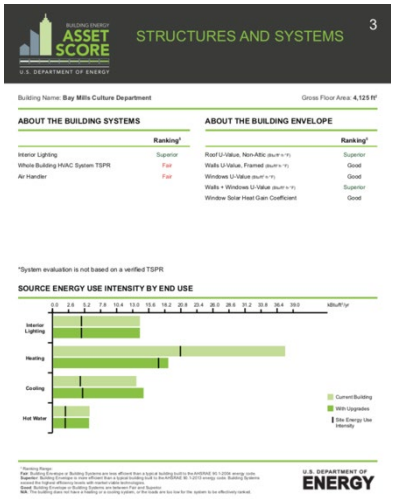
Mukwa Health & Fitness Center

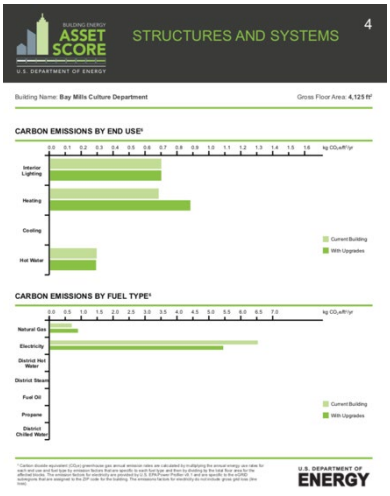




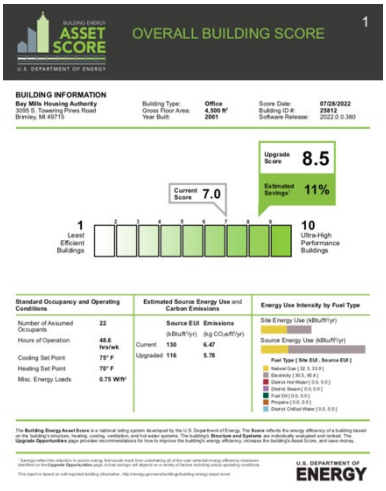
Culture Department

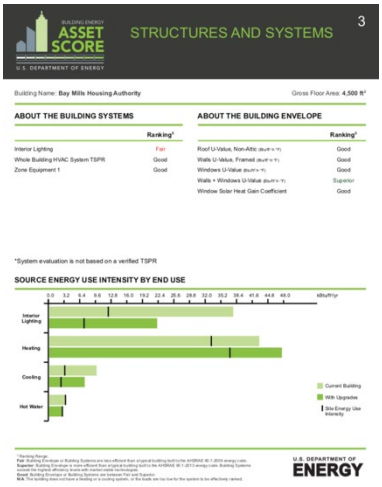


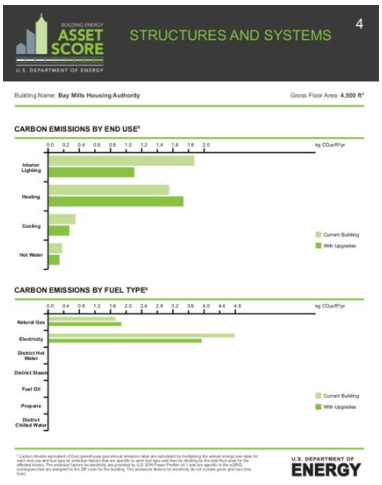




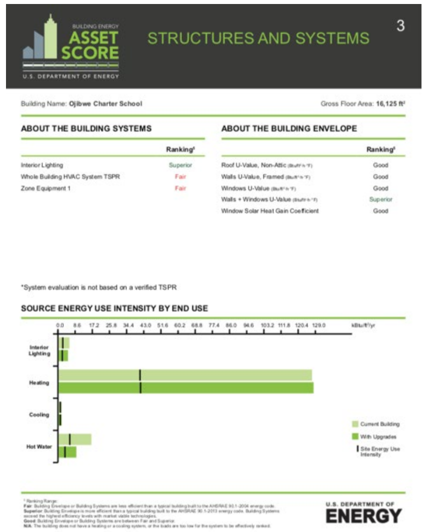
Bay Mills Housing Authority

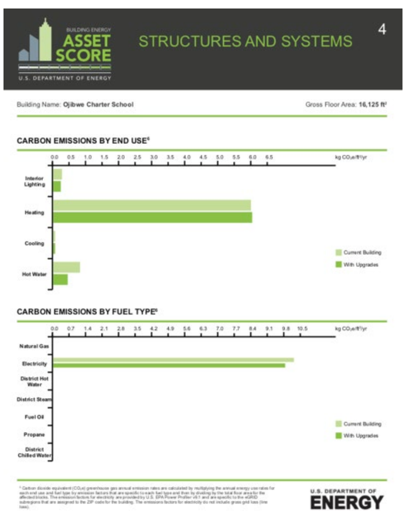




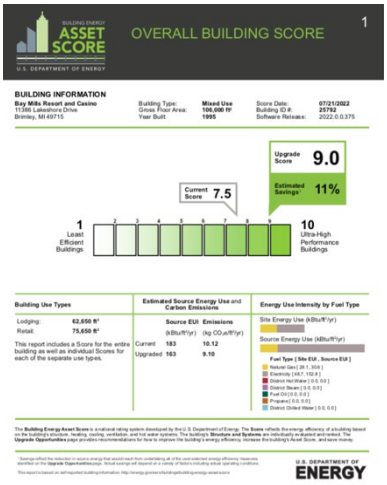


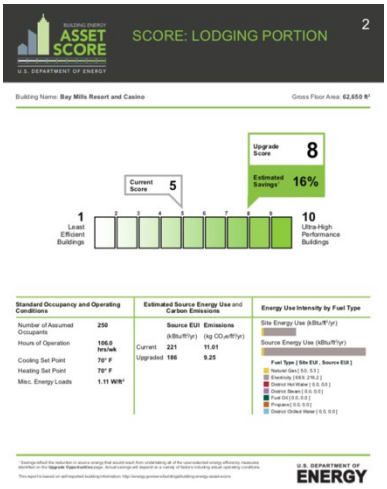
Ojibwe Charter School

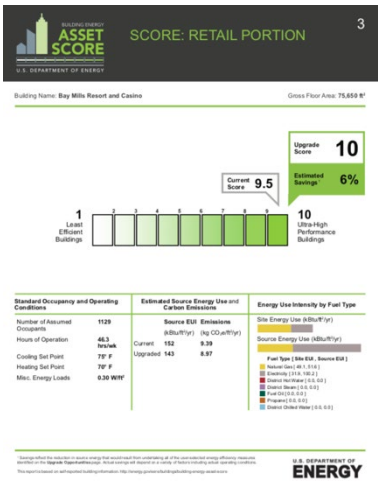


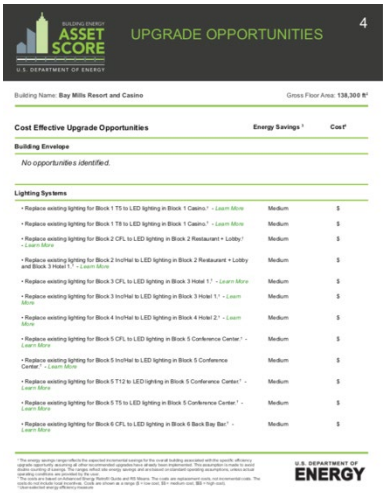


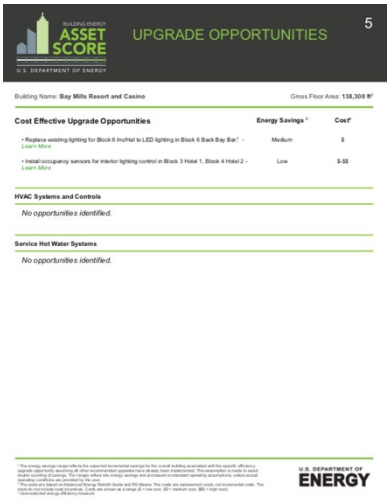
Bay Mills Resort & Casino

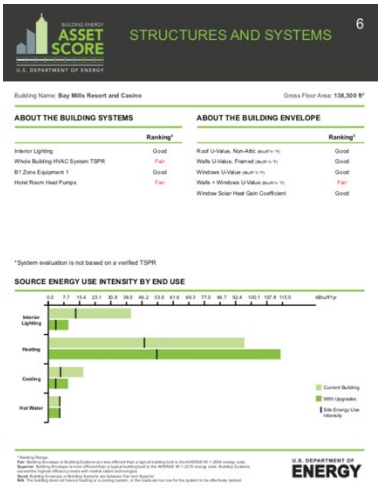


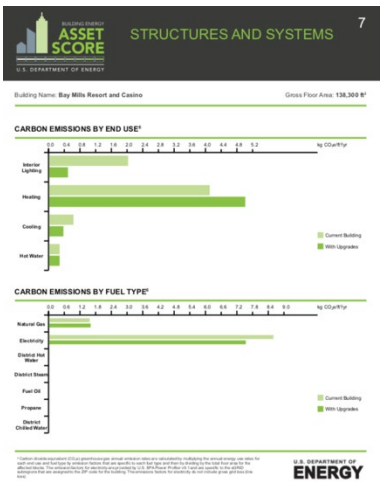








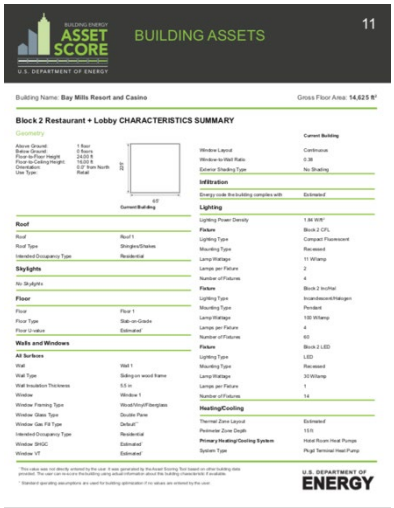


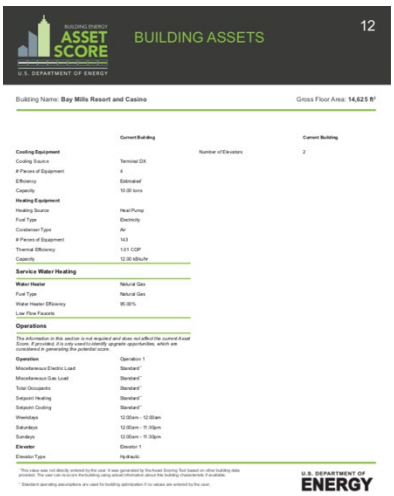

ASSET SCORE
U.S. DEPARTMENT OF ENERGY
STRUCTURES AND SYSTEMS
7
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 138,300 ft²
CARBON EMISSIONS BY END USE¹
kg CO2e/ft²/yr
Interior Lighting
Heating
Cooling
Hot Water
Current Building
With Upgrades
CARBON EMISSIONS BY FUEL TYPE²
kg CO2e/ft²/yr
Natural Gas
Electricity
District Hot Water
District Steam
Fuel Oil
Propane
District Chilled Water
Current Building
With Upgrades
U.S. DEPARTMENT OF ENERGY

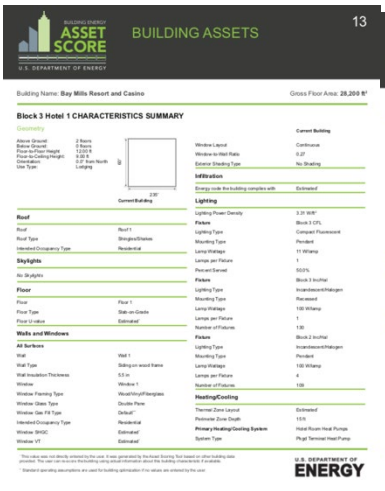

ASSET SCORE
U.S. DEPARTMENT OF ENERGY
BUILDING ASSETS
8
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 29,400 ft²
BUILDING CHARACTERISTICS SUMMARY
Plants
B1 Heating Loop
U.S. DEPARTMENT OF ENERGY


ASSET SCORE
U.S. DEPARTMENT OF ENERGY
BUILDING ASSETS
9
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 29,400 ft²
Block 1 Casino CHARACTERISTICS SUMMARY
Geometry
Current Building
Roof
Skylights
Floor
Walls and Windows
Infiltration
Lighting
Heating/Cooling
Cooling Equipment
U.S. DEPARTMENT OF ENERGY

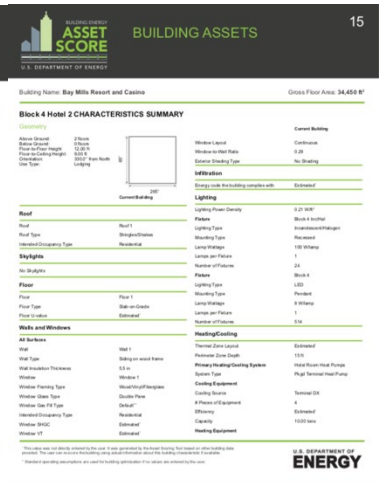

ASSET SCORE
U.S. DEPARTMENT OF ENERGY
BUILDING ASSETS
10
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 29,400 ft²
Current Building
Service Water Heating
Operations
U.S. DEPARTMENT OF ENERGY

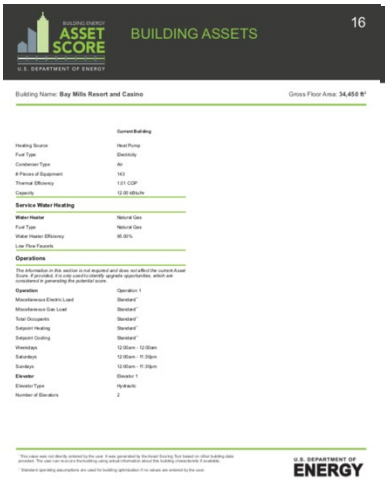

ASSET SCORE
U.S. DEPARTMENT OF ENERGY
BUILDING ASSETS
11
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 14,625 ft²
Block 2 Restaurant + Lobby CHARACTERISTICS SUMMARY
Geometry
Current Building
Roof
Skylights
Floor
Walls and Windows
Infiltration
Lighting
Heating/Cooling
U.S. DEPARTMENT OF ENERGY


ASSET SCORE
U.S. DEPARTMENT OF ENERGY
BUILDING ASSETS
12
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 14,625 ft²
Current Building
Service Water Heating
Operations
U.S. DEPARTMENT OF ENERGY


BUILDING ASSETS
13
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 28,200 ft²
Block 3 Hotel 1 CHARACTERISTICS SUMMARY
U.S. DEPARTMENT OF ENERGY

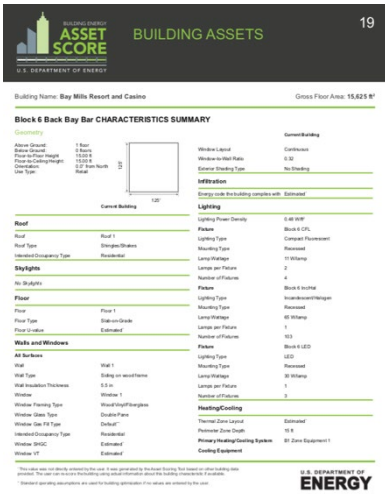

BUILDING ASSETS
14
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 28,200 ft²
U.S. DEPARTMENT OF ENERGY


BUILDING ASSETS
15
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 34,450 ft²
Block 4 Hotel 2 CHARACTERISTICS SUMMARY
U.S. DEPARTMENT OF ENERGY


BUILDING ASSETS
16
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 34,450 ft²
U.S. DEPARTMENT OF ENERGY

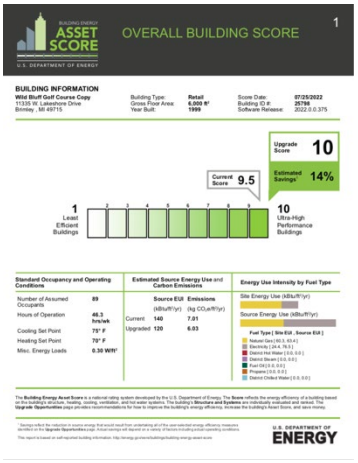

BUILDING ASSETS
17
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 16,000 ft²
Block 5 Conference Center CHARACTERISTICS SUMMARY
U.S. DEPARTMENT OF ENERGY

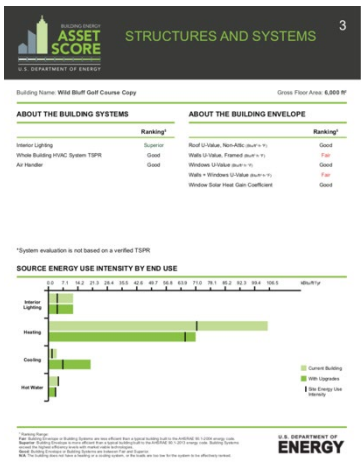

BUILDING ASSETS
18
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 16,000 ft²
U.S. DEPARTMENT OF ENERGY

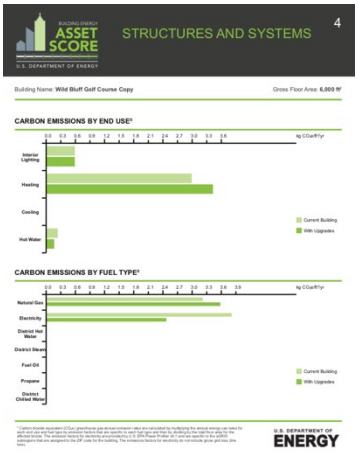

BUILDING ASSETS
19
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 15,625 ft²
Block 6 Back Bay Bar CHARACTERISTICS SUMMARY
U.S. DEPARTMENT OF ENERGY

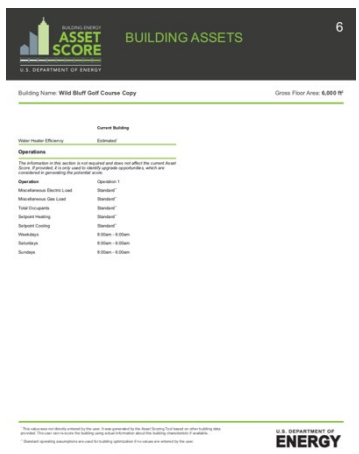

BUILDING ASSETS
20
Building Name: Bay Mills Resort and Casino
Gross Floor Area: 15,625 ft²
U.S. DEPARTMENT OF ENERGY

Wild Bluff Golf Course

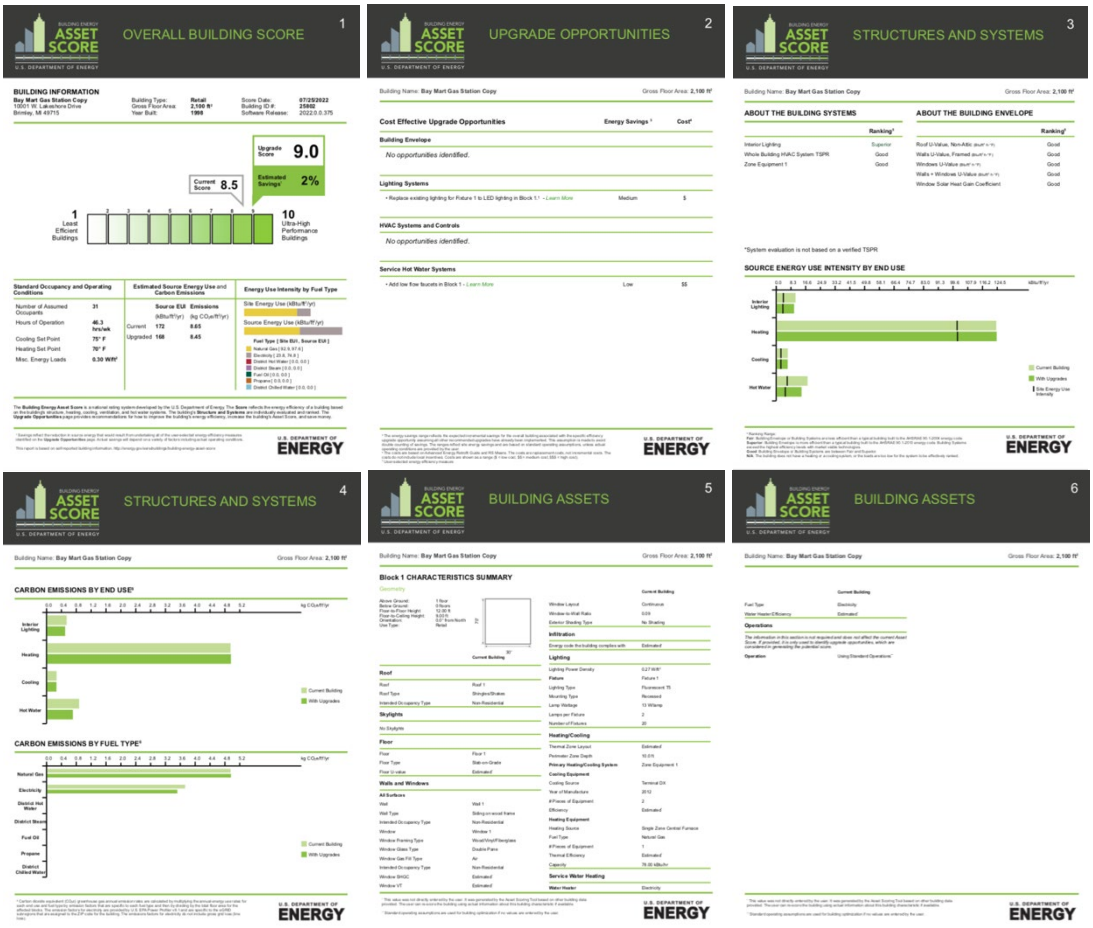




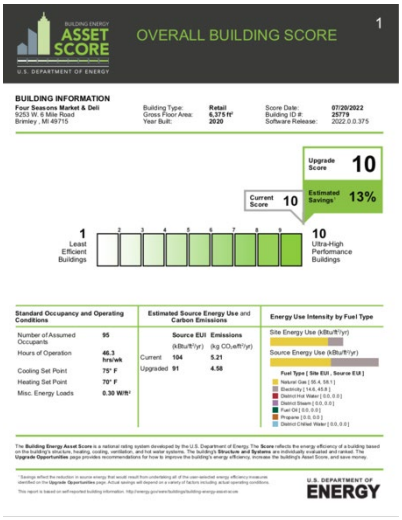


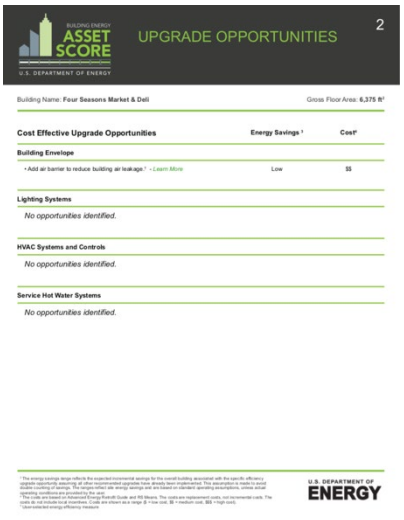


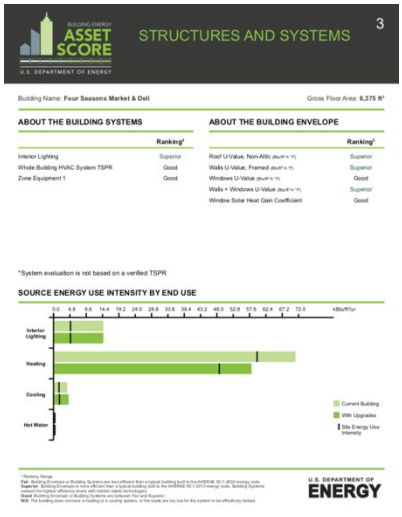
Bay Mart Gas Station

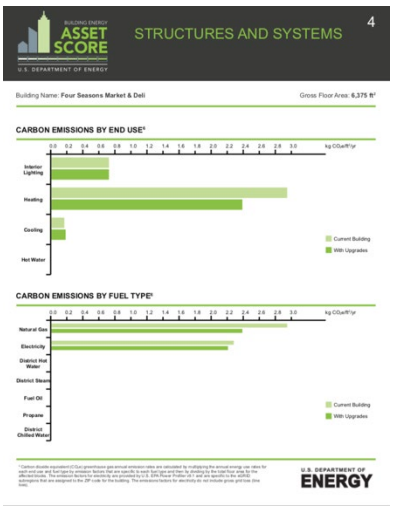


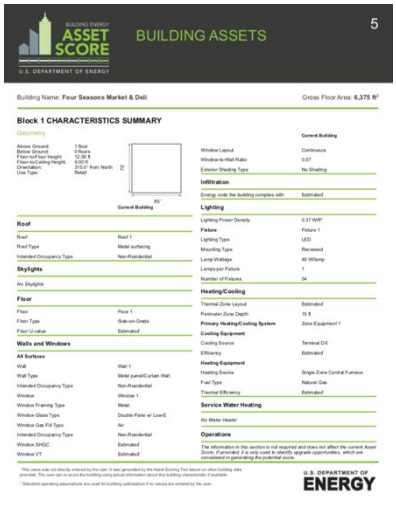
Four Seasons Market & Deli



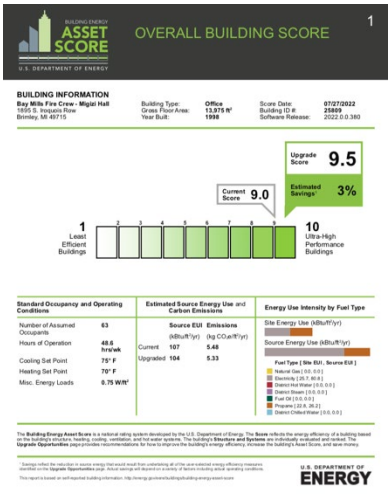


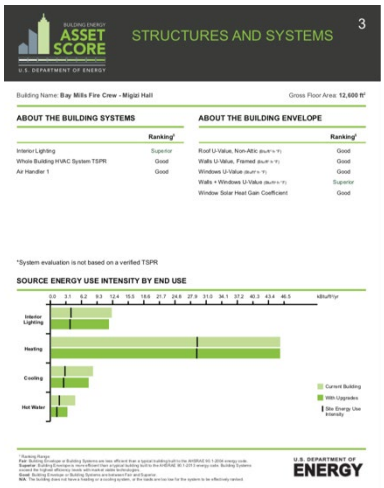


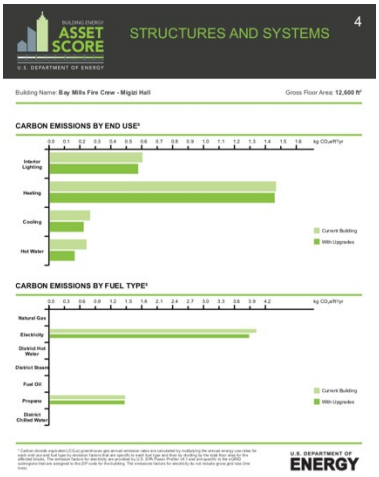


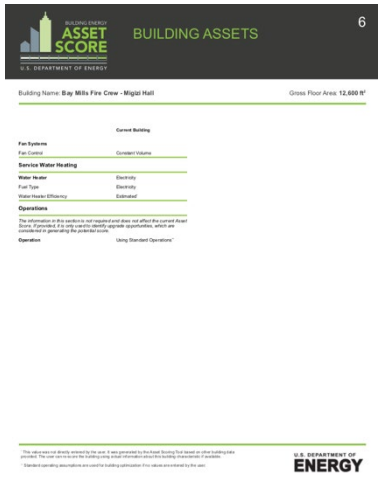


Bay Mills Fire Crew - Migizi Hall

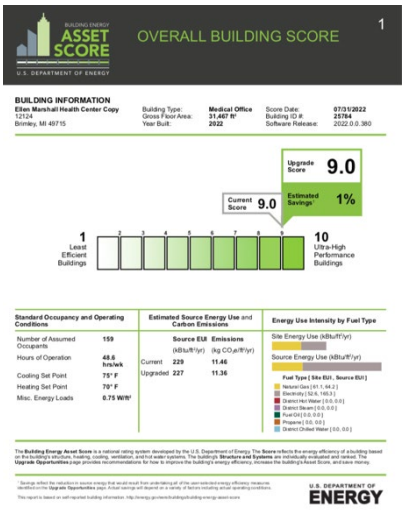


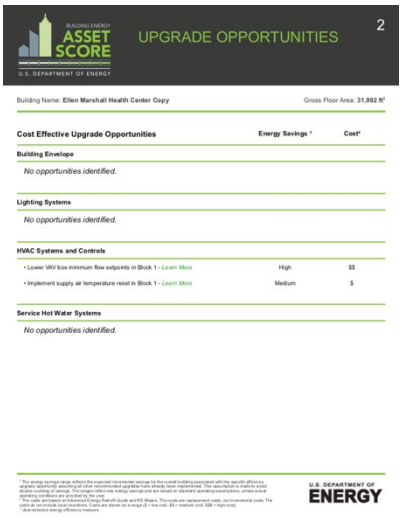


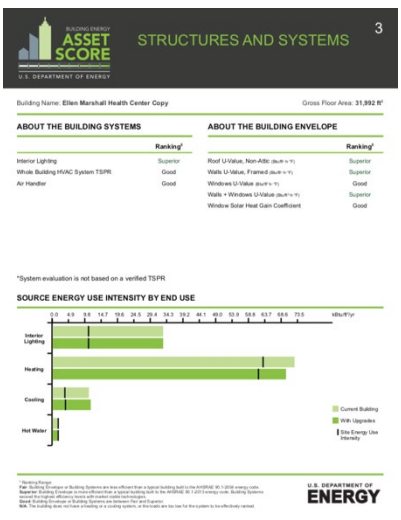


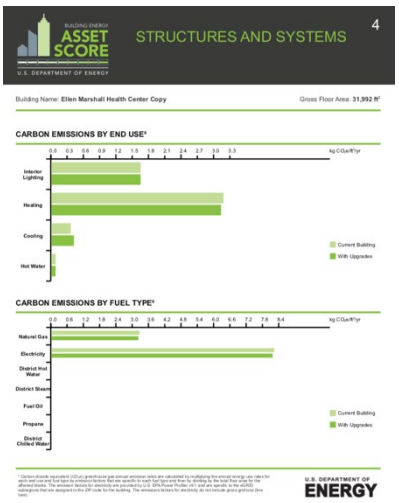


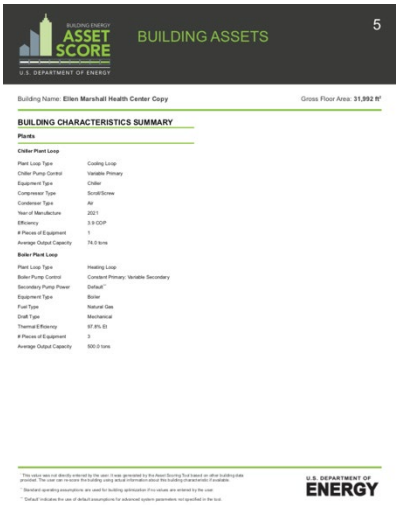
Ellen Marshall Health Center











Appendix C: Excerpts from 2011 Energy Efficiency Study

Energy Efficiency Feasibility Study
and
Resulting Plan for the Bay Mills Indian Community




To reduce energy consumption at Bay Mill Indian Community's most energy intensive buildings that will, in turn, reduce emissions at the source of energy production, reduce energy expenditures, create long lasting energy conscious practices and positively affect the quality of the natural environment.

Prepared by:

Funded by:

Tribal Energy Program

Executive Summary

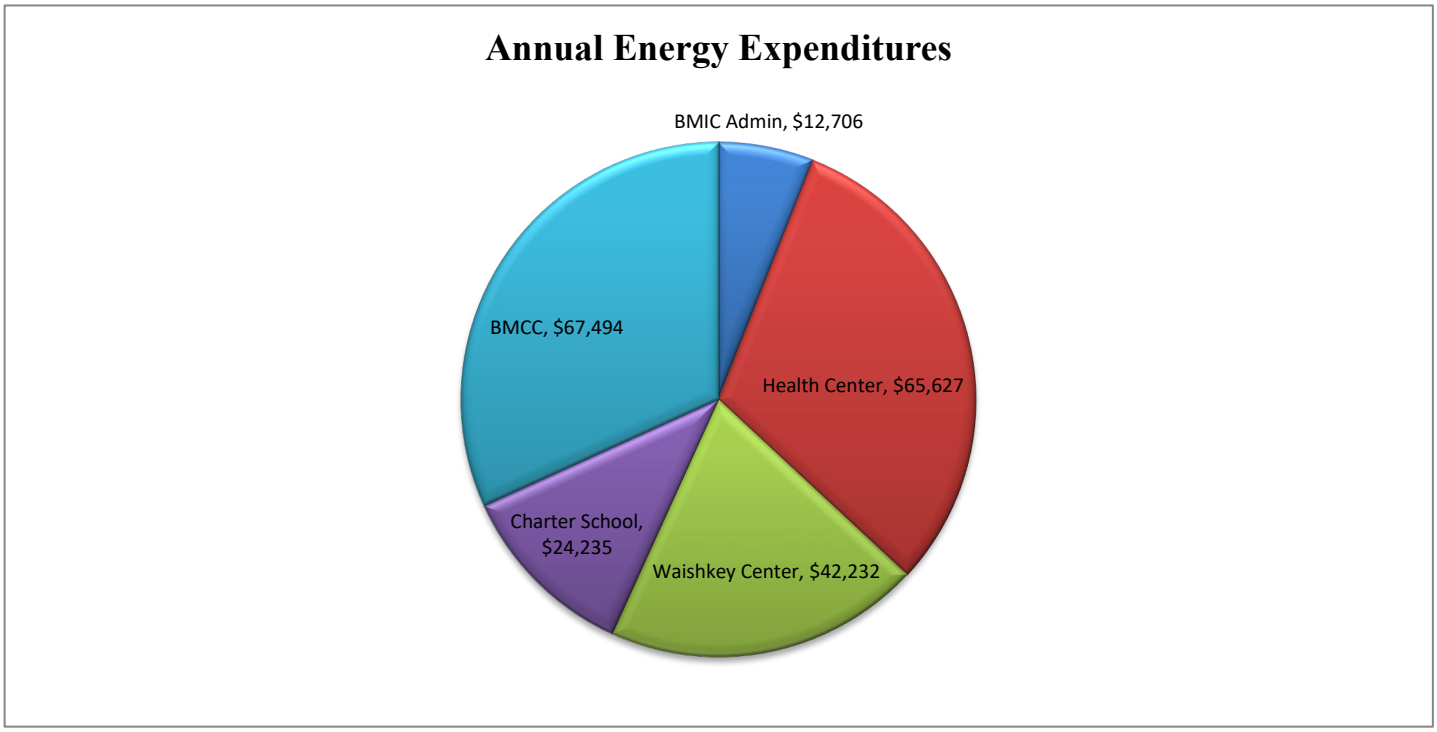
In 2011 the Inter-Tribal Council of Michigan, Inc. was awarded an Energy Efficiency Development and Deployment in Indian Country grant from the U.S. Department of Energy's Tribal Energy Program. This grant aimed to study select Bay Mills Indian Community community/government buildings to determine what is required to reduce each building's energy consumption by 30%. The Bay Mills Indian Community (BMIC) buildings with the largest expected energy use were selected for this study and include the Bay Mills Ellen Marshall Health Center building, Bay Mills Indian Community Administration Building, Bay Mills Community College, Bay Mills Charter School and the Waishkey Community Center buildings. These five sites are the largest energy consuming Community buildings and comprise the study area of this project titled "Energy Efficiency Feasibility Study and Resulting Plan for the Bay Mills Indian Community".

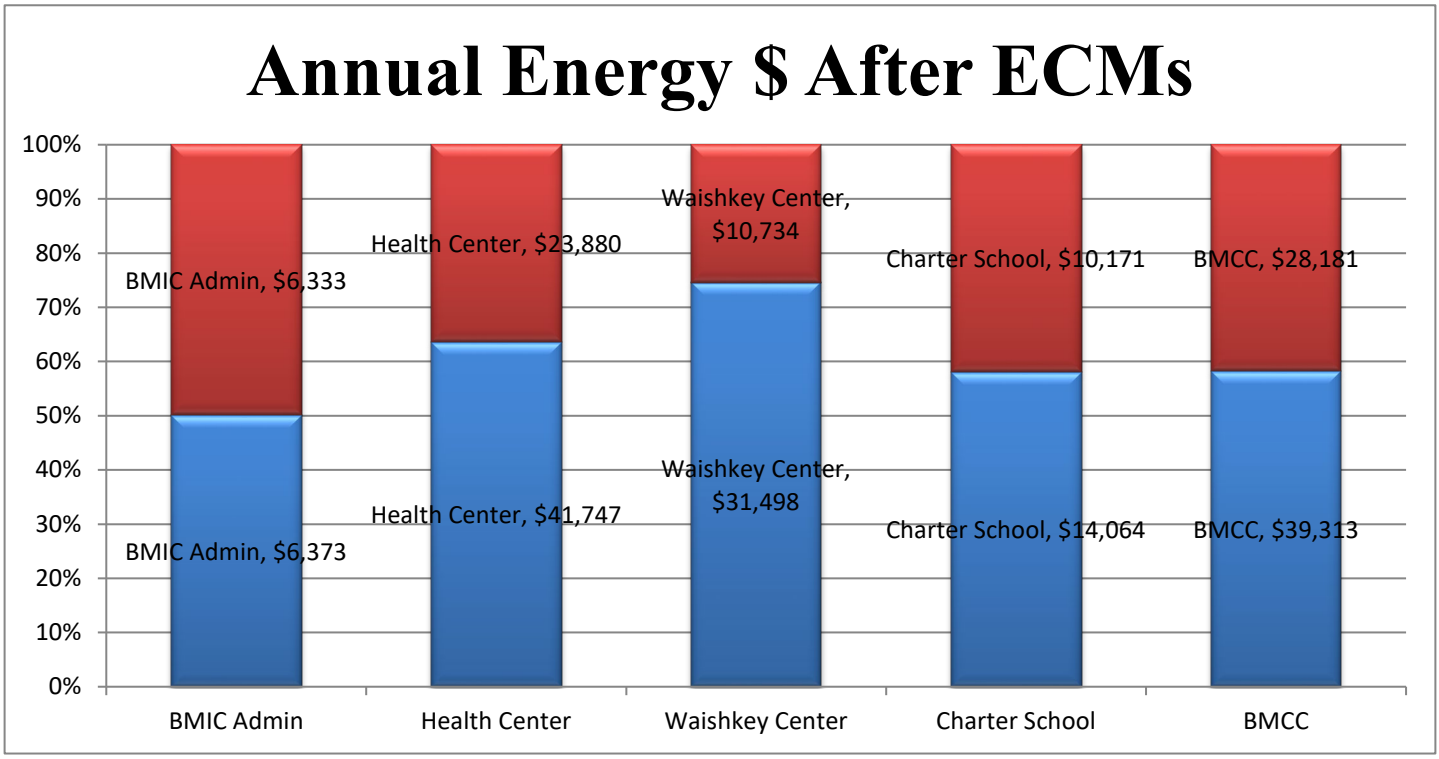
The ultimate objective of this study, plan and the Tribe is to reduce the energy consumption at the Community's most energy intensive buildings that will, in turn, reduce emissions at the source of energy production, reduce energy expenditures, create long lasting energy conscious practices and positively affect the quality of the natural environment.

This feasibility study and resulting plan act as a guide to the Community's first step towards planned energy management within its buildings/facilities. It aims to reduce energy consumption by 30% or greater within the subject facilities with an emphasis on energy conservation and efficiency. The primary goals of the plan are to maximize long-term savings and foster a culture of energy conservation. In order to meet these goals, this plan provides both specific strategies and efficiency items for reducing energy usage and a step-by-step planning guide. The document contains short-term, mid-term, and long-term action plans nested within the overall process. No cost conservation measure will constitute the short-term actions. The mid-term and long-term actions could be funded by contributing 50% of the cost savings to an energy savings account. This mechanism of reinvesting energy savings has been very successful in cutting energy cost over the long-term (Ann Arbor, MI has demonstrated great success since founding an energy fund in 1998). By utilizing this reinvestment mechanism this energy action plan stands as both a powerful resource and a model for successful energy management. This Plan is intended to be a living document that provides focus and resources for an ongoing process of planning, implementation, and evaluation of energy efficiency, conservation, and renewable energy measures.

The energy audits and related power consumption analyses conducted for this study revealed numerous significant energy conservation and efficiency opportunities for all of the subject buildings. In addition, many of the energy conservation measures require no cost and serve to help balance other measures requiring capital investment. Reoccurring deficiencies relating to heating, cooling and thermostat inefficiencies, powering computers, lighting, items linked to weatherization and numerous other items were encountered that can be mitigated with the energy conservation measures developed in the following plan.

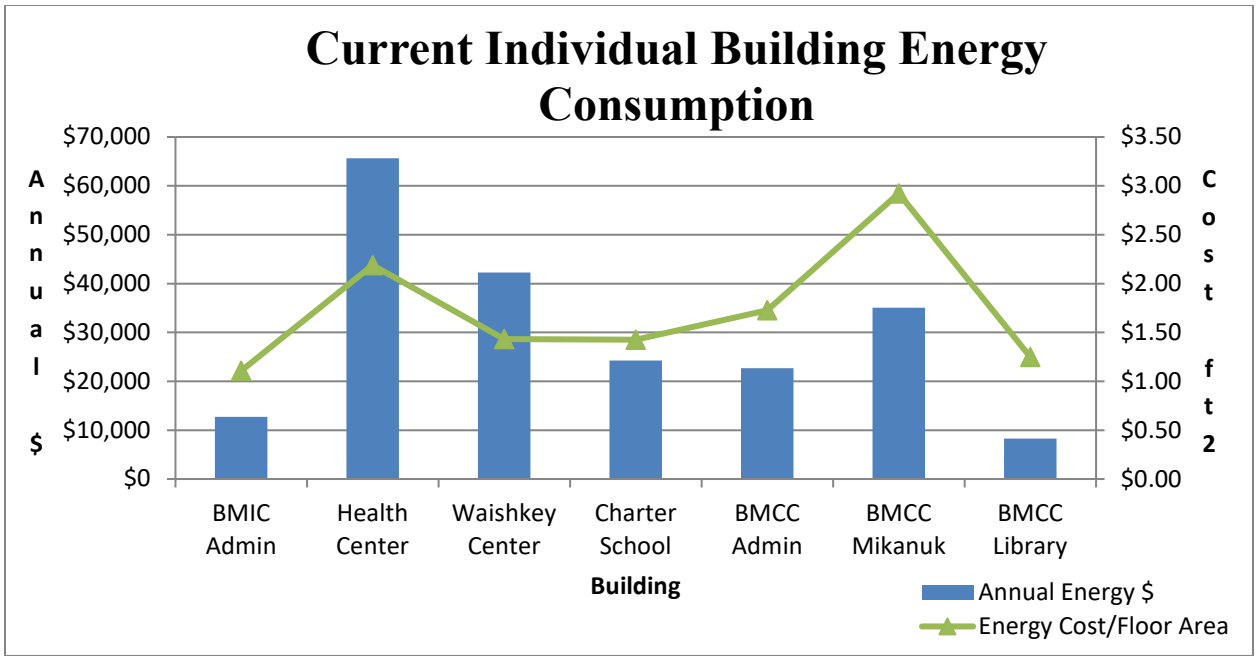
The two charts below depict the existing state of energy consumption within the subject buildings and that of the same buildings with the energy conservation measures developed in this project.

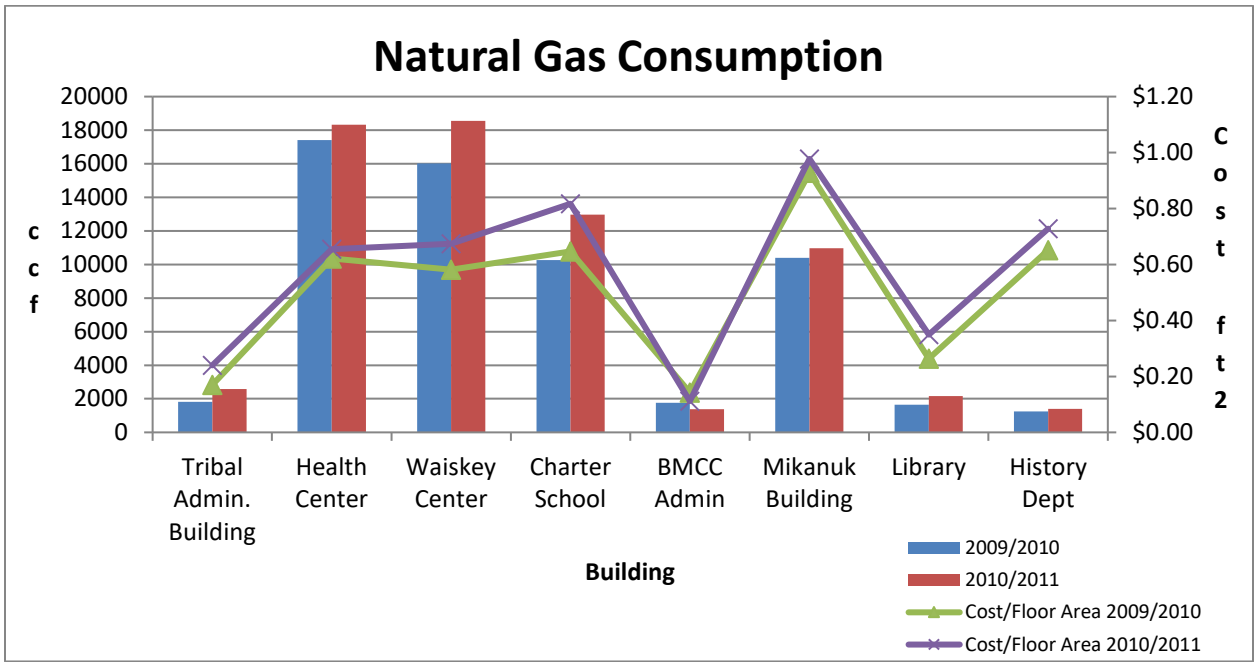


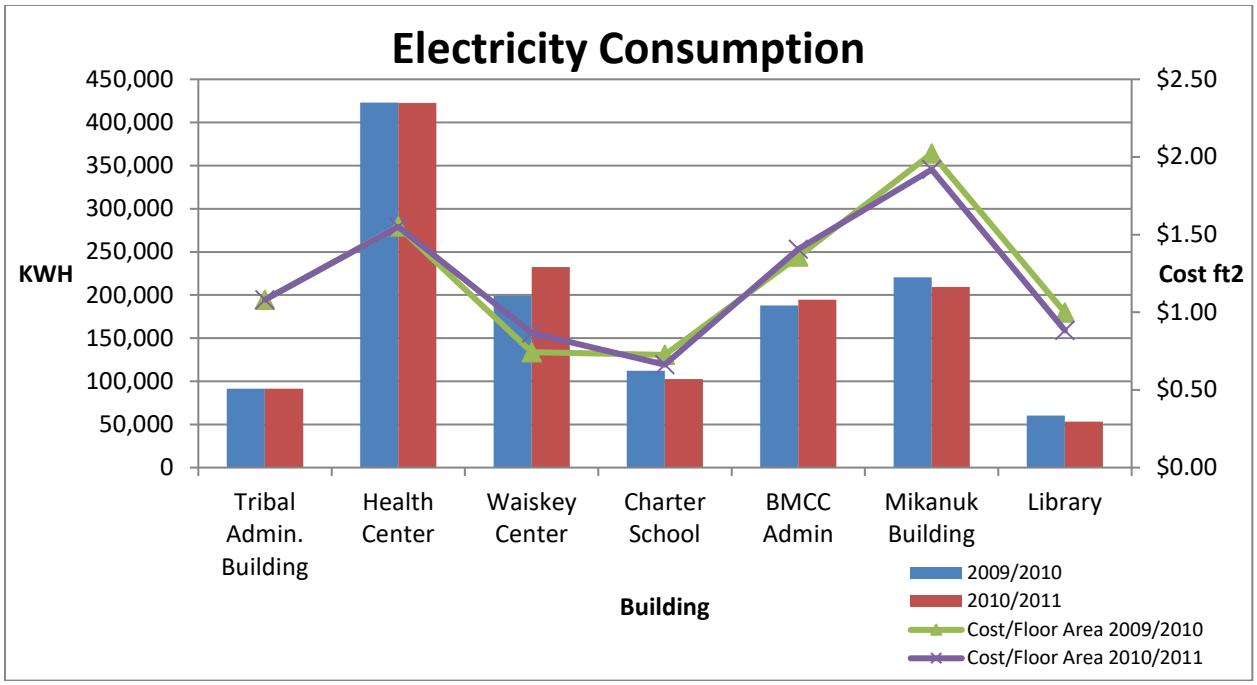


Based on each facility's energy use, estimates of greenhouse gas emissions were generated using Energy Star Portfolio Manager. The College consumed the most total site energy and also generating the greatest amount of GHG emissions at 411 MT CO2-e in 2011 and was close followed by the Ellen Marshall Health Center at 400 MT CO2-e. The total annual GHG emissions was 1,292 MT CO2-e, which to put in more tangible terms is equivalent to the annual emissions from 269 cars or the amount of carbon sequestered annually 1,059 acres of forest.[7] The following table and charts illustrate the current state of energy consumption in the subject buildings.

Building Energy Performance					
Building	**Energy Performance Rating (1-100)**	**Site Energy Intensity/National Median (kBtu/ft2/yr)**	**Source Energy Intensity/National Median (kBtu/ft2/yr)**	**Total Annual Site Energy (kBtu)**	**Total Annual GHG Emissions (MT CO_2-e)**
Tribal Administration Building	85	51/82	118/189 (-38%)	586,009	81
Ellen Marshall Health Center	44	111/104	227/213 (+7%)	3,329,503	400
BMIC Charter School	52	106/109	165/170 (-2%)	1,717,715	150
Waishkey Center Community Building	NA	88/39	145/100 (+45%)	2,589,427	242
Bay Mills Community College Library	NA	65/104	139/244 (-43%)	429,411	55
Bay Mills Community College Admin.	NA	70/104	186/244 (-24%)	926,286	148
Bay Mills Community College Mikanuk	NA	157/104	308/244 (+26%)	1,880,608	216
Source: Energy Star Portfolio Manager					


Current Individual Building Energy Consumption
Annual $
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
Cost ft2
BMIC Admin
Health Center
Waishkey Center
Charter School
BMCC Admin
BMCC Mikanuk
BMCC Library
Building
Annual Energy $
Energy Cost/Floor Area


Natural Gas Consumption
ccf
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
$1.20
$1.00
$0.80
$0.60
$0.40
$0.20
$0.00
Cost ft2
Tribal Admin. Building
Health Center
Waiskey Center
Charter School
BMCC Admin
Mikanuk Building
Library
History Dept
Building
2009/2010
2010/2011
Cost/Floor Area 2009/2010
Cost/Floor Area 2010/2011


Electricity Consumption
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
KWH
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
Cost ft2
Tribal Admin. Building
Health Center
Waiskey Center
Charter School
BMCC Admin
Mikanuk Building
Library
Building
2009/2010
2010/2011
Cost/Floor Area 2009/2010
Cost/Floor Area 2010/2011

C.1 BMIC Current Tribal Administration Building

(ECMs Totaling 50% Energy Reduction)

The Bay Mills Indian Community Administration Building is an 11,400ft^2 split level office building owned by the Tribe. The Administration Building was constructed in the early 1970s and is situated directly on the south shore of the Saint Marys River/Lake Superior. The Administration Building is connected via a hallway to the Kings Club Casino. The administration and casino portions of the building share an electric meter but separate gas meters. The shared electricity meter posed some challenge in differentiating electricity for just the administration activities portion but was successfully determined from the completed energy auditing performed in the project. Like many older buildings, the Administration Building has had additions and building alterations performed. The building serves approximately 25 staff and is utilized year round.

The Administration Building utilizes grid electricity and natural gas as sources of energy. Electricity is used for all items requiring energy and natural gas is the primary heating fuel source and is supplemented by electric baseboard heating in some parts of the building. Heating is controlled by two programmable thermostats, each tied to a natural gas forced air furnace and six upstairs offices with individual manual thermostats controlling electric baseboard heating. The six upstairs offices and the Tribal court offices have individual wall AC units.

The Administration Building features wood frame construction, fiberglass insulation, vinyl siding, a combination of wood framed and vinyl sliding windows, one glass/aluminum framed double exterior door, one single metal entry door, one sliding glass door, pitched roof and half of the building with a blocked basement and the other half on a slab foundation.

Analyses of the Administration Building's energy consumption history and energy audit information revealed that computers is the largest energy consuming item followed by heating, interior lighting, hot water, computer servers and other items shown in the following chart.

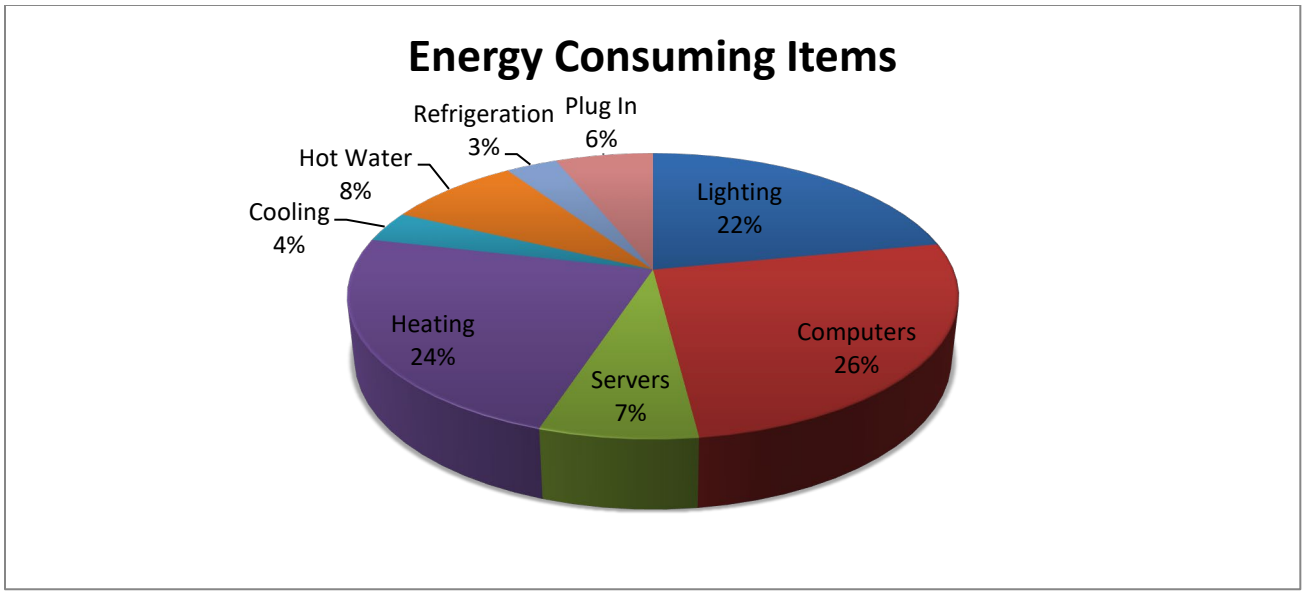


Figure B.1. Energy Consuming Items

To improve building energy performance, the following Energy Conservation Measures (ECMs) were developed in response to energy audit and analyses findings. Each ECM is further described below.

Table B.1. Energy Conservation Measures

ECM	Description of **Energy Conservation Measures**	% Energy Use Savings	Total Cost Savings ($/year)	Estimated Capital Cost ($)	Simple Payback (years)
1	Hibernate computers during non-work hours	67.4%/13.8%	$1,753	$0	0
2	Interior Lighting (T8 Fixtures, bulbs and occupancy sensors)	49.4%/9.5%	$1,208	$8,372	6.93
3	Energy Efficient Water Heaters (2)	62%/5.2%	$665	$2,298	3.46
4	Thermostat optimization (6pm-6am 10 degree setback/stepup; thermostat heat setting @ 70 degrees; 76 degrees AC) & Turning Off Electric Baseboard and Wall AC Units at Close of Work Day	29%/7.7%	$968	$0	0
5	Energy Efficient Refrigerators (Replace 2 w/ 1 Efficient fridge)	89.4%/2.6%	$336	$945	2.81
6	Replace Incandescent Bulbs with CFLs	78.3%/2.0%	$256	$14	0.06
7	Timed Power Supplies (Copiers, Printers, Postage)	53.4%/1.6%	$200	$323	1.61
8	Coffee Makers w/Insulated Carafe	92%/1.0%	$132	$130	0.98

9	Eliminate Redundant Items (Space heaters, ½ fridge)	100%/0.7%	$88	$0	0
10	Energy Star Water Cooler	45.2%/0.3%	$40	$191	4.81
11	Insulation & Air Sealing (Air seal attic deck and wall AC; Insulate attic and foundation)	20%/5.4%	$687	$10,000	14.5
	Total	**49.8%**	**$6,333**	**$22,273**	**3.51**

ECM 1: Computer Power Management

Existing Conditions

The energy audit of the Administration Building determined that work station computer systems largely remain powered on 24 hours per day. Computers that remain on after work cause unnecessary power consumption and can be mitigated by hibernating computers after/before work hours.

Energy Conservation Measure

Hibernating is a power management setting that every computer operating system has for reducing energy consumption. Utilizing this feature to power down computers outside of work hours will reduce the current wasted energy associated with keeping computers powered on when the building is unoccupied. Enabling the Hibernate feature to the specifications below will cause each computer to consume near zero energy outside of work hours (approximately 14 hours/day) and thereby result in a significant reduction in energy.

Computer Type	Existing Condition	New Condition
Workstation	Powered on 24/7	Enable Hibernate feature in each computer's Power Management settings after 90 minutes of inactivity.

Savings

Computer energy reduction: 67.4%
Overall building energy reduction: 13.8%
Annual savings: $1,753
Capital investment: $0
Payback: 0 years

Savings are calculated using the following: twenty-seven computers operating 261 week days calculated with 10 work hours and 14 efficency mode hours, 72 weekend days calculated with 100% hibernation/efficiency mode.

ECM 2: Interior Lighting

Existing Conditions

The Administration Building's interior is equipped with T12 fluorescent bulbs and fixtures on manual light switches. While these lights are more efficient than incandescent bulbs, newer and more efficient T8 bulbs and occupancy sensors would result in greater energy savings.

Energy Conservation Measure

Purchase and install T8 fixtures, bulbs and occupancy sensors for 24 rooms/offices that will consume less energy from higher efficiency lights and electricity conservation by automatically turning off lights when room is unoccupied. Multi-technology sensors would be used and prevent lights from unintentionally being turned off (see Appendix – Lighting for recommended Leviton occupancy sensor unit). U.S. EPA estimates 25% savings when occupancy sensors are used in office settings.

Lighting Item	Existing Condition	New Condition
Interior Lighting	Ceiling T8 fixtures and bulbs with manual on/off switches	Purchase and install 70 X 2 T8 lamp fixtures (Grainger item #2PFV4 @ $71.35 each); 10 X 4 T8 lamp fixtures (Grainger item # 3XY83 @ $146.05); 24 Leviton Multi-Technology Occupancy Sensor Units @ $79.86).

Savings

Interior lighting reduction: 49%
Overall building energy reduction: 9.5%
Annual savings: $1,208
Capital investment: $8,372
Payback: 6.93 years

Calculations for energy savings are based on increased efficiency of T8 fixtures over T12 and a 25% reduction relating to the use of occupancy sensors.

ECM 3: High Efficiency Water Heaters

Existing Conditions

The Administration Building currently uses two 40 gallon electric water heater to meet its need for hot water. Of the various types of common ways to heat water, electric water heaters are amongst the most expensive and double that of natural gas or hybrid/heat pumps. Hot water demand is for kitchen needs and the two restrooms.

Energy Conservation Measure

Replace the existing electric waters heater with hybrid/heat pump water heaters. This measure would result in cutting energy used for hot water in half while remaining safe and reliable. In heat pump mode, these water heaters will use heat from ambient air and transfer it to the water in the tank. This type of water heater will be especially beneficial in the furnace/server room where excessive heat is generated and can be used for water heating.

Appliance	Existing Condition	New Condition
Water Heater	Two 40 gallon standard electric water heaters.	Replace two existing water heaters with hybrid/heat pump water heaters that would consume approximately ½ of the existing energy of existing the standard electric water heaters.

Savings
Hot water energy reduction: 62%
Overall building energy reduction: 5.2%
Annual savings: $665
Capital investment: $2,298
Payback: 3.46 years

ECM 4: Thermostat Optimization

Existing Conditions
Currently, the building's heating and cooling operates in a steady-state/occupied scenario 24 hours a day and 365 days a year. During energy audit visits, heat thermostat settings averaged 72 degrees on two programmable thermostats and widely varied on manual thermostats controlling electric baseboards. The electric baseboard heat is typically set in the mid 70s with no setback to compensate for cold and drafty north offices. Summer air conditioning thermostat settings average 72 degrees for two central AC units with two programmable thermostats and seven manually operated wall mounted AC units. Significant energy is wasted for excessive heating and cooling temperatures and heating and cooling of building during unoccupied times.

Energy Conservation Measure
Optimize thermostat heating and cooling programming to the EPA recommended temperature during work hours. In addition, program setbacks and step ups outside of occupied times for programmable thermostats and implement procedure to turn electric baseboard heat at the end of each work day. See Appendix – Thermostat Optimization for breakdown of savings/wasted energy.

Thermostat Setting	Existing Condition	New Condition
Heat – Forced Air	Avg. 72°F 24hrs/auto	Weekdays 6am-6pm: 70°F Weekdays 6pm-6am & Weekends 60°
Heat – Electric Baseboard	Avg. 74°F 24hrs/manual	Weekdays office hours: 70°F Weekdays 6pm-6am & Weekends: Electric baseboard heat turned off at the close of each work day.
Cooling – Central AC	Avg. 72°F 24hrs/auto	Weekdays 6am-6pm: 76°F Weekdays 6pm-6am & Weekends: off

Cooling – Wall AC Units	Avg. 72°F 24hrs/manual	Weekdays office hours: 76°F Weekdays 6pm-6am & Weekends: Wall AC units turned off at the close of each work day.

Savings
Building heating & cooling energy reduction: 29%
Overall building energy reduction: 7.7%
Annual savings: $968
Capital investment: $0
Payback: 0 years

ECM 5: High Efficiency Refrigerators

Existing Conditions

The Administration Building currently uses two standard/non-high efficiency refrigerators. These refrigerators are located in the staff kitchen and the Bay Mills News office and consume approximately double the electricity of current high efficiency units. In addition, the number of staff working in the Tribal Administration building could utilize one full size refrigerator instead of two full size units.

Energy Conservation Measure

Replace the two existing refrigerators with one high efficiency refrigerator in the staff kitchen.

Appliance	Existing Condition	New Condition
Refrigerators	Two non-high efficiency refrigerators.	Replace the two existing refrigerators with one high efficiency refrigerator that would consume significantly less electricity.

Savings
Refrigeration energy reduction: 89.4%
Overall building energy reduction: 2.6%
Annual savings: $336
Capital investment: $945
Payback: 2.81 years

ECM 6: Replacing Incandescent Light Bulbs

Existing Condtions

The vast majority of interior lighting at the school is fluorescent lighting but there are some remaining incandescent bulbs. Incandescent bulbs use approximately four times the electricity as energy efficient alternative bulbs and can be easily and cheaply replaced.

Energy Conservation Measure

Purchase and replace incandescent bulbs with energy efficient compact fluorescent bulbs. Benefits of CFLs will include significantly less energy consumption for comparable light output and longer bulb life.

Savings

Energy reduction from incandescent bulbs: 78.3%
Overall building energy reduction: 2.0%
Annual savings: $256
Capital investment: $14
Payback: 0.06 years

ECM 7: Timed Power Supplies

Existing Condtions

Various electronic items throughout the building continue to draw "phantom" power as they sit idle after class/work hours. Energy auditing showed that copiers and printers continue to draw electricity even when idle and building is unoccupied.

Energy Conservation Measure

Purchase seven APC P11GTV power strips to power down printers with master device/hibernating computer automatically and three APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day.

Plug In Device	Existing Condition	New Condition
Printer	Seven printers that are inconsistently powered off	Purchase and utilize APC P11GTV power strips to power down printers when master device/hibernating computer powers down
Copier	Three copy machines that continue to draw power unnecessarily after work hours	Purchase and utilize APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day
Postage	One postage machine that is powered on 24/7	Purchase and utilize APC Day & Time Timer/Surge Protector to limit power to postage machine to 10 hours per day

Savings

Timed electronic energy reduction: 49%
Overall building energy reduction: 0.7%
Annual savings: $163
Capital investment: $233

Payback: 1.5 years

ECM 8: Replacing Conventional Coffee Pot with Thermal Carafe Unit

Existing Condtions

The staff kitchen has a coffee machine with hot plate that remains on and drawing electricity throughout the work day to heat coffee pot.

Energy Conservation Measure

Purchase and replace conventional coffee machine with unit that heats water/coffee during brew and maintains heat by means of insulated carafe and doesn't require electricity beyond brew time. Benefits of thermal carafe unit will include significantly less energy consumption for coffee.

Appliance	Existing Condition	New Condition
Staff Kitchen Coffee Machine	One coffee machine that draws power throughout the day for heating elements.	Replace with Bunn BT Velocity Brew Drip Coffee Maker with Insulated Carafe

Savings

Energy reduction from thermal carafe style coffee maker: 92.0%
Overall building energy reduction: 1.0%
Annual savings: $132
Capital investment: $130
Payback: 0.98 years

ECM 9: Removing Redundant Energy Consuming Items

Existing Condtions

Space heaters and a ½ size refrigerator are convenient but are redundant when a staff refrigerator is available in the building and central heating combined with improved weatherization would provide necessary heat.

Energy Conservation Measure

Eliminate ½ size refrigerator and utilize existing refrigerator in the staff kitechen. Eliminate space heaters and improve building's heat retention with air sealing and improved insulation (see ECM 11: Air Sealing and Insulation).

Savings

Energy reduction from eliminating redundant items: 100%
Overall building energy reduction: 0.7%
Annual savings: $88

Capital investment: $0
Payback: 0 years

ECM 10: Energy Star Water Cooler

Existing Condtions

The existing water cooler located in the BMIC News office is a standard/non-Energy Star water cooler. Higher efficiency units are available that would reduce energy consumption tied to water cooler units.

Energy Conservation Measure

Purchase and replace existing water cooler with Energy Star water cooler.

Savings

Energy reduction from Energy Star water cooler: 45.2%
Overall building energy reduction: 0.3%
Annual savings: $40
Capital investment: $191
Payback: 4.81 years

ECM 11: Building Air Sealing & Insulation

Existing Condtion

While a blower test was not possible for the Administration Building, energy auditing and building weatherization inspection revealed that there are air sealing and insulation deficiencies. Weatherization deficiencies found include insufficient air sealing and insulation along foundation, insufficient air sealing of attic deck and insufficient attic insulation. These items contribute to building heat loss and consequently increase energy consumption and lower occupant comfort.

Energy Conservation Measure

Improve building's weatherization by preventing air infiltration/exfiltration through air sealing and resistance to heat loss during winter months and heat gain during summer months through improved insulation.

Weatherization Component	Existing Condition	New Condition
Air sealing	Insufficient air sealing in attic deck, perimeter of windows and attic access doors.	Air seal top plates in attic with 1" closed cell spray foam. Caulk perimeter of window trim and attic access doors.

Attic insulation	Variable: No insulation to R24 fiberglass batts	Additional R44 of blown cellulous in attic.
Foundation insulation/air seal	No insulation evident	2” of closed cell spray foam (R21) on foundation walls above grade and into rim joist area (insulates and air seals).

Savings

Heating & cooling energy reduction: 20.0%
Overall building energy reduction: 5.4%
Annual savings: $687
Capital investment: $10,000
Payback: 14.5 years

C.2 Ojibwe Charter School original building

BMIC Ojibwe Charter School (ECMs Totaling 42% Energy Reduction)

The Bay Mills Indian Community Charter School is a single story 17,000ft^2 K-6 elementary school owned by the Tribe. The school was opened in 2003 in its current building, a new modular structure that was intended to be used for approximately five years during the interim of when a permanent structure would be built. Ten years later and the structure continues to be used with no concrete plans to replace the school building. The school has XX students, XX staff and has 180 days of classroom instruction per year.

The school utilizes grid electricity and natural gas as sources of energy. Electricity is used for all items requiring energy except for building heating where natural gas is used. Each room has its own wall mounted combination heat and air conditioning unit with programmable thermostat.

The school building features wood frame construction, wood siding, vinyl sliding windows, three sets of double metal utility exterior doors, one single metal entry door, flat roof and elevated off the ground with skirting along perimeter.

Analyses of the school's energy consumption history and energy audit information revealed that heating is the largest energy consuming item followed by interior lighting, refrigeration, computers, cooling and other items shown in the following chart.

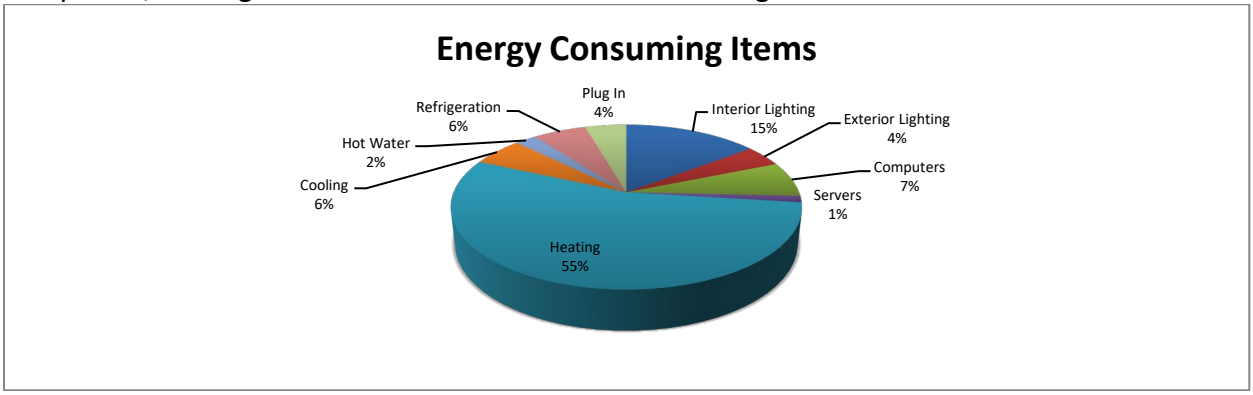


Figure C2. Energy Consuming Items

To improve building energy performance, the following Energy Conservation Measures (ECMs) were developed in response to energy audit and analyses findings. Each ECM is further described below.

Table C2. Energy Conservation Measures

ECM	Description of **Energy Conservation Measures**	% Energy Use Savings	Total Cost Savings ($/year)	Estimated Capital Cost ($)	Simple Payback (years)
1	Thermostat optimization (6pm-6am 10 degree setback/stepup; thermostat heat setting @ 69 degrees; 78 degrees AC)	41%/23.3%	$5,619	$0	0
2	Hibernate computers during non-work hours	62%/3.9%	$1066	$0	0
3	Interior Lighting (Occupancy sensors)	40.0%/5.4%	$1,297	$2,156	1.66
4	Exterior Lighting (LED retrofits and reduce on time)	94.4%/3.7%	$897	$5,127	5.71
5	Energy Efficient Water Heaters	62%/1.4%	$333	$1,149	3.46
6	Unplug Appliances During Summer (Kitchen freezer, fridge, icemaker, drinking fountain)	37%/2.5%	$598	$0	$0
7	Replace Incandescent Bulbs with CFLs	78.3%/0.3%	$67	$4	0.06
8	Timed Power Supplies (Copiers, Printers, Postage)	49%/0.7%	$163	$233	1.5
9	Eliminate Redundant Items (½ fridge)	100%/0.3%	$76	$0	0
10	Exterior Door Air Sealing	0.4%/0.23%	$55	$200	3.6
	Total	**42%**	**$10,171**	**$8,869**	**0.9**

ECM 1: Thermostat Optimization

Existing Conditions

Currently, the building's heating and cooling operates in a steady-state/occupied scenario 24 hours a day and 365 days a year. During energy audit visits, the average thermostat heat setting was 74 degrees and thermostat air conditioning settings at 72 degrees. The building is already equipped with programmable thermostats for nearly every room. Significant energy is wasted for excessive heating and cooling temperatures and heating and cooling of building during unoccupied times.

Energy Conservation Measure

Optimize thermostat heating and cooling programming to in the classroom, cafeteria and offices to the EPA recommended temperature during school hours. In addition, program setbacks and step ups outside of occupied times. See Appendix – Thermostat Optimization for breakdown of savings/wasted energy.

Thermostat Setting	Existing Condition	New Condition
Heat	Avg. 74°F 24hrs/auto	Weekdays 6am-6pm: 69°F Weekdays 6pm-6am & Weekends 59° Classrooms & Cafeteria: Heat Off During Summer
Cooling	Avg. 72°F 24hrs/auto	Classrooms & Cafeteria: AC Off During Summer Office Weekdays 7am-5pm: 78°F Office Weekdays 5pm-7am & Weekends 78°F

Savings

Building heating energy reduction: 38%
Building cooling energy reduction: 41%
Overall building energy reduction: 23.3%
Annual savings: $5,619
Capital investment: $0
Payback: 0 years

ECM 2: Computer Power Management

Existing Conditions

The energy audit of the Charter school determined that work station computer systems largely remain powered on 24 hours per day and teachers' laptops are powered during school hours as they are often taken home for work. Computers that remain on after work cause unnecessary power consumption and can be mitigated by hibernating computers after/before school hours.

Energy Conservation Measure

Hibernating is a power management setting that every computer operating system has for reducing energy consumption. Utilizing this feature to power down computers outside of class/work hours will reduce the current wasted energy associated with keeping computers powered on when the building is unoccupied. Enabling the Hibernate feature to the specifications below will cause each computer to consume near zero energy outside of class/work hours (approximately 14 hours/day).

Computer Type	Existing Condition	New Condition
Workstation	Powered on 24/7	Enable Hibernate feature in each computer's Power Management settings after 90 minutes of inactivity.
Laptop	On average, removed after hours	Enable Hibernate feature in each computer's Power Management settings after 90 minutes of inactivity.

Savings
Computer energy reduction: 62%
Overall building energy reduction: 3.9%
Annual savings: $957
Capital investment: $0
Payback: 0 years

Savings are calculated using the following: four computers operating 261 week days calculated with 10 work hours and 14 efficency mode hours, 72 weekend days calculated with 100% hibernation/efficiency mode; 33 computers operating 180 week days calculated with 10 work hours and 14 efficiency mode hours, 72 weekend days calculated with 100% hibernation/efficiency mode.

ECM 3: Interior Lighting

Existing Conditions
The school's interior is equipped with energy efficient T8 fluorescent bulbs and fixtures on manual light switches. While these lights are efficient, additional electricity can be conserved by utilizing occupancy sensors to automatically turn a room's lights off when unoccupied. U.S. EPA estimates 40-47% savings when occupancy sensors are used in school settings.

Energy Conservation Measure
Purchase and install occupancy sensors in 27 rooms that will result in lights automatically turning off when room is unoccupied. Multi-technology sensors would be used and prevent lights from unintentionally being turned off (see Appendix – Lighting for recommended Leviton occupancy sensor unit).

Lighting Item	Existing Condition	New Condition
Interior Lighting	High efficiency interior lighting controlled manually by on/off switches.	Purchase and install 27 occupancy sensor that will automatically detect if the room is occupied/unoccupied and control lights by turning on when occupied and turning off when unoccupied.

Savings

Interior lighting reduction: 40%
Overall building energy reduction: 5.4%
Annual savings: $1,297
Capital investment: $2,156
Payback: 1.66 years

Calculations for energy savings are based on a 40% reduction of current electricity associated with interior lighting.

ECM 4: Exterior Lighting

Existing Conditions

The parking lot and building exterior is currently lighted by twelve 450 watt high pressure sodium lights on a timer that has the lights remaining on ten hours per night. Both the bulbs' high wattage and timer on throughout the night cause energy consumption that can be mitigated.

Energy Conservation Measure

Replace existing 450 watt high pressure sodium bulbs with 56 watt LED retrofit bulbs and optimize timer for 2 hours on before the start of school and 2 hours after school. Significant energy will be saved through conservation (reduced on time) and high efficiency bulb replacement. LED lights also provide advantages from long operational life.

Exterior Light	Existing Condition	New Condition
High Pressure Sodium Lights	Twelve 450 watt exterior lights remaining on 10 hours per night.	Replace 450 watts HPS bulbs with 56 watt LED retrofit bulbs. Reset timer to 2 hours on in morning and 2 hours on in the afternoon/evening weekdays only.

Savings

Exterior lighting reduction: 94.4%

Overall building energy reduction: 3.7%
Annual savings: $897
Capital investment: $5,127
Payback: 5.71 years

ECM 5: High Efficiency Water Heater

Existing Conditions

The school currently uses a 40 gallon electric water heater to meet its need for hot water. Of the various types of common ways to heat water, electric water heaters are amongst the most expensive and double that of natural gas or hybrid/heat pumps. Hot water demand is for kitchen needs and the two restrooms.

Energy Conservation Measure

Replace the existing electric water heater with a power vented natural gas or hybrid/heat pump water heater. Both alternatives would result in cutting energy used for hot water in half while remaining safe and reliable.

Appliance	Existing Condition	New Condition
Water Heater	One 40 gallon standard electric water heater.	Replace existing water heater with power vented natural gas water heater.

Savings

Hot water energy reduction: 62%
Overall building energy reduction: 1.4%
Annual savings: $333
Capital investment: $1,149
Payback: 3.46 years

ECM 6: Unplugging Unutilized Items During Summer Months

Existing Conditions

Energy auditing revealed that several items that are not utilized/necessary during the summer vacation months remained on and consuming energy. Items that remained on included a commercial kitchen freezer, commercial size refrigerator, residential size refrigerator, icemaker and drinking fountain. With the cafeteria unused during the summer months, unplugging these appliances is an excellent means of conserving electricity.

Energy Conservation Measure

Unplug the commercial sized freezer, commercial sized refrigerator, residential sized refrigerator, commercial icemaker and drinking fountain during the summer.

Appliance	Existing Condition	New Condition

Kitchen Commercial Freezer	Powered on all year	Unplug between school dismissal in spring and fall start of school.
Kitchen Commercial Refrigerator	Powered on all year	Unplug between school dismissal in spring and fall start of school.
Kitchen Refrigerator	Powered on all year	Unplug between school dismissal in spring and fall start of school.
Kitchen Icemaker	Powered on all year	Unplug between school dismissal in spring and fall start of school.
Drinking Fountain	Powered on all year	Unplug year round. Drinking water supply originates from deep groundwater and is cold without refrigeration.
Teachers' Lounge Refrigerator	Powered on all year	Remain plugged in all year for office staff working during summer.

Savings
Subject appliance energy reduction: 23%
Overall building energy reduction: 2.9%
Annual savings: $684
Capital investment: $0
Payback: 0 years

ECM 7: Replacing Incandescent Light Bulbs

Existing Condtions
The vast majority of interior lighting at the school is from energy efficient fluorescent lighting but there are some remaining incandescent bulbs. Incandescent bulbs use approximately four times the electricity as energy efficient alternative bulbs and can be easily and cheaply replaced.

Energy Conservation Measure
Purchase and replace incandescent bulbs with energy efficient compact fluorescent bulbs. Benefits of CFLs will include significantly less energy consumption for comparable light output and longer bulb life.

Savings
Energy reduction from incandescent bulbs: 78.3%
Overall building energy reduction: 0.3%
Annual savings: $67
Capital investment: $4

Payback: 0.06 years

ECM 8: Timed Power Supplies

Existing Condtions

Various electronic items throughout the building continue to draw "phantom" power as they sit idle after class/work hours. Energy auditing showed that copiers and printers continue to draw electricity even when idle and building is unoccupied.

Energy Conservation Measure

Purchase five APC P11GTV power strips to power down printers with master device/hibernating computer automatically and three APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day.

Plug In Device	Existing Condition	New Condition
Printer	Five printers that are inconsistently powered off	Purchase and utilize APC P11GTV power strips to power down printers when master device/hibernating computer powers down
Copier	Three copy machines that continue to draw power unnecessarily after work hours	Purchase and utilize APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day

Savings

Timed electronic energy reduction: 49%
Overall building energy reduction: 0.7%
Annual savings: $163
Capital investment: $233
Payback: 1.5 years

ECM 9: Removing Redundant Energy Consuming Items

Existing Condtions

½ size refrigerator is redundant when other refrigerators are available in building.

Energy Conservation Measure

Eliminate ½ size refrigerator and utilize other existing refrigerators in the building.

Savings

Energy reduction from eliminating redundant items: 100%
Overall building energy reduction: 0.3%
Annual savings: $76
Capital investment: $0
Payback: 0 years

ECM 10: Exterior Door Air Sealing

Existing Condtion

Overall assessment of the building's weatherization is good with the exception of exterior doors that all lack a good seal resulting in air infiltration/heat loss. The doors are in good condition but lack proper sealing into door frame because of worn weather stripping and/or improper fit.

Energy Conservation Measure

Purchase durable door seals/weather strip kits to effectively seal door into frame and thereby reduce air infiltration/heat loss from leaky closed doors. In addition, adjust strike plates to ensure that door closes snugly against door seal.

Savings

Heating & cooling energy reduction: 0.4%
Overall building energy reduction: 0.23%
Annual savings: $55
Capital investment: $200
Payback: 3.6 years

C.3 Waishkey Center

Waishkey Center Building (ECMs Totaling 35.1% Energy Reduction)

The Waishkey Center is largely a single story 29,475ft^2 multi-purpose community building owned by the Tribe. The Waishkey Center was constructed in 1971 and has been utilized for numerous purposes. Currently, the main functions of the building are the gymnasium, and will become part of the OSC expansion.

The Waishkey Center utilizes grid electricity and natural gas as sources of energy. Electricity is used for all items requiring energy except for building heating where natural gas is used. HVAC controls have largely been gutted leaving the HVAC system operating in an inefficient steady state.

The Waishkey Center building features block construction, brick exterior, aluminum sliding windows, three sets of double metal utility exterior doors, three single metal entry door, flat roof and slab foundation.

Analyses of the Waishkey Center's energy consumption history and energy audit information revealed that heating is the largest energy consuming item followed by ventilation, interior lighting, computers, hot water and other items shown in the following chart.

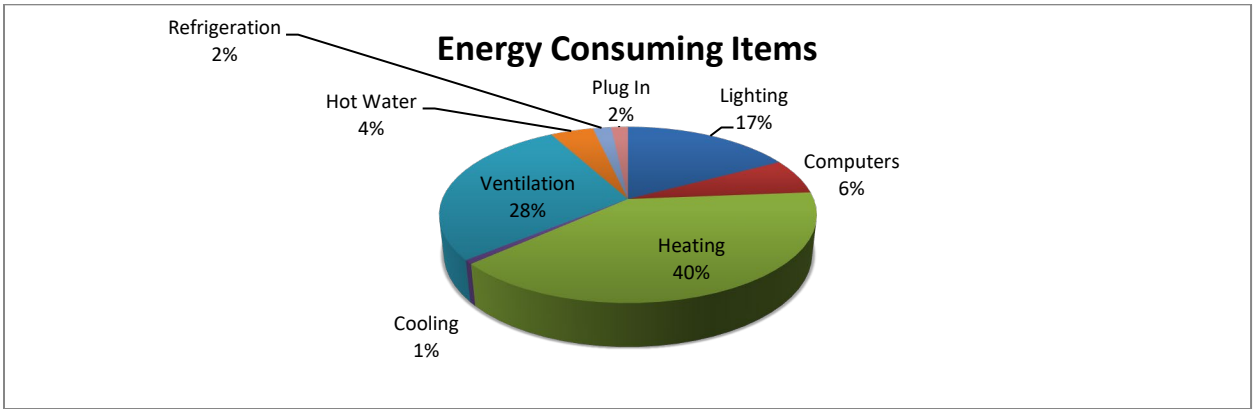


Figure C3. Energy Consuming Items

To improve building energy performance, the following Energy Conservation Measures (ECMs) were developed in response to energy audit and analyses findings. Each ECM is further described below.

Table C3. Energy Conservation Measures

ECM		Description of **Energy Conservation Measures**	Energy Use Savings	Total Cost Savings ($/year)	Estimated Capital Cost	Simple Payback
1		Hibernate computers during non-work hours	67.4%/4.3%	$1,818	$0	0
2		HVAC Upgrade – New Rooftop Furnace & AC Units, Direct Digital Controls, Air Handlers, Duct Optimization, Duct Cleaning and Thermostat Optimization	28%/19.2%	$8,111	$175,000	21.6
3		Replace Incandescent Bulbs with CFLs	78.3%/.2%	$94	$5	0.06
4		Energy Efficient Gymnasium Lights (T5 High Bay Fixtures & Bulbs)	29.3%/1.2%	$508	$2,585	5.09
5		Exterior Lights w/ LED Retrofit Bulbs	75%/.8%	$325	$1,677	5.16
6		Interior Lighting (Occupancy sensors and limited T8 Fixtures and bulbs)	26.1%/3.1%	$1,291	$4,395	6.93
7		Coffee Makers w/Insulated Carafe	84%/0.4%	$169	$130	0.77
8		Timed Power Supplies (Copiers, Printers)	63.5%/0.5%	$213	$180	.85
9		Eliminate Redundant Items (Space heaters, ½ fridge)	100%/0.3%	$112	$0	0
10		Energy Efficient Refrigerators	78.7%/1.4%	$592	$3,780	6.39
11		Energy Star Water Cooler	45.2%/0.2%	$79	$382	4.81
12		Air Sealing Exterior Doors	5%/2.0%	$851	$5,000*	5.9*
13		High Efficiency Water Heater(s) & Thermostat Optimization	35%/1.5%	$647	$2,300	3.55
		Total	**35.1%**	**$14,810**	**$195,434**	**13.2**

ECM 1: Computer Power Management

Existing Conditions

The energy audit of the Waishkey Center determined that work station computer systems largely remain powered on 24 hours per day. Computers that remain on after work cause

unnecessary power consumption and can be mitigated by hibernating computers after/before work hours.

Energy Conservation Measure

Hibernating is a power management setting that every computer operating system has for reducing energy consumption. Utilizing this feature to power down computers outside of work hours will reduce the current wasted energy associated with keeping computers powered on when the building is unoccupied. Enabling the Hibernate feature to the specifications below will cause each computer to consume near zero energy outside of work hours (approximately 14 hours/day) and thereby result in a significant reduction in energy.

Computer Type	Existing Condition	New Condition
Workstation	Powered on 24/7	Enable Hibernate feature in each computer's Power Management settings after 90 minutes of inactivity.

Savings

Computer energy reduction: 67.4%
Overall building energy reduction: 4.3%
Annual savings: $1,818
Capital investment: $0
Payback: 0 years

Savings are calculated using the following: eighteen computers operating 261 week days calculated with 10 work hours and 14 efficency mode hours, 72 weekend days calculated with 100% hibernation/efficiency mode.

ECM 2: HVAC Upgrades

Existing Conditions

Currently, the building's heating and cooling operates in a steady-state/occupied scenario 24 hours a day and 365 days a year as a result of old and compromised HVAC controls and air handlers. The two boilers in the heating system are two years old and reliable but the remaining HVAC system has not had necessary upgrades and as a result the control system is gutted and doesn't offer adequate control of heating and ventilation. In addition to running the air handlers continuesly, the air handlers are old, inefficient and intended for a building with a different purpose when an indoor swimming pool was housed in the Waishkey Center. The indoor swimming pool has been removed and converted to the Boys and Girls Club activity space and office space. No documented duct cleaning has surely led to restricted airflow and decreased HVAC efficiency.

During energy audit visits, phnuematic controlled heat thermostat settings averaged 72 degrees but actual temperature varied widely throughout the building due to heat supply imbalance and air leakage around exterior doors and gymnasium roof.

Air conditioning is present only in the Police Department portion of the building. Summer air conditioning thermostat were set at 74 degrees for the rooftop AC unit.

As with all other buildings in this project, significant energy is wasted for excessive heating and cooling temperatures and heating and cooling of building during unoccupied times.

Energy Conservation Measure

Replace existing HVAC equipment that is in need of replacement with high efficiency heating, cooling and ventilation system. In addition, take advantage of programmobility of new system to optimize thermostat heating and cooling to the EPA recommended temperature during work hours along with setbacks and step ups outside of occupied times. See Appendix – Thermostat Optimization for breakdown of savings/wasted energy.

HVAC Component	Existing Condition	New Condition
Engineered Design	NA	Waishkey Center would have design and specifications of high efficiency HVAC created for heating and cooling load of building.
HVAC Controls	Pnuematic temperature controls with very limited functionality	● Direct Digital Controls for zone by zone thermostat programming ● Demand Control Ventilation for on demand ventilation ● Speed control capability of new rooftop heat & AC units ● Sensor controls for exhaust fans
Furnace & Air Conditioning	Two natural gas boilers with an estimated 72% efficiency; One rooftop AC unit for Police Department	Replace existing boilers and AC unit with four natural gas fired rooftop units. Each unit would be 17.5 ton cooling and 300 MBH heating. Heat units would be 81% efficient.
Air handlers	Continously running and inefficient to available equipment	Air handlers would be incorporated in the rooftop units in the above measure.
Ducts	Ducts are restricted and imbalanced	Clean ducts to improve airflow and reroute to optimize heat and cooling supply and return.
Thermostat - Heating	Avg. 72°F 24hrs	Weekdays 6am-6pm: 70°F Weekdays 6pm-6am & Weekends 60°
Thermostat - Cooling	Police Department AC Avg. 74°F 24hrs/auto	Entire Waishkey Center Weekdays 6am-6pm: 76°F Weekdays 6pm-6am & Weekends: off

Savings
Building heating & cooling energy reduction: 28%
Overall building energy reduction: 19.2%
Annual savings: $8,111
Capital investment: $175,000
Payback: 21.6 years

ECM 3: Replacing Incandescent Light Bulbs

Existing Condtions
The vast majority of interior lighting at the Waishkey Center is fluorescent lighting but there are some remaining incandescent bulbs. Incandescent bulbs use approximately four times the electricity as energy efficient alternative bulbs and can be easily and cheaply replaced.

Energy Conservation Measure
Purchase and replace incandescent bulbs with energy efficient compact fluorescent bulbs. Benefits of CFLs will include significantly less energy consumption for comparable light output and longer bulb life.

Savings
Energy reduction from incandescent bulbs: 78.3%
Overall building energy reduction: 0.2%
Annual savings: $94
Capital investment: $5
Payback: 0.06 years

ECM 4: Gymnasium Interior Lighting

Existing Conditions
The Waishkey Center's gymnasium is equipped with eleven 450 watt metal halide bulbs and fixtures on manual light switches. This arrangement of lights is more energy intensive than fluorescent alternatives.

Energy Conservation Measure
Purchase and replace existing metal halide lighting with eleven T5 high bay fluorescent fixtures and bulbs.

Lighting Item	Existing Condition	New Condition
Interior Lighting	Eleven 450 watt metal halide bulbs and fixtures.	Replace 11 Gymnasium Lights with T5 High Bay Fluorescent Fixtures and Bulbs (VaporTight High Bay 6 Lamp T5 Fixture $194.99; T5HO 54W bulb $39.98/6pack)

Savings

Gymnasium lighting reduction: 29.3%
Overall building energy reduction: 1.2%
Annual savings: $508
Capital investment: $2,585
Payback: 5.09 years

ECM 5: Exterior Lighting

Existing Conditions

The parking lot and building exterior is currently lighted by six 150 watt high pressure sodium lights on a timer that has the lights remaining on twelve hours per night. Both the bulbs' high wattage and timer on throughout the night cause energy consumption that can be mitigated.

Energy Conservation Measure

Replace existing 150 watt high pressure sodium bulbs with 45 watt LED retrofit bulbs and optimize timer for 5 hours on before scheduled building occupancy and 5 after. Significant energy will be saved through conservation (reduced on time) and high efficiency bulb replacement. LED lights also provide advantages from long operational life.

Exterior Light	Existing Condition	New Condition
High Pressure Sodium Lights	Six 150 watt exterior lights remaining on 12 hours per night.	Replace 150 watts HPS bulbs with 45 watt LED retrofit bulbs. Reset timer to 5 hours on in morning and 5 hours on in the afternoon/evening weekdays only.

Savings

Exterior lighting reduction: 75%
Overall building energy reduction: 0.8%
Annual savings: $325
Capital investment: $1,677
Payback: 5.16 years

ECM 6: Interior Lighting

Existing Conditions

The majority of the Waishkey Center's interior is equipped with T8 fluorescent bulbs and fixtures on manual light switches but some less efficient T12 lights remain. While T12 lights are more efficient than incandescent bulbs, newer and more efficient T8 bulbs and occupancy sensors would result in greater energy savings.

Energy Conservation Measure

Purchase and install T8 fixtures and bulbs for the Boys and Girls Club main room and 47 occupancy sensors for remaining room/offices. This alternative will consume less energy from higher efficiency lights and electricity conservation by automatically turning off lights when room is unoccupied. Multi-technology sensors would be used and prevent lights from unintentionally being turned off (see Appendix – Lighting for recommended Leviton occupancy sensor unit). U.S. EPA estimates 25% savings when occupancy sensors are used in office settings.

Lighting Item	Existing Condition	New Condition
Interior Lighting	Mix of T8 and T12 fixtures and bulbs with manual on/off switches	Purchase and install 9 X 2 T8 lamp fixtures (Grainger item #2PFV4 @ $71.35 each)
Light switches	Manual on/off switches	47 occupany sensors (Leviton Multi-Technology Occupancy Sensor Units @ $79.86)

Savings

Interior lighting reduction: 26.1%
Overall building energy reduction: 3.1%
Annual savings: $1,291
Capital investment: $4,395
Payback: 6.93 years

Calculations for energy savings are based on increased efficiency of T8 fixtures over T12 and a 25% reduction relating to the use of occupancy sensors.

ECM 7: Replacing Conventional Coffee Pot with Thermal Carafe Unit

Existing Condtions

The staff kitchen has a coffee machine with hot plate that remains on and drawing electricity throughout the work day to heat coffee pot.

Energy Conservation Measure

Purchase and replace conventional coffee machine with unit that heats water/coffee during brew and maintains heat by means of insulated carafe and doesn't require electricity beyond brew time. Benefits of thermal carafe unit will include significantly less energy consumption for coffee.

Appliance	Existing Condition	New Condition

Staff Kitchen Coffee Machine	One coffee machine that draws power throughout the day for heating elements.	Replace with Bunn BT Velocity Brew Drip Coffee Maker with Insulated Carafe

Savings
Energy reduction from thermal carafe style coffee maker: 84.0%
Overall building energy reduction: 0.4%
Annual savings: $169
Capital investment: $130
Payback: 0.77 years

ECM 8: Timed Power Supplies

Existing Condtions
Various electronic items throughout the building continue to draw "phantom" power as they sit idle after class/work hours. Energy auditing showed that copiers and printers continue to draw electricity even when idle and building is unoccupied.

Energy Conservation Measure
Purchase four APC P11GTV power strips to power down printers with master device/hibernating computer automatically and two APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day.

Plug In Device	Existing Condition	New Condition
Printer	Four printers that are inconsistently powered off	Purchase and utilize APC P11GTV power strips to power down printers when master device/hibernating computer powers down
Copier	Two copy machines that continue to draw power unnecessarily after work hours	Purchase and utilize APC Day & Time Timer/Surge Protector to limit power to copiers 10 hours per day

Savings
Timed electronic energy reduction: 63.5%
Overall building energy reduction: 0.5%
Annual savings: $213
Capital investment: $180
Payback: 0.85 years

ECM 9: Removing Redundant Energy Consuming Items

Existing Condtions

Space heaters and a ½ size refrigerator are convenient but are redundant when a staff refrigerator is available in the building and central heating combined with improved HVAC system would provide necessary heat.

Energy Conservation Measure

Eliminate one ½ size refrigerator and utilize existing refrigerator in the staff kitchen. Eliminate three space heaters and improve balance of building's HVAC system (see ECM 2: HVAC Upgrades).

Savings

Energy reduction from eliminating redundant items: 100%
Overall building energy reduction: 0.3%
Annual savings: $112
Capital investment: $0
Payback: 0 years

ECM 10: High Efficiency Refrigerators

Existing Conditions

The Waishkey Center currently uses four standard/non-high efficiency refrigerators. These refrigerators are located in the Police Department staff kitchen, Boys and Girls Club room and two in the Boys and Girls Club classroom and consume approximately double the electricity of current high efficiency units.

Energy Conservation Measure

Replace the four existing refrigerators with high efficiency refrigerators.

Appliance	Existing Condition	New Condition
Refrigerators	Four non-high efficiency refrigerators.	Replace the four existing refrigerators with four high efficiency refrigerators that would consume significantly less electricity.

Savings

Refrigeration energy reduction: 78.7%
Overall building energy reduction: 1.4%
Annual savings: $592
Capital investment: $3,780
Payback: 6.39 years

ECM 11: Energy Star Water Cooler

Existing Condtions

The two existing water coolers located in the Police Department conference room and the Boys and Girls Club teen room are standard/non-Energy Star water coolers. Higher efficiency units are available that would reduce energy consumption tied to water cooler units.

Energy Conservation Measure

Purchase and replace two existing water coolers with Energy Star water coolers.

Savings

Energy reduction from Energy Star water cooler: 45.2%
Overall building energy reduction: 0.2%
Annual savings: $79
Capital investment: $382
Payback: 4.81 years

ECM 12: Exterior Door Air Sealing

Existing Condtion

Overall assessment of the building's weatherization is fair/poor with one component being exterior doors that lack a good seal resulting in air infiltration/heat loss. The three sets of aluminum framed glass double doors and three single steel doors are in good condition but lack proper sealing into door frame because of worn weather stripping and/or improper fit.

Energy Conservation Measure

Purchase durable door seals/weather strip kits to effectively seal door into frame and thereby reduce air infiltration/heat loss from leaky closed doors. In addition, adjust strike plates to ensure that door closes snugly against door seal.

Savings

Heating & cooling energy reduction: 5.0%
Overall building energy reduction: 2.0%
Annual savings: $851
Capital investment: $5,000
Payback: 5.9 years

ECM 5: High Efficiency Water Heater

Existing Conditions

The Waishkey Center currently has two 100 gallon natural gas atmospheric vented water heaters to meet its low demand for hot water. The two large water heaters were sized for a past period of time when the locker rooms and showers were more utilized. Hot water demand is now much lower. Downsizing to two smaller and more efficient

natural gas water heaters would significantly reduce energy associated with heating water.

Energy Conservation Measure

Replace the two existing 100 gallon atmospheric vented 75% AFUE water heaters with two 50 gallon power vented natural gas water heaters and reduce thermostat to 120 degrees.

Appliance	Existing Condition	New Condition
Water Heater	Two 100 gallon natural gas water heaters with temperature setting set near Max.	Replace two existing water heaters with 50 gallon power vented natural gas water heater and set thermostat for 120 degree water.

Savings

Hot water energy reduction: 35%
Overall building energy reduction: 1.5%
Annual savings: $647
Capital investment: $2,300
Payback: 3.55 years

ECM 13: Recommend for Future Upgrade (Considered but not included in this plan - Gymnasium Roof Insulation and Air Sealing

Existing Condition

Overall assessment of the building's weatherization is fair/poor with one component being exterior doors that lack a good seal resulting in air infiltration/heat loss and the other being the gymnasium roof with significant air infiltration and poor insulation at the ceiling/roof level. The roof was recently replaced with a new membrane roof with minimal insulation and no air sealing.

Energy Conservation Measure

Plan for necessary roof/ceiling insulation and air sealing at a point in time when roof is needing replacement.

Onsite Energy Audit Recommendations
Goal Setting
A Plan of Action
    Overview
    Short-Term Actions

Mid-Term Actions
Long-Term Actions
Implementation Action Plan
Evaluation of Progress
Recognition of Achievement